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Mid-term Review Report

Automotive Parts and Accessory Systems R&D Centre

March 2009

Automotive Parts and Accessory Systems R & D Centre
汽車零部件研究及發展中心

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Contents

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I. Executive Summary

(A) Introduction

Automotive Parts and Accessory Systems R&D Centre Ltd. (APAS) was established on 31 March 2006 by the HKSAR Government under the Hong Kong R&D Centre Programme and a new three-tier funding model of the ITF to undertake market-led R&D programmes and commercialize their results for the development of the automotive parts and accessory systems industry. APAS collaborates with industry, universities and technology institutes in helping local industries capture emerging opportunities and go through business transformation. APAS is hosted by HKPC.

(B) Vision

To become a world-class automotive parts R&D centre and assist Hong Kong foundation enterprises to enter into or expand in the automotive industry

(C) Mission

- Develop R&D competencies in selected core technical areas
- Establish related networks in the Mainland and overseas
- Collaborate with the Mainland and overseas R&D partners
- Promote R&D services and expand user base

(D) Highlights of APAS

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- Having consulted the relevant industries and academic sector, APAS focuses on 4 core technology areas, namely electronics and software; safety; hybrid electric drive and environment; and new materials and processes.

- APAS sets high priority on developing its core competence in microprocessor based system integration capabilities for safety systems, electric vehicles and hybrid electric drive.

- Manual of Corporate Governance and Operation Manual and Standard Procedures have been compiled to monitor the conduct of R&D project activities and APAS' daily operations.

- APAS has established a wide business network and maintained a close contact with the industry through networking with industry partners and overseas experts.

- In the last three years, APAS has organized and taken part in 143 public events comprising workshops, exhibitions and seminars.

- APAS has set up a members club to promote the latest events and facilitate club member's access to industry information, reports, standards and engineering specifications of major global auto makers. Up to December 2008, the club has more than 600 members.

- Up to December 2008, 55 sponsors have been engaged for 27 R&D projects which have been approved by the Technology Committee and Board of Directors.

- The test lab in APAS has conducted 14 test projects for a wide range of automotive products and prototype samples for the industry. It is expected that the activities in APAS for automotive parts testing will ramp up gradually to support automotive parts related validation and verification in Hong Kong.

- Up to December 2008, total expenditure in relation to APAS' operation and upgrading of testing facilities was $35.6 million. The figure for the whole five year term is estimated to be $89.5 million, representing a 10.5% reduction from the original funding of $100 million approved by Legco.

- Up to December 2008, $92.1 million ITF funding has been approved to support 27 R&D projects. It is anticipated that during the first five year term, 87 R&D projects will be undertaken and the approved ITF funding to support those 87 projects will be $250.7 million. This represents a slight 0.3% increase over the indicative target of $250M for 110 R&D projects in the paper to Finance Committee in 2005.

- Calculated on cash flow basis, the ITF funding received for the R&D projects is $61.5M up to December 2008. On the same basis, the ITF funding required for the whole five year period is estimated at $188.9 million. The remaining part of the approved ITF fund will be disbursed in the second five year term.

- For the second five year term, the total expenditure for APAS' operation and upgrading and maintaining testing facilities is estimated to be $140 million. It is anticipated that 85 R&D projects will be undertaken and the ITF funding required is $300 million.

- Over the last three years, APAS has experienced difficulties in finding industry contributions for the R&D projects. Faced with the drastically changed financial situation and economic downturn worldwide in 2009, it will be a challenge to meet the expectation of generating up to 40% of R&D expenditure from industry contribution when APAS ramp up to the fifth year of operation in 2010/11.

(E) Conclusion

Since its establishment on 31 March 2006, APAS has made substantial progress in its operation, R&D project execution and service support to industries. This provides a solid foundation for APAS to achieve its goals for the first five year term and strengthen its ability to accomplish its mission in the long term.

II. Establishment of APAS

(A) Background

1. Since 2006, China zoomed past Japan to become the world's No. 2 vehicle market. Now it looks poised to pass up the United States to be the biggest. The rapid growth momentum of the Mainland automotive industry has brought about enormous opportunities for the Hong Kong industry. Given Hong Kong's strong base of foundation industries and government support, local manufacturers could provide the much needed technologies and components to support the development of the Mainland automotive industry.

2. Against this background, the Finance Committee of Legco approved a proposal by the Innovation and Technology Commission to allocate $100 million from the Innovation and Technology Fund (ITF) to support the establishment and operation of the Automotive Parts and Accessory Systems R&D Centre (APAS) hosted by Hong Kong Productivity Council.

3. APAS was set up on 31 March 2006 to undertake market-led R&D projects as well as to commercialize the R&D results in collaboration with industry, universities and technology institutes. APAS aims to assist the industry to develop competitive new products and technologies to capture market opportunities and enhance the capabilities of industry in product design, quality standards and technical skills for meeting international standards.

4. APAS coordinates and provides project management function for ITF funding applications which contribute to innovation and technology upgrading in the automotive parts industry. It also provides a platform to facilitate industry, R&D institutions, technology partners and academia to form focused R&D teams and assist in the commercialization of R&D results. In addition, APAS provides testing facilities for product development and consultancy support for upgrading.

(B) Market Study and Latest Market Development

5. APAS commissioned a study on the market conditions of the Mainland's automotive parts and accessories industry in early 2008. The objective was to assess the R&D needs

of industry in the Mainland market for the local industry to penetrate this market. Sources of information included the China Automotive Information Net and Industry Yearbook, Organization Internationale des Constructeurs d'Automobiles (OICA), reports of reputable organizations, industry journals and websites of trade information and individual companies. The survey itself did not cover the R&D capabilities of local industries and their interests in participation in R&D projects.

6. The study found that in general, Mainland and Hong Kong manufacturers lag behind foreign suppliers in advanced technologies. They are less competitive in the higher-end segments of automotive parts and accessories. The automakers need to either import those parts and accessories, or source them locally from the foreign suppliers. Now that the Mainland government calls for innovation in the industry and increase in market share of local brands, opportunities arise for Hong Kong manufacturers to collaborate with the local automakers and develop their own products.

(i) China's position in the global automotive market

7. Producing 8.88 million units of motor vehicles, China became the world's third largest producing country in 2007 with a market share of 12.2%, after Japan (15.9%) and USA (14.7%). It is expected that the sales volume in 2008 will be close to 10 million units.

(ii) The Mainland automotive market

8. Despite the rapid growth in production and sales, car ownership in the Mainland remained very low at 28.1 units of motor vehicles (of which 19.9 units were passenger cars) per 1,000 inhabitants. Analysts predict that the Mainland's motor vehicle production and sales will grow by 15-20% in the next five years. Annual sales may reach 18-22 million units by 2012, and the in-use motor vehicle population in the Mainland may exceed 100 million units in 2014.

(iii) The Mainland automotive parts and accessories industry

9. Under the current market situation and policy directives, the following trends in the automotive parts and accessories industry are envisaged:

- Increase in OEM production to meet increasing demand from international automakers
- Local business leverage on increasing content of local auto parts by Mainland automakers
- More R&D investment in the industry to increase the value-added of local auto parts and

components

- Re-manufacturing of used auto parts
- Demand for local supply of auto parts and components offer opportunities to small suppliers

(iv) The Mainland market for 4 major auto part segments

Automotive electronics

- Products with potential are Telematics and Navigation, Infotainment and Sensors.
- Many enterprises in consumer electronics have restructured their production to cater for the car infotainment market. They swarm the lower end of market, making it unfavourable to brand development. There are also many OEM manufacturers.
- With the emergence of lower-price portable navigation devices (PND), Mainland automotive GPS product sales are expected to increase by more than 50% per annum.
- The sales turnover of sensors is expected to reach US$1,320 million in 2010. The Mainland sensor manufacturers are ten years behind the overseas suppliers in technological level, and can take up a very small fraction of the market. If they cannot leave the vicious cycle of "no market, no capital for R&D, no new technology", it will be difficult for them to meet the demand for higher quality sensors from automobiles of the new era.

Safety systems

- Products with potential are ABS systems, airbags, air suspension systems and bumpers.
- The lag behind of Mainland manufacturers is evident in the ABS systems. The market is dominated by foreign brands which account for more than 70% of the market.
- The situation is similar in airbags.
- Application of air suspension to coaches in the Mainland started only a few years ago, and the market relies on imports.
- Although there are many bumper manufacturers in the Mainland, it imported US$76.0 million worth of bumpers and parts in 2007, mainly from Japan, Germany, and South Korea.

Electric vehicles/hybrid electric vehicles and environment

- Many Mainland engine manufacturers are known to have plans to expand their production capacity in diesel engines with foreign technologies.

- The hybrid electric vehicles are not yet commercialized nor produced in mass quantity in the Mainland or worldwide. The bottleneck currently lies in the batteries. The production of electric bicycles and scooters has supported the development of high capacity lithium-ion batteries for heavy electric vehicle applications, and is conducive to the future development of hybrid electric automobiles/electric automobiles.

Advanced materials and processes

- Materials with potential are high strength steel, magnesium alloy, aluminum alloy and plastics and composite materials.
- The automotive industry still needs to import some high strength steel products to fulfill its requirements.
- Most magnesium and aluminum alloy products currently produced by the Mainland enterprises for automobiles are rather elementary in terms of technological level. For wider use, they need to go for applications which have higher requirements in terms of tensile strength, heat tolerance, erosion resistance and fatigue resistance. The domestic manufacturers would need a lot of technological breakthroughs such as in improving the purity of their products and the precision of the product size to grasp these opportunities.
- Usage of plastics materials is low. Underdevelopment in recycling of plastics would slow down the use of plastics and composite materials.

10. The study findings confirm that there is considerable room for growth for the local industry by tapping the vast Mainland market. This will continue to provide ample opportunities for APAS to capitalize on its foundation built up in the past 3 years and expand its support to upgrade the capabilities of the local industry and develop competitive new products and technologies.

11. APAS has closely monitored the world trends and the impacts of the financial tsunami on the automotive industry. The APAS CEO and a team of engineers attended the Fédération Internationale des Sociétés d'Ingénieurs des Techniques de l'Automobile (FISITA) and Automechanika 2008 in Germany in September 2008. They have liaised with experts to bring forth know-how and contacts for further collaboration development.

12. The financial tsunami has affected the investment sentiment of local industry players who placed priority on meeting their business needs rather than supporting R&D ventures. To cope with the situation, APAS has planned to explore new development areas which promise potential for the local industry, such as in Design-to-Delivery Processes Management, Standard, Compliance, Intelligent Transportation System, and

cooperation with entrepreneurs in the Mainland.

(v) Government policies on EV/HEV and their impact on the auto industry

13. In response to increased public concern about environmental issues and the skyrocketing price of energy, governments in different countries and regions have laid out new policies to encourage the production and utilization of Electric Vehicles (EV) and Hybrid Electric Vehicles (HEV).

14. In his inauguration speech, President Obama of United States promised that his new government would support the development of EV/HEV. His new stimulus package will provide funding both for individual use of fuel-efficient cars and for manufacturing advanced batteries for these cars.

15. The Mainland has taken an aggressive approach in supporting electric vehicle development. Detailed incentive programs have been implemented to promote the use of EV/HEV. Thirteen major Chinese cities have been chosen to try out EV/HEV as part of a strategy to boost the growth of the market and industry for EV/HEV.

16. The Hong Kong SAR Government has emphasized the goal of promoting the use of EV and developing re-charging facilities within the city. This policy will provide a big boost towards EV development in this region.

17. These government policies will have a significant impact on EV development in the automotive industry. It is expected that the development of key components and systems integration technologies will be accelerated for EV. The market for EV and HEV will grow along with improved features and quality for EV/HEV. With supportive policies from the government and development effort on the part of the automotive industry, public acceptance for EV/HEV will be gradually enhanced.

(C) Four Focus Areas

18. With reference to the needs of local industry, APAS has adopted a technology roadmap which focuses on the following 4 areas:

- Electronics and Software
- Safety Systems
- Hybrids, Electric Drives and Environment
- New Materials and Processes

19. APAS supports projects that apply existing technologies to develop products that are suitable for after-market or supplying to Asian auto makers, such as those in the Mainland. In addition, preference will be given to projects that have strong elements of system integration. The objective is to assist new and existing component suppliers to increase their technical capability to develop high value-add systems meeting the demands of OEMs and Tier 1 markets.

(i) Electronics and Software

20. Electronics and software are essential parts of virtually every vehicle system. From sensing, information processing, to actuation, they are the brain of many components and systems. The value of electronics and software in modern vehicles is projected to increase to over 30% of the cost of each car in the near future. The basic technical capability of applying electronics and software in the automotive environment is evidently one of the key elements to excel in the automotive industry.

(ii) Safety Systems

21. The applications of safety and security related components are not only limited to protective and preventive systems for the driver and passengers. Those dealing with restrain systems are highly regulated requiring high level of reliability and assurance. There are a number of systems that are less critical and yet provide comfort and convenience that allow the driver to operate the vehicle more safely, such as illumination and prognostic systems for preventive maintenance, and many of the interior systems which support the driver and passengers. These components represent good starting point for manufacturers with less experience to enter the industry.

22. As with most systems in vehicles, the usual combination of technologies applied include mechanical, electrical, and electronic components in a highly integrated structure providing the needed functions. They are often referred to as mechatronic systems. The nature of mechatronic system usually requires a multi-disciplinary team to develop such products.

(iii)Hybrids, Electric Drives and Environment

23. Technologies which provide fuel economy and emission control are in high demand. On the other hand, crude oil price had gone up to $140.00 per barrel in 2008, and more stringent emission regulations and environmental concerns are driving and adding more pressure on the development of innovative technologies. Hybrid drives and eventually electric drives are part of the answer. Equally challenging is the need to make the internal combustion engine more efficient and less polluting. The key to the success in Electric/ Hybrid Electric vehicle applications is: low weight structural components, higher energy density and long life battery packs, more efficient internal combustion engines, and more efficient power control.

24. Up to end 2008, APAS has undertaken six EV-related projects in cooperation with R&D teams in Hong Kong and the Mainland. These six projects cover key component technologies such as Battery Management Control strategy, functional EV power pack demonstration and Charging Station for EV technology. The total project cost of the projects is close to $23 million and the ITF funding required is about $21 million.

25. Moreover, six new proposals related to EV are in the pipeline. They cover key technologies on Regenerative Braking Control Systems and EV power management. The total project cost is estimated to be over $30 million and the ITF funding required is about $26 million.

(iv) Advanced Materials and Processes

26. For the auto parts industry, the two focus areas in material are composites and light weight alloys. The performance needs are light weight and strength at acceptable cost. Any gram reduction leads to better fuel economy and value for the consumer. Composites can potentially replace heavier metal parts for many structural and some functional parts. For body parts, steel has many desirable qualities in manufacturing, design flexibility and reparability. However, low cost replacements are needed to reduce the weight of parts. Improvements in steel applications such as galvanization and high

strength steel have led to weight reduction, but further reduction is needed. For light weight alloys in engine, transmission, gears, seats, and intake manifolds, aluminum alloys have been used quite extensively.

27. Limitations of materials and capabilities of processes are what engineers and manufacturing people deal with on a daily basis. Better materials and processes are fundamental enablers for developing new and improved products which deliver fuel economy, safety, emission and process cost benefits. This focus area is certainly an important part of any meaningful R&D program.

(D) Core Competence

28. Based on both needs and strengths of the auto parts industry in Hong Kong and the Pearl River Delta Region, as well as the market needs for high value and high margin parts and products, APAS has committed to building up its core competence in Automotive Electronic Controls (AEC) and Automotive Systems Integration (ASI). Specifically, APAS will devote more resource on micro processor based Electronics Control Unit buildup, software development, sensor signal processing and monitoring, control strategy and algorithm design, and failsafe logic implementation.

29. In line with the mission of APAS to help HK area industry grow and capture the business opportunity of the fast rising Mainland auto industry, APAS focus on technical areas that represent:

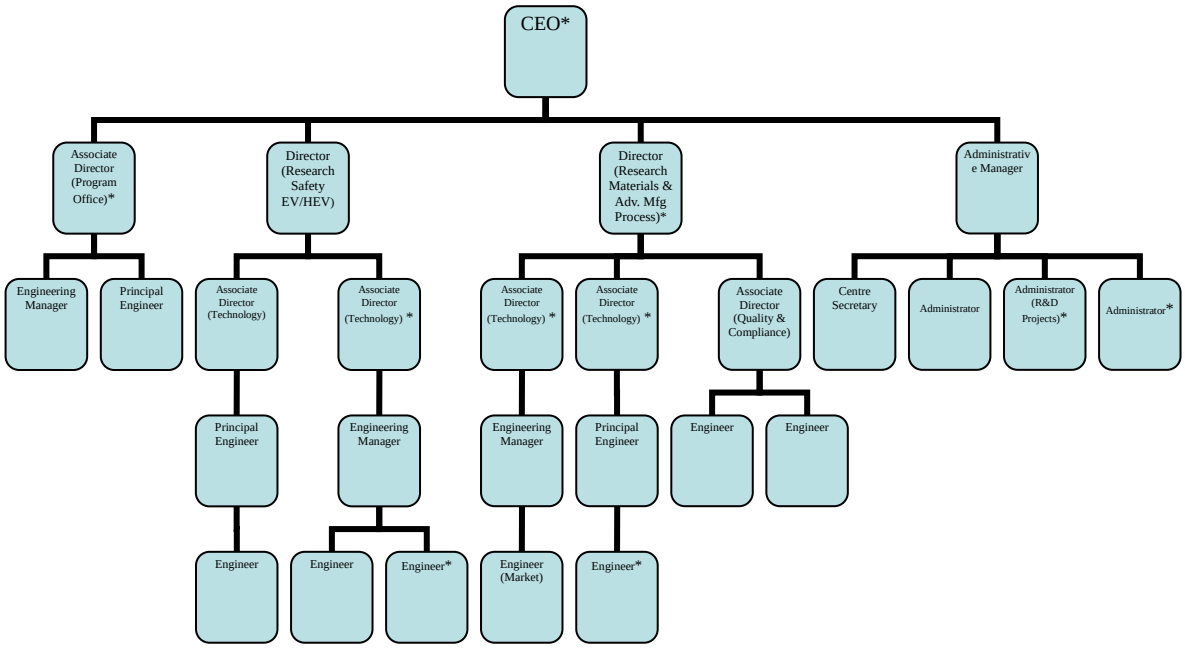
- strongest industrial strength of the local industry
- highest value to the industry
- highest un-met demand in the industry

30. Clearly, electronics is the strength of the Hong Kong industry with over 735 companies engaging in manufacturing of electronic products and over 9,600 companies engaging in import/export with a total export value of over HK$1,220 trillion. However, the automotive electronic control market is dominated by a few multi-national tier 1 suppliers such as Bosch, Delphi, Denso, Visteon, and Siemens. Most automakers in the Mainland have been forced to follow joint ventures and use the technologies of those tier 1 suppliers. As the Mainland develops its own brands of vehicles, home grown systems and products in Automotive Electronic Controls (AEC) and Automotive Systems Integration (ASI) are very much demanded by Mainland automakers.

(E) Organization Structure

(i) Staffing Position

31. The staff establishment of APAS comprises 27 posts. Up to 1 April 2008, 17 posts are filled and recruitment for 9 posts is in progress. The remaining Administrator will be filled on need basis. The organization chart is shown below.



*under recruitment

(i) Recruitment Plan of R&D Staff

32. As recommended by Finance and Administration Committee (FAC), the staffing needs for R&D projects should be leveraged on outside resources as much as possible without compromising the project deliverables and timeliness of projects. In this connection, APAS has entered into a Research Unit arrangement with HKPC to leverage on the latter's capability and technical resource. APAS will continue to look for opportunities to obtain the support of other partners such as universities and other R&D institutions. The aim is to maintain the core competencies of APAS as a nucleus for developing new project proposals.

(F) Corporate Governance

(i) Manuals and Standard Practices

33. The operation of APAS in the areas of human resources, financial management, internal control and external reporting is guided by a corporate governance manual. The manual also sets out the specific matters that APAS' Chief Executive Officer should adhere to in support of the Board in fulfilling APAS' obligations under the project agreement with the Government.

34. In addition, an operation manual with a set of standard practices have been adopted to provide standing instructions to APAS staff. The standard practices are issued to all staff members through the central computer network. The standard practices cover the areas of general administration, human resources, work environment and finance.

(ii) Internal Audit

35. To ensure that tasks performed by staff are in compliance with applicable policies and procedures as specified in various standard practices, APAS has commissioned the Internal Audit (IA) Unit of HKPC to undertake internal audit programmes for effective and transparent corporate governance.

36. So far, six internal audit programmes have been conducted on staff recruitment, payroll, traveling and entertainment expenses, procurement of equipment and information/database. The audit findings and observations were reported to the Finance and Administration Committee at its quarterly meetings. Issues raised by IA were dealt with promptly by APAS through the adoption of appropriate rectification measures based on IA's recommendations.

(iii) Enhancement of Project Management Capabilities

37. APAS has adopted a Project Management Process (PMP) for monitoring the progress of R&D projects. PMP is a system of planned and coordinated events with defined objectives to ensure timely completion of project deliverables. Phase-gate process techniques are used to keep R&D projects on track and in line with budget targets, comprising phase reports to the Project Review Panel on project progress at 6 defined phases of the projects, and 3 gate reviews by the Project Review Panel to give the green

light for project continuation or otherwise. The PMP is graphically presented at Appendix 1.

(iv) Declaration of Interest and Confidentiality of Information

38. To deal with issues concerning conflict of interest during vetting and approval of project proposals, APAS has adopted a system for declaration of conflict of interest. Members of the Board of Directors and APAS staff that supports the Technology Committee, as well as Expert Review Panel members, should disclose and register in writing their personal interest, pecuniary or otherwise, on first appointment and thereafter annually, to the APAS Secretariat by submitting a Declaration of Interest form. The above members and APAS staff are also required to declare on a project basis any potential conflict of interests in the subject matters and consideration prior to their vetting by the Technology Committee. APAS is currently working on an enhanced system to facilitate project vetting.

39. Given that in the processing and vetting of project proposals, confidential information contained in such proposals may be disclosed to those who are involved, members of the Board, APAS staff and Expert Review Panel members are also required to sign a confidentiality agreement which serves to bind parties involved in project vetting not to disclose information related to the proposals submitted.

(G) Conclusion

40. APAS has setup the required structure, procedures and governance procedure for its operations. With clear focus areas and core competence to guide its direction for R&D projects, APAS is poised to fulfilling the targets set for its first five year term, and moving forward to the second five year term.

III. Mid-Term Review

(A) R&D Projects

(i) Expenditure

41. From 2006/07 up to December 2008, 27 R&D projects have been approved. The total ITF funding approved for the projects is $92.1M.

On cashflow basis, the total ITF funding received up to December 2008 was $61.5M. It should be noted that since most of the ITF project funds are disbursed to APAS by installment, it is estimated that among the ITF funding approved in 2009/10, $11.8M will be disbursed to APAS after the first five year period.

The 27 projects are supported by 55 sponsors who have made a total contribution of $18.1M, or 16% of the total project cost, which reflected the support from the industry towards the projects.

The shortfall in approved project number and industry sponsorship is mainly due to the longer time required to do the setup arrangement, recruit suitable project staff and difficulties in finding industry partners. As a new R&D organization, APAS has yet to build up a track record and industry confidence in its R&D capability. Industry investment in R&D has also been hard hit by the global economic downturn.

The table below sets out the number of R&D projects approved, the ITF funding approved and received, as well as industry sponsorship solicited for the projects upto December 2008.

		2006/07	2007/08	2008/09	2009/10	2010/11
No of R&D Projects	Actual	5**	13	9*	N.A.	N.A.
ITF Funding	Budget	52.7	63.4	63.4	53.1	17.3
	Approved	30.8**	29.9	31.4*	N.A.	N.A.
	Actual	12.7**	22.4	26.4**	N.A.	N.A.

		2006/07	2007/08	2008/09	2009/10	2010/11
Industry Contribution & IP Income	Budget	0.0	7.0	15.9	22.8	11.5
	Actual	3.7**	7.2	4.5*	N.A.	N.A.

*up to December 2008

** Figures include 6 R&D projects were approved by ITC prior to the establishment of APAS but put under the monitoring of APAS subsequently (Appendix 2).

42. The 27 approved projects include 19 platform projects, 2 collaborative project and 6 seed projects. Classified by the four technology focus areas of APAS, 6 projects are in the area of Electronics and Software, 9 in Safety Systems, 6 in Hybrids, Electric Drives and Environment, and 6 in New Materials and Processes. A list of the projects is at Appendix 3. Details of these 21 projects are at Appendix 4.

(ii) Potential for commercialization

43. APAS takes an active approach to facilitate the industry to adopt the projects results. The deliverable of one project, viz. a Vehicle Front Light System, has been adopted by the project sponsor. Taking into account the rapid development of the automotive market in the Mainland, there is considerable potential for the commercialization of the project deliverables, especially those projects on safety system and standard in-vehicle control electronics.

44. Patent application is planned for 14 platform projects and 1 collaborative project. Up to now, 4 applications have been filed. It is estimated that 6 applications will be filed in 2009 and the rest in 2010 and 2011. The timetable for commercialization of R&D results and licensing of patents is at Appendix 10.

(iii) Industry contribution and participation

45. The industry contribution and IP income has been set to increase by 10% every year, with the 2005 original goal to reach 40% in the fifth year. The cumulative industry contribution for APAS' projects was HK$18.1M from 55 sponsors up to December 2008. At least 75% of the sponsors have indicated intention to adopt the R&D results in real applications. The other sponsors are venture capitalists and companies from other industry sectors whose participation is based on foreseeable business potentials in the R&D projects. In fact one of the sponsors who is a vehicle lighting supplier has adopted the R&D results in terms of mechanical, control and optical to leverage the fixed

headlight to smart adaptive headlight.

46. Compared to the Initial 5-Year Plan under which 80% of the projects are collaborative projects and 20% platform projects, up to now, 2 of the 27 projects undertaken by APAS falls under the category of collaborative project. Four more collaborative project proposals are under evaluation.

47. Industry contribution constitutes 16.4% of the total project cost up to December 2008. Over the past 3 years, APAS has faced practical difficulties to persuade the industry to make contributions towards the projects. With drastically changed financial situation in 2009, it will be difficult to achieve 40% contribution from industry in the fifth year.

(B) APAS Operation

(i) Expenditure

48. Total expenditure to support APAS' operation was $35.6M up to December 2008, which is 52% of the budget target for the 3-year period. This is due to the under spending in manpower cost because of unfilled posts and delay in equipment procurement to tie in with the progress of R&D projects.

Item		2006/07	2007/08	2008/09	2009/10	2010/11
Staff Cost	Budget	7.5	7.7	8.0	7.6	8.9
	Actual	1.9	7.4	5.4 *	N.A.	N.A.
Capital Cost	Budget	14.7	8.6	8.4	5.3	2.3
	Actual	0.3	4.7	1.2 *	N.A.	N.A.
Other Direct Cost	Budget	5.2	4.1	3.8	3.9	4.0
	Actual	7.3	4.0	3.4 *	N.A.	N.A.
Total	Budget	27.4	20.4	20.2	$16.8	$15.2
	Actual	9.5	16.1	10.0 *	N.A.	N.A.

*up to December 2008

(C) Non-R&D Activities and Services

49. APAS has established a wide business network and maintained a close contact with the industry through networking with industry partners and overseas experts, public events such as seminars and workshops, testing support to the industry and dissemination of market intelligence. These non-R&D activities have enabled APAS to fulfil its mission to introduce the latest development in automotive technologies and market trends, publicize its R&D work, boost participation in its activities, and assist the industry to develop new products and technologies to meet international requirements. At the same time, these non R&D activities have helped APAS obtain timely information of the business environment and industry needs.

(i) Networking with industry partners

Participation in trade associations

50. APAS is a member of the following local trade associations with close connection to the automotive industry. Participations in these associations helps APAS promote and disseminate its R&D projects:

- Federation of Hong Kong Industries (FHKI)
- Hong Kong Electronic Industries Associations (HKEIA)
- Hong Kong Automotive Parts Industry Association (HKAPIA)
- Hong Kong Electronic Technology Association (HKETA)
- Hong Kong Diecasting and Foundry Associations (HKDFA)
- Hong Kong Metal Finishing Society (HKMFS)
- Hong Kong Critical Components Manufacturers Association (HKCCMA)
- Federation of Hong Kong Machinery and Metal Industries (FMM)
- Society of Automotive Engineers (SAE) International
- Institute of Electrical and Electronics Engineers (IEEE)

51. APAS representatives attend monthly meetings and join study missions of the above associations. The CEO and senior staff of APAS have also given presentations and conducted talks in various association functions like exhibitions, seminars and work group and committee meetings.

52. APAS sends staff to sit on the working committees of trade organizations to increase their exposure and give advisory support, as appropriate.

53. APAS also receives delegations organized by trade associations to disseminate information about its upcoming events (e.g. Project Solicitation Workshop, Project Partnership Workshop, APAS Open House) to association members and industry.

Memoranda of Understanding

54. APAS recognizes that pursuance of the technology roadmap and R&D programme requires huge manpower resource support. To leverage on the R&D expertise of relevant R&D organizations, APAS has entered into cooperation partnership with R&D partners (universities, manufacturers, government departments etc.) in the Mainland, US and Europe through signing memoranda of understanding. A list of the MOUs signed is at Appendix 5.

(ii) Support of overseas/Chinese experts in R&D activities

55. APAS has actively solicited the help of overseas and Mainland experts to raise the level of expertise of local researchers through experience sharing and to work on worthwhile project proposals. Currently 15 R&D projects have been generated in cooperation with overseas experts and local researchers. A list of such projects is at Appendix 6.

56. APAS has identified around 271 university professors or experts in research institutes from the FISITA. They are from Germany, Japan, Korea and other 24 countries in Europe, Asia and Americas who authored the papers on the four core technologies of “Electronics and Software”, “Safety Systems”, “Hybrid, Electric Drives & Environment” and “New Materials & Processes” respectively. APAS plans to invite them to join the Expert Review Panel to review platform proposals received for funding support.

(iii) PR and promotional programmes

57. APAS has organized and taken part in public events comprising workshops, exhibitions and seminars. A brief account of the major events is set out in the following paragraphs and snapshots of the events are at Appendix 7.

Workshop

58. APAS has organized Project Progress and Partnership Workshop on 21 November 2008.

During the workshop, 17 projects and potential project ideas, including the market potential of the project deliverables, were introduced to the local industry. The workshop also served to promote the capabilities of APAS for more service opportunities.

Exhibitions

59. APAS has also taken part in a number of exhibitions. Examples include the Global Auto Parts & Accessories Show, Hong Kong International Auto Parts Fair (HKIAPF), Innovation Carnival 2008, Inno Design Tech Expo, Asia Pacific Microwave Conference (APMC) 2008 and China Hi Tech Fair. During these exhibitions, the testing services of APAS were also demonstrated.

Seminars

60. APAS has organized a number of seminars on topics like Regenerative Braking Systems and Environmental Testing in Automotive Parts and Electronics and innovative products like Flat Plate Automotive Oxygen Sensors.

(iv) Test laboratory

61. A test lab has been set up to provide sub-system and component level testing to support APAS' own R&D projects as well as to support local suppliers in engineering performance verification testing to meet the safety and reliability requirements in the automotive supply chain. Since April 2008, the test lab has conducted 14 test projects for a wide range of automotive products and prototype samples for the industry. A list of the projects is at Appendix 8.

62. To promote the testing capabilities and equipment to the industry, an open house and technical seminars have been organized for the APAS laboratory. The lab has also received visitors and delegates from Hong Kong, the Mainland, U.S., Europe, and Australia. Most of the visitors were from renowned companies such as SAE International and US car companies. In addition, the testing lab has received several local student groups via seminar training course and an Automotive Engineering master program offered by the HK Polytechnic University.

(v) Dissemination of technology and market intelligence

63. APAS runs a website and Members' Club which promotes APAS' latest events and

facilitate Club members' access to industry information, reports, standards and engineering specifications of major global auto makers. As at December 2008, the Club has 600 members.

(D) Challenges and Opportunities

64. In serving the Hong Kong automotive industry, APAS adopts a market pull rather than a technology push approach by undertaking R&D projects which meet market needs. The global financial tsunami has significant negative impact on the North American automotive industry, driving down R&D efforts in the market. But the Hong Kong industry could capitalize on this opportunity to recruit more technologists and accelerate R&D efforts to increase R&D throughputs and get ready to satisfy the automotive system needs upon market recovery.

65. The identification of R&D needs and development of successful R&D projects require a lot of resource support. Local universities and R&D institutions from outside of Hong Kong, especially in the PRD and Mainland, are potential R&D resources. To tap these resources, consideration should be given to designing incentives for these institutions to participate in APAS' project activities with a cooperative spirit.

66. The major obstacles for APAS to launch new projects and secure financial support from the industry are deficiency of manpower to solicit industry partners and promote R&D results. To resolve this, APAS should devote more effort to communicating with the local industry and R&D partners, such as through regular workshops, dissemination meetings, open house and sponsor visits as well as enlarging the search of sponsors to companies outside Hong Kong including the Mainland.

(E) Validity of the Initial 5-Year Business Plan

67. In the light of the operational experience in the past 3 years and taking account of the current economic environment, the difficulties in finding private sponsorship cannot be underestimated. This will unavoidably affect the number of R&D projects that can be launched and the level of industry contribution that can be secured during the 5-year period.

68. In addition, because of the time required in patent registration, revenue derived from the licensing of R&D projects will not be realized until after 2011. This will render the original target level of IP income unrealistic.

69. Taking account of these factors, it is proposed to revise the 5-year plan, details of which are set out in next section.

IV. Recommendation

70. In view of the challenges faced and changing circumstances, to position APAS to better serve the industry, a series of measures are recommended to improve its services to the industry and improve the cost-effectiveness of its operations. At the same time, it is also deemed necessary to make suitable adjustment to the initial 5-year plan. A view has also been formed for the future operation of APAS beyond 2011 with the pursuit of appropriate strategies.

(A) Achieving First-Term Target

(i) Revision of Business Plan

71. The economic downturn has affected industry interest in sponsoring R&D activities. Recently, a number of sponsors have withdrawn from participating in two projects and one proposal, as they have run into business issues caused by the financial tsunami. Against this background and taking account of the progress of the R&D programme so far, suitable revision of the initial business plan is required.

It is proposed that the projection of ITF funding and industry contribution and IP income in the 5-Year Plan should be adjusted, as follows:

- decreasing the number of R&D projects from 110 to 87 or by 21%;
- reducing the ITF funding requirment (cash flow basis) from $250M to $188.9M or by 24%; (in terms of funding approved, $250.7M is projected, representing a slight increase of 0.3% over the original budget)
- downward revision of the target for industry contribution and IP income from $176.6M to $40.9M or by 77%. Due to the impact of the financial tsunami, the proportion of platform projects is expected to increase and no IP income is estimated for the 5-year period.

The revised 5-year business plan for APAS is shown below, alongside the original target approved by Legco:

	2006/07	2007/08	2008/09	2009/10	2010/11	Revised Estimate (% variation over original target)	Indicative Target set out in the 2005 FC Paper
No. of Technology Projects	5**	13	29	20	20	87 (-12%)	110
ITF Project Fund (cash flow) ($M)	12.7**	22.4	30.2	51.1	72.5	188.9 (-24%)	250.0
ITF Funding Approved ($M)	30.8**	29.9	70.0	60.0	60.0	250.7 (+0.3%)	250.0

** including 6 automotive related R&D project which were approved under ITF prior to the establishment of APAS and have been put under the monitoring of APAS

72. APAS has exercised stringent control over its operating cost. For APAS operation cost over the 5-year period, slight adjustment is proposed. Total expenditure to be funded by ITF is projected to be $89.5M, or 10.5% below the approved commitment of $100M. Breakdowns of total expenditure (excluding income) are shown below:

Expenditure Item	2006/07	2007/08	2008/09	2009/10	2010/11	Revised Estimate
Staff Cost ($M)	1.9	7.4	8.3 *	12.3 *	13.5 *	43.4
Capital Cost ($M)	0.3	4.7	3.9	5.0	5.5	19.4
Other Direct ($M) Cost	7.3	4.0	5.2	5.5	5.8	27.8
Total ($M)	9.5	16.1	17.4	22.8	24.8	90.6

* ITF project overheads not included. The estimated overhead funds for 2009, 2010 and 2011 are $1.3M, $1.2M and $1.2M respectively.

(ii) Improvement of R&D Services

a. Review of Technology Roadmap

73. Based on industry feedback and the latest market and technological development, such as that revealed by the China market study commissioned by APAS in early 2008, APAS has constantly reviewed its market and technology roadmap to ensure that suitable support would be provided to the industry especially in HEV/environmental friendly vehicle and active safety technology. In this connection, intelligent transportation has been added to the electronic and software area and corporation standard process, like enterprise resource management, has been revised under the Material and Processing area. The future R&D direction of APAS is set out in the updated market and technology roadmap (Appendix 9). A summary is given below:

Electronics and Software

74. Core technologies will be developed in intelligent transportation, body electronics and infotainment incorporating core components and standardizations. Examples of potential projects are body electronics common platform, car-to-infrastructure multimedia data transfer and communication, driver information systems and engine management systems etc. In the longer term, the focus will be on more time critical and extensive data processing applications like intelligent transportation. Possible project ideas include:

- Drive by wire technology (digital driving)
- Auto steering/drive system (intelligent driver)
- Intelligent infrastructure system & vehicle interaction (intelligent traffic light & vehicle corresponding system etc.)
- Vehicle self diagnostic & driver assist technology (help driver to diagnose what's wrong)

Safety Systems

75. APAS will capitalize on the approved projects on ABS electronic control unit (ECU), hybrid control unit (HCU) and collaboration with other institutes in activity safety and advanced driver assistance systems (ADAS) research to launch further design and development in active safety technology like anti-lock brake systems (ABS)/electronic stability control (ESC) safety systems and user friendly safety warning & drive assist

systems. Potential projects will involve automotive systems with collision avoidance, pedestrian recognition and road-sign recognition functions. Possible project ideas include:

- Brake by wire technology development
- Vehicle stability & control integration technology
- Pedestrian protection & similar technology
- Collision mitigation technology
- Other active safety & driver assist safety features (like backup assist etc)

Hybrid, Electric Drives and Environment

76. In view of potential market demand and technology trend for green vehicle, APAS will concentrate on exploring potential projects in the development of the plug-in hybrid electric vehicle (PHEV)/pure electric vehicle (EV)/hybrid electric vehicle (HEV) technology and associated technology like proofing overall vehicle control strategy, advanced battery management system, hybrid air conditioning system, energy usage communication and driver interaction, electric power steering, plug-in charging system & infrastructure & low cost direct drive etc. Possible project ideas include:

- Plug-in HEV continue improvement and refinement
- Charging system and infrastructure technology that supports the electrification trend
- HEV/EV interactive control and driver communication to maximize fuel economy and safety
- Advance regenerative function development
- Advance energy usage & storage and management technology

New Materials, Processes, Standard and Compliance

77. The focus will be on advanced & light-weight materials and added standardized design & manufacture process management to improve company efficiency. Projects that aim to further strengthen local capabilities in automotive advanced materials and manufacturing technology will be proposed. New material development will be in the areas of magnesium sheet metal forming, rapid heating and cooling plastic injection moulding, direct metal laser sintering, super hard nano-composite coating, light weight car seat assembly etc. Product development, manufacture and quality management processes shall be examined and developed to assist the local auto industry to comply with

international standards. Possible project ideas include:

- Development of systematic processes and tools that enable APAS companies to meet international standards in design, manufacture & competitiveness
- Light weight or new material application & process research
- Nano technology application development

78. In support of the technology roadmap, more effort will be made to expand the existing technology partnerships beyond the existing core technology research pool:

Research Team	**Core Expertise**
HKPC Automotive and Electronics Division	Infotainment, Safety Warning
HKPC Materials Technology Division	Anti-lock Braking System
HKPC Manufacturing Technology Division	Advanced Materials
APAS	Electric Vehicle, Hybrid Electric Vehicle, Plug-in hybrid Electric Vehicle
APAS	Regenerative Braking System
APAS	Anti-lock Braking System , Traction Control System, Electronic Stability Control System
CUHK	Hybrid Electric Vehicle, Plug-in hybrid Electric Vehicle
CityU, Nanjing University of Science and Technology, Tsinghua University, Peking University Shenzhen Graduate School	Image Recognition Algorithm
PolyU Electric Vehicle Lab	Electric Vehicle, Motor Control System, Battery Control System, Vehicle Control System, Air Conditioner

Research Team	**Core Expertise**
Hybrid Electric Vehicle Lab of the Shenzhen Institute of Advanced Integration Technology by CUHK and Chinese Academy of Sciences	Hybrid Electric Vehicle, Motor Control System, Battery Control System, Vehicle Control System

79. To ensure that the R&D outcomes would help industry grasp market opportunities, APAS would continue to closely monitor project progress to ensure that the projects are completed on time. Currently, most of the supported projects are implemented over a duration of 20 months.

b. Facilitation of Industry Participation

80. Industry contribution to sponsor platform and collaborative projects is difficult to obtain and is subject to many factors. In particular, to solicit more Collaborative projects, it is advisable that more flexibility is allowed in the timeframe and sharing of returns from the commercialization of project results.

81. APAS shall devote greater effort to promoting the technology licenses and patents obtained from the R&D results as well as know-how obtained from technology alliances to serve industry's emerging needs. Based on the current progress of the R&D projects, APAS will monitor the timetable for licensing of patents and R&D results (Appendix 10) in a bid to transfer the project deliverables to the industry at the best time.

82. To attract more private investment in R&D projects, APAS will continue to participate in automotive parts conferences and exhibitions and technical seminars to introduce its R&D projects and services to potential target users. Staff will be sent to attend major automotive related international events such as SAE International, Frankfurt Auto Show, and the Shanghai Auto Show. Outreach events in Hong Kong, PRD, and other parts of the Mainland will be organized. Visits will be made to major auto makers, Tier 1 suppliers, and local suppliers.

c. Leverage of Outside Research Capability

83. APAS will continue to strengthen its liaison and networking effort and capitalize on the industry network and connection with R&D institutions for the formulation of R&D projects to address industry needs. Potential R&D partners will be explored in

undertaking collaboration and other projects.

84. Under the current IP policy, university professors who engage in R&D projects do not retain the ownership of the IPs. To encourage more universities to develop projects with high market potential, it is suggested to modify the IP policy to provide more incentives to universities to cooperate with APAS to turn their research results into marketable products.

d. Marketing of Testing and Consultancy Services

85. APAS will step up marketing of its testing and consultancy capability to encourage the local industry to carry out testing of automotive parts/components and systems to comply with international standards. Technical seminars and training courses will be organized to promote APAS' capability. Automotive testing specialists from automotive related organizations will be invited to be the speakers of upcoming seminars in the topics of environmental, durability and testing standards. Local industry companies, R&D institutes, and business partners will be invited to participate.

86. In order to strengthen the testing and consultancy capability of APAS, closer collaboration with other laboratories and R&D institutes, such as HKPC, Guangzhou Vkan Certification & Testing Institute (CVC), Guangzhou Mechanical Engineering Research Institute (GMERI), Automotive Research and Testing Centre (ARTC) of Taiwan, is required. Each of these organizations has unique strengths in engineering testing in its region (Appendix 11).

87. APAS plans to enter into strategic alliance, such as through signing Memoranda of Understanding, with these organizations and form a network under which each partner will serve as a focal point to serve clients in its region, while sharing market information, technical knowledge and service capability with others in automotive testing or even broader areas of support.

88. APAS will explore the concept of building an "automotive and transportation technology network" under which workshops, seminars and training will be held for the network members which include industry associations, companies and universities. APAS will also participate in technology exhibitions to demonstrate its R&D projects and capabilities.

89. To improve customer service, it is proposed to set up an online enquiry system to facilitate clients to obtain a better understanding of the services of APAS and in turn help APAS better meet specific client requirements. The system is expected to improve initial communication with clients.

e. Commercialization of R&D Projects

90. APAS will continue with industrial marketing efforts to commercialize the R&D results which are ready to be launched in the marketplace. In support of the commercialization process, testing and consultancy services will be offered as complementary support to facilitate adoption of the research output. The Shenzhen SZ-HK Productivity Foundation (SZJV) is another platform to help APAS to launch commercialization programs in the Shenzhen area and other places inside the Mainland. APAS may deploy engineers to work on R&D projects with other mainland-based engineers and conduct exhibitions and other promotion activities there.

91. Taking one of the seed project as an example, a wireless parking camera has been developed to provide a monitoring system for backward moving long vehicles to prevent accidents. The project has overcome technical barriers such as noise reduction, interference, picture resolution and so on. Apart from visits to the target clients and demonstrations in exhibitions and seminars, APAS will assist potential clients to find out the optimum position to install the wireless camera in different vehicles. Reliability testing support, such as CISPR25 and ISO 7637 for EMC, and elated consultancy service will be provided as a full package to support the commercialization process.

92. APAS regularly conducts seed projects to increase the strategic technology know-how of its researchers. These seed projects aim to develop proof of concept prototypes of selected technologies by working with professors in local and overseas universities within a 6-month period with a budget of less than $1 million for each project.

93. Based on the proof of concept prototypes and the experience obtained, APAS will line up industry partners and propose platform proposals to further develop the selected strategic technologies for commercialization.

94. For the seed projects which are not yet ready for commercialization, APAS will line up industry partners and propose platform proposals to further develop the projects for commercialization.

f. Improvement on Administration and Governance

95. To promote the right match of technologies to fit into the market and technology roadmap of APAS, the “Programme Management Office” should be expanded to become the “Programme Development & Management Office” with the following responsibilities:

- Solicit MOU
- Develop research alliances
- Sign up external experts
- Review and approve Project Coordinator
- Improve proposals with applicants and ITC
- Facilitate drafting of proposals to win funding support
- Review and endorse submitted proposals
- Develop sub-grant agreements and contracts
- Review and endorse equipment status
- Confirm received funds of approved projects
- Update and manage project profile and pipeline status
- Create and manage project account and checks by Project Management System
- Review and approved change request of on-going projects
- Facilitate project reviews to get installment funding from ITF
- Individual R&D project governance including PMP implementation
- Monitoring R&D project schedule and expenditure
- Review and endorse half-yearly progress report and project final report
- Manage and license APAS’ intellectual property

(B) Operation of APAS in the Second 5-YearTerm

96. It is expected that after the 5-year period, APAS will have built a strong foundation and capabilities to take the local industry to the next stage of development. In fact, with the continuing development of the Mainland automotive market and gradual improvement in the global economy, a surge in demand for APAS' support is envisaged. Leveraging on its strengths, APAS could explore the future opportunities and face the future challenges after 2011 to become a world-class automotive parts R&D centre.

(i) Strengths and Opportunities

97. APAS has a strong team of experienced and dedicated experts from the automotive industry. By working together with experts and R&D partners in a variety of fields, the team has built up a strong network for enhanced support and expansion of expertise. This will position APAS to provide the required support to assist the industry to explore potential growth areas.

98. The current financial crisis in Hong Kong has put more pressure for companies to reconsider their future business strategies and put more effort in value-added products like automotive components. This will help to boost market demand for APAS' support.

99. Hong Kong is one of the major cities in the Mainland, and its geographical location, political condition, infrastructure, financial situation, legal status and intellectual properties are all well-structured to easily attract technological investment. Hong Kong is an investment hub for innovative products and new business development.

100. Universities in Hong Kong are famous and rank high worldwide with a pool of talented students graduating each year. The talented group of students has much to contribute in the R&D arena.

101. Pearl River Delta (PRD) enterprises have shifted towards the development of more advanced and value-added products, which tally with APAS' strategic direction.

102. All major OEMs are coming to the Mainland to explore its huge markets in the automotive industry. This provides a great opportunity for APAS to build collaborations, joint ventures or partnerships.

(ii) Challenges

103. There is no Original Equipment Manufacturer (OEM) of automobiles in Hong Kong. To support the development of the local industry, more experienced engineers with relevant expertise are required. Currently, the local industry is relying on overseas experts for R&D support.

104. The Central Government and Mainland enterprises are investing heavily on key technologies for the automotive industry. Quick identification of market needs are required so that projects with high market potential can be developed and industry partners can be solicited as potential collaborators. Also, as the automotive industry is a mature industry, many of the major and basic technologies have already been well-established. The product life cycle is also shortened with many recently-developed products becoming obsolete quickly. As the product lifespan gets shorter, shortening the "time to market" span is essential to success.

(iii) Strategies

105. To meet the changing industry needs and capitalize on the shift towards value added products in the PRD, APAS will continue to work closely with industry, universities and technology institutes to initiate market-led R&D projects and further expand its capabilities along the technological roadmap. It will continue to build up core competencies in Electronics and Software, Safety Systems, Hybrids, Electric Drives & Environment and New Materials & Processes and focus on areas with high potential for development.

106. Identification of R&D strategic partners is the key to soliciting potential R&D projects and expansion of service support. APAS will build upon the network established and extend strategic partnerships for collaboration to strengthen its position in the local automotive field.

107. The development of the Automotive Technology & Transportation Network (ATTN) will be one of the primary focuses of APAS in the next five years. APAS will build upon the contacts from individuals, trade associations, and approximately 300 overseas experts to build up the network.

108. In conclusion, collaboration and leveraging with partners, talents building, and reducing the time to market are the top priorities of APAS in the next five years. Fulfilling these

objectives will enable APAS to achieve the ultimate goal of undertaking market-led R&D programmes which will bring about economic gains in the end.

(iv) Business Plan for 2nd 5-Year Term

Operating Expenditure

109. For the next 5 years (2011/12 to 2015/16), total operating expenditure is estimated to be $140M. This is 56.4% more than the revised estimate of $89.5M for the first 5-year period, or 40% more than the commitment of $100M approved by the Finance Committee (FC) for the first 5-year period.

2011/12 ($M)	2012/13 ($M)	2013/14 ($M)	2014/15 ($M)	2015/16 ($M)	Total estimate ($M)
24.15	26.0	27.95	39.95	31.95	140.0

ITF Project Funding

110. 80 R&D projects are anticipated to be undertaken in the next 5-year term. The ITF funding required to support the 80 R&D projects is estimated to be $300M. This is 16.7% more than the revised estimate of the first 5-year period ($250.7M) or 20% more than the $250M earmarked for the first 5-year period.

2011/12 ($M)	2012/13 ($M)	2013/14 ($M)	2014/15 ($M)	2015/16 ($M)	Total estimate ($M)
60.0	60.0	60.0	60.0	60.0	300.0

(C) Other Key Issues

(i) R&D Work outside Hong Kong

111. Due to limited resource available and the small size of the automotive industry in Hong Kong, there will be a need to conduct R&D work and solicit sponsorship outside Hong Kong. APAS is located next to the Mainland whose automotive industries and markets are one of the largest in the world. APAS will link up with tier 1, tier 2 & OEM suppliers in the Mainland to assist local automotive parts and accessory systems vendors to earn market share in the Mainland market.

112. APAS strongly supports the relaxation of the geographical restriction of the university-industry collaboration programme (UICP) and allow up to 50% of the R&D work to be conducted in the Mainland or elsewhere. In some cases, APAS suggests further relaxation of this restriction and allow more than 50% of R&D work to be conducted outside Hong Kong.

(ii) Institutional Arrangements

113. As the host organization, HKPC provides the needed institutional support to APAS, like HR, administration & manpower. APAS is able to utilize the support from HKPC to promote technology transfer and commercialization. APAS can also leverage on the network of HKPC and other universities to source potential research partners and sponsors.

114. The current mode of arrangement has worked smoothly. Structural changes are not recommended at this stage.

(iii) Streamlining Funding Procedures

115. In order to improve the effectiveness and streamline the current funding procedures, APAS has the following recommendations:

- Continue to work with R&D partners to enhance the quality of proposals to facilitate vetting and approval;
- provide clear and market-led technology themes in calls for proposals & optimize vetting by the Technology Committee; and
- revise funding regulations to allow sponsorship and R&D projects from outside Hong Kong to supplement local development.

(iv) Technology Roadmap for Electric Vehicle (EV)/Plug-in Hybrid Electric Vehicle (PHEV)

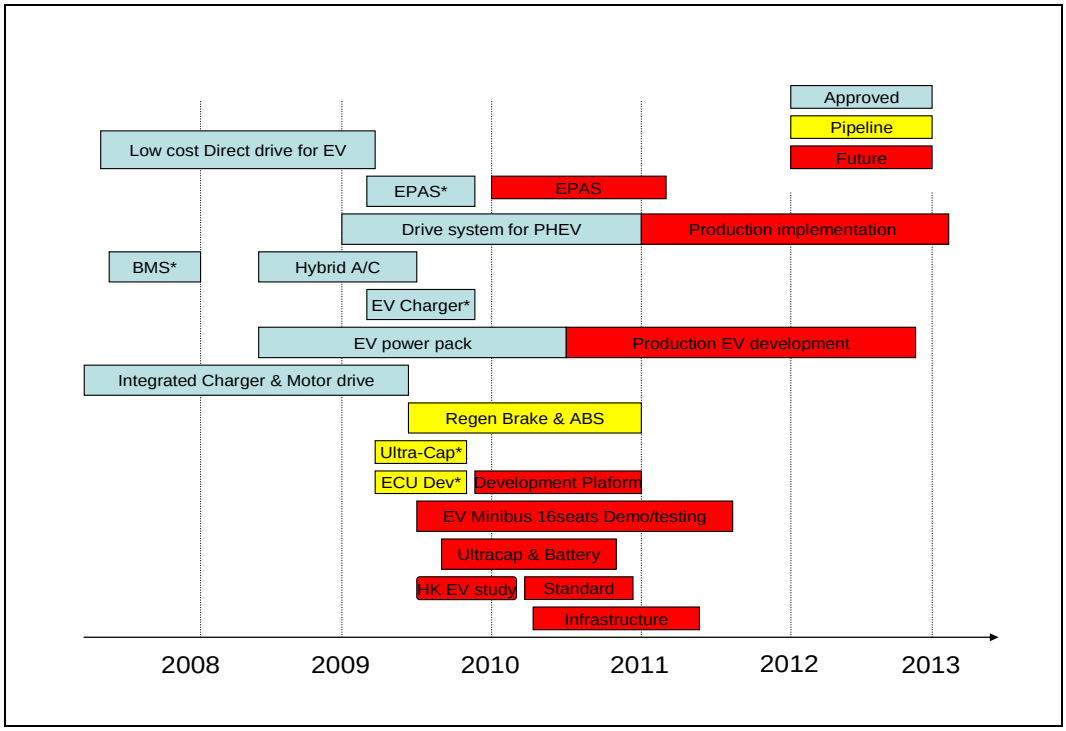
116. With recent development of fuel efficient vehicles like PHEV and EV and the global trend for automobile electrification, the Mainland has strategically launched green vehicle initiation and is determined to transform the automotive industry into alternative vehicle by subsidizing R&D research funding and EV demo program in various cities. As for Hong Kong, the government has made new requests for environmental vehicle, specifically EV, in the current budget proposal. Based on these developments, a renewed interest in EV is envisaged. APAS is in a unique position to assist and facilitate the EV strategy for Hong Kong. The following R&D plan is suggested:

Near Term (by 2010)	• Initiate & confirm EV/HEV development & implementation strategy to ensure a sustainable plan • Pilot vehicle development platform & develop vehicle development experience • Initiate & continue EV/PHEV development & associated system technology research • Develop a comprehensive disseminate plan • Initiate EV minibus demo plan • Develop core control and EV development competence • Continue charger station research & initiate infrastructure study
Mid Term (2010 – 2013)	• Update & review hybrid development platform for future development • Pilot charger station & develop infrastructure standard

	& implementation plan with Government and industry partners • Develop first own production ready EV/HEV • Increase partnership with OEM & component suppliers
Long Term (2013-)	• Initiate the next generation of EV/HEV development • Bookshelf developed technology & identify future technology direction and plan • Finalize charger standard and deploy infrastructure support step by step • Continuously research on charging improvement & HEV/EV development

Current R&D development in EV/PHEV area

117. As outlined in the technology roadmap (appendix 9) for environmental vehicles, EV/PHEV is one of the four focus area in APAS. APAS has heavily engaged in HEV, PHEV, EV and associated technology development. For example, partnering with research institutes and industries from both Hong Kong and the Mainland, the seed project on high voltage battery management has been completed and tabbed for further development for Lithium Ion development. Another six HEV/EV projects have been approved and would be launched, including a Guangdong-Hong Kong joint EV power pack platform, PHEV, electric power steering, electric air condition system and charger development. Study and development work are in progress. Three more projects involving regenerative braking, ECU core competence develop and EV energy storage system will feed into the pipeline in the next 2 months. The chart below sets out the projects of APAS in the EV/PHEV area.



EV Development Gap and Opportunities

118. Due to limitation of resources, local research institutes and APAS do not have any direct vehicle development experience and lack the direct support of OEMs. In addition, infrastructure development requires coordination from various government agents and other industry players, especially the utility & construction companies. To deal with the situation, APAS has to:

- identify platform development strategy for engine control unit (ECU), solicit brake regenerative development to develop core competence and regenerative brake technology;

- partner with OEMs to develop a 16-seat electric minibus and participate in the whole product development cycle, and lead the testing of the demo to gain vehicle development experience;

- reposition the center to build a closer relationship with the automotive industry such as OEMs, Tier 1, Tier 2 suppliers and integrate their production experience with APAS' research capability to build a product oriented environment; and

- solicit the support of utility and construction companies, and integrate and share APAS' R&D development plan with these companies to gain infrastructure support.

Dissemination plan

119. APAS will take an active role to promote the PHEV and EV technology to the general public since environmental vehicles are a fairly new concept to most Hong Kong citizens. The dissemination plan includes the following actions:

- establish an EV/HEV development & application consortium to drive an EV pilot program and unify an EV/PHEV roadmap for Hong Kong;

- actively communicate APAS' development plan with various government agents & industry. Participate in policy setting & promotion of environmental vehicle in various venues;

- market and target the environmental vehicle to early adaptor initially to create a ripple effect on the technology;

- organize EV/PHEV demonstration programs, seminars, exhibitions and participate in conferences to report the development progress & test findings;

- utilize media and general opinion poll to publicize the EV minibus development and gain and retain public awareness and support; and

- set up special events to promote to potential buyers the electric vehicle and other advance technologies that will reduce operating cost and environmental impacts.

(D) Conclusion

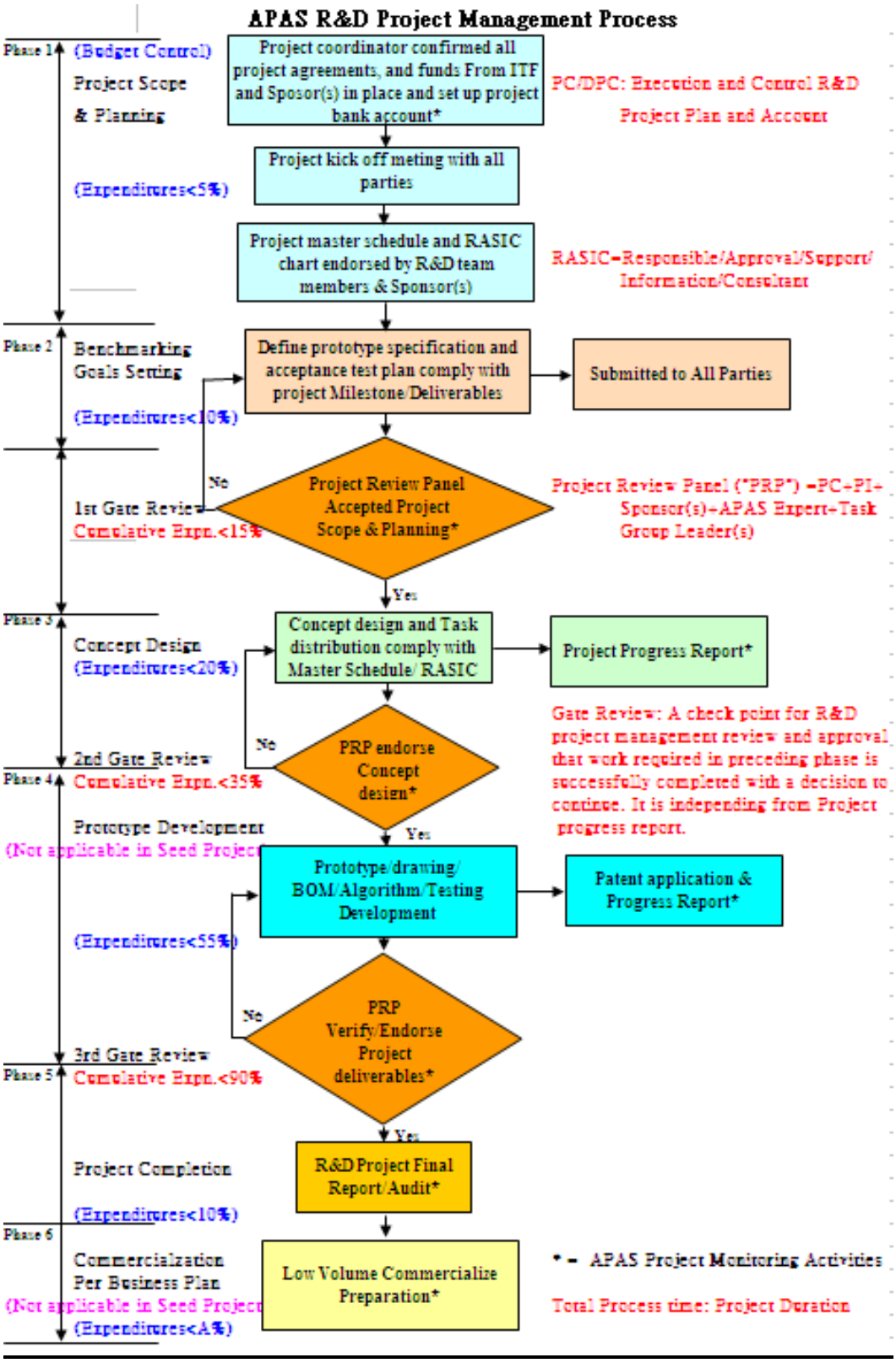
120. Based on the work accomplished in the first half of the initial 5 years, APAS will constantly improve, revise and update its alignment to industry and research institutes in the light of dynamic changes in market demands, technology development and external environment. APAS will continue to:

- reposition its R&D efforts toward meeting the requirement of tier 1, tier 2 suppliers and OEMs in product development for more market driven and collaboration projects;

- refine and improve the monitoring of R&D projects with better planning to maximize project efficiency; and

- revise and update the four focus areas to include Intelligent Transportation and Enterprise Resource Management process to help local or Mainland suppliers upgrade and improve competitiveness in the international market.

121. APAS has acquired unique irreplaceable strengths to serve the automotive industry and will reposition its function for the Mainland market and future development. Looking ahead, APAS will not only lead and guide R&D in local research institutes and industries in the automotive arena but also expand into a regional R&D hub in the southern part of the Mainland in the second 5-year term for well anticipated development opportunities.


APAS R&D Project Management Process
Phase 1
(Budget Control)
Project Scope
& Planning
(Expenditures<5%)
Project coordinator confirmed all project agreements, and funds From ITF and Sposor(s) in place and set up project bank account*
PC/DPC: Execution and Control R&D Project Plan and Account
Project kick off meting with all parties
Project master schedule and RASIC chart endorsed by R&D team members & Sponsor(s)
RASIC=Responsible/Approval/Support/Information/Consultant
Phase 2
Benchmarking
Goals Setting
(Expenditures<10%)
Define prototype specification and acceptance test plan comply with project Milestone/Deliverables
Submitted to All Parties
No
1st Gate Review
Cumulative Expn.<15%
Project Review Panel Accepted Project Scope & Planning*
Project Review Panel ("PRP") =PC+PI+Sponsor(s)+APAS Expert+Task Group Leader(s)
Yes
Phase 3
Concept Design
(Expenditures<20%)
Concept design and Task distribution comply with Master Schedule/ RASIC
Project Progress Report*
No
2nd Gate Review
Cumulative Expn.<35%
PRP endorse Concept design*
Gate Review: A check point for R&D project management review and approval that work required in preceding phase is successfully completed with a decision to continue. It is independing from Project progress report.
Phase 4
Prototype Development
(Not applicable in Seed Project)
Yes
Prototype/drawing/ BOM/Algorithm/Testing Development
Patent application & Progress Report*
(Expenditures<55%)
No
3rd Gate Review
Cumulative Expn.<90%
PRP Verify/Endorse Project deliverables*
Phase 5
Yes
Project Completion
(Expenditures<10%)
R&D Project Final Report/Audit*
Phase 6
Commercialzation
Per Business Plan
(Not applicable in Seed Project)
(Expenditures<A%)
Low Volume Commercialize Preparation*
* = APAS Project Monitoring Activities
Total Process time: Project Duration

Appendix 2

6 R&D Projects which have been put under the monitoring of APAS

Project Reference	Project Title
GHP/014/06	To Develop a Mg Semi-solid Slurry Maker for Rheo-diecasting in Production of High Strength Low Weight Mg Automotive Parts Project Coordinator : Li-man LI Recipient Organization : Hong Kong Productivity Council
GHP/011/05	Intelligent Omni-directional Hybrid Electric Vehicle (IOHEV) Project Coordinator : Yang-sheng XU Recipient Organization : The Chinese University of Hong Kong
GHS/073/04	Design and Fabrication of HID and LED Lighting System for Automotive Illumination Project Coordinator : Eric Ka-wai CHENG Recipient Organization : The Hong Kong Polytechnic University
GHS/044/04	To Establish Automotive Components Quality Management Support Services for Enhancing the Capabilities and Reputation of Auto Parts Suppliers Project Coordinator : Stephen LEE Recipient Organization : Hong Kong Productivity Council
GHS/043/04	A Total Solution for Manufacturing of High Strength Mg Automotive Parts Mg Thixoforming, Scraps Recycling and Billet (Feedstock) Production Project Coordinator : Stephen LEE Recipient Organization : Hong Kong Productivity Council
GHS/039/04	Optical CAE Technology for Automotive Lighting and Illumination Parts Development Project Coordinator : Li-man LI Recipient Organization : Hong Kong Productivity Council

Appendix 3

List of Approved ITF Projects Classified by 4 Major Technology Areas[1]

Electronics & Software Projects

- Development of Software and Hardware Platform and Methodology for Integrated Configurable Dashboard Design (P)
- Development of the 14V Idling Stop/Start System (P)
- Battery Management Control Strategy (S)
- Development of I.C. Engine Control Strategies (S)
- Automotive Electronic Sub-system Design Guideline (S)
- Development of an Integrated Map Matching Based Automotive Navigation System (C)

Safety Systems

- To Develop a Versatile Hydraulic Control Unit (HCU) for an Integrated Chassis Electronic Stability Control (ESC) System (P)
- Development of Electronic Control Unit (ECU) for Vehicle Anti-lock Braking System (ABS) and Electronic Stability Control (ESC) System (P)
- Development of Automotive Headlamp System for LED Light Source (P)
- Battery-less Tire Pressure Monitoring System (P)
- Design and Fabrication of HID and LED Lighting System for Automotive Illumination (P)
- Optical CAE Technology for Automotive Lighting and Illumination Parts Development (P)
- Development of Automobile Advanced FrontLight System (C)
- Long Vehicle Wireless Backup Monitor System (S)
- Development of Immobilizer System (S)

Hybrids, Electric Drives & Environment

- Low Cost Direct Drive for Electric Vehicles (P)
- Integrated Battery Charger and Motor Drive Systems (P)
- A New Generation of Electric Vehicle Power Pack Platform (P)
- Development of an Automotive Hybrid Air Conditioning System Technology (P)
- Intelligent Omni-directional Hybrid Electric Vehicle (IOHEV) (P)
- Development of Automated Manual Transmission (AMT) Controls and Systems (S)

[1] P – platform project; C – collaborative project; S – seed project

New Materials & Processes

- Powder Metal Forming Technology for High Temperature Light Weight Aluminum - Titanium Alloys (P)
- Development of Advanced Tube Hydroforming Technology for Making Complicate-Shaped Metallic Tubular Automotive Parts (P)
- Development of Microcellular Foam Injection Molding Technology Incorporated with Co-injection Technology for Producing High Quality and Value-added Plastic Automotive Parts (P)
- To Develop a Mg Semi-solid Slurry Maker for Rheo-diecasting in Production of High Strength Low Weight Mg Automotive Parts (P)
- To Establish Automotive Components Quality Management Support Services for Enhancing the Capabilities and Reputation of Auto Parts Suppliers (P)
- A Total Solution for Manufacturing of High Strength Mg Automotive Parts Mg Thixoforming, Scraps Recycling and Billet (Feedstock) Production (P)

Details of Approved Projects

A New Generation of Electric Vehicle Power Pack Platform

GHP/041/07AD

Vincent, Huang Bufu
Automotive Parts & Accessory Systems R&D Center

R & D Partners

1. Sun Yat-sen Univ.
2. Yiwei EV Ltd.
3. Hong Kong Productivity Council
4. Hong Kong Kinway Technology

Introduction

1. Develop an electric vehicle power pack platform with a maximum speed 120Km/h and a max range 300Km, with innovation in power distribution, energy management, regenerative braking, torque control and optimum intelligent vehicle control system.
2. Develop high performance motor, motor control system, power battery pack and battery management system with our own proprietary intellectual properties.

Advantages

1. Increase one-charge drive range of electric vehicle.
2. Enhance safety and reliability of the power pack platform.
3. Reduce the cost of the power pack platform.

Conclusions

1. Following successful development of the high performance power pack platform and mastering its core technology will lay a solid foundation for handling any potential energy crisis.
2. It also advances our teams' technology in electric vehicle and promotes industrialization of electric vehicles.
3. Hence, it has a profound impact on industrialization of electric vehicles, as well as the development of electric vehicle parts.

Sponsors

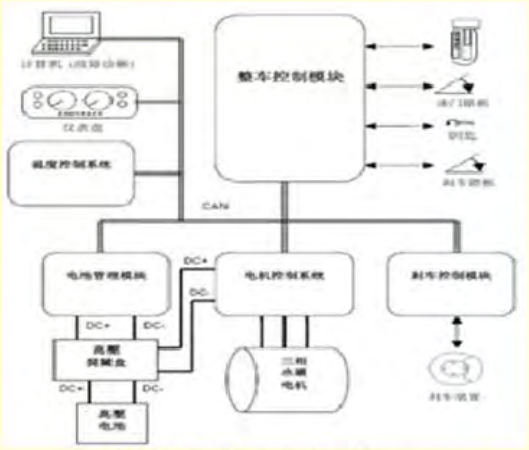
1. Surface Mount Limited
2. Euauto Technology Limited

Deliverables

1. Multi-domain simulation platform for matching EV mechanical/electrical system.
2. Most advanced electric vehicle control technology for performance and efficiency.
3. PMRS motor represents the motor technology trend for EV/HEV applications.
4. High power/energy density Lithium Iron Phosphate (LiFePo4) battery and its management system.

R & D methodology

System Structure



Vehicle Control System

AUTOMOTIVE ELECTRONIC SUB-SYSTEM DESIGN GUIDELINE

ITP/001/08AP

William Ting
Automotive Parts & Accessory Systems R&D Center

R&D Partners

1. Hong Kong Polytechnic University
2. East China Jiao Tong University
3. Hong Kong Productivity Council

Cover Page

Table Of Contents

Deliverables

1. The Design Guideline of automotive electronic systems with details on ABS ECU.
2. The research approach, methodology and experience gathered by the seed project.
3. The ECU design know-how for other APAS Safety proposals on ABS, HCU, Stability Control and other electronics hardware development.

Introduction

To develop the initial guideline of a typical automotive sub-system e.g. ECU (Electronic Control Unit) by benchmarking and the engineering collaboration with industry firms.

R&D Methodologies

1. Benchmarking the ECU to its functional and environmental requirements.
2. Studying the Design Failure Mode and Effect Analysis.
3. Performing the subsystem modeling and simulation.
4. External consultation.

Battery Management Control Strategy

ITP/032/07AP

C.H. Leung
Automotive Parts & Accessory Systems R&D Center

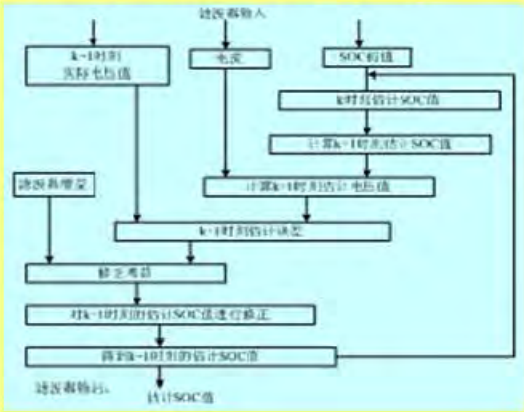
R & D Partners

1. Dr. H.J. Wu, Shanghai Jiao Tong University
2. Prof. Eric Cheng – Polytechnic University
3. Dr. H.B. Ma – Automotive Parts & Accessory Systems R&D Centre

BMS Specification:

Functions
- Battery monitoring
- Battery current
- Battery voltage
- Battery string voltage
- The individual cell voltage
- Battery temperature
- The temperature of each cell
- The temperature of the cooling system
- Battery diagnostics
- State-of-charge detection (SOC)
- Cranking capability (CC)
- Power availability
- Available capacity
- Available capacity at nominal conditions
- State-of-health (SOH)
- Data storage
- Real-time clock
- Temperature control
- Balancing
- Error handling
- Insulation indication

R & D methodology



Deliverables

1. Study of the various re-chargeable battery types e.g LiNiCoAlO2, LiNiCoMnO2,LiMn2O4 or LiFePO4 and the different BMS control strategy
2. Study of the following key functionalities on:
   - Balancing control of charging & discharging of all cells inside the pack,
   - Status monitor on voltage, current and temp on all cells,
   - Safety Protection by disconnecting the cells timely from the vehicle drive-train in the abnormal events,
   - Battery Pack status on State of Charge SOC, SOH, temp and current tests,
   - Isolation tests to ensure insulation of high voltage battery cells from car body,
   - Other requirements by hybrid/electric vehicle manufacturers.
3. Definition of the Battery model, BMS control model and interface in MATLAB/Simulink
4. Validation of the BMS control strategy by MATLAB/Similink on currents, voltage, temp effects to estimate SOC including cells-balancing and isolation by Battery model, BMS control model and interface.

Introduction

This project is to develop a state of the art control strategy, algorithm software for a Battery Management System (BMS) on Li-ion type battery for Hybrid, Plug-in Hybrid and Electric vehicle.

Advantages

BMS is one key technology enabler to Hybrid and Electric vehicle industry. But accurate BMS is always proprietary and company secret know-how to the supplier. Automotive Parts and Accessory Systems R&D Centre plans to acquire the capability and demonstrate the BMS know-how of Li-ion battery by sponsoring a seed project with academic research results that can be validated in Collaborative project.

Development of 14V Idling Stop/Start System

ITP/036/08AP

Prof. Yangsheng Xu
The Chinese University of Hong Kong

香港中文大學
The Chinese University of Hong Kong

R & D Partners

1. The Chinese University of Hong Kong
2. Shenzhen Green Wheel Electric Vehicle Co., Ltd.

Introduction

1. Based on the current existing engine and starter, an intelligent starter system will be developed so as to realize automatic ISS (idling stop start) functionality by development of an intelligent starter controller (ISC).
2. To further reduce fuel consumption and emission as well as to enhance the driving comfort, a new idling stop/start system will be developed, which consists of a belt-driven starter-generator (BSG) and its controller, a belt and hydraulic tension mechanism, and an idling stop/start controller (ISSC).

Advantages

1) Low system cost;
2) Fuel saving and CO2 reduction to about 7% (ISS system in NEDC) and 5% (iStarter system in NEDC); 10% (ISS system in the Japan 10-15 cycle) and 7% (iStarter system in the Japan 10-15 cycle);
3) Universal for all kinds of vehicle with electronic injection engine;
4) High system reliability and low maintenance cost;
5) Simple operation with no great change of driving habit;
6) Enhanced driving comfort with noise reduction (about 6 dB lower than conventional vehicles) and vibration reduction;
7) Fast cranking up of the engine ISS system (≤0.4 s);
8) Hybrid powertrain family serialization; and
9) Suitable for vehicle aftermarket and OEM.

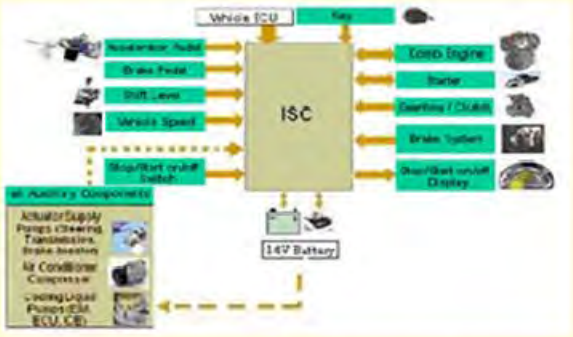
Sponsors

1. Shenzhen Dang Jin Technology Limited
2. Jun Tai Yang Technologies (Shenzhen)

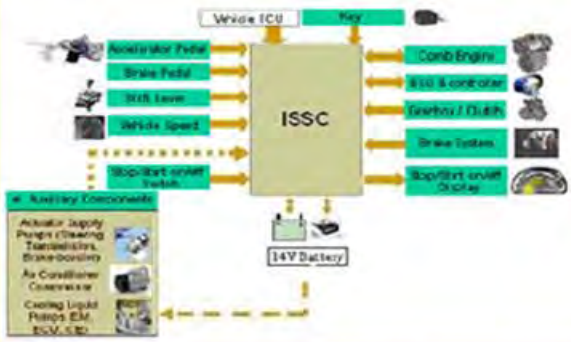
Deliverables

First phase: iStarter system
1) Intelligent starter controller (ISC)
2) Sensors, fuses, relays, wire and harness
Second phase: ISS system
1) BSG motor
2) BSG motor controller
3) Belt and hydraulic tension mechanism
4) Idling stop/start controller (ISSC)
5) AGM battery, sensors, fuses, relays, wire and harness

R & D methodology



System configuration of iStarter



System configuration of ISS system

Development of Advanced Tube Hydroforming Technology for Making Complicate-Shaped Metallic Tubular Automotive Parts

ITP/030/07AP

K K LEE
Hong Kong Productivity Council

Hong Kong Productivity Council 香港生產力促進局

R&D Partner

1. Hong Kong Productivity Council

Introduction

Metallic tube hydroforming is an cost-effective process making use of internal fluid pressure in conjunction with axial compression to increase the tube expansion ratio to produce tubular parts with complicated cross-sections such as tee-joint, engine mounts, seat-frame supports, etc.

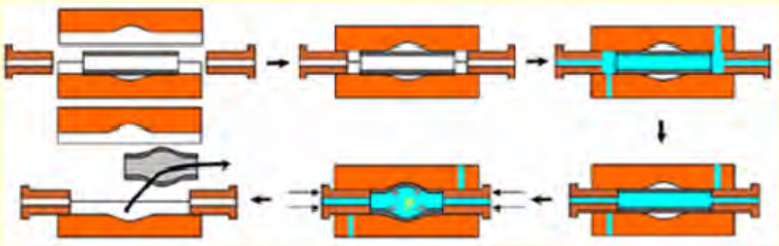
Advantages

1. Reduce part weight
2. Enhance strength & safety (no more welds)
3. Eliminate leakage problem
4. Open up a new potential market for Hong Kong manufacturers

Deliverables

1. A "white-paper" containing knowledge and know-how on parts design, tooling design and fabrication, processing set up and techniques and practical application will be compiled.
2. A set of facilities for the metallic tube hydroforming technology will be setup.
3. Practical application case studies will be developed to evaluate the process capabilities and demonstrate applications, techniques and know-how in making tubular auto and motorcycle parts.
4. Techniques for CAE simulation of the metallic tube hydroforming process will be developed.
5. A series of pubic technical seminars, workshops and overseas training will be organized to promote, transfer and disseminate the technology to the industry.

Forming Process



Tube Hydroforming Machine

Application Examples

Sponsors

1. Keensound Industries Ltd.
2. Morning Sun (HK) Ltd.
3. Vigor Precision Ltd.

Development of AMT Controls and Systems

ITP/008/08AP

Dr. Haibo Ma
Automotive Parts & Accessory Systems R&D Center

R&D Partners

1. Automotive Parts and Accessory Systems R&D Centre
2. Michigan State University

R&D methodology

1. Design and model different AMT architectures by means of Simulink.
2. Simulate and analyze the dynamics of different AMT architectures.
3. Design and verify AMT control algorithms by using Simulink.
4. Implement and validate the AMT control strategies via a hardware-in-the-loop system.

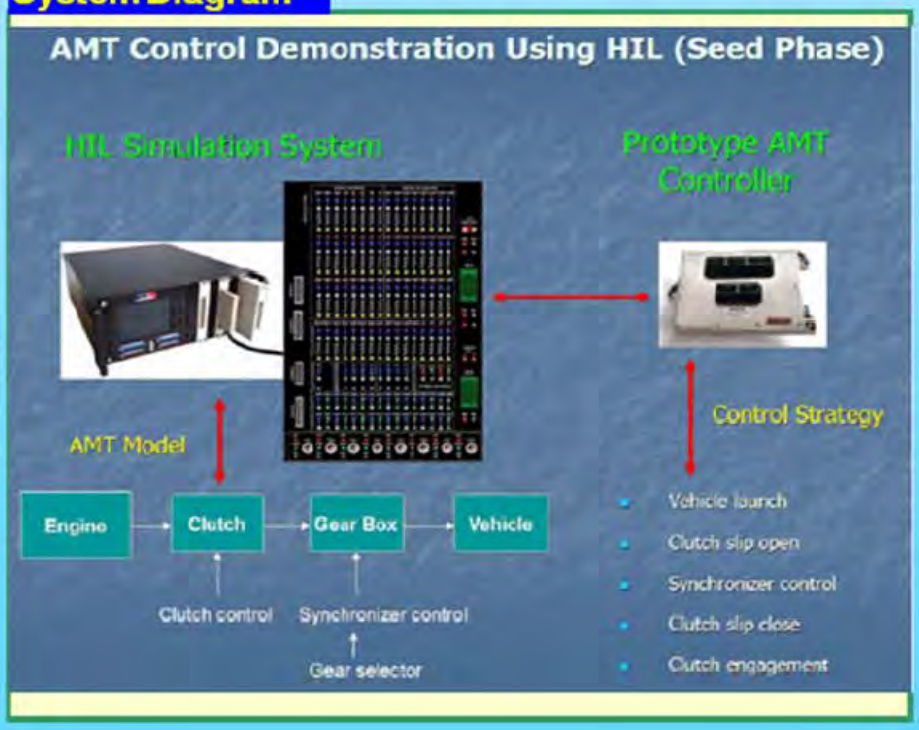
Deliverables

1. To develop dynamic mathematical models for various AMT architectures.
2. To develop control strategies for 2 different types of AMT. One is an electrical motor driven clutch actuation AMT; the other is an electro-hydraulic clutch actuation AMT.
3. To build a hardware-in-the-loop (HIL) system that consists of an ECU which serves as the AMT controller.

Introduction

This seed project is to evaluate various architectures of Automated Manual Transmission (AMT) and develop control strategies for AMT to ensure satisfactory drivability with excellent fuel economy.

System Diagram



Development of an Automotive Hybrid Air Conditioning System Technology

ITP/017/08AP

William Ting
Automotive Parts & Accessory Systems R&D Center

R & D Partners

1. Hong Kong Polytechnic University
2. Hong Kong Productivity Council
3. Hong Kong Institute of Vocational Education
4. EM Tech

Deliverables

1. A prototype hybrid air conditioning compressor for EV and HEV.
2. A prototype electronic control system for managing the compressor
3. One demonstration unit with hybrid air conditioning system installed.

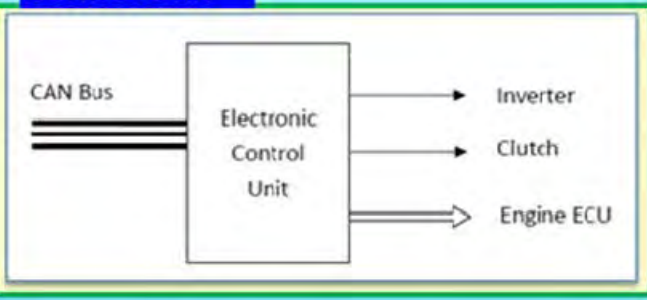
Introduction

Current vehicle air-conditioning systems are driven by the engine which means there will be no air-conditioning when the engine is not running. Legislation of switch off engine when idling makes it necessary to seek for alternative way to power the air-conditioning system.

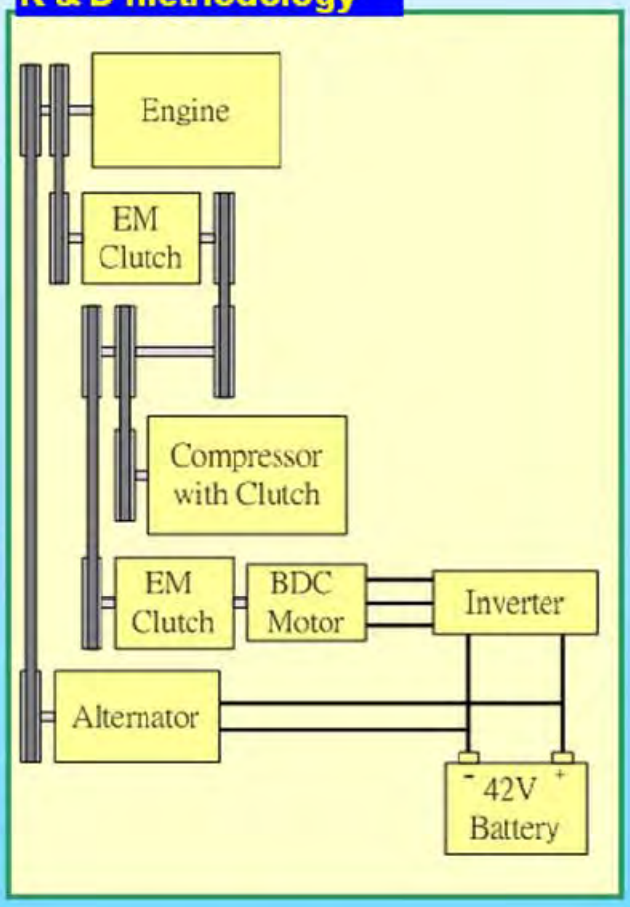
Advantages

1. Fuel saving
2. Meet future legislation on stop-engine off while waiting requirement
3. Direct replacement of conventional air-conditioning system

Control Unit



R & D methodology



Sponsors

Morning Sun (Hong Kong) Limited
Boshi Industries Limited
Keensound Industries Limited
Vigor Precison Limited
Lomak Industrial Company Limited
Double Group Worldwide Limited
Well Mark Industrial (Hong Kong) Limited

Conclusions

Hybrid air conditioning system made to replace conventional system in an vehicle

-Patent Pending-

Development of Automobile Advanced Frontlight System

ITP/029/07/A

Dr. Lawrence Poon
Hong Kong Productivity Council

R & D Partners

1. HK Wong's Automobile Lamp Industrial Limited
2. Hong Kong Productivity Council
3. Norstar Automotive Industrial Holding Limited

Introduction

This is the first collaborative project from APAS Centre with 51% matching fund supported by single sponsor. The project aims to develop Adaptive Frontlight System (AFS) with integrated and innovative features for vehicle safety by offering more visibility and comfort. IPs generated from this project include advanced optical design, innovative moving mechanism and control system.

Advantages

1. Leveling and blending of low beam can help to maintain high visibility ahead in different road structures
2. Advanced home positioning design guarantees high repeatability of moving mechanism
3. R&D results can be used on any vehicle type (with or without CAN bus)

AFS Prototype

AFS designed for a China OEM's new car model

Basic Specification

- Leveling angle: 3.75deg up / 3.75deg down
- Swivel angle: 20deg outbound/5deg inbound
- Light source: Halogen
- Optical class: C & E
- Life cycle: 3 Yrs or 160,000km

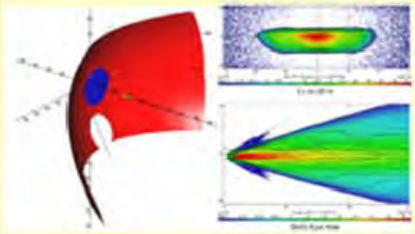
Sponsors

1. HK Wongs Automobile Lamp Industrial Limited

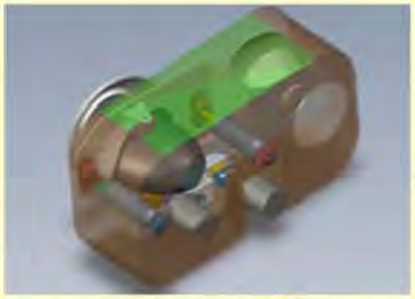
Deliverables

1. Control algorithm of fully automatic AFS
2. Innovative moving mechanism with high repeatability and fast response
3. Optical design for movable low beam and high beam modules.
4. A full function AFS prototype with road test validated

R & D methodology



Optical Design



Mechatronics Design

Control Module

Conclusions

1. Patent pending for R&D results
2. It will be the first fully automatic AFS in China automotive market

-Patent pending-

Development of Automotive Headlamp System For LED Light Source

ITP/019/08AP

Stanley Ngai
Hong Kong Productivity Council

R&D Partners

1. Hong Kong Productivity Council
2. Applied Science and Technology Research Institute Company Limited

Introduction

LED has been widely used in interior lighting, turning indicator, daytime running light and rear lighting in vehicles. However, it is rarely used headlight because of the heat management, optical design problems. The project aims to develop the first LED headlight in China as a showcase of HK APAS R&D capability and provide a platform to Chinese automotive headlight industry to develop this technology.

Advantages

1. Longer life
2. Shorter response time
3. LED has almost the same colour temperature that is about 6000K as daylight so using it as headlamp's light source can improve driving comfort.

Basic Specification

- Comply ECE 112 regulation
- Can withstand engine compartment temperature requirements from -40 ℃ to as high as 150 ℃

Sponsors

1. Lomak Industrial Co., Ltd.
2. NTK (Hong Kong) Ltd.
3. Wai Chi Electronics Ltd.

Deliverables

1. Heat management method for LED headlamp system;
2. Optical component design for LED headlamp;
3. Constant current control device;
4. LED headlamp prototype with low beam and/or high beam functions which can fulfill ECE requirement.

R & D methodology

Optical design

Thermal management

Constant current control

Conclusions

- Cost effective LED head lamp with low beam and/or high beam functions that fulfill ECE requirement

Development of Electronic Control Unit (ECU) for Vehicle ABS and ESC System

ITP/010/08AP

Vincent, Huang Bufu
Automotive Parts & Accessory Systems R&D Center

R&D Partners

1. Automotive Parts & Accessory Systems R&D Centre
2. Texas A&M University

Introduction

1. Anti-lock braking system (ABS) and electronic stability control (ESC) system form the foundation for new advances on vehicle equipment. Today, the market for ABS and ESC is growing at a very robust rate in the whole world.
2. ABS, especially the ESC development activities are still at the very early stage in China. There is no ESC product in Chinese automotive market which is fully developed and IP owned by the Chinese company.
3. We propose to develop an advanced electronic control unit (ECU) which can be easily implemented to the ABS and ESC systems.

Advantages

1. Develop vehicle electronic stability control (ESC) product which is fully developed and IP owned.
2. High-performance integrated chassis electronic stability control (ESC) strategy.
3. Introduce V-development mode and hardware-in-the-loop (HIL) simulation to reduce development time and increase optimization level.

Conclusions

We will develop our proposal ESC system with the order as following:

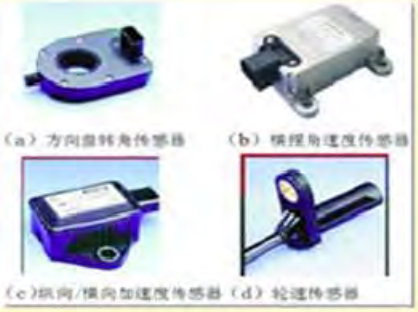
1) Electronic control system: a patentable mechanism of integrated chassis ESC system enabled ECU will be designed fabricated and evaluated.
2) ESC control strategy: the integrated chassis electronic stability control (ESC) strategy with all the functions, including the ABS, traction control and vehicle stability control will be developed.

Deliverables

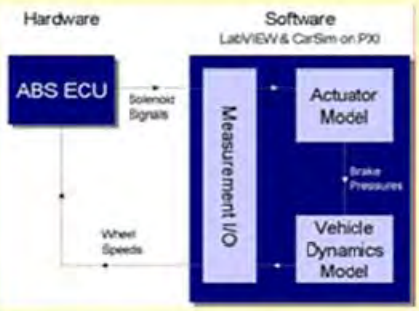
1. A patentable ECU prototype will be designed and evaluated.
2. The integrated chassis electronic stability control (ESC) strategy with the comprehensive functions, including the ABS, traction control and vehicle stability control.

R & D methodology

Structure



Sensors



Signal Routing

Sponsors

1. Double Group Worldwide Ltd.
2. Dragon Peal Ltd.

Development of I.C. Engine Control Strategies

ITP/037/07AP

Anthony Shum
Automotive Parts & Accessory Systems R&D Center

R & D Partners

1. Automotive Parts & Accessory Systems R&D Centre
2. Michigan State University

Introduction

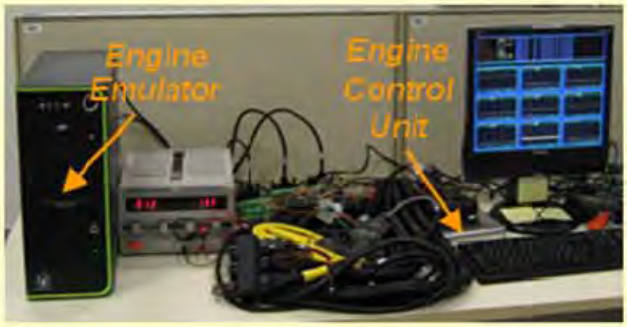
The main objective of this seed project was to develop engine control algorithms for
(1) Optimizing air-to-fuel ratio (i.e. *lambda* = 1), and
(2) Maximizing engine output torque by controlling the ignition timing.

R & D methodology

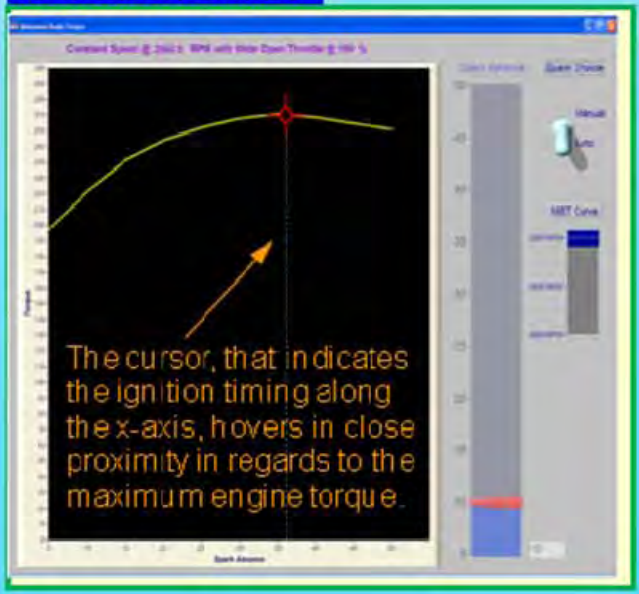
1. The engine control algorithms was developed by means of Simulink.
2. The engine control algorithms was implemented via a Hardware-In-the-loop (HIL) system.
3. The efficacy of the engine control algorithms was validated via a real-time animation software.

Deliverables

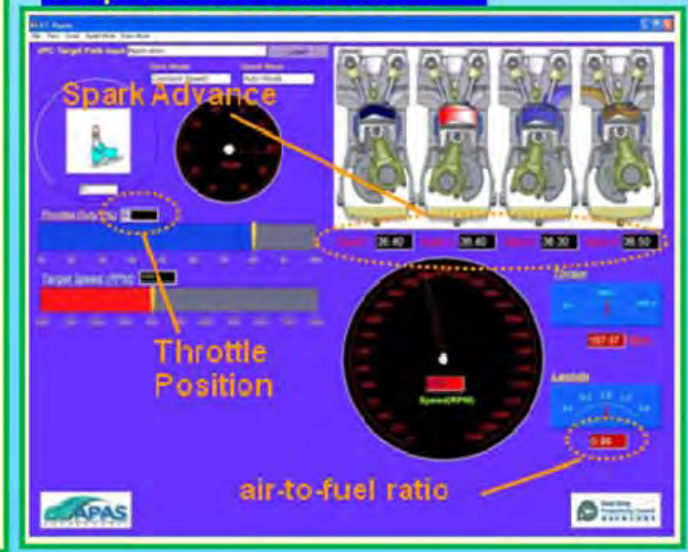
1. Engine control algorithms for fueling & ignition timing control had been developed under Simulink environment.
2. A Hardware-In-the-Loop (HIL) system had been built, in which it comprises an engine control unit (ECU) plus an engine emulator.
3. An animation software had been developed for demonstrating the HIL results, which could communicate with the engine emulator via TCP/IP. As a result, the resultant air-to-fuel ratio & ignition timing could be validated graphically.



Verification of MBT



Graphical User Interface



Development of Immobilizer System

ITP/020/08AP

Dr. Haibo Ma
Automotive Parts & Accessory Systems R&D Center

R & D Partners

1. Automotive Parts and Accessory Systems R&D Centre
2. Shanghai Jiao Tong University

R & D methodology

1. The immobilizer system with the 4th generation RFID technology which provides improved security and lower cost with mutual authentication algorithm and new wafer technology.
2. The application layer protocol shall exploit KWP2000 with user-defined parts; the physical and data-linked layer protocol shall be based on CAN to adapt to different OEM requirements.
3. System prototype can be verified by hardware-in-the-loop simulation system.

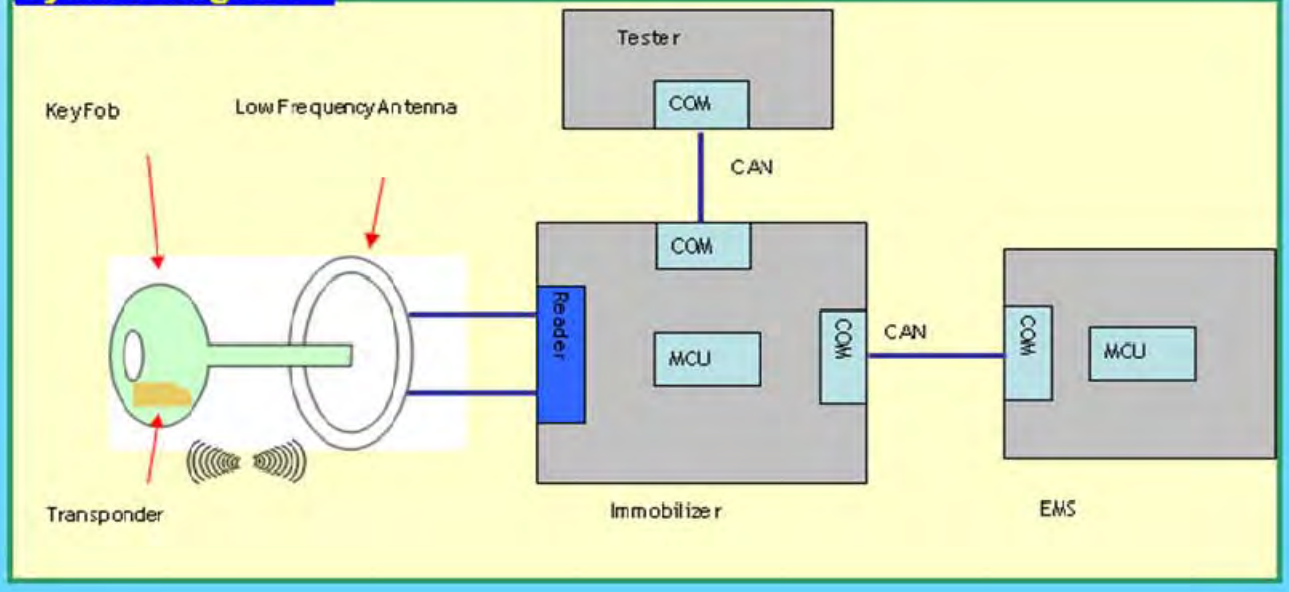
Deliverables

1. To develop the Matlab/Communication models which is built in conjunction with the authentication & communication protocols.
2. To complete the communication specification for both ECU and Scan Tool.
3. To make a hardware-in-the-loop (HIL) system in conjunction with the immobilizer prototype for its functional verifications.

Introduction

This seed project is to develop a complete immobilizer system, which would provide a cost-effective solution for China OEMs to against car-theft. It will strengthen the competitiveness of HK industries to produce such devices.

System Diagram



Development of Microcellular Foam Injection Moulding Technology Incorporated with Co-injection Technology for Producing High Quality and Value-added Plastic Automotive Parts

ITP/015/07AP

K.K. LEE
Hong Kong Productivity Council

R&D Partner

1. Hong Kong Productivity Council

Introduction

The innovative combination of microcellular foam injection moulding and co-injection results in an integrated system to produce high-quality automotive components with significant reduction in weight and energy consumption, and improvement of part qualities and productivity. Plastic automotive parts such as bumpers, fenders, interior trims, interior plastic frames and other plastic components can be produced by this advanced technology.

Advantages

1. Reduction in weight.
2. Improvement of part surface quality.
3. Improvement in functionality by sandwich moulding.

Sandwich moulding

The System

TheMucell Co-injection System

Deliverables

1. A foam injection unit with particular design will be developed.
2. A co-injection manifold will be developed.
3. A case study will be developed for evaluation.
4. A "white paper" containing detailed design will be compiled and a series of seminars and workshops will be arranged to transfer the technologies to the industry.

Hardware

The Foam Injection Unit

The Co-injection manifold

Sponsors

1. Elite Precision Machinery Co., Ltd.
2. Multi-Tech Machinery Ltd.
3. Servo Technology Co., Ltd.
4. Welltec Machinery Ltd.

Conclusions

1. The technology can be applied to all plastic components inside an automotive that are originally produced by injection moulding.
2. The technology is especially effective for bulky decorative parts, such as interior trims, handles, etc.
3. The technology can also be applied to non-decorative parts that require weight reduction, such as bumpers, fenders, etc.

-Patent pending-

Development of Software and Hardware Platform and Methodology for Integrated Configurable Dashboard Design

ITP/012/08AP

Mr. Vincent CHUNG
Hong Kong Productivity Council

R&D Partner

1. Hong Kong Productivity Council

Introduction

The project aims to develop a SOFTWARE & HARDWARE PLATFORM for configurable dashboard (TFT) design & development. This platform can assist dashboard designer/ manufacturer to configure display and embedded driver solutions in a user-friendly approach.

Advantages

1. Allow OEM to integrate as much information into the dashboard for display ON DEMAND
2. The display graphics and navigation style are configurable
3. Cost saving by supplying same dashboard H/W to different OEM models

Preliminary ICD Prototype

!!!Not yet prototyping at this stage!!!

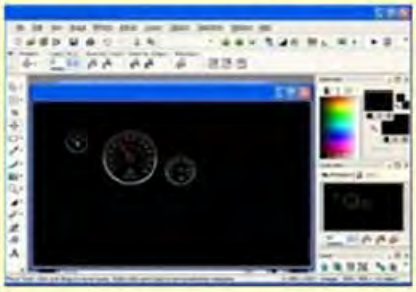
Basic Specification

- TFT Panel: 10.1' digital panel
- Development Board: Automotive grade
- Processor: 32 bit

Deliverables

1. Software design tool running on PC
2. Embedded dashboard hardware platform
3. Advanced graphic display behavior by HMI
4. Graphic library

R & D methodology



User friendly drag and drop design software on PC

Real-time response driver solution

HMI & GUI design

Sponsors

1. World Symbol Limited
2. IT Auto Parts Limited
3. Wellgain Group Limited
4. Silcon InnoProducts Limited

Infotainment system for mass transportation vehicles

ITP/001/09AP

Mr. Rick Tiande Mo
Hong Kong Productivity Council

R&D Partner

1. Hong Kong Polytechnic University

Introduction

The project aims to develop an infotainment system for mass transportation vehicles, e.g. bus, coach, & train, basing on the MOST (Media Oriented Systems Transport) hardware and software protocol. The system will include a Media Center and support for mobileTV reception.

Advantages

1. The MOST protocol will support data transfer over fiber optics, which has the benefit of high data rate and light weight.
2. The latest MOST150 (spec.3.0) will be implemented supporting 150Mbps bandwidth enabling high-definition video transmission.
3. MOST150 will support Ethernet protocol to enable mobile computing & mobile web-surfing.
4. Media Center will enable multiplexing of high volume media from multiple high-definition media sources.
5. Multi-Antenna, Multi-Channel mobileTV reception will enable simultaneous TV reception from large number of digital broadcast channels.

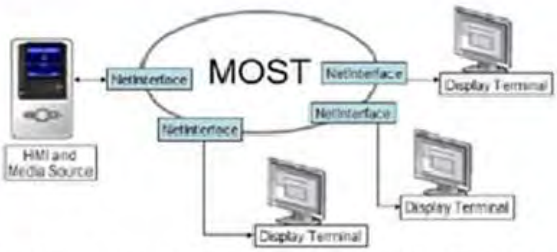
Conclusions

1. R&D works for upstream development – protocol design & testing
2. Sponsors interested in developing downstream peripherals & customization

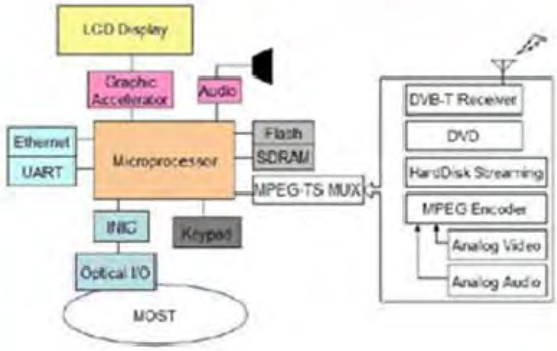
Deliverables

1. Reference hardware & software design for Head / Main Unit
2. Reference hardware & software design for Display Terminals
3. Hardware & Software development platform for customer specific customization

R & D methodology



The hardware architectures of the Display Terminals and HMI & Media Source are similar to the figures below:



Media Center enables multiplexing of high volume media from multiple high definition media sources

Multi-Antenna, Multi-Channel mobileTV reception

Integrated battery charger and motor drive systems

ITP/040/07AP

Prof. K. W. Eric Cheng
The Hong Kong Polytechnic University

R&D Partner

1. Hong Kong Polytechnic University

Introduction

The conventional method for electric vehicle is to have separate battery charger and motor drives. The battery charger is to convert power from AC to DC for the battery. The circuit using is usually a single-ended circuit for very small power and H-bridge circuit for medium and high power battery charger. In general, for power level higher than 0.5kW, the H-bridge topology will be used. On the other hand, the motor drive for the electric vehicle is usually higher power and in the range of kW or above that depends on the traction power needed. The H-bridge circuit is usually used and Pulse Width Modulation (PWM) is used for the control of the motor speed, torque, and motion control. Therefore there is a strong commonality in the circuit design for both important devices (charger and motor drive) in an electric vehicle.

Advantages

1. The proposed integrated system is novel and has not been seen commonly in the past.
2. The integrated system will form an important device for electric vehicle by significantly reducing the cost, development time, implementation time, production cost and maintenance by one single H-bridge converter & circuit doing two functions.
3. The R&D Center will obtain this latest technology in further research and commercialization for electric vehicle areas and market respectively

Sponsors

1. Shining Rich Limited
2. General Hope Limited

Deliverables

1. Control method for integrated charger and drive
2. Integrated circuit for charger and drive
3. Obtain the characteristics of the integrated battery and drives
4. Establish a scalable method for other power rating
5. Generate the patent for the integrated system

R&D methodology

- The phase shifted control for power electronic converter, the pulse-width modulation technology.
- High frequency transformer technology and the control method of motor drive and battery

Initial Experimental System and Test

Long Vehicle Wireless Backup Monitor System

ITP/039/07AP

C.H. Leung
Automotive Parts & Accessory Systems R&D Center

R & D Partner

1. Hong Kong Productivity Council

Deliverables

1. To develop the software algorithms for
   a) Channel coding, communication protocol,
   b) Intelligent RF frequency hopping,
   c) Design and optimize the RF antenna,
   d) Data correction / re-transmission for reliable data reception in automotive environment,
   e) Enhancement / optimization to image compression algorithm.
2. To build Hardware prototype as demo.

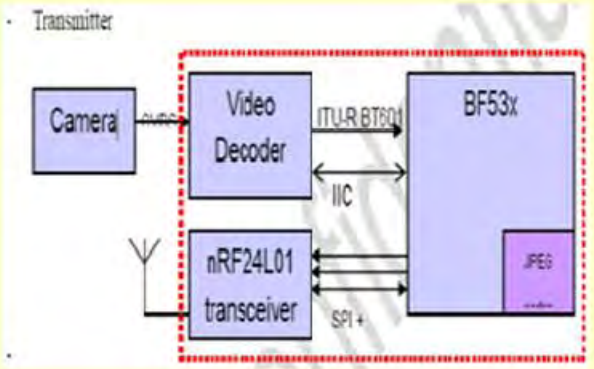
Advantages

1. Near-real time transmission of images from the rear to driver console at 2Mbps transfer rate;
2. Safe-guard interference by and reliability against other systems within the 2.4GHz open spectrum;
3. Overcome 40 foot container shielding effect to RF signal between rear-end camera to front console.
4. Ready to apply in Collaborative project.

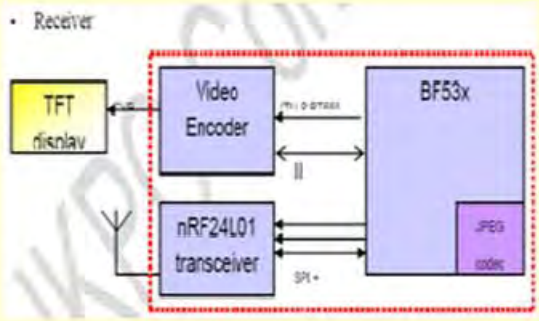
Introduction

To develop a vehicle a reliable backup monitor system for long vehicle using a wireless link that allows flexible and easy installation for after-market users at different vehicle locations.

RF Transmitter



RF Receiver



Low Cost Direct Drive for Electric Vehicles

ITP/013/07AP

Prof. K. W. Eric Cheng
The Hong Kong Polytechnic University

R&D Partner

1. The Hong Kong Polytechnic University

Introduction

Low cost direct drive for electric vehicles integrates advanced power electronics and in-wheel switched reluctance motors with optimization design. The drive with the configuration of outer-rotor can be used to directly drive wheels of electric vehicles.

Advantages

1. Simple and rugged motor construction by switched reluctance principle
2. Low weight
3. Potentially low production cost
4. Excellent power-speed characteristics
5. High power density
6. High operating efficiency
7. Inherent fault tolerance
8. 4 wheel Direct-drive

In-wheel SRM

Developed Techniques

- Multi-objective optimization design of in-wheel SRM

Sponsors

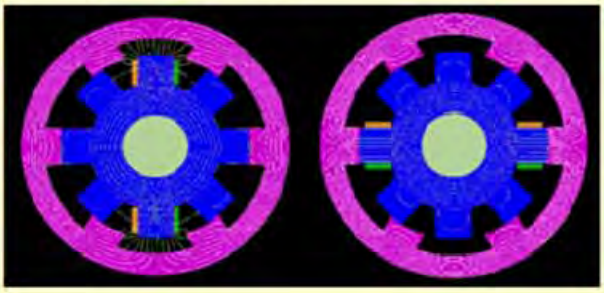
1. Euauto Technology Ltd.
2. Ritech Engineering & Supply Co., Ltd.
3. Silver Step Holdings Ltd.

Deliverables

1. Design method and fabrication of the direct-drive SRM prototype at 5kW.
2. Development of position tracing drive
3. Establishment of characterisation of the 2D VR actuator
4. Development of the control method of Directional control and power regeneration
5. Development the Interfacing with the other electrical system
6. Deliverable the in-wheel motor using the above techniques

R & D methodology

Finite Element Analysis



Experimental system

Conclusions

1. Direct drive is a modern technology that brings the motor and wheel into a single unit.
2. The interfacing mechanical devices are eliminated. It not only reduces the cost but also reduces the weight and increases the reliability.
3. Therefore it is most suitable to today's electric driven vehicle.

Powder Metal Forming Technology for High Temperature Light Weight Aluminium –Titanium Alloys

ITP/014/07AP

Prof. Chan-Hung Shek
City University of Hong Kong

香港城市大學
City University of Hong Kong

R&D Partners

1. City University of Hong Kong
2. Automotive Parts and Accessory Systems R&D Center

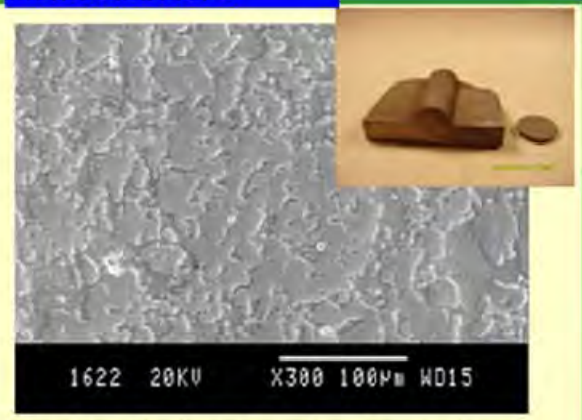
Introduction

Titanium-aluminium alloy is ideal for high-temperature environments. It has greater strength-to-weight ratio than aluminum alloys. In this project, metal powder of aluminum, titanium and titanium aluminium ($TiAl_3$) alloy powder are prepared at required mixing proportion.

Advantages

1. The metal powder technology will allow net shape forming of articles which can reduce processing time energy and steps
2. Titanium-aluminium alloy has high temperature performance, high strength and corrosion resistance.
3. Powder metallurgy is good for mass production.

Microstructure



Particles distributed evenly in the matrix

Conclusions

1. Powder metallurgy method is feasible to form light-weight Al-Ti alloy structure
2. Al-Ti powder alloys are sintered
   - short sintering time;
   - shape can be maintained
3. Al-Ti alloys can be sustained in a high temperature environment

Deliverables

1. To develop the most effective method or methods to sinter titanium-aluminium alloy.
2. To develop technology to form prototype with some complexity used for automotive part manufacturing
3. The goal of the project is to establish patentable processes and materials.

Thermal & Mechanical Properties

- Microhardness: 160 – 180 Hv
- Temperature which the material can withstand before collapse: 650 -700° C

R & D methodology

Below are some sintering methods for making a prototype, in which the properties are different for varies methods, optimization is needed

Tube furnace, which is a sintering furnace under Ar gas

Hot Isostatic Pressure (HIP) is to sinter product under high pressure & temperature in Ar environment

Vacuum furnace is a high vacuum sintering process

Sponsors

1. Galleon Industrial Ltd.
2. Simtrix International Ltd.
3. Gainford International Ltd.

To Develop a Versatile Hydraulic Control Unit (HCU) for an Integrated Chassis Electronic Stability Control (ESC) System

GHP/047/07AP

K.K. LEE
Hong Kong Productivity Council

R&D Partner

1. Hong Kong Productivity Council

Introduction

This project is to develop a versatile HCU for an integrated chassis electronic stability control (ESC) system incorporating the ABS, TCS and vehicle stability control features through the followings:

1. To design and fabricate the prototype of an HCU for an integrated chassis ESC system

2. To demonstrate the technology development and manufacturing know-how to the Hong Kong automotive industry

Deliverables

1. A patentable mechanism of integrated chassis ESC system enabled HCU will be designed, fabricated and evaluated.
2. The functionality of the developed HCU prototype will be verified. Product certification by a PRC accredited laboratory as well as a US/Germany accredited laboratory will also be obtained.
3. A development package including HCU design blue print, bill of material (BOM), manufacturing processes and know-how will be compiled.
4. Technical workshop or seminars.

Advantages

1. Local automotive manufacturers can acquire this technology and know-how.
2. Local manufacturers' capability in the integrated system can be increased and the upfront cost can be reduced.
3. To become one of the capable and qualified suppliers of the automotive safety system market.

Testing Equipment

ESC Enabled HCU Module

Sponsors

1. Peace Thread Company
2. Win Regent (Hong Kong) Limited
3. Jiang Su Tripple Sun United Science
4. Technologies Company Limited

Vehicle Safety Enhancement System Based on Wireless Communication

Prof. Yangsheng Xu
The Chinese University of Hong Kong
香港中文大學 The Chinese University of Hong Kong

R&D Partners

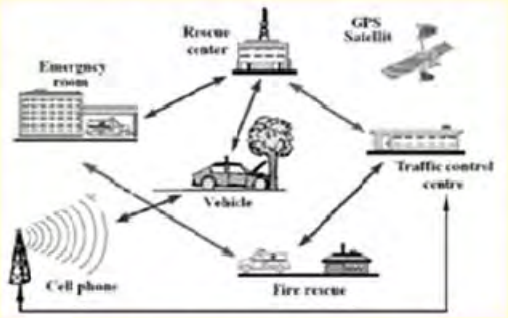
1. The Chinese University of Hong Kong
2. 中盈優創資訊科技有限公司

Introduction

To prevent the minor accident from being deteriorated, we propose to develop the vehicle safety enhancement system. It will detect the accident and classify its severity based on the information collected from the peripheral sensors in the vehicle, and locate position of accident by GPS. Thereafter, a WLAN-based component will transmit the message to the vehicles nearby. Moreover, vehicle safety can be further enhanced by GPS-based surrounding vehicle localization and hazardous driving behavior notification. In another way, a robust wireless communication component based on public wireless communication service will sends out the message to the traffic center for urgent rescuing reactions.

Functionalities

1. V2V communication for collision avoidance
2. V2V communication for accident notification broadcast
3. V2V communication for hazardous information share
4. V2I Reputing



The GSM/GPRS/3G channel

Deliverables

The deliverables will contain the subsystems listed below:
1) GPS component for accident localization and hazardous driving behavior analysis;
2) accident detection and severity analysis component;
3) WLAN-based vehicle-to-vehicle communication component;
4) GSM/GPRS/3G component for accident report to traffic center;
5) graphic user interface for accident notification.

R & D methodology

➢Global positioning system
- •Obtain position, direction and speed

➢Collision detection and analysis

➢Wireless LAN
- •Multi-hop network
- •Geocasting
- •IEEE 802.11a/b/g/p
- •Message collision avoidance
- •Communication security
- •Self-organization of the WLAN

➢GSM/GPRS/3G
- •Wireless data transmission
- •Vehicle carrier
- •Convenience for programming

Sponsors

1. Sunlink International Holdings Limited
2. Jun Tai Yang Technologies (Shenzhen)

Appendix 5

Memoranda of Understanding Signed by APAS

No.	Parties			Date	
	First Party	Second Party	Third Party	Sign date	Effective Period
1.	APAS	上海御能動力科技有限公司	五洲龍汽車有限公司	22.5.2007	*Project Based period
2.	APAS	Shanghai Maple Automobile Co. Ltd		7.6.2007	1yr
3.	APAS	Shanghai Jiao Tong University (SJTU)		20.7.2007	5 yrs
4.	APAS	Sun Yat-Sen University (SYSU)		7.7.2007	5 yrs
5.	APAS	University of Shanghai for Science & Technology (USST)		9.11.2007	5 yrs
6.	APAS	Michigan State University (MSU)		1.10.2007	5 yrs
7.	APAS	Hamlin Electronics Europe Limited		16.8.2007 & 29.8.2007	5 yrs
8.	APAS	Texas A&M University (TAMU)		28.8.2007	5 yrs
9.	APAS	Guangzhou Yi Wei Electric Vehicle Co. Ltd.		10.7.2007	5 yrs
10.	APAS	University of Minnesota (UMN)		28.1.2008	5 yrs
11.	APAS	惠州市華陽集團有限公司		29.2.2008	5 yrs
12.	APAS	北京艾普曼科技有限公司		1.2.2008	5 yrs
13.	APAS	廣州益維電動汽車有限公司	中山大學工學院	22.2.2008	*Project Based period

No.	Parties			Date	
	First Party	Second Party	Third Party	Sign date	Effective Period
14.	APAS	重慶市九龍橡膠制品制造有限公司		5.3.2008	5 yrs
15.	APAS	江門市經濟貿易局		9.5.2008	2 yrs
16.	APAS	華東交通大學		5.8.2008	5 yrs

* The MOU was signed for a specific project.

Appendix 6

Projects Supported by Overseas/Chinese Experts

Title of Project	Affiliation of Overseas/Chinese Experts
Powder Metal Forming Technology for High Temperature Light Weight Aluminum-Titanium Alloys	General Motors (US)
Development of I.C. Engine Control Strategies	Michigan State University (US)
ECU of Anti-lock Braking System and Electronic Stability Control System project.	Texas A&M University (US)
Development of Software and Hardware Platform and Methodology for Integrated Configurable Dashboard Design	Ease of Use Co. (Netherlands)
Development of Advanced Tube Hydroforming Technology for Making Complicate-Shaped Metallic Tubular Automotive Parts	Nanjing University of Science & Technology (China) Amino Engineering Co. Ltd. (Japan)
Development of Advanced Vehicle Management and Drive System for Plug-in Hybrid Electric Vehicle	ShenZhen Institute of Advance Technology Chinese Academy of Sciences (China)
An Advanced Safety System for Passenger/Goods Vehicles	Sun Yat-Sen University (China)
Development of Automated Manual Transmission (AMT) Controls and Systems	University of Minnesota, Michigan State University (US)
Development of Immobilizer System	Shanghai Jiao Tong University (China)
Electrical Power Assisted Steering for EV and HEV	Ji Lin University (China)

Title of Project	Affiliation of Overseas/Chinese Experts
Development of Smart Charging Station for EV and PHEV	Sun Yat-Sen University (China)
Integrated Lane Assist System	Nanjing University of Science & Technology (China)
Pedestrian Warning and Protection System	Shenzhen Graduate School of Peking University (China)
Advanced Collision Avoidance System	Nanjing University of Science & Technology (China)
Advance Image Recognition on Driver Assist System	Nanjing University of Science & Technology Shenzhen Graduate School of Peking University (China) (China)

Appendix 7

Public Relations and Promotional Programmes by APAS

Project Progress and Partnership Workshop held on 21 Nov 2008

Chairman Dr. Ng Tat Lun delivered the keynote speech

APAS Staff Dr. Stephen Lee delivered the closing remarks

Dr. Ma Haibo presenting

Full house of audience

Asia World Expo (28 April – 1 May 2008)

Presentation by APAS staff

APAS booth front view

APAS booth side view

Global Auto Parts & Accessories Show at The Venetian Macao (14-16 April 2008)

Presentation by Associate Director, Mr. Theodore Zhang

Global Auto Parts & Accessories Show (14 April 2008)

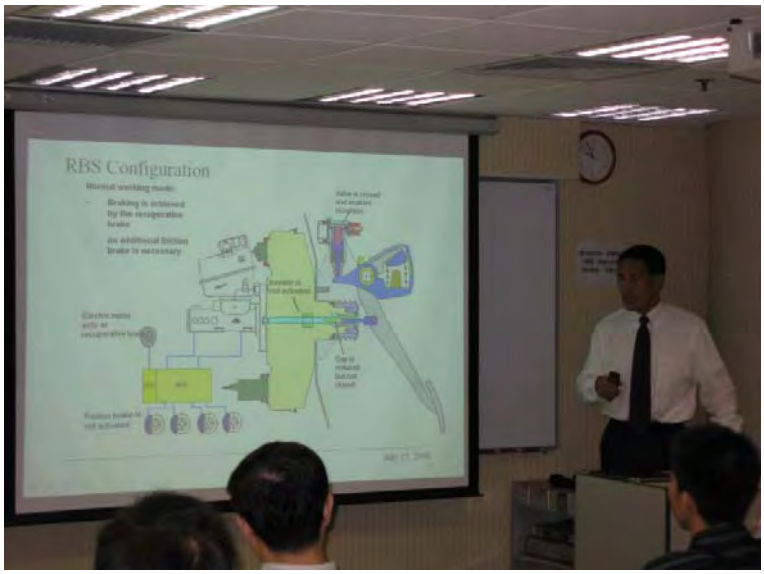
Full house of audience

Innovation Carnival 2008 at Kwun Tong APM (26 – 28 September 2008)

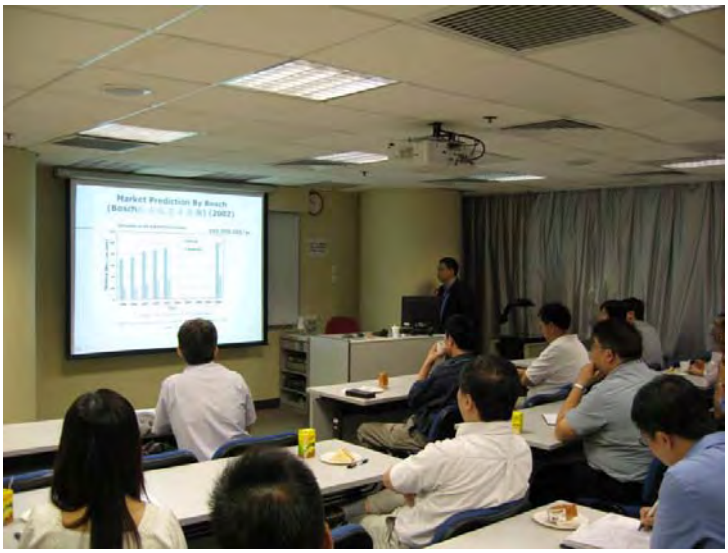
China High Tech Fair (12-17 Oct 2008)

Show case with Ti alloy powder at China High Tech Fair

Presentation by Dr. Ying Yang - Regenerative Braking System (6 July 2008)



Presentation by Dr. Wang Tie of Ford Scientific - Market demand for the prediction of Oxygen Sensors (29 August 2008)



Appendix 8

Lab Testing Projects in 2008

Product	Test Type
1. automotive LCD module	dust test, vibration and thermal tests
2. automotive LCD module	vibration and thermal tests
3. automotive LCD module	vibration and thermal tests
4. Sn plated connector	thermal shock
5. cell phone panel	thermal cycle
6. automotive hose	thermal test, pressure test, oil test, water test
7. cell phone panel	thermal shock
8. automotive LCD module	vibration and temperature cycle tests
9. watch components	salt spray corrosion test
10. automotive failed hose	temperature tests
11. automotive hose	temperature, pressure, oil tests
12. IBM circuit board	thermal cycle test
13. automotive LCD module	vibration and temperature tests
14. automotive LCD module	vibration and temperature tests

Appendix 9

Market and Technology Roadmap of APAS

(A) Electronics and Software

1. Market Trend

Automotive Electronics includes security system, comfort control system and information & communication system, which are designed to make car more secure, comfortable and convenient. For example, air bag, safety belt and central anti-theft locks are all used to make a car more secure, while automotive window, electric power doors, electric rear-view mirror and electric roof window (skylight) as well as a power management system that satisfies the needs of a variety of electrical devices are equipped to improve driving comfort. An electronic control system that coordinates all parts of a car is installed to make driving more convenient. The system integrates mass information from computer, sensors and traffic management service system, driver's information system, navigation system, computer network system, monitoring system and fault diagnosis system, etc. With multimedia getting into every area of live, infotainment system is getting popular in almost all kinds of automotives from passenger cars to recreational vehicles and even to mass transports like coaches and trains. In order to support the availability of information to the automotive, communication systems were installed. Such communication system will need to ensure reliable, continuous, and high bandwidth connection to the automotive. It is also critical for safety and security functions.

Hong Kong's electronics industry is the largest merchandise export earner, which accounted for 50% of Hong Kong's total exports in 2007. In addition to the star performer like IT and Media related electronic products, local industry is trying hard to create new opportunities in the booming industry – Automotive Electronics. However, some of the car makers (OEMs) shifted their R&D responsibility and risk to their 'Tier 0.5'suppliers. These suppliers need to involve in the early stage of the car development project and provide OEM a total solution from up-stream level like system architecture and algorithm design to the hardware fabrication at the down-stream. Such high entry level becomes the major obstacle for the development of the local Auto Electronics industry. A set of reference solution and technology development were implemented to help local industry to overcome such obstacle.

2. Technology Trend

With Automotive Electronics getting more and more complicated, it is getting more costly to

develop, maintain, and diagnosis Automotive Electronics System. Current proprietary or custom system solution for individual automotive manufacturer and their supply chain further worsen the situation. In order to address such problem automotive industry in embarking on various efforts to standardize including system, hardware, software, architecture, networking system and diagnostics to encourage interoperability and portability to reduce development costs. Such effort includes:

- AUTOSAR (Automotive Open System Architecture) for hardware, software & architecture
- Modular Vehicle Communication Interface & Open Diagnostics Data Exchange for Vehicle Diagnosis
- MOST (Media Oriented System Transport) for high bandwidth multimedia distribution
- FlexRay for High Speed Distributed Control System

Design Platforms, including both hardware and software, is also a trend to replace costly customization per implementation to parameterization setting from the reference platform.

In order to enable the information flow into and out of Automotives various communication standards were deployed including special consideration of the mobile, sometimes at high speed, requirements. Such standards include:

- UWB (Ultra-Wide-Band) for extremely high data rate (480Mbps) transfer including multimedia
- WiMax or 3G / 4G system for Data (and voice) communication

With the development of vast data management and image processing, intelligent transportation has become a trend in automotive development. More and more ‘Smart’ application and electronics will install on vehicle to reduce driving stress and improve safety.

3. APAS’ Near Future R&D Plan *(up to 2011)*

In the immediate term to near future term, core technologies will be developed in intelligent transportation, body electronics and infotainment incorporating core components and standardizations.

Project / Tech. Status	Project Title / R&D Topics
Completed / Acquired	Headlamp: AFS (Advanced Front-light System)
Approved / Under Development	Configurable Dashboard
	Headlamp: LED Headlamp
	Infotainment System & Media Center for Mass Transport (MOST150)
Submitted / Planned	Body Electronics Common Platform
	Driver Information System (DIS) / Central Body Control (CBC) with AUTOSAR (OS)
	Next Generation Dashboard & Driver Information System (DIS) e.g. 3D Display
	Infotainment System for ultra large Mass Transport (Hierarchical MOST150)
	Car-to-Infrastructure multimedia data transfer using UWB
	Car-to-Infrastructure automotive mobile communication gateway using WiMax
	Alcohol Detector and Immobilizer
	Engine Management System (EMS)
	Diagnostics Standards & features

4. APAS' Long Term R&D Plan *(2011 onwards)*

In the long term, core technologies will be developed to address more time critical and extensive data processing applications.

Project / Tech. Status	Project Title / R&D Topics
Potential	X-by-wire system using FlexRay
	Ultra Speed Vehicle Image Filtering Processing
	Auto steering/ drive
	Intelligent infrastructure system & vehicle interaction
	New Generation of OBD auto code conversion
	Low Cost Vehicle to Vehicle communication
	High Performance Engine Management System

(B) Safety Systems

1. Market Trend

Traditional passive safety systems such as seat belt or air bag can no longer satisfy the demand from auto industry. Most of the effective systems are supplemented by active systems and advanced driver assistance systems (ADAS). Well-know active systems are ABS, ESP, DSR, Adaptive Front light System (AFS), etc. Parallel to the development of these active systems, ADAS were introduced in the recent years. Collision Warning, Side Assist or Lane Assist are examples of these comfort systems.

The effect of the ABS/ESC system on vehicle safety has been verified by many research institutes. The evaluation test conducted by National Highway Traffic Safety Administration (NHTSA) of the United States confirms the same conclusion. ESC system will become a mandatory component for all new vehicles from year 2012 in United States. Many countries in European Union have adopted similar policy. Several OEMs have announced that they plan to meet this safety requirement before the year 2012.

According to the accident data from NHTSA in 2004, more than 40% of single vehicle fatal crashes are related to lane departure. Rear-end collisions are also very common, representing about 30% of all collisions between vehicles and 5.2% of fatal collisions nationwide. In order to minimize those accidents, BMW, Nissan, Volvo and Audi, etc. have already adopted the associated ADAS in their latest models. The European Commission proposal envisages that new heavy duty vehicle types should be fitted with collision warning and lane assist related driver assistance systems from October 2013. However, the high R&D and manufacturing cost of ADAS limits their wide-spread use in China Market.

With this as an impetus, low cost solutions for active safety and ADAS with our own IPs will certainly help to the local industry to catch up this huge market.

2. Technology Trend

There are only a few tier-one suppliers which have the capability to provide ABS/ESC systems to OEMs in automotive industry. APAS have proposed two projects on ECU and HCU development. Those two projects have been approved by ITC. Upon completion of those two projects, we will have a solid foundation to launch further design and development on ABS/ESC safety system.

In addition, APAS also collaborated with other institutes on the Active Safety and ADAS related projects. The projects aim to develop lane keep monitor and lane change assist platform for passenger cars by a low-cost and competitive means with more superior and intelligent operating algorithm. One possible way is to use **Radar-Vision Fusion Technology** with advanced image processing algorithm to detect approaching vehicles lying within the blind spot zones by equipping miniaturized cameras around the vehicle body. Some other teams applied **Monocular Vision Technology** to achieve lane tracking and blind spot detection. **Night Vision Technology** provides another ideal solution to promote driving safety, especially in the adverse and low visibility conditions. A camera with active infrared system will be incorporated to assist driving in the dark. All those new technologies will only help to finish the upstream works for active safety systems, development of an user friendly and effective warning system using either haptics, auditory or visual will be the critical downstream R&D tasks which governing the success of a Lane departure/collision warning system in the future.

3. **APAS' Near Future R&D Plan *(up to 2011)***

Project / Tech. Status	Project Title / R&D Topics
Completed/Acquired	Wireless Digital Backup Camera
	ABS System Architecture and Control Algorithm
	Failsafe Concept and ABS System Disable Strategies
	Regen Braking System for HEV
	Adaptive Front light System
Approved / Under Development	Configurable Dashboard
	Development of ECU for ABS/ECU Systems
	Development of HCU for ABS/ESC Systems
	Integrated Lane Change Assist System
	Tire Pressure Monitoring System
Submitted / Planned	Collision Avoidance System
	Pedestrians Recognition System
	Road-sign Recognition System

4. **APAS' Long Term R&D Plan *(2011 onwards)***

Project / Tech. Status	Project Title / R&D Topics
Potential	RAM Dump and Data Acquisition System
	Collision Mitigation System
	Complete ICU Design and Verification for ABS/ESC System
	Next Generation Driver-Assist-System using New Stereo Camera
	New Stochastic Decision-making Method for Autonomous Driving System
	Virtual Sensor & Car-to-car communication for future ADAS
	Adaptive Passenger Safety using Car-Interior Sensor
	Multi-level Sensorfusion and Computer-vision for Avoiding Overtaking Accidents

(C) Hybrid, Electric Drives & Environment

1. Market Trend

The environmental consequences brought about by vehicle exhaust can be combated through exploring advanced vehicle system, exhaust after treatment system and alternate fuel. The scare reservation of fossil fuel has driven the focus on better fuel economy vehicles. Hybrid electric system has attracted much attention because the current advances in such technology can significantly satisfy the requirements from customers, governments and OEMs.

As a pioneer, Toyota started production of Hybrid Prius in 1997 and reached a production volume of 100,000 in 2006. Facing challenge from Toyota, other OEMs, such as Honda, Ford, GM, Chrysler, Nissan, Daimler, VW, BMW, etc., have also been actively developing their own hybrid vehicles.

A study by Automotive Research Institute of University of Michigan, a well known automotive research institution in US, predicts the market share of non-traditional vehicles as follows:

2015: Electric Vehicle 1%, Fuel Cell Vehicle 2%, Hybrid Electric Vehicle 20%
2020: Electric Vehicle 2%, Fuel Cell Vehicle 3%, Hybrid Electric Vehicle 27%

It can be seen that there will be a really big market for these types of vehicles.

In those economies that stringent emission standards are imposed, HEV market is expected to grow continually since the performance and the cost effectiveness of HEV technology is still superior to pure electric vehicle while alternate fuel system requires complex change in system integration and infrastructure support. In China and other developing Asian cities where the use of diesel will still be prevalent in the near future, the deployment of advanced combustion engine and exhaust after treatment system should be the most imminent solution to alleviate air pollution problem and global warming.

2. Technology Trend

Tremendous amount of research and development is still underway to develop advanced vehicle system and explore alternate fuel, with the ultimate goal to reduce emission and reduce the reliance on fossil fuel. The technologies which have been drawn attention include: hybrid-electric, plug-in hybrid, pure electric, fuel cell, advanced internal combustion engine and/or bi-fuel engine fueled with compressed natural gas, methanol, biofuel, etc.

The transition from heavy to beyond dependence on fossil fuel will involve many costly and complex issues including changes to the production and distribution infrastructure. Hence, is it expected that the market and technology development will continue to focus on hybrid vehicle systems and there is much room for improving the performance and cost.

A hybrid vehicle is driven by at least two different forms of energy. A hybrid electric vehicle uses electric energy (usually stored in a power battery) as one of the energy sources. The other source can be diesel, gasoline or any type of alternative fuel (in an internal combustion engine). Some configurations use fuel cells to provide the electric energy needed.

In general, a hybrid propulsion system consists of an engine, a transmission, one or two motors, a power battery, an electric regenerative brake system and a hybrid air conditioning system. The recent development trend in HEV area as a result of adding electric portion to the propulsion system is to improve the performance and reduce the cost of the following systems:

- Vehicle Control System
- Motor & Motor Control System
- Battery & Battery Management System
- Regenerative Brake System

- Hybrid Air Conditioning System
- Electric Power Assisted Steering

For better emission control of diesel vehicles to meet the more stringent standards, it is expected more advanced and cost effective systems are required, such as :

- Catalyst
- Diesel Particulate Filter and its Regeneration System
- De-NOx System

Besides fuel economy and emission problem, new solutions are also required to minimize the environmental impact arising from the end-of-life vehicles, which sets constraints on the materials used in their construction.

Considering the global technology trend in this area, APAS' R&D plans for the near future and in the long term have been defined as shown in the sections below.

3. APAS' R&D Plan in the Near Future *(up to 2011)*

Project / Tech. Status	Project Title / R&D Topics
Completed / Acquired	Electric Vehicle Control Strategy
	Hybrid Electric Vehicle Control Strategy
	Fuel Cell Vehicle Control Strategy
	Motor Control Systems
	Power Battery Chargers
Approved / Under Development	A New Generation of Electric Vehicle Power Pack Platform (GD-HK 2007)
	Battery Management Control Strategy (Seed)
	Development of an Automotive Hybrid Air Conditioning System Technology (Platform)
	Integrated Battery Charger and Motor Drive System (Platform)
	Low Cost Direct Drive for EV (Platform)
Submitted / Planned	Development of Plug-in Hybrid Electric Vehicle Technology to Improve Fuel Economy and Protect Environment (GD-HK 2008)
	Development of Port HEV and its Key Technology (SZ-HK 2008)

Project / Tech. Status	Project Title / R&D Topics
	Development of a 14V Idling Stop/Start System (Platform)
	Advanced Battery Management System (Platform)
	Development of an Automotive Hybrid Air Conditioning System (Collaborative)
	Development of an Electric Minibus (Collaborative)
	Low Cost Direct Drive for EV's (Collaborative)
	Integrated Battery Charger and Motor Drive System (Collaborative)
	X-by-Wire System for HEV Application

4. APAS' Long Term R&D Plan *(2011 onwards)*

Project / Tech. Status	Project Title / R&D Topics
Potential	Development of HEV for Port Transportation (Collaborative)
	Development of Plug-in Hybrid Electric Vehicle (Collaborative)
	Development of a 14V Idling Stop/Start System (Collaborative)
	Advanced Battery Management System (Collaborative)
	Electric Power Assisted Steering
	Charging system & infrastructure that supports future electrification trend
	Advance Regen function
	Development of Diesel Exhaust Treatment Technology / System
	High Energy/Power Density Battery at Low Cost
	Cost Effective Fuel Cell Technology

(D) New Materials & Process

1. Market Trend

Automotive advanced materials and manufacturing technologies refer to the integration of product & materials development, advanced processing technologies, advance quality planning and manufacturing systems management through the synergetic combination of fundamental and applied engineering knowledge in solving complex manufacturing problems in the automotive industry. The key drivers for the development of automotive advanced materials and manufacturing process & technologies include:

- Demands for improved safety, greater vehicle configurability and reduce fuel consumption
- Requirements to integrate product development, manufacture, quality management system and adopt standardized resource planning system to improve corporation efficiency & competitiveness.
- Competitive pressure to reduce development and manufacturing cycle times and costs and to improve responsiveness, agility, flexibility, durability, efficiency and quality, in order to achieve greater profitability and return on capital
- Requirement to reduce material waste, energy consumption and emissions of CO2 and other harmful substances, during manufacture and use of vehicles
- Development in new material applications, associated design and processing technologies, together with competition to develop innovative structures and materials to improve vehicle performance in terms of weight, stiffness, safety, responsiveness, fuel efficiency, configurability and environmental impact
- European and international policy, regulation and legislation concerning transport, energy, CO2, safety and waste management.

2. Technology Trend

The recent development trend in response to the above key drivers is to the usage of lightweight alloys such as high strength steel, aluminum and magnesium as well as plastics and composite materials in order to have a significant weight reduction of an automobile for better effective use of petroleum. Various advance manufacturing technologies to process those new material applications have been developing in recent years. Common examples include advanced engineering materials development (e.g. Mg alloys and their various processing techniques), advanced metal forming for large complicated structural parts (e.g. hydro-forming, 3D dieless forming, etc.), advanced plastic processing and composites for automotive parts (e.g. MuCell, rapid heating and cooling, localized induction heating for plastic injection, etc.), and advanced surface finishing (e.g. ion plating, plastic polymerization,

micro-arc composite coating, etc.).

3. APAS' R&D Plan in the Near Future *(up to 2011)*

In view of the market demands as well as the strengths and capabilities of Hong Kong industries, APAS' development focus in advanced materials and manufacturing technology is grouped into five aspects:

- Advanced Magnesium Processing for Light Weight Applications
- Advanced Plastic & Metal Processing

- Advanced Materials & Surface Finishing
- Automotive Mechanical Component Systems
- Advance enterprise resource process & management system

Since the establishment of APAS in 2006, several Mg processing technologies and one advanced plastic processing technology (MuCell) have already been acquired or being developed by local institute, APAS then put its focus on further developing MuCell technology in combining with co-injection moulding and other metal processing technologies including the metallic tubular hydroforming and the powder metal forming for Al-Ti alloys. A new project on mechanical component system (ESC enabled HCU) will also commence in Dec 2008.

From now on up to the end of the first five-year (up to 2011), five more new projects will be proposed to further strength local capabilities in automotive advanced materials and manufacturing technology. Added Enterprise resource planning project shall be to help local APAS suppliers strength their capability to compete on the global automotive market by adopting to a set of international standards.

The following table is a list of the current or proposed new technology development topics:

Project / Tech. Status	Project Title / R&D Topics
Completed / Acquired	Mg hot & cold chamber diecasting
	Mg semi-solid injection moulding
	Mg thixoforming
	Mg rheo-diecasting
	Plastic microcellular foam injection moulding
Approved / Under	Plastic microcellular foam with co-injection moulding

Project / Tech. Status	Project Title / R&D Topics
Development	Hydroforming for metallic tubular products
	Powder metal forming for Aluminum-Titanium alloys
	ESC enabled hydraulic control unit (HCU)
Submitted / Planned	Mg sheet metal forming
	Rapid heating & cooling plastic injection moulding
	Direct metal laser sintering for rapid prototyping & tooling
	Super hard nano-composite coating
	Light weight car seat assembly

4. APAS' Long Term R&D Plan *(2011 onwards)*

In the second five-year, one of the strategies in APAS' development is to further strengthen the local capabilities in advanced materials and manufacturing technology by acquiring or developing some advanced technologies & standard widely adopted in overseas such as in-mould decoration for fabric-texture, flow control forming, metal foam formation, injection moulding for metal matrix composites, advanced hybrid materials system and enterprise resource planning. Another strategy is to develop the capabilities in the development of a whole car or a large major mechanical component system. Examples of technology include 3D free-form sheet metal RP for car body panel development, localized induction heating and sequential plastic injection moulding for large plastic parts making such as car bumper and spoiler and advanced crash simulation in automobile and components.

Besides on the technology development , there is a need to incorporate standardize process to further strength & upgrade local component/system suppliers into next level that match OEM expectation.

Project / Tech. Status	Project Title / R&D Topics
Potential	Localized induction heating for plastic injection moulding
	Sequential plastic injection moulding
	In-mould decoration (IMD) for fabric-texture or other textured finish
	Standardized enterprise resource management/planning
	3D free-form sheet metal RP
	Servo-drive stamping and flow control forming (FCF)
	Metal foam formation

Project / Tech. Status	Project Title / R&D Topics
	Metal Injection Moulding (MIM) for metal matrix composites
	Advanced hybrid materials systems
	Advanced crash simulation in automobile & components

Appendix 10

Timetable for Licensing of Patents and Commercialization of R&D Results

R&D Result	Estimated date to commercialize
Euro-4 Engine Control Strategies	2009
Battery Control System	2009
Automated Manual Transmission	2009
Long vehicle wireless backup monitor system	2009
Immobilizer system	2009
Automobile advanced frontlight system	2009

Project Patent	Draft & File	Examination	Estimated date to license
[1] Infotainment system for mass transportation vehicles	14/12/2010	2011	2012
[2] Development of the 14V Idling Stop/Start System	15/1/2011	2011	2012
[3] Development of Automotive Headlamp System for LED Light Source	30/11/2009	2010	2011
[4] Development of an automobile hybrid air conditioning system technology	30/6/2009	2010	2011
[5] Development of Software and Hardware Platform and Methodology for integrated Configurable Dashboard Design	15/6/2010	2011	2012
[6] Development of Electronic Control Unit (ECU) for Vehicle Anti-lock Braking System (ABS) and Electronic Stability Control (ESC) System	31/10/2009	2011	2012
[7] Integrated battery charger and motor drive systems	31/7/2009	2010	2011
[8] Development of Advanced Tube Hydroforming Technology for	30/9/2009	2010	2011

Making Complicate-Shaped Metallic Tubular Automotive Parts			
[9] Development of Automobile Advanced Frontlight System	9/11/2008	2009	2010
[10] Development of microcellular foam injection moulding technology incorporated with co-injection technology for producing high quality and value-added plastic automotive parts	30/11/2008	2009	2010
[11] Powder Metal Forming Technology for High Temperature Light Weight Aluminum-Titanium Alloys	30/11/2008	2009	2010
[12] Low cost direct drive for electric vehicles	31/12/2008	2009	2010
[13] An Advanced Safety System for passenger/goods vehicles	30/9/2010	2011	2012
[14] To Develop a Versatile Hydraulic Control Unit (HCU) for an Integrated Chassis Electronic Stability Control (ESC) System	31/10/2009	2010	2011
[15] A New Generation of Electronic Vehicle Power Pak Platform	30/6/2010	2011	2012

Appendix 11

Testing Capabilities of Different Organizations

Name of Organization	Strength of Testing Capabilities
APAS	APAS' test lab provides automotive parts design and production validation support to automotive industry. It has the latest testing equipment which can fulfill the most updated environment durability testing requirements for automotive electronics. APAS testing laboratory staffs have strong knowledge and experience in automotive testing.
HKPC	As the hosting institute of APAS, HKPC provides technical advice to clients by its professional consultants in different areas such as material characteristic, manufacturing technology and so on. This can help clients design a proper testing plan for their products and implement design improvement after the test.
CVC	CVC (Guangzhou Vkan Certification & Testing Institute) is located in Guangzhou. The strength of CVC is a full size optical testing chamber which is unique in Pearl River Delta. They are also equipped for conducting many different types of automotive and non-automotive testing.
GMERI	GMERI (Guangzhou Mechanical Engineering Research Institute) is another testing laboratory in Guangzhou. The strength of this laboratory is in engine, steering and braking, filter, and rubber plastic tests, supported by equipment to measure engine noise, efficiency, fuel consumption etc.
ARTC	ARTC (Automotive Research & Testing Center) is a testing institute in Taiwan funded by the Taiwan Government. Its labs are specialized in automotive testing, with capability of safety, component quality, emission and fuel economic, NVH, and EMC testing. It also has a vehicle test proving ground.

Mid-term Review Report

The Hong Kong Research Institute of Textiles and Apparel

March 2009

Table of Contents

Mid-term Review Report

Background

In its efforts to promote Hong Kong as a technology hub, the Government conducted an exercise in June 2004 to determine which industries deserved and could best be served by dedicated Research and Development (R & D) centres.

2. The textile industry in Hong Kong dates back to the early 1950s and has contributed significantly to Hong Kong's economic development over the decades. Over the years our textiles industry has grown from strength to strength from mass production of inexpensive garments to quality, high fashion apparel wear. To-day Hong Kong remains a leading player in this field.

3. Against this background The Hong Kong Research Institute of Textiles and Apparel (HKRITA) was established in April 2006 with a 5 year provision of HK$275.3 million from the Innovation and Technology Fund (ITF) controlled by the Commissioner for Innovation and Technology (CIT). This provision covers:

(a) HK$60.3 million to meet the "operational" costs for the Centre; and

(b) HK$215 million for R & D projects (estimates)

Institutional and Organisational Arrangements

4. The Hong Kong Polytechnic University (PolyU) was selected to host HKRITA because:

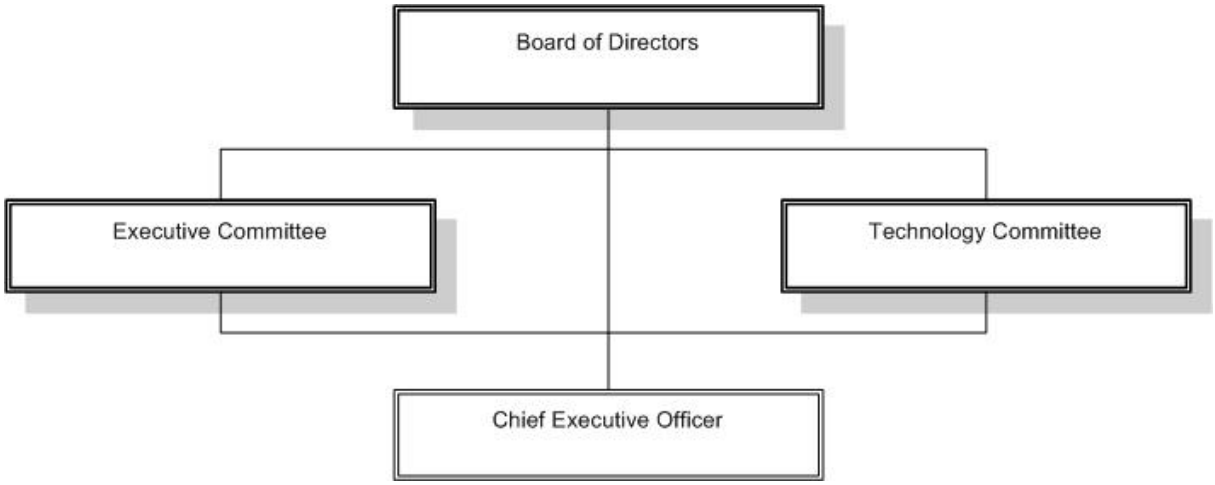
(a) the Institute of Textile and Clothing, a faculty of PolyU, is recognized amongst the world's top three world class research centres; and

(b) it was anticipated that many of research projects would be carried out by professors at PolyU given their expertise in the various fields of technology pertaining to textiles.

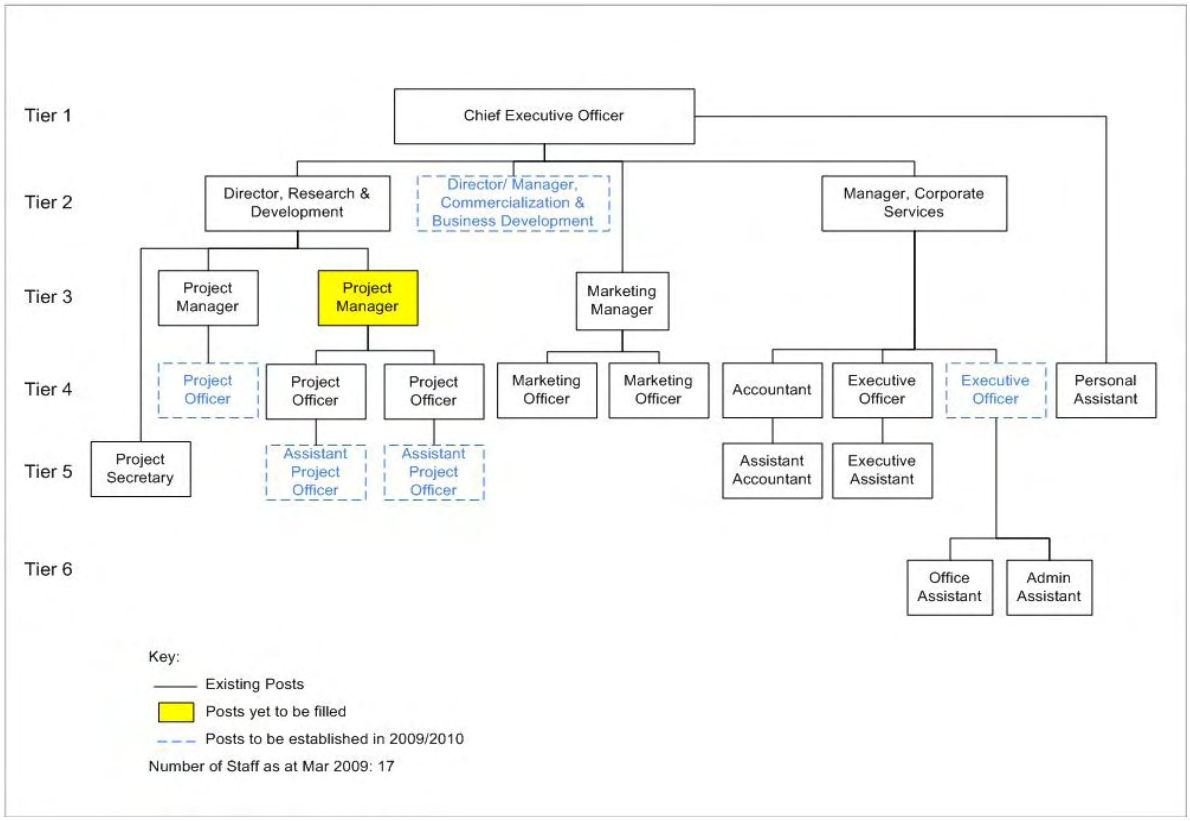
5. This arrangement has worked extremely well. Indeed, PolyU provided accommodation for the HKRITA Secretariat and has readily provided support through its Partnership Development Office and various resource departments.

6. HKRITA is an independent and financially autonomous limited company. Our Memorandum and Articles of Association, inter alia, provide for a Board of

Directors to be appointed by the President, PolyU in consultation with CIT. The Board determines policy and spearheads the direction of HKRITA. The Board of Directors is underpinned by an Executive Committee (ExCom) and a Technology Committee (TC). The organization chart is shown below with the respective terms of reference at Annex 1.



7. The Chief Executive Officer is responsible for policy formulation and the day to day management of HKRITA. He is supported by the Director, Research and Development, the Manager, Corporate Services and the Marketing Manager. The HKRITA Secretariat establishment is depicted below:



Vision and Mission Statements

Vision

8. To be a leading centre of excellence in research, development and technology transfer in fashion and textiles technology.

Mission

9. (a) to be a Hong Kong-based world renowned research institute for the textiles and clothing industry;

(b) enhance the economic development of the HKSAR through this concerted and focused R & D effort;

(c) support the continual development of technologies to enhance the competitiveness of the fashion and textile industry;

(d) develop and transfer technologies for the benefit of HKSAR companies and for Hong Kong society as a whole; and

(e) leverage the collective R & D capabilities of HKSAR universities and related institutions in mainland China and overseas to strengthen the capability of the Centre.

Focus Areas for Research Projects

10. The four focus areas which have been adopted by the Board for research projects are:

(a)	New Materials, Textiles and Apparel Products
	- thermal and moisture management fabrics and garments - nano materials - shape memory polymers, fabrics and garments - smart garments for healthcare applications - functional fibers

(b)	Advanced Textiles and Production Technologies
	- multiple functional treatments for fabrics and garment - new coloration technologies - new finishing technologies - new spinning technologies - 3D pattern CAD

(c)	Innovation Design and Evaluation Technologies
	- new mannequin for product development and evaluation - quality evaluation systems - product specification - garment fit

(d)	Enhanced Industrial Systems and Infrastructure
	- knowledge portal - yarn and fabric database - fashion design database - industrial consortium - training and consultancy

11. Based on experience over the past three years, HKRITA believes that these broad focus areas comprehensively cover the field for research in the textiles and apparel industry.

12. To support the Administration's initiative and to facilitate co-operation in research activities across the border, HKRITA has also participated in the Guangdong – Hong Kong Technology Cooperation Funding Scheme where funding support for projects is also available in the following specific focus areas:

(a)	Innovative Textiles Materials
	- Harmless and Environmental-friendly Natural and Man-made Fibres with Multi-functionalities - Interactive Intelligent Textiles Material

(b)	Energy-saving and Environmental-friendly Production System and Material
	- Innovative Textiles and clothing Production System to Save Energy/ Fuel Consumption - Environmental-friendly Textile Dyestuff and Chemical - Quick Testing Technology for Toxic and Harmful Textiles and Clothing Products

Project Applications

13. Applications can be submitted under the following categories:

(a) Platform Research programme

This programme is open to universities, institutions, trade and industry associations. This requires support from at least two industry sponsors who should make a cash contribution of at least 10% of the total project cost.

(b) Collaborative Research programme

This programme is open to private companies who must collaborate with a local research institute or organisation.

(c) Contract Research programme

This programme offers consulting and research services to companies or industry consortia on a fee contract basis.

14. Applications can either be in response to call circulars or submitted at anytime.

Performance Evaluation/ Indicators

15. By April 2009, HKRITA will have been in operation for three years. Our performance can be assessed under the following headings:

The R & D Programme

Number of projects

16. Projects applications are vetted by the R & D team in the HKRITA Secretariat which then seeks advice from a panel of experts, both local and overseas, prior to submission to the TC for a decision.

17. Up to December 2008, a total of 29 projects have been approved (see details in Annexes 2 and 3) with funding reaching HK$88.2 million and industry contribution at HK$13.1 million in cash which is equivalent to 13% of total project costs.

18. The number of present and projected projects, with funding details (in HK$m), is shown in the following table:

Types of projects	2006/07 to December 2008				2006/07 to 2010/11				2011/12 to 2015/16			
	No. of projects	Industry contribution	Total ITF funding	Percentage of Industry contribution	No. of projects	Industry contribution	Total ITF funding	Percentage of Industry contribution	No. of projects	Industry contribution	Total ITF funding	Percentage of Industry contribution
Platform research	26	11.4	86.6	12%	67	22.4	197.2	10%	90	33.3	333.2	9%
Collaborative research	1	1.6	1.6	50%	5	12.2	12.2	50%	10	38.1	38.1	50%
Contract research	2	0.1	-	-	6	0.3	-	-	10	0.9	-	-
Total	29	13.1	88.2	13%	78	34.9	209.4	14%	110	72.3	371.3	16%

19. Four projects have been successfully concluded whilst another 17 are scheduled for completion by the end of the 2009/10 financial year. Many of these projects show good potential for commercialization. The following three examples highlight this:

(a) a novel spinning technology for the production of torque free single ring yarn which enhances the hand feel and other qualities of cotton fabrics. There is already strong interest from industry partners in purchasing the intellectual property rights from the project.

(b) an innovative rotary type wet finishing machine that meets industry expectations for washing cashmere. Industry partners are interested in acquiring prototype machines.

(c) a fabric structure analysis and appearance evaluation system for weave structure identification. This will facilitate the quick prototyping of woven fabric and knit fabric evaluation. The deliverables have already attracted considerable industry interest.

Seminars and Workshops

20. Over the past three years, a total of 24 seminars and workshops have been held. Our staunch supporting organizations include:

(a) The Textile Council;

(b) Hong Kong Apparel Society;

(c) The Chinese Manufacturers Association;

(d) Knitwear Innovation and Design Society; and

(e) Hong Kong Institute of Textile and Apparel.

The full list of supporting organizations is at Annex 4.

21. These events have enabled HKRITA to explain its role and remit, provide technical information, introduce on-going projects and provide participants with the opportunities to exchange views and share experience. In summary, these events have been well-received and attracted close to 2,500 participants from the industry.

Extension Services

22. The key aim of the “extension services” programme is to identify practical problems faced by the industry and, where appropriate, initiate research projects or provide a consultancy service to solve such problems. This initiative has been welcomed by and proven to be beneficial to the industry.

23. As part of this programme, the R & D team frequently visits factories and organisations across the border. Over 25 visits have been made.

Memorandum of Understandings (MOUs)

24. Overseas delegations and other visitors have touched base with HKRITA to exchange views (list of Annex 5). To facilitate mutual co-operation, MOUs have been signed (see Annex 6).

Intellectual Property (IP) Registration

25. Research which has resulted in new technologies need to be protected. To-date HKRITA has filed 10 IP registrations.

Publicity and Marketing

Broad Strategy

26. Our fundamental marketing strategies have been to promote HKRITA as a professional R & D Centre; focus on our research programme; instil a research culture in the industry and publicise technologies and knowledge to our partners.

Membership Scheme

27. We have a membership scheme (see Annex 7) and have 252 registered members. One difficulty in recruiting more members is due to the reluctance of individual companies to join since they have access to HKRITA through their affiliation with trade organisations (such as the Textile Council).

28. The major communication channels we have developed are:

(a) HKRITA website (www.hkrita.com) in English and Chinese. To-date there have been over 200,000 hits;

(b) E-Newsletter issued on a quarterly basis which, inter alia, provides articles on projects as well news on current industry matters (sample copy

at Annex 8); and

(c) Electronic direct mailing (eDM) which enables a fast and efficient way to reach industry partners.

Exhibitions and Roadshows

29. HKRITA has participated in 23 exhibitions in Hong Kong, China and overseas over the past three years. This included involvement in government-initiated events (e.g. the Innovation Expo), international conventions (e.g. Fashion Week), HKRITA's own activities (e.g. the Technology Symposium and the roadshows at four local universities). A full list is at Annex 9.

Symposia, Seminars and Workshops

30. These activities are primarily to support the R & D programme and provide practitioners with the latest information on technology as well as an in-sight into on-going projects (see Annex 10).

HKRITA Secretariat

31. A fully functioning Secretariat has been established to support the Board and the R & D programme.

32. The Corporate Governance Manual sets out our office practices and guidelines based on the procedures stipulated in the Memorandum and Articles of Association and in the Tripartite Agreement between HKRITA, PolyU and HKSAR Government as well as other administrative requirements set by CIT.

Operating and Project Provision 2006/07 to 2010/11

33. The actual expenditure and budget for the first five years of HKRITA's operation are:

*Operating Expenditure** (in HK$m)

2006/07	2007/08	Up to Dec 2008	2008/09	2009/10	2010/11	Revised estimate	Funding approved by FC
5.7	9.3	22.0	10.1	15.4	19.2	59.7	60.3

** The budget covers manpower, equipment and other direct costs including rental, legal costs and marketing fees.*

*ITF Project Funding** (in HK$m)

2006/07	2007/08	Up to Dec 2008	2008/09	2009/10	2010/11	Revised estimate	Indicative Target in FC Paper
17.3	14.8	45.6	25.2	57.7	62.8	177.8	215.0

** Up to 08/09, there has been an average of 10 projects per year. The projected increases in expenditure for 2009/10 and 2010/11 are because we anticipate 20 projects per annum.*

34. The actual expenditure to end December 2008 shows that HKRITA has been:

(a) meticulous in keeping operating expenditure well within the overall budget; and

(b) project expenditure is also below budget because of the vetting procedures adopted which have screened out applications for which funding could not be justified.

35. It is noteworthy that the audit reports for 2006/07 and 2007/08 have been certified without qualification.

Road Map and the Way Ahead

Focus Areas

36. Feedback from our industry partners as well as from PolyU and other research institutes which have been involved in HKRITA projects over the past three years has confirmed that our Focus Areas for research (see paragraphs 10 to 12) remain valid. This has also been borne out our field trip and observations as well as through discussion with our contacts in the Pearl River Delta and Yangtze River Delta. We will therefore continue to identify and invite project applications in these fields.

37. We shall explore how we can leverage on the capabilities of universities and research institutions on research projects.

38. Our Extension Services programme will continue to reachout to industry partners to identify problems areas and where appropriate initiate projects for research.

39. HKRITA will also explore how best it can develop its consultancy services (e.g. to help industry tackle environmental issues) and, where appropriate, carry out research projects in-house.

Commercialisation

40. With projects coming to fruition, a new and important priority will be to push for the commercialisation of research deliverables. We shall, inter alia, adopt the following approaches:

(a) promotion of projects' results;

(b) conversion of lab-scale prototype to scalable, commercial product;

(c) filing of patents; and

(d) licensing arrangement & technology transfer to interested industry users

With this in mind, a "Standing Committee on Commercialisation" will be set up to study business plans, assess market interest, and advise on practical approaches to capture market interest.

Publicity and Marketing

41. Our marketing priority will be to complement the R & D efforts to generate industry interest in the deliverables from completed projects. HKRITA will also continue to organise seminars and workshops to benefit industry partners as well as take part in roadshows and exhibitions.

Operational

42. In consultation with CIT, we shall streamline procedures with a view to speeding up project related work. The Administrative team will also constantly review staffing, procurement and other arrangements to ensure value for money.

Budgetary Projections to 2011/12 – 2015/16

43. Our budgetary forecast for ITF required for the second five year period is:

*Operating Expenditure** (in HK$m)

2011/12	2012/13	2013/14	2014/15	2015/16	Total estimate
32.6	29.5	31.8	33.9	35.4	163.2

* *The increase in the budget reflects expenditure of HK$5 million per year for "commercialization" expenses and additional manpower (including inflation adjustment) to meet increasing R & D workload.*

*ITF Project Funding** (in HK$m)

2011/12	2012/13	2013/14	2014/15	2015/16	Total estimate
64.6	68.5	71.8	75.3	79.1	359.3

** Based on 20 projects per annum with a 5% inflation adjustment.*

Why HKRITA Must Continue

44. Hong Kong remains one of the world's top players in the textile and apparel industry:

(a) Indeed, many of the major manufacturing plants across the border are, in fact, owned by businessmen from Hong Kong who also have large textiles factories in, for example, Thailand, Sri-Lanka, Mauritius and Vietnam. Collectively, we manufacture for almost all the leading brands in the world and supply the world's mega-stores; and

(b) the census figures for the period ending December 2007 show that the gross value of domestic export for the Hong Kong Textiles and Clothing Industry stood at HK$42.5 billion which equated to 39% of total domestic export. This clearly underlines the significant contribution the textile and clothing industry still makes and justifies a continued investment by the Administration to support the industry. To put this in perspective, the HK$275 million provided by the government for the first 5 year period

equates to less than 1% of the export figures.

We must therefore continue with research to provide the cutting edge.

45. When HKRITA and the other R & D Centres were set up, it was accepted that this should be a long term commitment. Research projects can take several years to complete before results are come to fruition. Only then can the industry benefit.

46. Feedback from the major textile and other organizations, as well as form industry partners confirm their support for HKRITA and the need for the research programme to continue.

47. The funding of R & D Centres reflects the implementation of the Administration's policy to make Hong Kong a technology hub. During difficult economic times, it is all the more imperative to invest for the future.

48. To end the R & D programme would be, to say the least, short-sighted, since many projects have deliverables which will benefit the industry and which show potential for commercialisation. Indeed, there are already many projects in hand which show good potential for commercialisation. This will be an on-going process.

Conclusion

49. The Board of Directors is totally satisfied that HKRITA has made steady progress over the past three years in serving and benefitting the textiles and apparel industry, particularly through research related projects.

50. The Board is of the firm view that HKRITA should continue to operate with funding support from the Administration.

HKRITA Secretariat
16 March 2009

Terms of Reference

Board of Directors

(a) to steer the research direction of HKRITA;
(b) to monitor the operational and financial sustainability of HKRITA;
(c) to oversee the commercial (including commercialisation) activities of HKRITA;
(d) to ensure that the research and development (R&D) activities of HKRITA are progressing in accordance with the project proposal and the relevant annual plan;
(e) to examine and approve the audited accounts of HKRITA (including the directors' report attached thereto); and
(f) to ensure that the funds from the Innovation and Technology Fund to HKRITA are expended in accordance with the project proposals and the relevant annual estimates.

Executive Committee

(a) to oversee the implementation of the annual plan of HKRITA;
(b) to advise and support the CEO and the management team on matters relating to the operation;
(c) to monitor and ensure the effective management of HKRITA; and
(d) to advise on the appointment of senior staff.

Technology Committee

(a) to identify and formulate R&D projects in accordance with the R&D programme in the annual plan drawn up by the Board and approved by the CIT during its five years of operation (as the case may be);
(b) to assess and endorse including without limitation the scope, implementation approach and reasonableness of the budget of the R&D projects;
(c) to examine and endorse the reports and the audited accounts of each one of the R&D projects against individual project agreements executed between HKRITA and the Government of Hong Kong Special Administrative Region before the submission of such to CIT; and
(d) to prepare annual estimates of income and expenditures of the R&D projects for incorporation into the annual estimates for examination and endorsement by the Board.

R & D Projects by Focus Areas

	Technology Area		No. of projects	Total project cost (HK$ million)	Total ITF funding (HK$ million)
Platform Project	HKRITA Technology Focus Area				
	A	New Materials and Textiles and Apparel Products	6	23.7	20.8
	B	Advanced Textile and Clothing Production Technology	6	18.1	16.1
	C	Innovative Design & Evaluation Technologies	7	34.8	30.5
	D	Enhanced Industrial Systems & Infrastructure	4	8.4	7.5
	Guangdong-Hong Kong Technology Cooperation Funding Scheme 2008				
	1. Innovative Textile Materials				
	a	Harmless & Environmental-friendly Natural & Man-made Fibres with Multi-functionalities	0	0	0
	b	Interactive Intelligent Textile Material	1	6.0	5.4
	2. Energy-saving and Environmental-friendly Production System and Material				
	a	Innovative Textiles and Clothing Production System to Save Energy/ Fuel Consumption	1	2.7	2.4
	b	Environmental-friendly Textile Dyestuff and Chemical	0	0	0
	c	Quick Testing Technology for Toxic and Harmful Textiles and Clothing Products	1	4.3	3.9
		Sub-Total:	**26**	**98.0**	**86.6**
Collaborative Project	A	New Materials and Textiles and Apparel Products	1	To be received	
Contract Project	D	Enhanced Industrial Systems & Infrastructure	2	No ITF funding required	
		Total:	**29**		

Annex 3

List of R & D Projects

	Type	Project Title	Focus Area	Total project cost (HK$)	Total ITF funding (HK$)
1	Platform	Biofunctional Materials and Applications	A	4,469,800	3,739,800
2	Platform	Advanced Clothing Functional Design CAD Technologies	C	4,082,800	3,532,800
3	Platform	Development of an Innovative Finishing System for Wet Processing of Garments and Accessories	A	1,689,450	1,449,450
4	Platform	Advanced Textile and Garment Manufacturing Process Technology	B	3,908,984	3,378,984
5	Platform	Development of a Laboratory-Scale Electrochemical Mercerization and Bleaching System for Technological Evaluation	B	997,620	977,620
6	Platform	Finer Nu-Torque Cotton Yarn Production	B	2,380,950	2,130,950
7	Platform	Development of Fabric Structure Analysis and Appearance Evaluation System	C	2,864,250	2,524,250
8	Platform	Advanced Functional Surface Treatment Technology for Textile Materials	A	4,752,000	4,002,000
9	Platform	Imaging Colour Measurement (ICM) System for Textile and Garment Industry	C	4,372,050	3,872,050
10	Platform	Development of Shape Memory Knitted Fabrics/Garments	A	11,000,000	10,000,000
11	Platform	Development of a Problem Solving Model for the Hong Kong Textiles and Clothing Industries	D	3,049,200	2,699,200
12	Platform	Development of an Integrated Solution for Minimizing Pilling Problem of Cashmere Knitwear	B	2,779,500	2,479,500
13	Platform	Fabric Sensors for Three Dimensional Surface Pressure Mapping	C	8,025,400	7,125,400
14	Platform	Development of Smart Interactive Functional Clothing	C	3,147,590	2,767,590
15	Platform	High-Performance Sportswear and Devices	C	5,422,890	4,568,490
16	Platform	Development of a Fashion Sales Forecasting Decision Support System Using Artificial Intelligence Techniques	D	2,799,995	2,519,995
17	Platform	Functional and Decorative Textile Products through Sputtering Technology	A	793,000	713,000
18	Platform	Novel Finishing Treatment for Knitwear Using Low Temperature Rapid Evaporation	B	2,854,270	2,564,270
19	Platform	Small Sized Fiber Sensors	1b	5,963,600	5,363,600

	Type	Project Title	Focus Area	Total project cost (HK$)	Total ITF funding (HK$)
20	Platform	Development of an Innovative Manufacturing Solution for Energy-saving and Environmental-friendly Production of Brassiere Cup	2a	2,696,050	2,426,050
21	Platform	Novel Quick Testing Sensors of Formaldehyde in Textile Fabrics and Clothing Products	2c	4,343,900	3,893,900
22	Platform	Biofunctional Materials and Applications (II)	B	5,216,100	4,616,100
23	Platform	Advanced Clothing Functional Design CAD Technologies (II)	C	6,790,850	6,070,850
24	Platform	Remote Assessment System for Physical Prototypes under an e-clustering Environment (EPAS – e-clustered prototype assessment system)	D	1,559,015	1,387,015
25	Fast Track	An Intelligent Fabric Sample Resources Management System (FRMS) for Fashion Product Development	D	992,293	862,293
26	Fast Track	Application of Foam Dyeing Technology for Developing Colour Wash-out Effect on Cotton Knitted Fabric	A	999,990	899,990
27	Collaborative	Development of 100% Cotton Super Comfort & Easy Care Fabrics and Garments	A	To be received	
28	Contract Research	Energy Saving	D	No ITF funding required	
29	Contract Research	Competence Enhancement	D	No ITF funding required	

Remarks(*):

HKRITA Focus Areas

A. New Materials, Textiles and Apparel Products

B. Advanced Textile and Clothing Production Technology

C. Innovative Design and Evaluation Technologies

D. Enhanced Industrial Systems and Infrastructure

Guangdong-Hong Kong Technology Cooperation Funding Scheme - Specific Topics & Areas

1a. Innovative Textile Materials: *Harmless & Environmental-friendly Natural & Man-made Fibres with Multi-functionalities*

1b. Innovative Textile Materials: *Interactive Intelligent Textile Material*

2a. Energy-saving and Environmental-friendly Production System and Material: *Innovative Textiles and Clothing Production System to Save Energy/Fuel Consumption*

2b. Energy-saving and Environmental-friendly Production System and Material: *Environmental-friendly Textile Dyestuff and Chemical*

2c. Energy-saving and Environmental-friendly Production System and Material: *Quick Testing Technology for Toxic and Harmful Textiles and Clothing Products*

Supporting Organisations

1. Ace Style Institute of Intimate Apparel
2. China Textile Academy
3. Chinese Manufacturers' Association of Hong Kong
4. Clothing Industry Training Authority
5. Hong Kong Apparel Society
6. Hong Kong Institution of Textile and Apparel
7. Hong Kong Intimate Apparel Industries' Association
8. Hong Kong Productivity Council
9. Hong Kong Society of Dyers and Colorists
10. Institute of Textiles and Clothing
11. Knitwear Innovation and Design Society
12. Textile Bioengineering & Informatics Society
13. Textile Council of Hong Kong
14. Textile Institute Association (HK)
15. The Hong Kong Design Institute

Annex 5

Delegation and Visitors

Date	Delegates/ visitors	No. of visitors
26 Apr 2006	Delegation of Fujian Economic Trade Committee (福建省經濟貿易委員會)	6
02 Jun 2006	Prof Trevor Little, Head of Textile Department, North Caroline State University, USA	1
30 Jun 2006	Delegation of Fountain Set (Holdings) Limited	30
06 Jul 2006	Delegation of Fo Shan Garment / Clothing Associations	30
28 Aug 2006	Delegation of Savantas Policy Institute	4
14 Sep 2006	Dr Liren Wang and a delegate from Zhejiang University City College	2
18 Sep 2006	Prof Roger H Wardman, Head of School of Textiles & Design, Heriot Watt University, UK	1
16 Oct 2006	Delegation of Cotton Incorporated	3
03 Nov 2006	Assistant Executive Director Mr. Raymond Yip and other senior managerial staff from Hong Kong Trade Development Council	6
21 Nov 2006	Dr. Ma Lian, Manager, BASF (China) Co., Ltd.	1
09 Dec 2006	Delegation of Hong Kong Public Relations Professionals' Association	25
27 Dec 2006	Polliam Trading Corporation Limited	3
10 Jan 2007	KARL MAYER (H.K.) Limited/ KARL MAYER Textilmaschinenfabrik GmbH	4
11 Jan 2007	DowChem	5
23 Jan 2007	Consul General of the Islamic Republic of Pakistan	1
25 Jan 2007	Mr. Wilson Fung, CEO and senior staff of Hong Kong Productivity Council	3
29 Jan 2007	Delegates from Arena Sportswear Company	4

Date	Delegates/ visitors	No. of visitors
06 Feb 2007	Nodie Washington, Nasser Fredj and Dr. Jiping Wang from P&G	2
12 Feb 2007	Yosikazu Yamasaki (山崎義一), Head of Osaka Office, Japanese Fiber Society and Dr. Kanji Kajiwara (梶原莞爾), Faculty of Home Economics, Otsuma Women's University	2
19 Mar 2007	Delegates from De Montfort University (Textile Engineering & Materials Research Group)	2
20 Mar 2007	Ms Lindsey Stewart, Director - Research, MAS Design (Hong Kong) Ltd.	1
27 Mar 2007	Dr. Michael T. Fralix, President & CEO, $[TC]^2$, North Carolina, United State	2
15 May 2007	Mr Mark Fisher, Sourcing Manager of Meywin Limited and Mr Philip Sanchez, VP Product Development, Maclaren (HK) Limited	2
22 May 2007	Delegates from the 5th China (Dalang) International Woolen Knitwear Fair	2
23 May 2007	Delegation of The Science and Technology Department of Jiangxi Province (江西省科技廳)	18
05 Jun 2007	Delegation of Zhejiang Provincial Science and Technology Department (浙江省科技廳)	8
08 Jun 2007	Delegation of Guangzhou Research Institutes	6
08 Jun 2007	Delegates from Trevia - The Fibre Company	2
14 Jun 2007	Delegates from Modern Testing Services (Global) Ltd.	3
15 Jun 2007	Delegation of China Textile Academy (中國紡織科學研究院)	4
28 Jun 2007	Delegates from Panyu Propet Leather Co. Ltd. and Fabricoat Technology Company Ltd.	3
10 Jul 2007	Delegates from Marks & Spencer	2
31 Jul 2007	Delegation of Dongguan City Sci-Tech Bureau (東莞市科學技術局)	6
01 Aug 2007	Delegates from Whirlpool Corporation, Corporate Research Group	2

Date	Delegates/ visitors	No. of visitors
23 Aug 2007	Mrs Rita Lau Ng Wai-lan, JP, Permanent Secretary for Commerce and Economic Development Bureau (Communications and Technology Branch), HKSAR Government	1
30 Aug 2007	Delegation of China National Textile and Apparel Council (中國紡織工業協會)	5
01 Nov 2007	Foshan Textiles and Garment Industrialists (佛山企業代表)	28
02 Nov 2007	Delegation of Chilie textiles and garment industry, organised by Hong Kong Trade Development Council	5
01 Dec 2007	Delegation of Shengzhou Government (浙江省嵊州市人民政府代表團) led by Mr Richard Sheng, Mayor of ShengZhou, Zhejiang, China	5
10 Dec 2007	Mr Xin Li, Associate Director and Mr Ziang Zhao, President Professor, China Textile Academy (中國紡織科學研究院)	3
27 Dec 2007	Delegates from the Exhibition and Conference Research and Service Centre, Zhejiang University City College (浙江大學城市學院會展研究及服務中心代表)	3
11 Jan 2008	Professor Shin-Horng Chen, Director of the International Division, Chung-Hua Institution of Economic Research, Taipei	3
15 Jan 2008	Commissioner for Innovation and Technology, Innovation and Technology Commission, HKSAR Government	3
29 Jan 2008	Delegates from the Food and Environmental Hygiene Department, HKSAR Government	5
12 Feb 2008	Delegates from Fook Cheong Outwear Ltd.	12
05 Mar 2008	Mr AKG Nair, Executive Director from Pearl Academy of Fashion, India	1
14 Mar 2008	Dr Eric Thun, Said Business School, Oxford	1
03 Apr 2008	Mr Louie Chun Yu, Manager, Textile & Apparel, Singapore Textile & Fashion Federation	2

Date	Delegates/ visitors	No. of visitors
30 Apr 2008	Mr Simon Galpin, Associate Director-General of Investment Promotion and Mr. Simon Tsang, Head, Technology, InvestHK	2
19 May 2008	Delegation of Department of Basic Research Ministry of Science and Technology of The People's Public of China (MOST)(中華人民共和國科學技術部基礎研究司基地建設處考察團)	7
12 Jun 2008	Mr Blouw from the Council for Scientific & Industrial Research, South Africa	4
13 Jun 2008	Delegation of Dongguan Technology Council (東莞市科技局)	21
27 Jun 2008	Delegation of Guangdong Literature & Arts Professional Technical Institute(廣東文藝學院)	6
16 Jul 2008	Delegation of Shannxi Textile Science and Research Institute (陝西省紡織科學研究所)	6
16 Jul 2008	Delegation of Humen Fashion Technology Innovation Centre	20
12 Dec 2008	MOST Delegation led by the Minister of Science and Technology (國家科技部考察團)	16
17 Dec 2008	Delegation of Wuji University (五邑大學)	9
18 Dec 2008	Delegation of Shengzhou Science Technic Station (嵊州市科技代表團)	6

List of Memorandum of Understanding

	Date	Organisation
1.	08 Oct 2007	Sun Yat-sen University
2.	11 Oct 2007	Zhejiang Institute of Modern Textile Industry
3.	18 Oct 2007	China (Dalang) Woolen Knitwear Research & Development Centre
4.	10 Jun 2008	China Textile Academy
5.	31 Jul 2008	The Society of Dyers and Colourists
6.	05 Sep 2008	Australian Wool Innovation Limited
7.	09 Sep 2008	Humen Fashion Technology Innovation Center
8.	20 Oct 2008	Cotton Incorporated
9.	18 Nov 2008	College of Textiles, Dong Hua University

Annex 7

HKRITA Membership Scheme

Type of Membership	Annual Membership Fee	Benefits
Corporate Member	HK$1,000	• Access to basic project information being carried out by HKRITA • Access to the R&D Projects Database • Updated news on emerging technology and industry trends • Members who are project sponsors will have access to the information proprietary to the particular project • Privilege in participation of technical seminars and activities organised by HKRITA • Latest news of HKRITA activities and events • A listing on HKRITA website with hyperlink to the company's/ organisation's website • Joint networking activities with HKRITA
Affiliate Member	HK$1,000	• Same as Corporate Member (limited to Associations/ Trade Organisations only) *This category does not extend to members of the Associations*
Ordinary Member	HK$300	• Access to basic project information being carried out by HKRITA • Access to the R&D Resources Database • Updated news on emerging technology and industry trends • Privilege in participation of technical seminars and activities organised by HKRITA • Latest news of HKRITA activities and events
Institution Member	Free	Same as Corporate member
Student Member	Free	• Access to basic project information being carried out by HKRITA • Updated news on emerging technology and industry trends • Free participation in the technical seminars and activities to be organised by HKRITA

HKRITA e-Newsletter

HKRITA
The Hong Kong Research Institute of Textiles and Apparel

中文

e-Newsletter

Issue 10

January 2009

Cover story

Roadshows at Universities

Academic and research collaboration among different sectors and organisations helps expand intellectual repertoire of our society, increase knowledge exchange and promote research activities. It fosters the sustainable development of Hong Kong in due course.....

more>

Research Projects were Awarded in International Competitions

The Hong Kong Research Institute of Textiles and Apparel (HKRITA) has been committed to fostering the industry development through quality research projects. Two HKRITA projects – "FabricEye™ - Fabric Structure Analysis and Appearance Evaluation", and "Advanced Functional Surface Treatment Technology for Textile Materials: Lotus Nano® Repellency Technology" were awarded.....

more>

Industrial Connection in China

Technology Seminar for Sweater Manufacturing in Dongguan

Sweater manufacturing is an important sector in the textiles and apparel industry. After a well-received seminar on this area had held at early 2008, The Hong Kong Research Institute of Textiles and Apparel (HKRITA) organised another talk, "Technology Seminar for Sweater Manufacturing", at Royal Garden Hotel, Dalang, Dongguan.....

more>

Technology Feature

Development of a Problem Solving Model for the Hong Kong Textiles and Clothing Industries

Customisation aims to deliver the best products and services to meet individual customers' needs. However it also means that manufacturers are no longer able to enjoy mass production in a single order. Nowadays industry faces a shorter production time, frequent changes of production arrangement.....

full article >

R&D Projects

Three new platform research projects have just been approved with HK$3.15 million funding support. These projects are:

New Materials and Textiles and Apparel Products

1. Application of Foam Dyeing Technology for Developing Colour Wash-out Effect on Cotton Knitted Fabric

Enhanced Industrial Systems and Infrastructure

2. An Intelligent Fabric Sample Resources Management System (FRMS) for Fashion Product Development

3. Remote Assessment System for Physical Prototypes under an E-clustering Environment (EPAS – E-clustered Prototype Assessment System)

PRIME SOURCE FORUM HONG KONG

THE ANNUAL MEETING PLACE FOR THE APPAREL INDUSTRY

Workshops: 31/3/2009
Forum: 1-2/4/2009
HKCEC

Technology Symposium for Textiles and Apparel 2009

18-19 March 2009

Event Highlights

The 86th Textile Institute World Conference - Fashion and Textiles: Heading Towards New Horizons

18-21 Nov 2008

The 86th Textile Institute World Conference was held at the Hong Kong International Trade and Exhibition Centre from 18 to 21 November 2008.....

more>

Exchange Session with College of Textiles, Donghua University
18 Nov 2008

Briefing workshop: Innovation & Technology Development on Textiles & Apparel
26 Sep 2008

Challenges in Colour Technology 2008 (Shenzhen)
25 Sep 2008

more>

Visits

The Ministry of Science and Technology of the People's Republic of China

12 December 2008

Visit of Wuyi University
17 December 2008

Visit of Shengzhou Science and Technology Delegation
18 December 2008

Upcoming Events

12-15 Jan 2009	HKTDC Hong Kong Fashion Week for Fall/Winter 2009	Hong Kong Convention and Exhibition Centre
16 Jan 2009	Seminar on Green Technology in Dyeing, Finishing and Functional Processing for Textile Products	HKPC Building
5-8 Mar 2009	The 10th China (Dongguan) Int'l Textile & Clothing Industry Fair cum The 4th South China Int'l Sewing Machinery & Accessories Show	Guangdong Modern International Exhibition Centre
18-19 Mar 2009	Technology Symposium for Textiles and Apparel 2009: R&D – The Cutting Edge of Technology	Chiang Chen Studiio Theatre, The Hong Kong Polytechnic University

Enquiry
The Hong Kong Research Institute of Textiles and Apparel

Address: R906-08, Shirley Chan Building
The Hong Kong Polytechnic University
Kowloon, Hong Kong

Tel: (852) 2627 0180 Fax: (852) 2364 2727 E-mail: info@hkrita.com

Editorial Team
Dr. KC Ho, Ms Pandora Chan, Ms Lydia Fung, Ms SC Ku

Major Exhibitions and Roadshows

Date	Events	Location
03 May 2006	World of Trims Exhibition organized by Apparelkey	PolyU, Hong Kong
29 –30 May 2006 08 –09 Jun 2006	Road-shows organised by the Innovation and Technology Commission	Guangzhou and Foshan Shenzhen and Dongguan, China
06 –10 Jun 2006	2006 Pan PRD Trade Fair – HK Pavilion organized by HKTDC	Yunnan, China
11-14 Jul 2006	Fashion Week Spring/Summer 2007	HKCEC, Hong Kong
12 –17 Oct 2006	China Hi-Tech Fair	Shenzhen, China
10 –13 Nov 2006	Innovation Festival 2006: Youth Innovation Exhibition	Hong Kong Science Museum, Hong Kong
29 Nov –1 Dec 2006	Innovation and Design Expo	HKCEC, Hong Kong
15-18 Jan 2007	Hong Kong Fashion Week for Fall/ Winter	HKCEC, Hong Kong
03 May 2007	Reception for Mainland, Taiwan and Foreign Owned Technology Companies by Invest Hong Kong	The Hong Kong Club, Hong Kong
14 May 2007	Roadshow in “Traders Meet for the Textile Industry”	HKCEC, Hong Kong
06-12 Jun 2007	The 4th PPRD Regional and Trade Cooperation Fair	Hunan, China
10-13 Jul 2007	Hong Kong Fashion Week Spring/ Summer 2008	HKCEC, Hong Kong
04 Sep 2007	Media Workshop: An Update on Innovation, Technology and Design	The Hong Kong Science and Technology Parks, Hong Kong
14-19 Sep 2007	Innovation Festival 2007 & Innovation Expo 2007	HKCEC, Hong Kong
13-20 Sep 2007	Joint exhibition with PolyU at the International Exhibition of Textile Machinery (ITMA)	Munich, Germany

Date	Events	Location
12-17 Oct 2007	China Hi-Tech Fair 2007	Shenzhen, China
18-22 Oct 2007	The 6th China (Dalang) International Woolen Knitwear Fair	Dongguan, China
12-15 Dec 2007	Innovation Design Tech Expo	HKCEC, Hong Kong
14-17 Jan 2008	Hong Kong Fashion Week Fall/ Winter 2008	HKCEC, Hong Kong
8-11 Jul 2008	Hong Kong Fashion Week Spring / Summer 2009	HKCEC, Hong Kong
12-17 Oct 2008	China Hi-Tech Fair 2008	Shenzhen, China
16-19 Oct 2008	6th China Invention Exhibition at Suzhou	Suzhou, China
25 Nov –19 Dec 2008	R&D - the Cutting Edge of Technology: Exhibition Tours and Briefing Sessions	Local universities: CityU, PolyU, HKU, HKUST

Major Symposium, Seminars and Workshops

Date	Events	Location
07 Apr 2006	The 8th China Venture Capital Forum	Shenzhen, China
20 Apr 2006	Launching Ceremony of the R&D Centres	Hong Kong Convention & Exhibition Centre (HKCEC), Hong Kong
22 Jun 2006	Seminar for FHKI Member	FHKI, Hong Kong
19-23 Jun 2006	IFFTI Annual Conference	North Carolina State University, United State
18 Jul 2006	Forum of applications of advanced technology on textiles and apparel	Shenzhen, China
04 Aug 2006	Luncheon briefing for Textile Council	Hong Kong
16 – 18 Oct 2006	The Sixth International Thermal Manikin & Modelling Meeting	PolyU, Hong Kong
27 Jan 2007	Seminar on the Latest Breakthrough in Technology for Textile Dyeing and Finishing	Clothing Industry Training Authority, Hong Kong
28 – 31 Mar 2007	The 8th China (Dongguan) International Textile Industry Fair	Dongguan, China
19-20 Apr 2007	Technology Symposium for Textiles and Apparel : New Ideas, New Opportunities	PolyU, Hong Kong
02-04 May 2007	International Forum on Fashion & Textiles	PolyU, Hong Kong
21 May 2007	The Innovation and Technology Forum	HKCEC, Hong Kong
22 May 2007	Jangxi, Hong Kong and Guangdong Technology Forum	Wan Chai, Hong Kong
23 May 2007	Shenzhen-Hong Kong Innovation Circle- by the Shenzhen Bureau of Science Technology and Information of the Shenzhen Municipality	Shenzhen, China
29-30 May 2007	2007 China International Forum on New Technologies of Dyeing and Finishing	Hangzhou, China
27 Jun 2007	Shaoxing, Hong Kong and Taiwan Cooperation Week 2007	Hong Kong
11 Jul 2007	Press Conference of The 6th China (Dalang) International Woolen Knitwear Fair	HKCEC, Hong Kong
06 Aug 2007	Luncheon cum seminar for Hong Kong Intimate Apparel Industries' Association Ltd.	Hong Kong
23-24 Aug 2007	Fashion Merchandising Training	Shanghai, China
30 Oct 2007	Seminar: Review on ITMA 2007	PolyU, Hong Kong

Date	Events	Location
14 Nov 2007	Seminar and lab tour for members of The Chinese Manufacturers' Association of Hong Kong	PolyU, Hong Kong
15 Nov 2007	Joint seminar with Dystar: “Econfidence Denim”	PolyU, Hong Kong
14 Dec 2007	Seminar: Innovation and Technology Applications for Textile and Garment Industry	HKCEC, Hong Kong
18 Jan 2008	Technology Forum for Sweater Manufacturing	Clothing Industry Training Authority, Hong Kong
05-08 Mar 2008	The 9th China (Dongguang) Int’l Textile and Clothing Industry Fair	Dongguang, China
13 Mar 2008	Seminar in Interstoff Asia Essential Spring 2008: Innovation and Technology Development for Knitwear Industry	HKCEC, Hong Kong
28 Mar 2008	Challenges in Colour Technology 2008	PolyU, Hong Kong
31 Mar 2008	Post New Technology and Innovations on Eco-Textiles to Taiwan Study Mission Sharing Seminar	HKPC, Hong Kong
08-09 Apr 2008	The 2nd International Textile Conference on New Technology of Dyeing & Finishing	Jinan, China
19 Apr 2008	Hi-Tech Conference in Textile Industry 2008	Dongguan, China
25 Jun 2008	Briefing Session of R&D Project Application	PolyU, Hong Kong
27 Jun2008	Briefing workshop for The Chinese Manufacturers’ Association of Hong Kong	PolyU, Hong Kong
31 Jul 2008	Seminar on Principles of Colour Measurement, Communication and New Innovations	PolyU, Hong Kong
31 Jul 2008	Seminar on Innovation and Technology Development on Textiles and Apparel (Briefing workshop for KIDS member)	PolyU, Hong Kong
01 Aug 2008	Seminar on Higher Production Effectiveness by Advanced Garment Manufacturing Technology	PolyU, Hong Kong
14-16 Aug 2008	SMART-TBIS Joint Symposium 2008	Hong Kong

Date	Events	Location
29 Aug 2008	Seminar on New Product Design and Development by Advanced Information Technologies	PolyU, Hong Kong
12 Sep 2008	Briefing Session for R&D Project Applications 2008	HKPC, Hong Kong
25 Sep 2008	Challenges of Colour Technology 2008 (Shenzhen)	Shenzhen, Hong Kong
26 Sep 2008	Briefing workshop for the member of Knitwear Innovation and Design Society	PolyU, Hong Kong
08 -10 Oct 2008	Seminar in Interstoff Asia Essential Autumn 2008: High Performance Sportswear and Device	HKCEC, Hong Kong
04 Nov 2008	Technology Seminar for Sweater Manufacturing	Dongguan, Hong Kong
18 Nov 2008	Exchange Session with College of Textiles, Donghua University	CITA, Hong Kong

Mid-term Review Report

Hong Kong Applied Science and Technology Research Institute

Operation and Management of
Hong Kong Applied Science and Technology
Research Institute Company Limited
for the Period of April 2006 to 31 December 2008

PURPOSE

This paper informs Members of the operation and management of the Hong Kong Applied Science and Technology Research Institute Company Limited ("ASTRI"), its strategic plans and how far it has been able to achieve its targets and goals, as well as how the Research and Development ("R&D") deliverables of ASTRI have enhanced Hong Kong's competitiveness in ICT technology-based industries from April 2006 to December 2008.

INTRODUCTION

2. Founded by the Hong Kong Special Administrative Region ("HKSAR") Government, ASTRI started operation in 2001 with the public mission of performing high quality R&D for technology transfer to industry, developing the much needed technical human resources and acting as a focal point that brings together industry and university R&D assets to enhance Hong Kong's technological competitiveness on a continuous basis. ASTRI's first full project was approved in March 2002.

3. In April 2006, ASTRI was designated by the Innovative and Technology Commission ("ITC") as Hong Kong's Information and Communications Technologies ICT R&D Centre, under which it operates four technology areas, namely Communications Technologies ("CT"), Enterprise and Consumer Electronics ("ECE"), IC Designs ("ICD"), and Material and Packaging Technologies ("MPT"). The ICT R&D Centre was merged with ASTRI and since then, the bulk of ASTRI's research endeavours have been conducted under the ICT R&D Centre.

ORGANISATION STRUCTURE

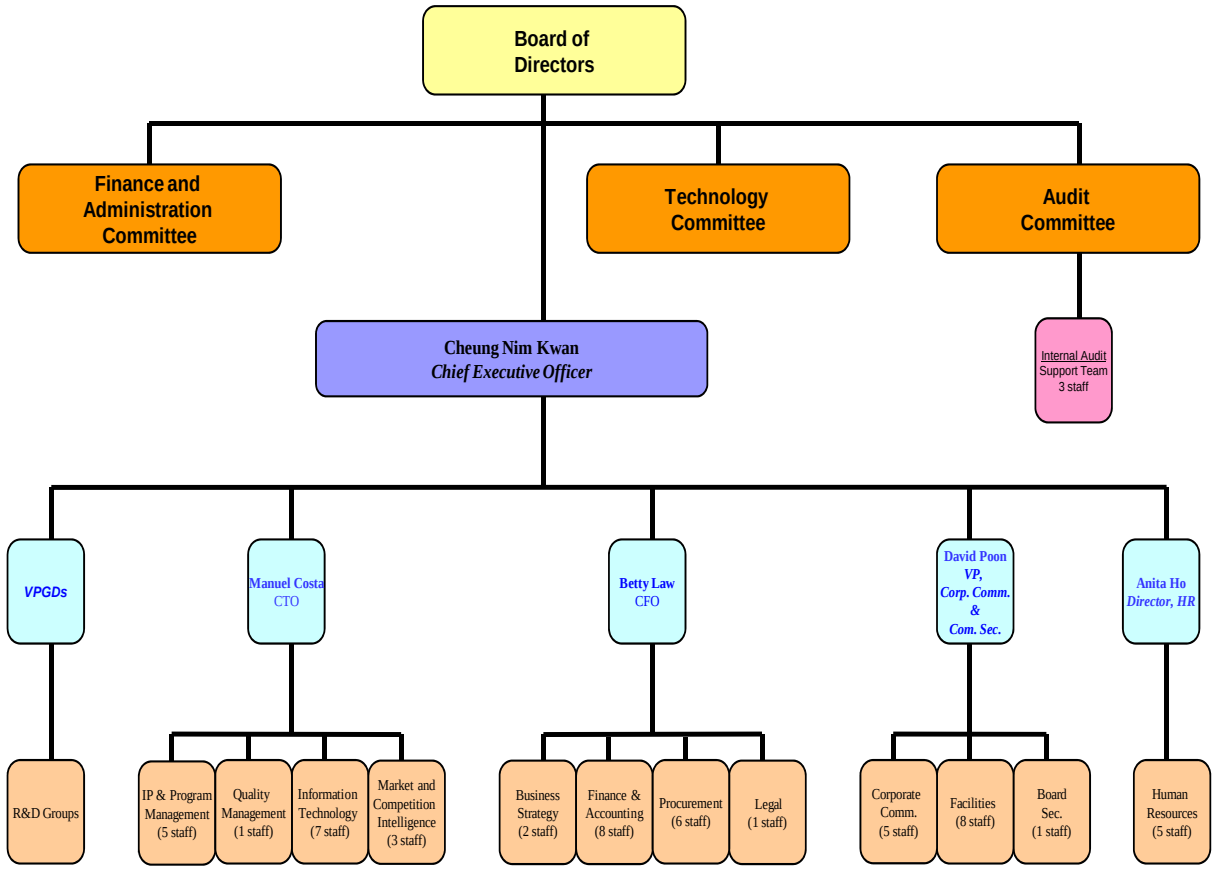
4. ASTRI is headed by a Chief Executive Officer ("CEO") and is governed by a Board of Directors comprising representatives from the industrial and commercial sectors, the academia and the

HKSAR Government. Three functional committees, namely Finance and Administration Committee, Technology Committee and Audit Committee, assist the Board in managing the business of ASTRI.

5. The CEO is responsible to the Board of Directors for the overall management of ASTRI. He is assisted by Vice President and R&D Group Directors ("VPGDs") who are in charge of the various research initiatives and the Headquarters executives who look after the administrative, financial, business development, technology management and other support functions of the institution. As of 31 December 2008, ASTRI has 469 staff of which 401 are research personnel. Below is the current organisation chart of ASTRI by functions:

Hong Kong Applied Science & Technology Research Institute Co Ltd

Organisational Chart – Headquarters



Remark: No. of staff as at 31 March 2008

6. ASTRI Board and management, during the period under review, have regularly reviewed the administration structure of ASTRI and implemented measures of reorganisation and reshuffling of duties with a view to further improving the overall operational efficiency of the Company. The latest organisation structure was formulated and endorsed by the Board of Directors at its meeting held in June 2008. The highlights of the new structure are summarised below:

(a) CEO, in addition to overseeing the operations of the four domains, will personally supervise the functions of Human Resources and Finance, as well as the Vice President of Corporate Communications, and the Chief Technology Officer, thus bringing the total number of Headquarters Executives directly reporting to him to four. This new structure will enable the CEO to provide personal leadership and guidance to both ASTRI's general administration as well as its R&D activities;

(b) Vice President of Corporate Communications will also act as Company Secretary and supervise the Facilities Department as well as the administration staff;

(c) Chief Operations Officer was re-titled Chief Technology Officer ("CTO") in the re-organisation to better reflect his range of responsibilities, which include formulation of ASTRI's five-year plan and its annual domain update, planning and projects portfolio operation and management.

OPERATING FOCUS

7. As a publicly-funded applied research institution, ASTRI operates under the firm conviction that it exists for the maximisation of "public good", and this public good is measured by the "economic impact" and other benefits they bring to their beneficiaries – the industry and the community as a whole.

8. In order to generate and sustain the economic impact, ASTRI is vigorously focusing on the following:

(a) “Customers”, i.e., the companies which make use of the technologies and intellectual properties developed by ASTRI to achieve economic returns. In this regard, the research projects undertaken by ASTRI should be market-driven which cater for the needs of the customers and the industry; and

(b) “Technology Transfer”, i.e., the paid transfer of well-defined product technologies, service technologies or enabling technologies, through a license contract, a service contract or other legal means, from ASTRI to its industry customers for the purposes of commercialisation. For ASTRI to link their research to potential customers and then on to commercialisation successes, technology transfer is the critical path.

ASTRI’S OPERATING MODEL : CUSTOMER-FOCUSED R&D

9. Based on the above considerations, ASTRI builds its operations under the theme of “customer-focused R&D”. It is a methodology that aims to maximise the “customer impact” of R&D and makes the conversion of research into real results a systematic process. This systematic process builds customer focus into every aspect and every step of the R&D programs run by ASTRI, from their initiation to the eventual transfer of the generated intellectual properties (“IPs”) to the customers in the following manner:

(a) hire and train R&D leaders who are not only outstanding technologists and seasoned professionals with extensive management track records, but also possess extensive “domain knowledge” of the industries they specialise in;

(b) plan and substantiate compelling technology initiatives to engage potential customers before the R&D projects are to be initiated - these visions are then broken down to projects for their implementation;

(c) identify clearly the customers before the project is approved for launching;

(d) work with the customers as early and closely as possible - treat the customers as partners of R&D rather than just the receivers of developed technologies;

(e) build R&D teams that are not only capable to innovate for new IP but also possess the knowledge and skills to make those innovations cost-competitive, market-compatible and serviceable so that they can be readily transferred to the potential customers for manufacturability; and

(f) identify, build and upgrade core technologies continuously to anticipate and satisfy the varying needs of its wide customer base dynamically.

10. A very critical part of the customer-focused R&D ASTRI practices is the rigorous setting and monitoring of quantitative performance targets to ensure that all the customer-focused considerations described above are addressed effectively. These targets are used as the essential basis for the performance appraisal of the R&D groups and their leaders in ASTRI, and they are set at the beginning of the financial year and monitored continuously for attainment. The three main types of quantitative performance targets adopted by ASTRI are:

(a) number of technologies transferred to industry per year - this is the most crucial as they are the “path” toward the commercialisation of the IPs developed by the R&D projects;

(b) number of patents filed per year as well as number of patents granted and its success ratio - this is important because patents are the essential indicators of the worthiness of innovations and they are used to increase the value of the technology transfer activities; and

(c) contributions from industry per year - as an R&D institution begins to engage customers and start to build a valuable brand name to its customer base, eventually the incomes from this customer base through various services such as the licensing and sales of technologies, design services, product development services will start to increase.

ACHIEVEMENTS

11. During the period under review, the present administration of ASTRI has achieved impressive progress in the implementation of the customer-focused R&D methodology described above.

Technology Transfers

12. The number of annual technology transfers to industry has grown impressively during the period under review. While the figure has increased from six in 2004 to nine in 2005, a total of 144 technology transfers (32 in 2006, 42 in 2007 and 70 in 2008) were completed from 2006 to 2008.

13. A total of seven Industry Collaborative Programmes were also established from 1 January 2008 to 31 December 2008.

14. We plan to increase the total number of technology transfers, which include business deals related technology licensing and contract services, and industry collaborative programmes to 84 for 2009 under the guidance and support of the ITC.

Patents

15. The number of patents filed by ASTRI has been growing fast from 2006 to 2008. For this period, more than 170 patents (53 in 2006, 58 in 2007 and 63 in 2008) have been filed.

16. Up to now, a total of 18 patents have been granted to ASTRI, 16 of them were granted after 2006. In general, it may take up to four years for a patent to be granted. A breakdown is as follows:

No.	Patent Title	First Inventor	U.S./China Patent Application Filing Date	Patent Granting Dates*	Domain
1.	System and Method for Providing Multimedia Wireless Message Across a Broad Range and Diversity of Networks and User Terminal Display Equipment	Zhibin Lei	02-Oct-03 (China)	17-Dec-08 (China)	ECE
2.	Dynamic Allocation of Channels in a Wireless Network	Siu-fai Lee	22-Oct-02	18-Nov-08	CT
3.	Systems and Methods for Managing Wireless Communications Using Link Space Information	Jason Hang-chang Leung	21-Oct-02	29-Apr-08	CT
4.	Multiband Branch Radiator Antenna Element	Peter Chun-teck Song	28-Feb-03	31-Dec-05	CT
5.	Wideband Shorted Tapered Strip Antenna	Peter Chun-teck Song	28-Feb-03	5-Apr-05	CT
6.	Location Positioning in Wireless Networks	Yi Gong	6-Aug-03	25-Dec-07	CT

No.	Patent Title	First Inventor	U.S./China Patent Application Filing Date	Patent Granting Dates*	Domain
7.	Low Cost, Multi-beam, Multi-band and Multi-diversity Antenna Systems and Methods for Wireless Communications	Peter Chun-teck SONG	24-Nov-03	11-Jun-06	CT
8.	Systems and Methods for Wireless Network Range Extension	Cheong-yui Wong	28-Apr-04	23-Jul-08	CT
9.	Location Determination and Location Tracking in Wireless Networks	Meixia Tao	30-Apr-04	15-Apr-08	CT
10.	Photo-Detectors and Optical Devices Incorporating Same	Torsten Wipiejewski	11-Oct-05	18-Dec-07	MPT
11.	Opto-Electronic Device for Optical Fibre Applications	Torsten Wipiejewski	11-Oct-05	12-Aug-08	MPT
12.	Meander Feed Structure Antenna Systems and Methods	Corbett Rowell	29-Mar-06	23-Oct-07	CT
13.	Heat Exchange Enhancement	Geoffrey Wen-tai Shuy	31-Mar-06	21-Oct-08	MPT

No.	Patent Title	First Inventor	U.S./China Patent Application Filing Date	Patent Granting Dates*	Domain
14.	Efficient Lighting	Geoffrey Wen-tai Shuy	28-Apr-06	13-Nov-07	MPT
15.	Monitoring Devices and Intrusion Surveillance Devices	Torsten Wipiejewski	16-Jun-06	19-Aug-08	MPT
16.	Miniature Balanced Antenna with Differential Feed	Corbett Rowell	19-Jun-06	18-Nov-08	CT
17.	Configurable SIMD Processor Instruction Specifying Index to LUT Storing Information for Different Operation and Memory Location for Each Processing Unit	Winnie Wing-yee Lo	3-Oct-06	21-Oct-08	ICD
18.	High Speed Context Memory Implementation for H.264	Chun-kit Hung	30-Mar-07	28-Oct-08	ECE

*Apart from the first patent listed above, the others were granted in the U.S.

Industry Contributions and Other Key Performance Indicators

17. Industry contributions are perhaps the most challenging of the three targets ASTRI annually set. Contributions are tightly linked and related to the technology transfer activities. They require considerable maturity of the R&D organisation and teams as well as the track records of reliable services before they can grow and expand to substantial amounts. In order to become proficient in doing this eventually, ITC has

set a target to generate industry contributions for platform projects to cover at least 10% of the total project cost as per ITSP Guidelines. The overall target for industry contribution for ASTRI in its entirety is set higher. For instance, in 2008 this was set at 12%. This overall target number is set at 10% minimum every year by ASTRI and its Board, and will be adjusted upwards yearly depending on the economic climate and other deciding factors. For instance, for FY 2010, ASTRI is considering adjusting that overall target to 14%.

18. ASTRI's senior management believes that eventually the overall contribution target may be set as high as 20%. For benchmarking purposes with similar Institutes in the region, we note that ITRI, which has been in existence for 40 years and has close to 5,500 staff, has not set its platform projects income target above 7% and its overall income target above 20%. The industry contribution ASTRI has been able to achieve during the past six years compared extremely favourably with its counterparts in the region.

19. Taking into consideration our latest track record, ASTRI should be able to generate significant contributions from industry for our R&D programs in the future.

20. IPs, including hardware plus software reference designs, copyrights, patents are the most important asset for a publicly-funded R&D institution like ASTRI. On one hand, they reflect innovation and inventiveness, and serve as the foundation for ASTRI's most important business – transferring technologies that are innovative. On the other hand, legalised IP rights protect taxpayers' investments in ASTRI's R&D programs. For these reasons, we set up procedures for the rigorous documentation and management of the processes involved and establish Patent Committees consisting of technical and IP management specialists to review and screen each pending application for originality, feasibility and marketability to ensure that the filing of these patents are indeed necessary and advantageous.

Year to Year Performance Indicators**

Performance Indicators	2006 Actual	2007 Actual	2008 Actual	2009 Estimate
No. of New Full Projects[#]	13	14	26	42
No. of New Seed Projects*	11	21	19	20

No. of Patents Filed	53	58	63	65
No. of Technology Transfers	32	42	70	84
No. of Clients Engaged in Technology Transfers	27	33	44	54
No. of Members Joining Consortia Formed by ASTRI	7	26	41	47
No. of Technology Workshop / Seminars Organised	48	55	31	30
No. of Participants of Seminars	2400	5400	3900	3800
Income from Industry (HK$ million)	6.9	9.8	20.7	22.0

Note:

** Per calendar year

Full projects are R&D projects with more than HK$2 million funding support from the ITF and including collaboration projects with industry.

* Seed projects are feasibility studies for developing substantive R&D project proposals. These studies should not cost more than $2 million nor exceed six months in duration.

MANAGEMENT FOR QUALITY

21. In addition to always trying to develop world-class IPs and transfer them effectively to industry customers, ASTRI puts a lot of emphasis on assuring the quality of both the research it does and the management processes it executes.

R&D Quality Assurance

22. To assure the quality of its R&D programs, ASTRI goes through a four-step process both for its annual planning and the vetting of its individual projects, and conduct continuous monitoring of all ongoing projects.

23. Every financial year ASTRI conducts its Annual Planning Cycle consisting of the following steps:

(a) annual update of ASTRI's Five-year Plan in October;

(b) review of Key Technology Initiatives by ASTRI's Domain Advisory Committees which consist of local industry and academic leaders;

(c) review of ASTRI's overall strategy and its execution by ASTRI's Technology Advisory Committee which consist of world-renowned international technology experts; and

(d) ASTRI Board review and approval.

24. All of the ongoing R&D projects are continuously monitored through ASTRI Board review in six to nine months from project commencement to evaluate the effectiveness of customer engagement. Half-yearly progress reports will be submitted to the ITC to examine the project progress against its stated milestones. The projects are also subject to quarterly reviews by the Technology Committee of the Board, and each of the ongoing projects is monitored monthly for progress by ASTRI's CTO.

Management Quality Assurance

25. To assure management quality, ASTRI is one of the very few R&D institutions in the world that has its management processes certified with ISO 9001:2000 standards in addition to having a Board-approved Corporate Governance Manual. The four essential objectives for ASTRI's ISO-based management system are Transparency, Speed, User-friendliness and Governance.

26. To efficiently exercise good corporate governance, an internal audit team reporting to the Audit Committee has been set up in 2007 to assist the Board by providing it with information and assurance on internal management controls and observations on major control inadequacies.

27. As required by ASTRI's Corporate Governance Manual, the Internal Audit Department carries out annual audits to meet coverage requirements specified by the Board in accordance with the determined priorities.

28. The Corporate Governance Manual also requires the Internal Audit Department to review the internal control system and report the efficiency and effectiveness of such system to the Board via the Audit Committee. With respect to this requirement, semi-annual Internal Audit Progress Reports were presented to the Audit Committee.

29. Furthermore, the Board of Directors also appointed the Head of Internal Audit as the Compliance Officer in April 2007 year to assist its governance function by providing timely information to the Audit Committee on the compliance status of ASTRI regarding policy and procedures of project management, finance, human resources, and administrative management.

30. To ensure continuous compliance with the Guide to Information and Technology Support Programme ("ITSP"), ASTRI's corporate governance policy, ISO procedures and other relevant guidelines, the Compliance Officer is required to submit quarterly reports to the Audit Committee.

31. Meanwhile, fully aware that ASTRI is supported by public funds, the Management, guided by its Board, continued to achieve further cost-effectiveness during the year. It is worth noting that ASTRI contained its administrative staffing cost to a relatively low level. Last year's ratio of management and administrative manpower cost (HK$29.03 million) over total manpower cost (HK$185.79 million) was about 15.6%, and only about 29% of recurrent expenditure was spent on staffing at Headquarters. Of the total 469 staff employed by ASTRI as of 31 December 2008, less than 15% are non-R&D staff (61).

32. The latest administrative staffing situation compares very favourably with other educational and research institutions in the region. The Management is monitoring closely the Headquarters staffing situation and will continue to employ appropriate measures to achieve a higher level of cost effectiveness and value for money, without adversely affecting the efficiency of ASTRI's overall operation.

FOCUS OF FUTURE EFFORTS

33. To further build on ASTRI's current success, the following objectives have been set for the coming years:

(a) continue to strengthen its institutional and research capabilities through the development of its R&D Centre;

(b) further promote and transfer technologies developed from its R&D projects to industry;

(c) work closely with the local industry and universities on the latest development of ICT technologies, manufacturing technology and market trends with a view to fostering closer collaboration;

(d) enhance local high-technology human resources development; improve the industrial involvement and contribution on its R&D projects through collaborative projects; and

(e) work with the HKSAR Government to create employment opportunities in hosting interns who have recently graduated from local universities.

34. To achieve the above, ASTRI will dedicate additional efforts in the following endeavours:

35. As the continuous success of ASTRI largely depends on the support of the HKSAR Government, industry and the community at large, ASTRI will continue to enhance its image, visibility and public awareness in Hong Kong, Mainland China and the region. ASTRI will continue to improve and strengthen its collaboration and partnership with the Chinese Mainland Government within the framework of its 11th Five-Year Plan.

36. ASTRI has so far held four very successful Industry and University Consultation Forums in 2007 and 2008 (two in Hong Kong and the other two in Shenzhen), introducing to industry and the academia our various technology programmes and R&D endeavours. The fora also successfully solicited the audiences' ideas for future projects and stimulated collaborations with industry on the development of innovative technologies for the sustainable growth of Hong Kong. With the encouragement and support of the City Government of Shenzhen, ASTRI is hopeful that, when its office in Shenzhen becomes operational in early

2009, to further increase the number of Forums held in Shenzhen as well as other strategic locations in the Pearl River Delta.

37. During the past year, ASTRI also successfully launched the Industry Collaborative Projects ("ICP") Scheme. So far, seven ICP projects have been initiated, involving multimedia and home entertainment, high-definition internet protocol receiver and TV system, low-cost MRI systems and components for mass markets, the tyre pressure gauge systems, and data storage multi-level technology. These projects are undertaken in collaboration with local industry partners who contributed 50% to 75% of the budget. This Scheme is a new funding model which is expected to further boost the collaboration between ASTRI and industry partners.

38. With the introduction of the Innovation and Technology Fund ("ITF") Internship Programme, ASTRI is in an extremely advantageous position to enhance the career prospects of recently graduated students in the hi-tech entrepreneurial business by providing them with the first practical experience in applied R&D that are vital to the development of their future careers.

THE WAY FORWARD

39. Looking ahead, ASTRI is optimistic that with the support from both HKSAR Government and industry as well as total commitment of all members of ASTRI, it will achieve further excellence in its R&D endeavours in a customer-focused manner that will contribute significantly not only to the sustainable growth of its customers but also to Hong Kong as a whole.

40. While ASTRI will continue concentrating on its current ICT core R&D focus, it will also explore opportunities for impact outside of just developing new and innovative technologies. It will also increasingly apply such technologies to areas where they are most likely to improve people's quality of life.

41. ASTRI, with its current portfolio mix of: (i) short-term product development projects (one to two-year horizon); (ii) medium-term advanced development projects (two to three-year horizon); and (iii) longer-term projects (three to five-year horizon), has already built a solid foundation of both sustainable and disruptive technologies that can support its long-term growth. In the coming years, ASTRI's focus will be

on seeding new applied research that can create economic impact for our customers, on expanding its industry partnerships, and increasing its collaboration efforts with both Hong Kong, Chinese and international research counterparts.

Hong Kong Applied Science and Technology
Research Institute Company Limited
January 2009

Hong Kong R&D Centre for Logistics and
Supply Chain Management Enabling Technologies
香港物流及供應鏈管理應用技術研發中心

Mid-term Review Report

March 2009

Table of Contents

Mid-term Review Report

1. Background

Logistics industry is identified as one of the economic pillars of Hong Kong. To maintain its leading role as a logistics and supply chain management hub, Hong Kong must continue to enhance its support for the logistics sector. The Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies (LSCM) was established in April 2006 with funding support from the Innovation and Technology Fund and is commissioned to provide a one-stop shop for technology transfer and commercialization in the relevant technologies.

2. Mission and Vision

The goal of LSCM is to foster the development of core competencies in applied R&D in logistics and supply chain related technologies, with focus on RFID, and to facilitate adoption of these technologies by industries in Hong Kong and the Mainland to enhance their competitiveness.

3. Institutional Set-up

LSCM is set up as a non-profit limited company by guarantee jointly owned by the University of Hong Kong, the Chinese University of Hong Kong and the Hong Kong University of Science and Technology on an equal share basis.

The operation of the Centre is overseen by the Board of Directors which is supported by the Finance and Administration Committee and Technology Committee. The Board of Directors has the following composition –

Board of Directors		
Type	**Description**	**Total Number**
"A" Directors	One from the University of Hong Kong One from the Chinese University of Hong Kong One from the Hong Kong University of Science and Technology	Three (3)
"B" Directors	Representatives from Academic institutions with R&D experience, logistics and supply chain management enabling technology-related industries, trade associations, research institutions, and/or public bodies, and/or persons with legal, accounting, financial or management background	Not less than two (2)
"C" Directors	One from the Government	One (1)

The Finance and Administration Committee is to oversee and monitor all matters

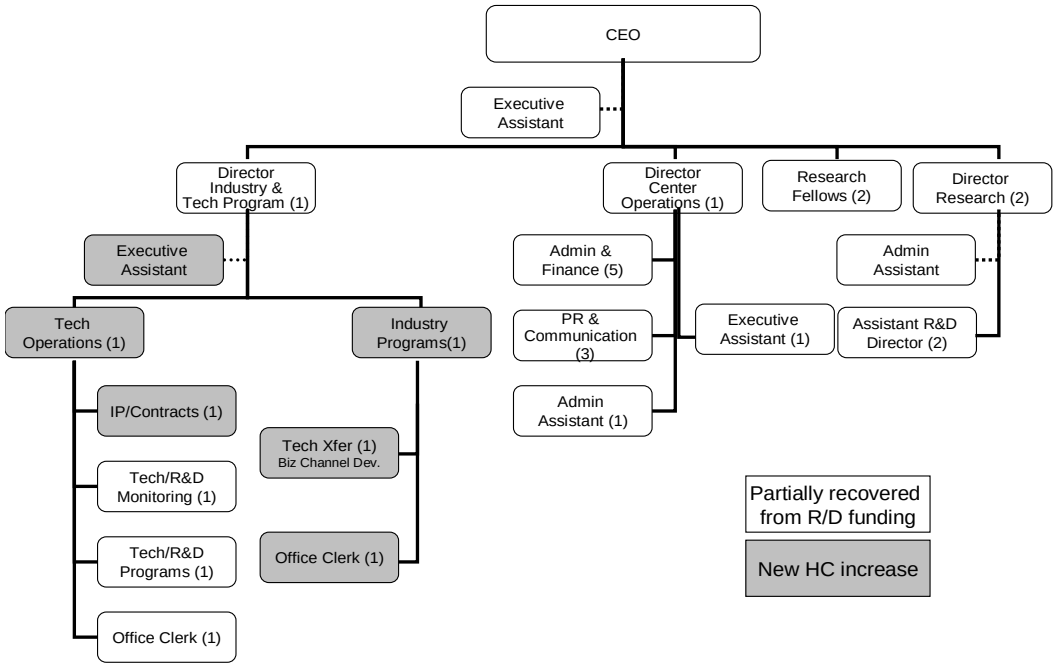
relating to the finance and administration of the Centre, including capital expenditures, financial management, budgeting, project control, treatment of intellectual property rights, staffing, human resource development and management, procurement, and commercialization framework. The chairman and members may all be drawn from the Board Directors.

The Technology Committee is to evaluate and assess project proposals and monitors and review the progress of all R&D programs and projects of the Centre. The Technology Committee comprises a chairman and a number of members as may be determined by the Board from time to time. The chairman and members may all be drawn from the Board Directors.

4. Organisation Chart

At present, there are 31 Centre staff including the Chief Executive Officer. As the Centre enters the next five-year period, we anticipate an increase in business and technology transfer activities, and a moderate increase in the overall research activities by working closely with university and R&D partners. The Centre is expected to be built up to full-strength by 2012 and headcount is expected to increase to 47. The Centre's organizational structure and mode of operation will remain largely unchanged.

Proposed Structure for LSCM Operations



In this structure, the Centre will maintain its current level of administrative staff while relying on host University support for finance, IT and HR operations. Additional staffs will be added to handle following tasks:

(a) IP and contract management
(b) Technology Transfer and commercialization
(c) Business and industry development
(d) Project monitoring/University relations

The Centre will continue to maintain two R&D Directors. The Directors will be responsible for i) developing R&D strategies for their respective areas, ii) liaising with industries on technical issues, and iii) monitoring research activities for their respective areas.

The Centre may also appoint selected PI's or outside experts as Centre Research Fellow(s) to represent the Centre in external activities as well as to advise the Centre on technology and research issues. The Research Fellows will be partially or fully funded by R&D budget.

5. Technology Roadmap and R&D programme

To ensure resources are put into the right R&D that will generate value for the industry, market intelligence is essential in determining what technologies and solutions are relevant to resolve real prominent industry problems.

In 2008, LSCM conducted a market intelligence study with an objective to empower logistics and supply chain community with industry needs and technology capabilities to enhance production and adoption of relevant technologies in the industry. Its extensive industry analyses and researches (including in-depth study of market trends and interviews with industry experts and leaders) have highlighted the following gaps between present technology and industry's requirements:

(a) Since the RFID UHF Gen 2 standards rectified in the ISO 18000-6C, hardware manufacturers have been offering their solutions to the market in accelerated pace. However, the general end users and service providers of logistics and supply chains do not have sufficient expertise to evaluate hardware performance from different vendors, nor do they have the capability to select solution to best fit their specific requirements.

(b) Tag cost is always the most critical factor in RFID mass adoption and deployment. Although the market is predicting 1-cent tag in the next decade, but how to achieve this price goal is still left as an open question. RFID tag cost consists of many different components that include silicon, inlay packaging and materials, antenna, testing, etc. Cost reduction is expected to come from all of these components.

(c) There is an increasing demand from industries involved in global logistics and supply chain management to leverage RFID to achieve global visibility for shipping from manufacturing sites to retail stores. This requirement for RFID tagging is best implemented at the point of origin, i.e. the manufacturing site, in order to realize the full benefits of this technology for global visibility. Currently, manufacturers are using the slap-and-ship approach for tagging the goods. This approach is labor intensive, inefficient and error-prone. Manufacturers are now seeking cost effective tagging methods, in which RFID tags are supplied to manufacturers as product assembly components or packaging material. Tagging would then become efficiently integrated with product manufacturing and packaging. Hence, this topic solicits research and development for technologies that enable techniques of embedding RFID tags within product assembly components and packaging material. Moreover, this topic also solicits for the shop-floor RFID infrastructure setup and the information systems as well as their integration with the manufacturer's legacy application systems, in such consideration of total system for the RFID integrated product assembly and packaging process.

(d) Since the ISO rectification for EPCglobal Gen2 protocol, Gen2 based RFID systems have become widely adopted in supply chain management deployments. However, Gen2 also shows a lot of limitations from its field applications, namely

- Read/write distance. Today’s passive RFID has a reading range of 5-10 meters. Achieving longer range needs semi-passive or battery-assisted RFID tags
- Accuracy. Today’s RFID performance is still not reliable and consistent. Accuracy performance varies significantly among different scenarios
- Sensor-integration. As RFID deployments expand to other applications, effective integration techniques for ambient data

collection and tracking in applications, such as temperature, humidity, vibration and radiation, etc. are lacking behind

- Security/privacy support. Privacy protection is crucial to consumer acceptance for RFID. Security is needed at tag and reader level
- Memory size. Current RFID memory size, which is typically 128-bit of EPC code, has limited RFID deployment in many applications

(e) In terms of e-logistics capability, we have the most advanced e-trading network and portals that interconnect all stakeholders in the value chain. However, in face of the vast number of SME players staying offline, these e-platforms fall short from critical mass to prevail in price-performance. Moreover, the e-logistics information infrastructures need to be continuously revitalized with value-added functionality to cope with renewed requirements from industry, such as streamlined cross-border logistics, product and food supply chain safety, RFID/e-seal based logistics tracking services, etc.

(f) Technology capability has become indispensable in the modern logistic practices. The SME sector while constitute the majority of the industry, are generally technology weak and investment deprived. Provisioning of logistics software by on-demand and per-use charge is considered as a good service model for SME adopting IT. Current software products and deployment models do not suit the requirements for SME adoption. (i) Logistics application software should be provided as services with good reliability and service upgradeability, and (ii) flexible charging models should be supported for affordable pricing schemes. (iii) Flexible and seamless combination of software services from different providers is crucial for best customization to specific user needs. (iv) Security and privacy is important for SME consideration.

(g) Modern logistics require flexible, mobile computing solutions that allow data capture, information compilation and enable information accessible at real time and anywhere along the supply chain. This is particular important for the freight forwarding, distribution and delivery industries as most of those operations are ubiquitous and mobile in nature. While so many enterprises will need to be supported with mobile solutions by the fast growing wireless technologies, the gap for adoption of mobile solutions is still severe among the majority of logistics operators where traditional

means of manual handling is predominant. The target is to help enable and foster the upgrade of the logistics industries with the state-of-the-art mobile technologies. Common examples are cited from the industries of air freight forwarding, trucking and courier delivery. Issues of cost of deployment, ease of use, information security and enterprise systems integration are important elements to deal with in the application development for these mobile logistics solutions.

(h) Electronic seal is the key technology deployed in the Green Lane cross-boundary trucking initiative launched in May 2006 through the cooperation of the Shenzhen and Hong Kong governments to simplify the customs clearing system and flow of cargo transport between Hong Kong and Shenzhen. When integrated with other technologies like RFID, GPS, wireless and environmental sensing, e-seal is identified with potential for applications in many areas, and the Green Lane cross-boundary trucking is indeed just one of the many. At the bottom-line, the cross-border truckers need to be enabled with e-seal and the related technologies in virtue of the Customs implementation of Green Lane which is driving a mass adoption of e-seal among them. Moreover, the industry needs to be continuously revitalized with value-added functionality to enable them to use e-seal in their business including and beyond cross-boundary trucking, which will help enhance their capability for secured logistics operations and thus their competitiveness as well.

(i) Besides product information and identification, many logistics operations requires tracking and monitoring of environmental conditions for the product handling, like temperature, humidity, shock, etc. The requirements may be mandated by government regulation or customer request. On example is temperature monitoring in the cold chain operations. Another relevant example is humidity control during transportation of environment-sensitive items like wines and fine arts. In these business cases, the tracking and monitoring requirements demand application and optimization technologies for auto-identification integrated with environmental sensing as well as wireless communication.

(j) Company assets can be enormous in number. In many case, assets can be mobile (like employees, portable equipments). Asset tracking demands are high in many companies to optimize and improve business operations.

Various technologies like RFID, Wi-Fi, ZigBee, GPS and mobile are available now. Nonetheless, only few products are available in the market, which offer accurate positioning and tracking with cost-effective deployment. No single RF positioning method can work in all conditions, thus solutions of hybrid technologies may be handy. The market is in need of versatile systems and tools that enable devising of effective solutions and easy deployment from off-the-shelf technologies.

(k) RFID technology has been used in managing inventory, electronic access control, security systems, automatic identification of cars on toll roads, electronic article surveillance, etc. However, the current off-the-shelf RFID solutions on the market cannot be simply plugged and played into existing applications, i.e. the reader cannot realize its expected performance because of the local interference and environment, and the tag's electromagnetic characteristics may be detuned by its hosting products and materials. Special customization may be needed to cope with the adverse conditions of operations such as acidity, dirt/grease, electromagnetic interference, harsh temperature, water, metal, timber, etc. Such adversities nonetheless are not uncommon in the ordinary environments occurring in the factories, warehouses, hospitals, highways, ports and logistics terminals.

These information facilities LSCM in the formulation and implementation of the following technology roadmap with an aim to strive logistics and supply chain technology development in a demand-led market-driven direction. In the coming years, LSCM plans to continue to focus on the following technology areas:

(a) **RFID hardware and systems** – to develop core design capabilities, system implementation and manufacturing processes of RFID tags and readers that are related to targeted logistics management applications. Key research areas include RFID Testing and Qualification, Low-cost RFID Tag Manufacturing Techniques, RFID Hardware Systems Development for Manufacturing and Packaging Industries, RFID Beyond Gen2

(b) **Networking and infrastructure technologies** – to develop advanced computer networking and information infrastructure technologies for industrial adoption of information technologies in their business processes and for enabling efficient and effective business integration among

enterprises, in order to nurture the technology enabled environment for competitive advantage of the local industry. Key research areas include Enterprise e-Logistics Internetworking, On-demand technologies for Logistics Application Software Service Platforms,

(c) **Applications and decision support technologies** – to reinforce Hong Kong's position as a world-class logistics hub with advanced technologies and to assist manufacturers and suppliers in this region to fulfill RFID adoption requirements set by their global buyers. Key research areas include RFID-enabled warehouse management system, food safety, cross border, retailing, manufacturing and decision technologies.

R&D Programme

Between April 2006 and December 2008, LSCM conducted six rounds of project proposal solicitation and received a total of 43 applications. LSCM also initiated R&D projects of relevance to the industry.

Against the original target of a total of 80 projects in five years, LSCM has so far undertaken 23 projects by the end of 2008 at a total estimated project funding of $161.8 million from ITF (full list at Appendix). About $22.4 million of industry sponsorship was secured with these projects, representing about 12% of the estimated total project costs.

The number of present and projected projects, with funding details (in million), is shown in the following table:

Types of projects	2006/07 to December 2008			2006/07 to 2010/11			2011/12 to 2015/16		
	No. of projects	Industry contribution (% of project cost)	Total ITF funding	No. of projects	Industry contribution (% of project cost)	Total ITF funding	No. of projects	Industry contribution (% of project cost)	Total ITF funding
Platform research	23	22.4 (12%)	161.8	41	34.9 (11%)	286.7	40	40.0 (11%)	327.0
Collaborative research	0	-	-	4	4.0 (31%)	9.0	10	13.0 (30%)	29.0
Contract research	0	-	-	0	-	-	0	-	-
Total	23	22.4 (12%)	161.8	45	38.9 (12%)	295.7	50	53.0 (13%)	356.0

Project Vetting

Project proposals are first vetted by the Expert Review Panel (ERP). The ERP consists of members from the logistics and supply chain management enabling technologies-related industries, trade and industry associations, research and academic institutions, public bodies, Government etc, and of the legal, accounting, financial and management professions. The Technology Committee then evaluates the proposals, taking into considerations of ERP's comments and make funding recommendation to the Commissioner for Innovation and Technology.

As the Centre's staff is eligible to apply the same R&D funding programs competing with researchers from other universities, to ensure all applicants are given fair and equal chances and to avoid potential conflict of interest, the technical staff under the Technology Program is not allowed to involve in R&D projects. Similarly, the Centre's R&D staff is also shielded from the project vetting process. Furthermore, in order to avoid potential influence to the vetting decision of Technology Committee, all Center staff will not provide opinions or views to Technology Committee on individual project application.

Technology Transfer

The Centre has started to build up R&D project pipeline since mid-2007. With an average project duration of about 18-24 months, some of our early funded projects are either completed or reaching their final development stages.

In late 2008, the Centre completed its first R&D project, "RFID Enabling technologies for Retail & Logistics Industry". The IP licensing arrangement with the university partners and the proposed license fee of the project deliverables were discussed and approved by the FAC in Jan, 2009. Currently, both the Hong Kong International Airport and Watson have expressed interest in adopting the new technologies and are potential clients of the project.

The following table shows the number of projects under the Platform Research Program to be completed in 2009/10.

Completion dates for Platform Research Projects		
Item	**Project name**	**Completion Date**
1	RFID-based Interoperable Gateway for Logistics Service Platforms	Mar, 2009

	(RIG)	
2	An eLogistics Appliance with Data Exchange and Conversion Technologies for Infrastructure Connectivity	Mar, 2009
3	RFID Benchmarking: Methodology and Practice	Mar, 2009
4	Integrated Passive UHF RFID Tags and Readers	Jul, 2009
5	Study the Design Challenges of 90nm Technology UHF RFID Tag IC	Jul, 2009
6	Package-specific RFID Tagging and Embedding Technology	Nov, 2009
7	Trustworthy RFID Technologies: Methodology and Practice	Mar, 2010

The Centre anticipates commercialisation activities gradually increasing. Organizing industry activities, such as LSCM Annual Conference, Industry & Technology Forums, Membership e-news, will be one of our key commercialization strategies.

In order to provide an effective platform for the exchange of IP and technology with the industry, the Centre will form a new cross-functional team which consists of researchers, technical staff, marketing staff and business staff to capture the increasing technology transfer opportunities.

6. Collaboration Parties

LSCM aims to act as the focal point of the coherent force that combines Government resources, industry support and university researchers to create the greatest value for the supply chain management and logistics industry. To empower the Centre with market feedback and intelligence, the Centre has engaged the following industry partners and research institutions, from local, mainland China and overseas for various forms of collaboration:

Organization	Details of Collaboration
1. Hong Kong Productivity Council 2. Hong Kong Science & Technology Parks Corporation 3. Hong Kong Trade Development Council 4. Federation of Hong Kong Industries 5. Guangdong and Hong Kong Feeder Association 6. Hong Kong Association of Freight Forwarding And Logistics	➢ Co-organize and promote industry events, e.g. seminar, training, exhibition, study tour ➢ Solicit industry problems and requirements ➢ Disseminate project results

7. Hong Kong CFS and Logistics Association 8. Hong Kong Logistics Association 9. Hong Kong Shippers' Council 10. The Chamber of Hong Kong Logistics Industry	
11. GS1 Hong Kong 12. Guangdong RFID Technology Service Center 13. Shanghai Base of National RFID Industrialisation 14. RFID China Alliance 15. EPCglobal, Inc.	➢ Promote RFID adoption and applications ➢ Closely monitor technology and stand development
16. The University of Hong Kong 17. The Chinese University of Hong Kong 18. The Hong Kong University of Science and Technology 19. The Hong Kong Polytechnic University 20. Sun Yat-sen University 21. Shanghai Research Center for IC Design 22. Shanghai Jiao Tong University 23. Beijing University of Posts and Telecommunications 24. Fudan University 25. Shenzhen Institute of Advanced Technology 26. RFID Research Center, Institute of Automation, Chinese Academy of Sciences 27. National ICT Australia (NICTA) 28. University College London (UCL) 29. Center for Information Technology Research in the Interest of Society/University of California, Berkeley (CITRIS/UCB) 30. University of California, Los Angeles (UCLA)	➢ Undertake research/consulting project ➢ Establish research partnership

7. Corporate Communication

Since the establishment of the Centre, we have participated in over 150 promotional events all over the world. These activities serve to promote the Centre's strong research capabilities and help to foster the adoption of enabling technologies by the logistics and supply chain industries.

In addition, we have organized more than fifty forums/conferences/seminars in the last few years, expanding our reach into the logistics and supply chain

industry. These activities also enable the research community in HK to interact directly with the industry players while searching for innovative solutions.

Thirty delegations from different countries have visited our Centre in the last two and a half years. Nine overseas groups are now collaborating with us on several R&D initiatives.

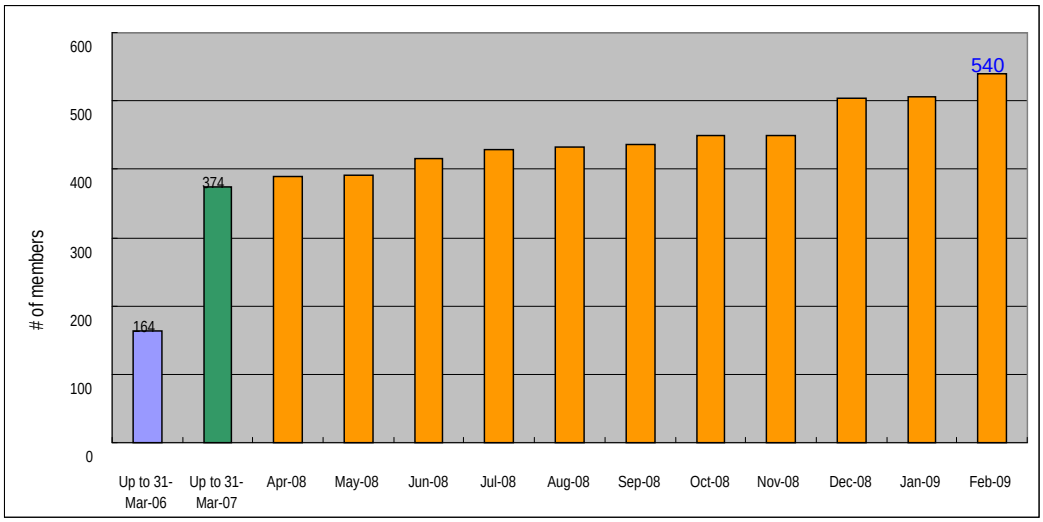
8. Industry Feedback and Liaison

Membership Scheme

As of Feb-24-2009, the Centre has recruited over 350 Individual members, 110 Company/Institutes members, and 70 Technology/Solution Provider members, making the total number of members to be **540**. The following table shows the summary of the membership status by membership year.

Membership Status by Membership Year					
Membership Year	**# of individual**	**# of end-user company**	**# of Tech / Solution provider company**	**Sub-total**	**Yearly Target**
Apr-2006 to Mar-2007	102	34	28	164	200
Apr-2007 to Mar-2008	141	40	29	210	200
Apr-2008 to Mar-2009 *(as of Feb-24-09)*	108	39	19	166	233
			Accumulated Total	**540**	

The following chart shows the growth of members since the inception of the membership program in Nov-2006.



Apart from business matching and project collaboration activities, members also actively participated in the Centre's events like Industry and Technology Forum, exhibitions, conferences, delegations as well as networking opportunities highlighted in the subsequent sections.

Industry Marketing

Highlights of other events and networking activities are listed as below:

Date	Activities
May-Jun-2006	Seminar and road-show series to promote Hong Kong's R&D Centres (GZ/FS/SZ/DG)
Jun-2006	The 3rd Foshan (International) Logistics Symposium (FS)
Oct-2006	China Hi-Tech Fair 2006 - Hong Kong Pavilion (SZ)
Oct-2006	2006 China International RFID Technology and Development Conference (SH)
Nov-2006	2006 Guangdong-Hong Kong RFID Technology Application Summit (GZ)
Dec-2006	Innovation and Design Expo (HK)
May-2007	The 5th China (Beijing) RFID International Summit and Hong Kong Delegation (BJ)
Jun-2007	Industry & Technology Forum I - RFID Standard and Development in Mainland & Hong Kong(HK)
Jun-2007	Guangdong RFID Study Tour (Scan & RFID China 2007) & Industry & Technology Forum II (GZ)
Aug-2007	Industry & Technology Forum III - e-Logistics Internetworking Connecting from Trucking to Electronic Transaction (HK)
Sep-2007	2007 Guangdong-Hong Kong RFID Technology Application Summit (GZ)
Oct-2007	2007/8 Preliminary R&D Themes & Industry Program (HK)
Oct-2007	GS1 Hong Kong Supply Chain Management Excellence Conference 2007 (HK)
Oct-2007	China Hi-Tech Fair 2006 - Hong Kong Pavilion (SZ)
Nov-2007	2007 China International RFID Technology and Development Conference (SH)
Dec-2007	Cyberport Venture Capital Forum 2007 (HK)

Dec-2007	Inno Design Tech Expo (HK)
Jan-2008	Briefing for LSCM Call for Proposals & Industry and Research Collaboration (HK)
Mar-2008	1st China RFID Benchmarking Test Forum & MOU Signing Ceremony (HK)
Apr-2008	Briefing for LSCM Call for Proposals & Industry and Research Collaboration (HK)
Apr-2008	Chongqing Hi-Tech Fair 2008 (CQ)
Apr-2008	HK / PRD Exchange Forum on Enabling Technology for Logistics and Supply Chain Industry & Agreement Signing Ceremony (GZ)
Jun-2008	The 6th China (Beijing) RFID International Summit (BJ)
Jun-Sep-2008	Hong Kong Logistics and Supply Chain Industry Survey (HK)
Jul-2008	RFID Study Tour 2008 (TW)
Jul-2008	2008 Guangdong-Hong Kong RFID Technology Application Summit (GZ)
Oct-2008	GS1 Hong Kong Supply Chain Management Excellence Conference 2008/Hong Kong RFID Awards 2008
Oct-2008	China Hi-Tech Fair 2006 - Hong Kong Pavilion (SZ)
Nov-2008	2008 China International RFID Technology and Development Conference (SH)
Nov-2008	Cyberport Venture Capital Forum 2008 (HK)
Nov-2008	Industry & Technology Forum - A Market Intelligence Study on Enabling Technologies for Industries related to Logistics & Supply Chain Management (HK)
Dec-2008	中国射频识别基准测试发展论坛暨中国射频识别基准测试联盟成立仪式 (BJ)

Events Participation

As above-mentioned, joining the conferences, delegations, seminars and exhibitions provide us with the opportunities to broaden our industry network coverage. The Business Development Team has participated in 52 events in 2007 and 2008. The following table shows the summary of the BD event participation between August 2007 and November 2008:

Events Participation	
Date of Event	**Event**
29-Aug-07	Supply and Demand 2007-09 Conference
29-Aug-07	LSCM Industry Technology Forum “DTTN”
5-Sep-07	ASTRI Industry & University Consultation Forum
16-Sep-07	GD-HK RFID Summit
14-Sep-07	Innovation Expo
05-Oct-07	2008 Preliminary R&D Themes & Industry Program
12-Oct-07	EPC conference
12-Oct-07	China High Tech Fair
15-Oct-07	HK Elec. Show

16-Oct-07	Hi Tech Fair
24-Oct-07	DTTN Seminar
26-Oct-07	RFID in SMEs of Hong Kong – PolyU
30-Nov-07	2007 GHMT Forum
26-Nov-07	Delegation of 15 珠海市軟件及通訊企業
29-Nov-07	Video Conference in TDC with Israeli RFID companies
4-Dec-07	Cyberport Venture capital Forum
12-14 Dec 07	IDT Expo
17-Dec-07	Hong Kong Logistics Association 10th Anniversary Celebration Dinner
17-Dec-07	Guangdong/HK Logistics Conference
12-14 Dec-07	IDT Expo, SME Expo
17-Dec-07	Hong Kong Logistics Association – 10th Anniversary Celebration Dinner
17-Dec-07	HKTDC - Invitation for Speech in Guangdong/HK Logistics Conference
9-Jan-07	Briefing for LSCM Call for Proposals & Industry and Research Collaboration
14-17Jan-07	廈港物流業研討會暨廈門福州訪問團
28-Feb-08	Luncheon with TDC Deputy Executive Director – Logistics Delegation for Xiamen and Fuzhou
1-Mar-08	1st China RFID Benchmarking Test Forum
29-Feb-08	LSCM off-site meeting
31-Mar-08	A UK View of Business Intelligence and Security in Retail and Logistic
15-Apr-08	Hong Kong Electronic Industry Council Gala Dinner 2008
8-Apr-08	STC (DGN) Grand Opening Ceremony
6-May-08	Invitation to the “Schenker Month”
16-Apr-08	SCM & NFC Session.
17-Apr-08	HK Electronics Fair
24-Apr-08	Citrix App. Delivery Conference 2008
28-Apr-08	珠三角地区物流信息化发展交流会暨研究合作签约仪式
28-Apr-08	Annual Dinner – HK Container Tractor Owner Association
4-Jun-08	The 6th (Beijing) RFID International Summit (5 June 2008)
19-20 June 08	SCAN China at Guangzhou
24-Jun-08	South-China International Logistics Center
2-Jul-08	松山湖 2008 香港推介會
8-Jul-08	2008 香港物流科技應用管理論壇
14-16 July 08	RFID Study Tour
23-Jul-08	2008 第四届粤港无线射频识别技术应用高峰论坛暨 RFID 应用成果展
7-8 AUG 08	GZ Delegation
15-Aug-08	物流信息公共平台建设与粤港合作座谈会
28-Aug-08	穗港信息服务业合作工作小组 第二次工作会议

2-Sep-08	Anniversary and the Ceremony – The Chamber of Hong Kong Logistics Industry
29-Sep-08	ETI seminar – RFID Technology on Retail Industry
10-Oct-08	GS1 Hong Kong SCM Excellence Summit 2008
17-Nov-08	Opening Ceremony of RFID Centre in Dongguan
14-Nov-08	Delegation from Shanghai Municipal District

9. Operating Expenditure

The expenditure and budget for the first five years of LSCM's operation are:

First 5-year Operating period (2006/07 to 2010/11)							
Operating expenditure (in HK$ m)							
2006/07	2007/08	Up to Dec 2008	2008/09	2009/10	20010/11	Revised estimate	Funding approved by FC
8.0	9.9	29.5	11.5	12.0	10.8	52.2	52.2

For the next five year period from 2011/12-2015/16, the total operating expenditure is estimated to be $135.6 million. This is largely due to an increase in technology transfer activities and additional staff to support the following task:

(a) IP and contract management,
(b) Technology transfer and commercialization
(c) Business and industry development, and
(d) Project monitoring/university relation.

Second 5-year Operating period (20011/12 to 2015/16)					
Operating expenditure (in HK$m)					
2011/12	2012/13	2013/14	2014/15	2015/16	Total estimate
25.6	26.5	27.5	28.4	27.4	135.6

Appendix

R&D projects summary					
	Project Title	Duration (months)	Project Types[1]	Principle conducting Org.[2]	Approved ITF Funding (HK$'000)
1	Design Challenges of 90nm Technology UHF RFID Tag IC	18	1	CUHK	2,000
2	An eLogistics Appliance with Data Exchange and Conversion technologies for Infrastructure Connectivity	18	1	HKU	5,985
3	Integrated passive UHF RFID Tags and Readers	18	1	HKUST	6,958
4	RFID-based Interoperable Gateway for Logistics Service Platforms	16	1	LSCM	9,999
5	RFID Benchmarking: Methodology and Practice	18	1	HKUST	1,988
6	RFID Enabling Technologies for Retail and Logistics Industry	12	1	HKU	5,849
7	Package-specific RFID Tagging and Embedding Technology	18	1	LSCM	12,852
8	RFID-Enabled Real-Time Manufacturing Shop-floor Information Infrastructure for PRD Processing Trade Enterprises	24	1	HKU	6,357
9	Trustworthy RFID Technologies: Methodology and Practice	24	1	HKUST	3,857
10	RF-based Technologies for Asset/Personnel Tracking	24	1	HKUST	5,840
11	RFID Benchmarking Methodology, Report and Tool Support	24	1	HKUST	9,099
12	Enhancing the Competitiveness of the Hong Kong Air Freight Forwarding Industry Using RFID and Software Agent Technologies	24	1	PolyU	4,037
13	Lightweight RFID Reader Chip for NFC and Mobile Applications	18	1	LSCM	12,862

[1] 0 = Foundation Project; 1 = Platform; 2 = Collaboration; 3 = Contract Research; 4 = Seed; 5 = Long Term;

[2] CUHK = The Chinese University of Hong Kong;
HKU = The University of Hong Kong;
HKUST = The Hong Kong University of Science and Technology;
LSCM = Hong Kong R&D Centre for Logistics and Supply Chain Management Enabling Technologies
PolyU = The Hong Kong Polytechnic University
CityU = City University of Hong Kong

14	Interoperability Technology and applications for container RFID and e-seal	24	1	LSCM	8,491
15	RFID-enabling Shenzhen Hong Kong integrated food safety and supply chain public information platform	24	1	LSCM	9,000
16	Privacy Protection and Communication Security in RFID Systems	6	4	LSCM	1,971
17	A Market Intelligence Study on Enabling Technologies for Industries related to Logistics & Supply Chain Management	24	5	LSCM	8,988
18	The Development of RFID-based Business Solutions for Counterfeit Prevention, Physical Asset Management (PAM) and Commercial Applications	30	0	Poly U	4,900
19	Enabling Technologies for Single-Chip Passive UHF RFID Tags and Readers	24	0	HKUST	6,503
20	Establishing an EPC Network Infrastructure to Enable End-to-End Supply Chain Visibility	26	0	GS1	14,150
21	RFID Enablement Middleware for Enterprise Applications	21	0	HKU	10,500
22	Development of RFID Reader	24	0	CityU	4,600
23	RFID Tag and Reader Technologies at UHF Band for Logistics Management	28	0	CUHK	5,000

納米及先進材料研發院有限公司
Nano and Advanced Materials Institute Limited

Mid-term Evaluation Report

March 2009

Contents

Executive Summary

Between April 2006 and December 2008, NAMI has undertaken 19 projects funded by ITF with a total amount of R&D project cost of HK$137.1 million. The industry contribution was 18.6 million, 13.6% of the total project costs. In addition, NAMI has been carrying out 6 contract research projects with a total project cost of over HK$3 million which was completely funded by industrial sponsors. These data reflect the strong support NAMI has received from the local industry.

There are a total of 8 technologies that have been commercialized or in the process of being commercialized and these technologies have found applications across different industries – cosmetics, healthcare products, digital display, energy savings, lighting as well as measurement and instrumentation.

NAMI will continue to strive for excellence in serving as a leading technology provider for Hong Kong and China. Six market sectors have been identified for the next phase of development. All these areas have been predicted to exhibit high growth in the next 10 years and there is increasing demand for technology innovations to maintain competitiveness. In addition, these industries are also expected to have 'spill-over' effects to generate growth in other supporting industries.

	Market size in 2013 (US$ billion)
Advanced composite materials (for Europe)	3.1
Environmental technology	1,000.0
Lifestyle and healthcare products	1,500.0
Metals and metal finishing	61.1
Solid state lighting	33.0
Sustainable energy (solar)	47.6

To ensure NAMI's activities match closely with industry requirements and meet the need to minimize 'time to market', focus will be strengthened to shorten the project approval process. Measures will be taken to protect the intellectual property of research projects and to ensure that technical development is aligned with emerging and sometimes changing market requirements on a continuing basis.

The organization of NAMI will undergo considerable expansion and consolidation to deliver the innovative products and technologies in a cost-effective manner. Corporate governance will also be strengthened to ensure that public funds are spent properly.

1. NAMI – From Start-up to Present

1.1 Challenges and Opportunities

Lured by cheaper land and labor, most Hong Kong industries have migrated north for its manufacturing since the 1980s. While the prosperity bestowed on Hong Kong has been highly beneficial, this legacy of industrial migration has an adverse effect on the development of Hong Kong's knowledge economy. Since the drivers for profitability are cost reduction and volume expansion, there is insufficient incentive for technological innovations. This is reflected in the anemic R&D investment of Hong Kong at 0.69% of GDP in 2003, which is well below the norm of 2% or more in other similar economies.

Laissez-faire style in industrial development has served Hong Kong well in the past, but doubts have surfaced on whether this strategy, or the lack of one, is still effective in a highly competitive global environment. While Hong Kong ponders and debates, other Asian economies are forging ahead. For example, Singapore, with a GDP per capita comparable to that of Hong Kong (US$26,833 vs. US$25,625), has already established strong industrial bases in chemicals, electronics, biomedical sciences, etc. The recent consensus in Hong Kong seems to call for coordination of efforts and promotion of intimate collaboration between Government, industries, and public research institutions. 'Industrial policy', previously viewed in some quarters as a blunt instrument for picking winners and losers, is no longer taboo. Indeed, much has been achieved to develop an R&D infrastructure that makes sense for Hong Kong since the Handover in 1997. The establishment of the Applied Science and Technology Research Institute (ASTRI) in 2001, and four R&D centers focusing on nanotechnology, auto parts, textiles, and logistics in 2006. These developments are exceedingly timely for the reasons below.

Meanwhile, Hong Kong enterprises in Guangdong in general and the Pearl River Delta (PRD) economic zone in particular are facing new challenges. Some of the light industries, particularly the large number of SMEs, are maturing. The labor cost and availability is tightening, raw materials cost is rising, land supply particularly in Shenzhen is dwindling, and new competitors are emerging from farther inland. Rather than competing on cost, Hong Kong businesses have to create new products and innovative, proprietary manufacturing processes to ward off the competition.

However, because of the lack of tradition in the commercialization of new technologies in Hong Kong, the Nano and Advanced Materials Institute Limited (NAMI), as well as other R&D centers, has taken longer than expected to form networks with researchers and industrialists, not only in Hong Kong but also in Mainland China and around the world. Most time-consuming was the development of the legal framework for collaborative

research and commercialization. Despite the delay and difficulties, much has been accomplished by NAMI and the achievements in the past three years are summarized below.

1.2 Achievements

The following performance indicators (in decreasing order of priority) are used:

- Research outputs successfully commercialized
- Level of participation by both the industry and academic communities in R&D projects
- Level of participation by both the industry and academic communities in events organized by NAMI

1.2.1 Successful Cases of Technology Commercialization

The ultimate aim of all R&D projects is to bring the project deliverables as 'products' to the market for commercialization. The term 'product' is used here to cover a wide range of R&D project outputs, which could be a manufacturing process, technical know-how, etc. which are not end products by themselves. In other words, how successful the research outputs can be commercialized is a measure of how well the Innovation and Technology Commission (ITC) funding has been used to enhance the competitiveness of the local industry and the technical expertise in Hong Kong. Some of the successful examples of NAMI, and its predecessor – Institute of NanoMaterials and NanoTechnology (INMT) up to the end of 2008 are given below.

Commercial Product – Air Purifier

A nano-catalyst was developed and used in an air purifier sold under the Giabo brand by Chiap Hua International Limited.

Licensed Technologies – Nanoelectronics for OLED

The low temperature polycrystalline silicon (LTPS) and active matrix organic light emitting diode (AMOLED) technologies were transferred to Sinodisplay Technology Limited (廣東中顯科技有限公司). In the first stage, Sinodisplay will spend around RMB0.5 billion to construct the first LTPS TFT AMOLED production lines in Mainland China. The production capability is expected to reach 50 million pieces of 2 inch-full-color-TFT-OLED display panels annually.

Licensed Technologies – Color LCD

A technology on color vertically aligned liquid crystal displays was licensed to CONA Electronics Limited.

Licensed Technologies – Photoalignment Technology for LCD

A photoalignment technology was licensed to Dainippon Ink and Chemicals, Incorporated.

Licensed Technologies – Integrated Manufacturing

The manufacturing process for separating C60 and C70 was licensed to ClearWaterBay Technology Limited in 2008. Negotiations on setting up a manufacturing facility in Hong Kong are currently in progress with Mitsubishi Chemical Corporation in Japan.

1.2.2 Technologies Being Commercialized

In addition to the projects that have already been commercialized, the following projects are in different stages of commercialization:

Nano-sensor

An aluminum-based nano-sensor technology has been developed. The current application is being used as humidity sensor offering superior performance in terms of better sensitivity, faster response time and better system linearity while keeping competitive. This technology is expected to find applications in consumer products such as watches, weather stations, etc. as well as in industrial applications in measurement and instrumentation.

High Reflectivity Coating for Lighting Applications

A coating material which can be applied on different types of surface has been developed for use as a more efficient reflector in lighting applications. The advantage of this coating can either be (i) to increase the perceived light output to enable a lighting apparatus to be positioned as a premium product or (ii) as an energy saving device to reduce the power required to achieve the same level of lighting intensity, which in some cases can save up to just over 30% in energy.

Negative Ion Technology for Air Purification

The air quality in both the office and home environments is polluted due to a variety of reasons. One of such factors is the use of electronic equipment which leads to the generation of positive ions in the form of dust particles. Studies, some of which even dated right back to the 1930s, have suggested a large concentration of positive ions can cause discomfort and symptoms such as headaches and nausea in some people. Therefore, the presence of negative ions is important to neutralize the undesired positive ions and hence can be considered to be an important part in indoor air conditioning.

To generate negative ions, the normal practice is to use an electric circuit to generate a high voltage. The negative ions so generated will combine with the positive ions to take the dust particles out of the air. The technology developed by NAMI does not require such high voltage for its operation. It is simply a coating material which releases negative ions and hence can be used in any applications where power supply is not available or feasible such as in

ornament products, which have popularly been claimed to be able to improve general health by improving blood circulation for individuals who wear them.

1.2.3 Past and Ongoing R&D Projects

Between April 2006 and December 2008, NAMI has undertaken 19 projects funded by ITF with a total amount of R&D project cost of over HK$137.1 million. The industry contribution was 18.6 million, 13.6% of the total project costs. In addition, NAMI has been carrying out 6 contract research projects with a total project cost of over HK$3 million which are completely funded by industrial sponsors. These data reflect the strong support NAMI has received from the local industry.

A full list of all the past and ongoing projects and the associated patents granted or pending is given in Appendices I and II, respectively.

The products and technologies resulting from all of these NAMI projects represent a wide range of industries, which include:

- Consumer products
- Cosmetics
- Digital display
- Lighting
- Measurement and instrumentation
- Electronics
- Lifestyle (e.g., health-related products)
- Medical (e.g., drugs)
- Metals

In terms of mobilizing the local research institutions to work with the local industry, NAMI has worked with:

- City University of Hong Kong
- Hong Kong Baptist University
- Hong Kong Productivity Council
- The Chinese University of Hong Kong
- The Hong Kong Polytechnic University
- The Hong Kong University of Science and Technology
- The University of Hong Kong

In addition, some of the R&D projects have engaged research institutions based in Mainland China such as the South China University of Technology. NAMI plans to extend this kind of collaboration to overseas research institutions if expertise is not available locally.

1.2.4 Participation in NAMI Events

One of the means to provide updates on technology and business applications to the local communities is through public seminars, symposia, etc. Each of these events is targeted at either a technology or a particular industry sector. Therefore, the number of participants in these events would be an indication of how relevant these events are. The average number of attendees per event in NAMI organized meetings has been over 100. These participants come from many different industries as well as from the local research and teaching institutions.

A list of events, exhibitions, symposiums, tradeshows and workshops organized or supported by NAMI is given in Appendix III.

2. NAMI – Looking Forward

2.1 New Market Opportunities for Nanotechnology and Advanced Materials

Nanotechnology and advanced materials are expected to have a revolutionary impact on different industry sectors such as energy, textiles, life sciences, information and communication technology, medicine, building construction, etc.

As can be seen from Figure 1 below, 'nanomaterials' was the main market driver in 2007, accounting for 87% of the total market. There are also high growths predicted in other application areas. In the fields of electronics, biomedical and consumer products, growth rates of 30.3%, 56.2% and 45.9% respectively over the next 5 years have been projected. Overall, the market share of other nano-based applications is expected to reach 30% of the total by 2013.

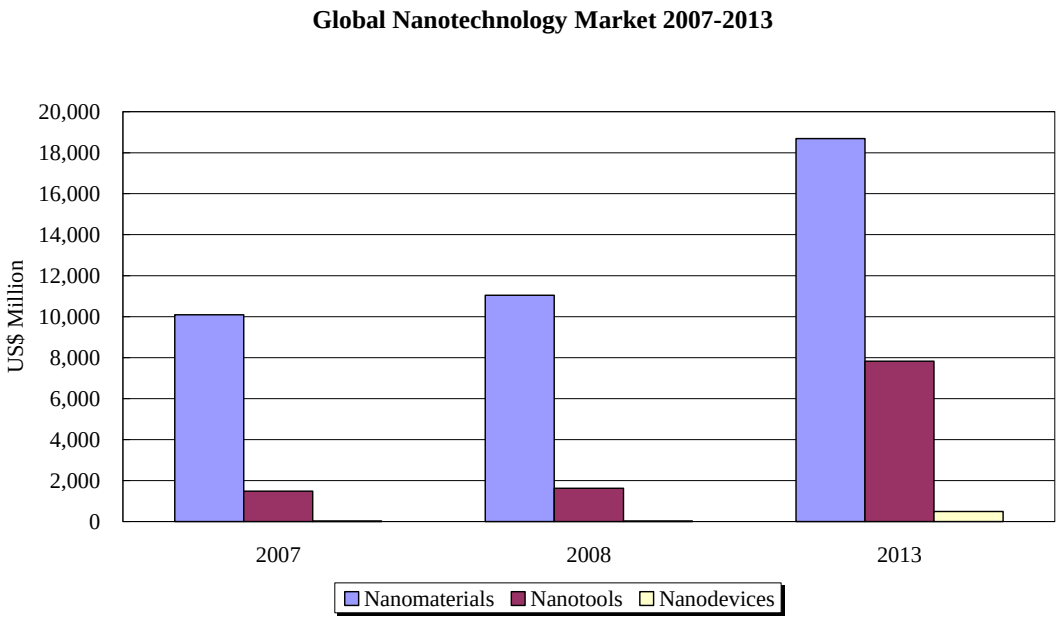


Figure 1 Global Nanotechnology Market 2007-2013

(Source: BCC Research, Report ID NAN031C, May 2008)

In addition, many applications across different market sectors also require the development of advanced materials in order to keep being innovative to serve existing requirements more efficiently as well as satisfying new requirements.

Market-driven Development and Future Research

To align NAMI's activities more closely with both current and emerging market needs, its outlook and focus has been changed from being technology-driven to include a more market-driven approach. This re-positioning results

in the following areas of industry to be identified by NAMI as its areas of focus:

- Solid state lighting
- Sustainable energy
- Environmental technology
- Metals and metal finishing
- Lifestyle and healthcare products
- Advanced materials for consumer and industrial applications

Solid State Lighting and Nanoelectronics

Currently, the answer to the worldwide quest for ultra-efficient lighting is believed to be solid state lighting. Solid state lighting normally refers to light emitting diodes (LEDs), organic LEDs (OLEDs) or polymer LEDs (PLEDs). The main advantages of solid state lighting are:

- It offers higher energy saving efficiency than fluorescent lighting (possibly up to 90% savings).
- Its lifetime is believed to be 50,000 hours which is much longer than that of fluorescent lighting.
- It is environmental friendly as LEDs do not contain mercury.

NextGen Research, in its market report 'LEDs and Laser Diodes: Solid State Lighting Applications, Technologies, and Market Opportunities', forecasts the overall solid state lighting market will achieve worldwide revenues topping US$33 billion by 2013. The bulk of demand, initially, will be generated from niche lighting applications including architectural, task lighting, medical applications. Significant implementation in residential and consumer markets is not expected to occur until 2014 or 2015.

Each of the two major lines of development for solid state lighting: (i) LED and (ii) OLED can potentially find applications in digital displays as alternatives to LCD as they both offer no viewing angle constraint as in the case of LCD, which requires compensation electronics to alleviate this limitation. However, this compensation approach can only be applied to high end products and would not be commercially viable for applications such as mobile phone displays or low cost consumer products.

OLEDs are considered to be an alternative to LEDs as they might have the advantage of being able to be smaller in size and lighter in weight. However, their costs are about twice the costs of LEDs so they are only currently being used in niche applications.

PLED is believed to be cheaper but has intrinsic difficulty in achieving a high degree of purity in the doping process, hence causing uncertainty in controlling production yield rate.

NAMI has ongoing projects in all the above areas. Some of the future work includes:

- Miniaturized LEDs in order to improve its resolution
- Improved manufacturing process to minimize the difference in lamp color of LED devices from the same production batch
- Development of low cost and high performance devices to penetrate the general lighting market
- OLED materials for better photo-electric conversion efficiency

Sustainable Energy

The sustainable (renewable) energy market (e.g. solar, wind, biofuels, geothermal, etc.) is being driven by several factors such as government policies, financial incentives, needs for energy source diversification. The size of this market is believed to quadruple between 2006 and 2016 to a total of around US$230 billion (see Figure 2 below).

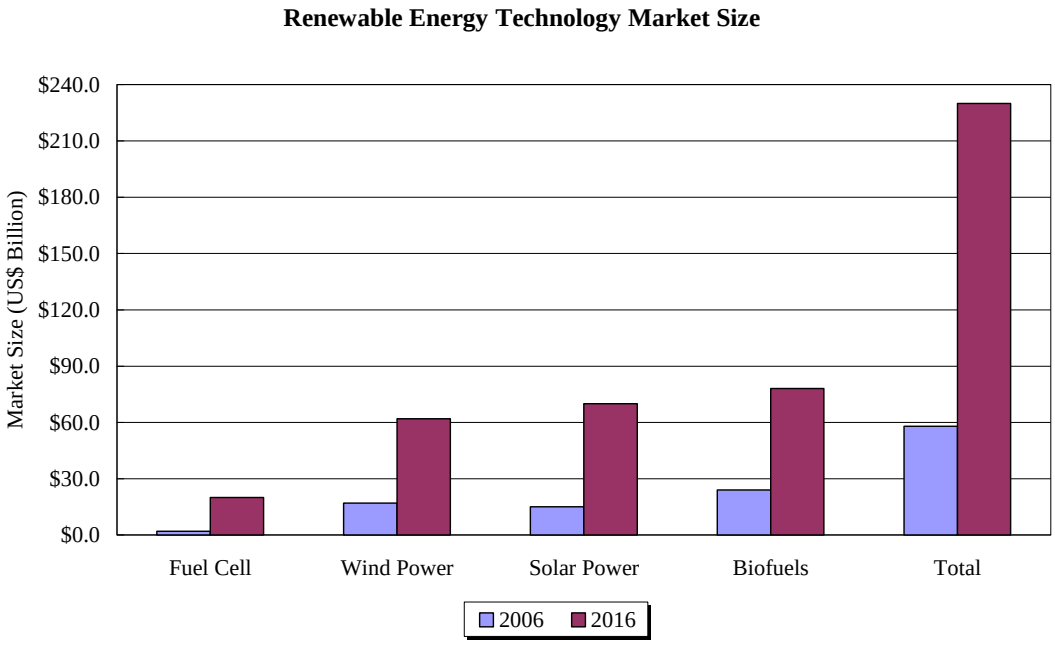


Figure 2 Renewable Energy Technology Market Size

(Source: http://www.data360.org)

Solar energy is one of the fastest growing technologies in the global economy and the 'Green Energy' market. When compared with other energy sources, such as coal, petroleum, nuclear, and hydropower, solar energy is clean, safe and inexhaustible. In China, the market share of solar (photovoltaic) energy is expected to grow from 4% in 2003 to 20% in 2010 and to 60% in 2020. It is estimated that by 2030 solar energy-generated power will account for over 10% of total global power supply, and that figure will rise to 20% in 2050.

In the near term, solar-grade silicon would be a key material for the photovoltaic technology. However, this problem is likely to fade by 2010 as silicon producers complete planned expansions and as newer photovoltaic

technologies that use less or no silicon become more widely used. Thin films are widely expected to lead growth in photovoltaic cells in the longer term.

In terms of research direction in this area, major effort should be given on how to maximize the photovoltaic conversion efficiency. These will be in the areas of reducing reflection by developing better anti-coating materials, stacking of solar cells, optimization of the overall panel design, etc. NAMI will initially focus on the solar energy segment in collaboration with DuPont Apollo but will also engage in other sustainable energy technologies in the near future.

Environmental Technology

The economic growth of the past 30 years in Asia produced the fastest rise in income for the largest number of people in human history. As Asia continues to accelerate the expansion of its manufacturing capabilities, there is a growing concern that this economic development will die with the environment. This provides an unprecedented opportunity to suppliers of environmental technology from around the world, and NAMI intends to participate in this area.

In general, the term 'Environmental Technology' is used to describe certain process and/or treatment for pollution prevention, preservation, restoration or waste minimization of a particular aspect of the environment such as air, water, wastewater (municipal and industrial) and waste. Typical environmental technologies work on aspects such as recycling, purification and removal of contaminants, sewage treatment, remediation, flue gas treatment, waste treatment, etc. In terms of creating a cleaner production environment, the trend is to use pollution prevention measures rather than end-of-pipe solutions.

The global market for environmental technologies and services was around US$380 billion in 1995 and the forecast for the whole environmental technology market is US$2,900 billion by 2020.

NAMI is currently working with various parties in industry and the research communities to establish a networking platform through marketing focus groups and other activities to select technologies which are most appropriate for the local industry. For example, an area of research being considered is the use of nano-particles in the production of bio-flocculant in wastewater treatment.

Metals and Metal Finishing

Metal finishing can be defined as the deposition of a coating that may be metallic or non-metallic onto a metallic substrate. It can be a surface treatment yielding a thin film to enhance the appearance, function or performance of a product. It includes a number of operations that include surface preparation, surface pretreatment and the actual coating process. The market can be broken down into:

- Inorganic metal finishing processes

- Surface preparation/pretreatment
- Consumables and spares

Growth in markets for inorganic metal finishing processes and technologies (IMFTs) such as electroplating, galvanizing, anodizing, electroless plating, conversion coatings, cladding and electropolishing is due partly to the role these technologies play in improving a component's capabilities in terms of corrosion or wear resistance, appearance and even performance. The rapid growth of the metal finishing industry is also due to the need for metal finishing in various applications. Metal finishing requirements have become very important to the computer, communications, electronics and appliances industries.

According to a market research report 'Inorganic Metal Finishing Processes: The Global Market' (MFG019B) from BCC Research, the global market for inorganic metal finishing technologies is expected to grow from US$42.3 billion in 2007 to an estimated US$61.1 billion in 2013, a compound annual growth rate (CAGR) of 6.6% (see Figure 3 below).

Global Inorganic Metal Finishing Technology Market Projection by Application Type 2006-2013

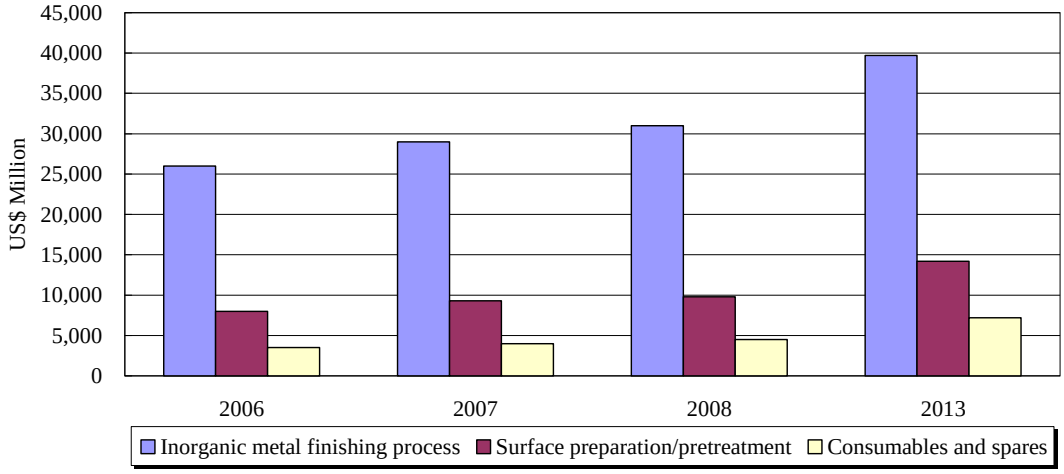


Figure 3 Global Inorganic Metal Finishing Technology Market Projection by Application Type 2006-2013

(Source: BCC Research, Report ID MFG019B, August 2008)

Surface preparation/pretreatment has the second largest share of the market, worth US$9.3 billion in 2007. This is expected to increase at a CAGR of 7.7% to reach US$14.2 billion in 2013.

Consumables and spares represent the fastest growing market segment, expected to increase from US$4.0 billion in 2007 to US$7.2 billion in 2013, a CAGR of 9.9%.

There are already a number of NAMI projects that are ongoing or in preparation to address the needs in this area. For example, the service life of steel structures in humid weather condition is based on certain British standards which are known to be less than satisfactory for the Hong Kong environment. R&D work is being planned as a result of this requirement to develop materials to address this market void for the Hong Kong industry. A number of government departments have already expressed their interests to be the initial trial users. This technology also has the potential to enable the Hong Kong industry to export this new material to other countries such as Singapore, with similar requirements.

Another initiative that NAMI is working on is to make use of the technical expertise overseas on metal composite materials involving a research institution in North America and some local trade federations. At present, NAMI is working with different parties in Hong Kong to identify the feasibility and the most suitable early adopters of this technology.

Lifestyle and Healthcare Products

The total market size for nanotechnology consumer products has been projected to be US$25.2 billion by 2011. However, the total market for end products associated with nanotechnologies for their production and distribution is expected to reach US$958 billion in 2010. In a survey on how nanotechnology has been applied in the consumer market dated August 2008, which is based on materials available on the Internet, it shows the major application in this market lies in the health and fitness which is also popularly grouped under the term 'lifestyle' (see Figure 4 below).

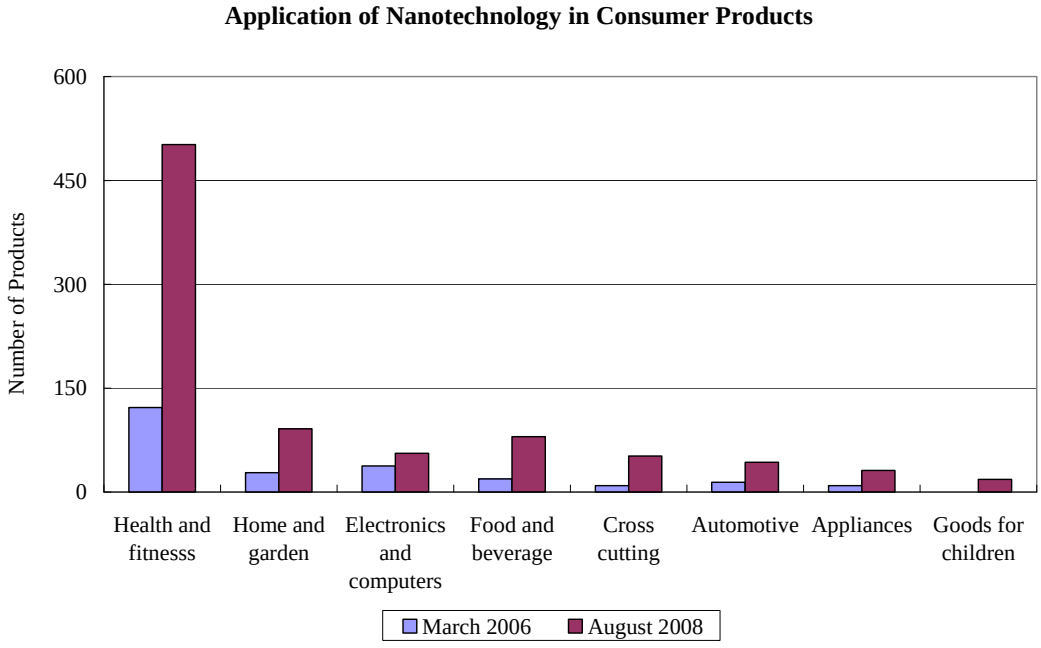


Figure 4 Application of Nanotechnology in Consumer Products

The product sub-categories under 'health and fitness' can be further broken down into: cosmetics (23%), clothing (20.9%), personal care (27.9%), sporting goods (14.9%), sunscreen (6%), and filtration (7.3%).

This same survey also suggests Asia is more advanced than Europe in terms of product diversity and user acceptance of products (see Figure 5 below).

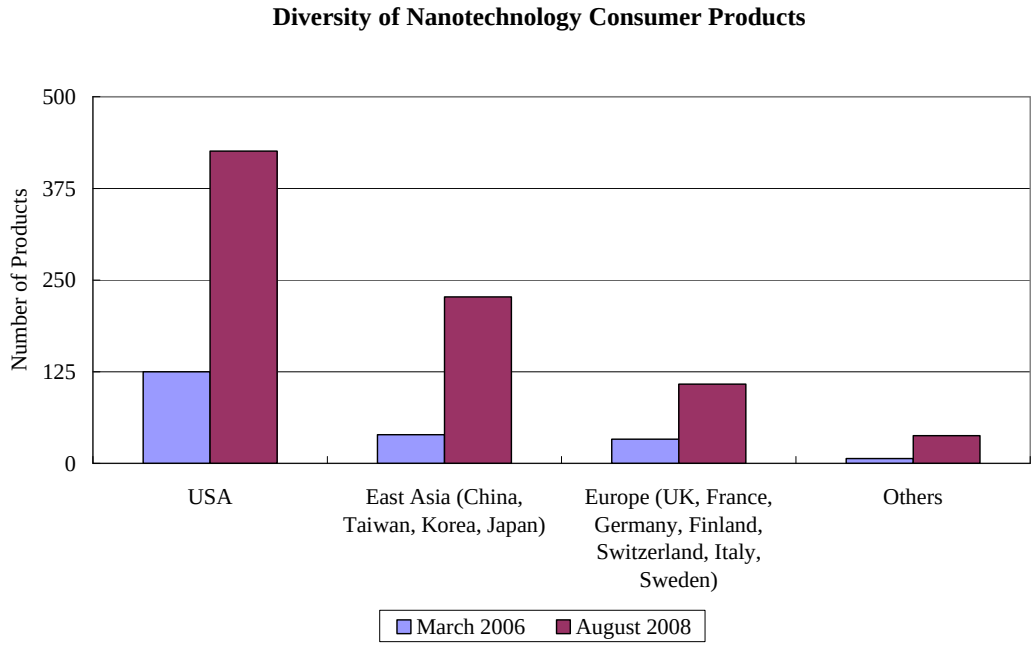


Figure 5 Diversity of Nanotechnology Consumer Products

It can been seen from Figure 6 below that, in terms of materials used, silver is by far the most used materials followed by carbon, which is a distant second.

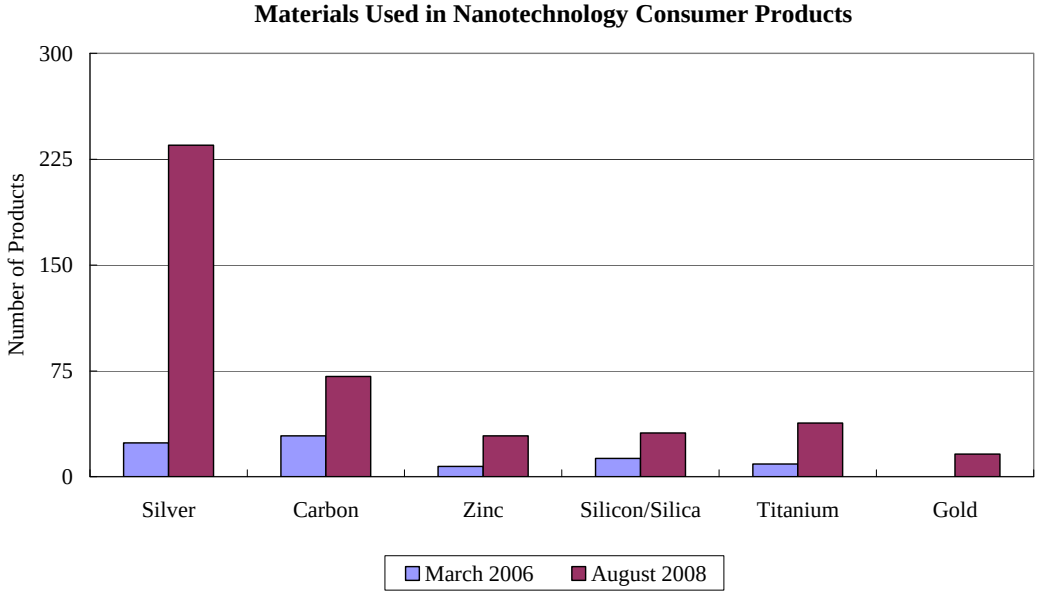


Figure 6 Materials Used in Nanotechnology Consumer Products

There are a number of NAMI projects in this area, which are expected to be commercialized shortly. NAMI will continue to track the development in this area to identify new innovations that fit the rather fast evolving market needs in this consumer market.

Another area which is related to health is the use of nanotechnology in medical application. In a report 'Global Markets for Nanoscale Materials and Devices' by BCC Research, it reports the total market size in 2007 was US$1.7 billion and predicts it to approach around US$3.7 billion in 2013 and could explode to US$9.4 billion by 2018. NAMI is currently exploring some research collaborations with parties overseas in the use of nanocapsules for carrying out medical treatments.

Advanced Materials for Consumer and Industrial Applications

Currently, there are hundreds of nanomaterials in use or under development, both in their pure form and as composites. These materials include carbon, silica, titanium dioxide, clays, metal powders, polymers and titanium. In many cases, the nanoscale versions of these materials will have different performance characteristics resulting from their smaller size, such as a higher surface-to-mass ratio, allowing for greater reactivity or greater strength relative to weight. The total global consumption of all types of nanomaterials is expected to reach 10.3 million tons or US$20.5 billion by 2010.

NAMI is currently working on a number of research ideas on developing new composite materials for both indoor and outdoor applications either (i) as low cost replacement to existing technology or (ii) for performance and physical properties that exceeds current capabilities.

2.2 Market Segment-based Technology and Product Roadmaps

NAMI has pursued five core areas of nanotechnology and advanced materials in the past three years:

- Nanomaterials: functionalization and applications
- Nanotechnology enabled nano opto-electronics
- Nano-structured/textured material applications
- Advanced materials for interconnection, packaging and thermal management
- Forming of advanced materials

However, NAMI has gradually switched from classification by technology area to classification by market segment. There are three reasons for pursuing an inside-out version of the three-year-old technology roadmap (see Figure 7 below).

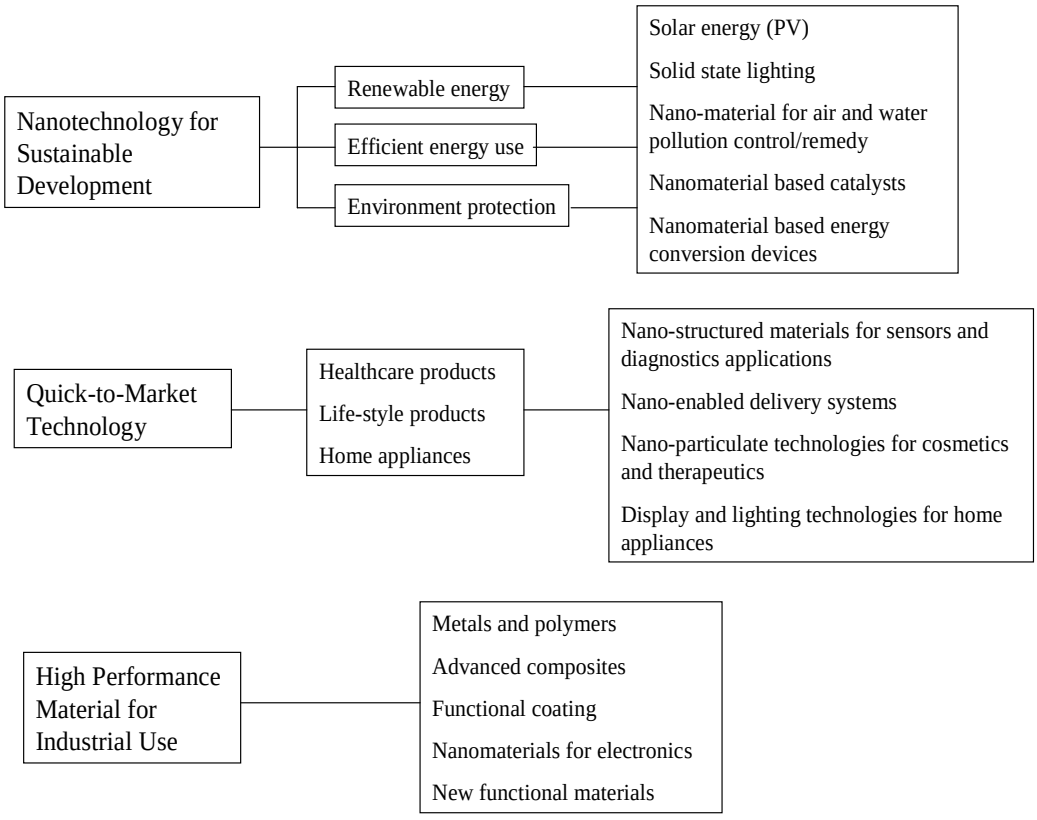


Figure 7 Technology Roadmap Based on Market Segments

First, NAMI has been aligning itself with various local trade associations such as the Chinese Manufacturers' Association of Hong Kong and the Federation of Hong Kong Machinery and Metal Industries which focus on specific markets. Second, each industry may require using more than one of the five core technology areas as well as other ancillary technologies. Most

importantly, the products and processes of each industry tend to have their own technological idiosyncrasies. Organizing the operation of NAMI along these lines will greatly facilitate the promotion of R&D projects and commercialization of the resulting deliverables.

Finally, the technology roadmap is regularly reviewed by the management and the Board of Directors to ensure that the R&D conducted is in the right direction. As a result, six application areas have been identified as areas of focus for development.

In the development and formulation of market-driven R&D projects, NAMI will proactively engage both the industry and the research community for inputs. It will assess both the commercial and technical viability of the project rigorously and drive for early trial and with industry the adoption of the technology by end users.

The current product roadmap (February 2009) based on the expected completion dates of existing R&D projects (excluding round 4 projects) is as follows:

	2009				2010				2011
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1
Advanced materials for consumer and industrial applications				1					1
Lifestyle and healthcare	3		1						4
Metals and metal finishing			1	1	1	1			1
Solid state lighting	1	1	1	1	1	2			1
Total	4	1	3	3	2	3	0	0	7

NAMI has established a technology commercialization process to manage R&D project outputs in a systematic manner and defines the readiness of a technology for commercialization in terms of a series of ‘gate’ numbers. Each gate number consists of a number of milestones (in the form of documents) that need to be completed in sequential order before the technology is considered ready for commercialization.

2.3 A Sharpened Centre Objective

The prime objective of NAMI has been and will continue to be the enabler of market-driven technology innovations to meet the needs of local industry in the development of nanotechnology and advanced materials. In particular, NAMI will:

- identify, lead and develop market-driven technology innovative R&D in partnership with both local industry and research communities in a concerted manner;

- help bridge and strengthen the relationship between industry and research communities through events, focus groups, NAMI's newsletters, and activities such as development of business plan, market analysis, etc.;

- drive the commercialization of R&D project outputs.

2.4 Organizational Structure

The operation of NAMI will be executed by five teams:

- Technical Team
- Project Administration Team
- Business Team
- Administration and Human Resources Team
- Accounting Team
- Project Support Team

The Technical Team consists of individual teams. Each individual team is headed by a Technical Manager who is assisted by a Technical Officer. These individuals will be supported by NAMI's operating budget and will be provided with laboratory and office space for conducting market-driven R&D. Each individual technical team can cover one or more market segments but it should possess both technical know-how and manufacturing experience in those market segments. In addition to the Technical Manager and the Technical Officer, each team can employ additional members supported by project incomes.

The Project Administration Team is responsible for processing and monitoring all the R&D projects in accordance with ITC rules and regulations. It is also in charge of the evaluation and filing of IP related to the R&D projects.

The Business Team headed by the Senior Business Development Officer (SBDO) is responsible for identifying, soliciting and executing R&D projects in the form of platform projects, collaborative projects and contract research. It also handles marketing communication, event organization, contract negotiation, client management, and most importantly the commercialization of R&D project outputs.

The Administration Team takes care of day-to-day operations of the office. These include the organization of Board meetings, establishment of internal control policies and procedures, liaison with internal and external counterparts and supporting other NAMI teams in their projects. The Human Resources Team is responsible for the full spectrum of human resources operations including recruitment, manpower planning, administration of compensation and benefits policies, performance management and employee services and relations, etc.; review personnel manual, salary strategies and related policies and procedures; and recommend changes to ensure practices are current, competitive and in compliance with HKSAR legislation.

The Accounting Team is in charge of the full spectrum of the finance and accounting functions including routine payment and receipt, project planning, budgeting, reporting and internal control compliance.

The Project Support Team serves as additional resources to assist in the administration, human resources and financial aspects because of the anticipated expansion of NAMI.

The organization chart is given in Figure 8 below. The total headcounts of Tier 1, Tier 2 and other staff are 1, 5 and 38 respectively. The Project Support Team comprises 3 members.

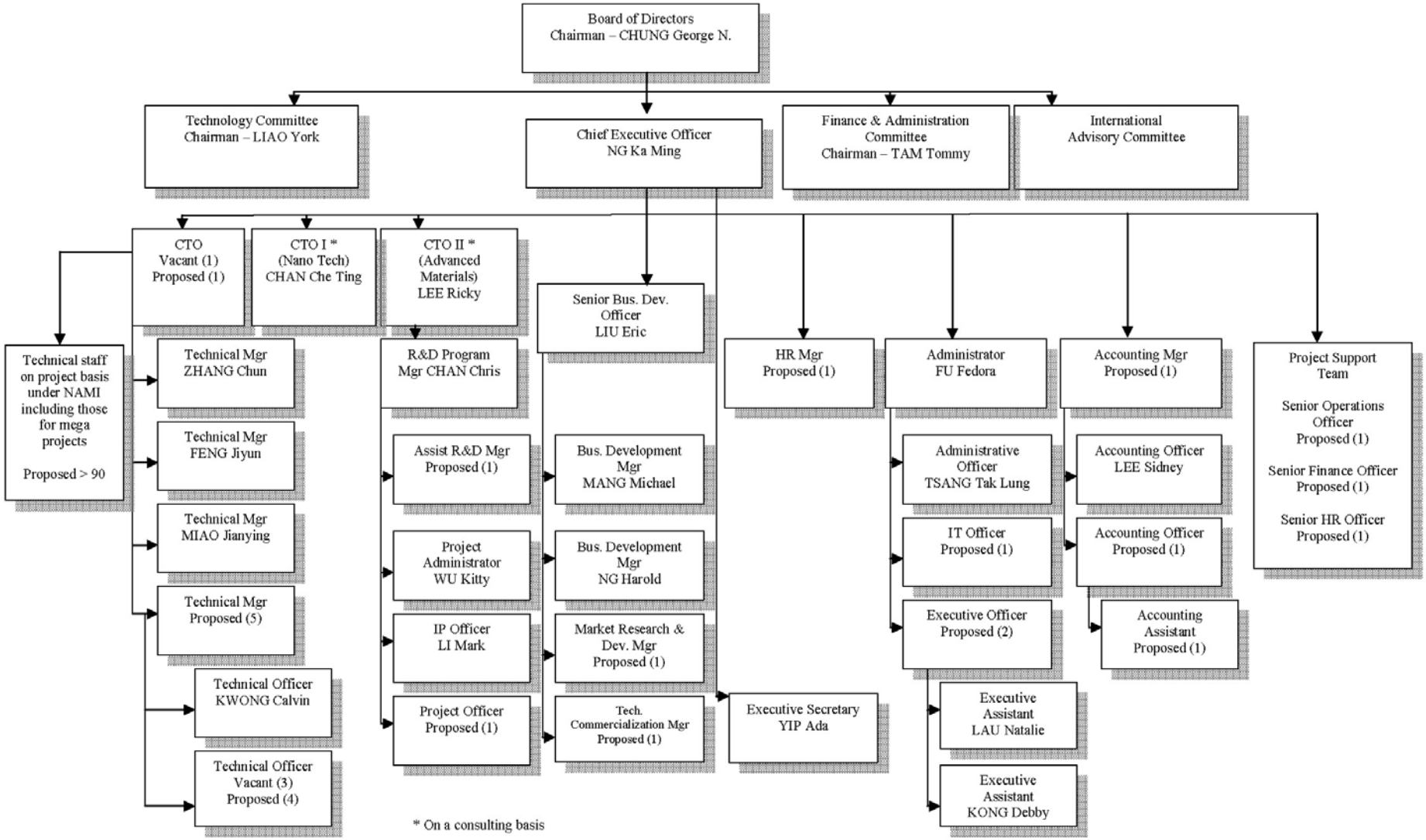


Figure 8 Organization Chart of NAMI

2.5 Institutional Arrangements and Corporate Governance

The Centre has been established as a non-profit company limited by guarantee and is wholly owned by HKUST. A Board of Directors oversees all aspects of NAMI activities. A Technology Committee consisting of members with technology background and government representatives is in charge of the evaluation and monitoring of R&D project proposals. A Finance and Administration Committee oversees the administration procedures and policies as well as all aspects of NAMI's financial matters. An International Advisory Committee will be formed to provide advice in terms of scientific and technology directions to the Center.

2.6 Past and Projected Centre Income and Expenditure

The past and projected income (including Innovation and Technology Fund (ITF) grants for Centre operation and incomes from contract research projects) and expenditure of both Centre operation and R&D projects for the financial years from 2006/07 to 2015/16 are given in Table 1.

The past and projected operational expenditure for the financial years from 2006/07 to 2015/16 is given in Table 2.

	2006/07 [1]	2007/08 [1]	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	Total
Total expenditure	10.5	17.9	62.6	189.9	273.6	180.9	153.2	180.0	169.1	181.7	1,419.4
Total income	11.8	11.8	14.0	33.9	31.1	30.1	31.3	32.6	33.9	35.2	265.7

Table 1 Income and expenditure of Centre Operation and R&D Projects for the Financial Years from 2006/07 to 2015/16 (in HK$ million)

	2006/07 [1]	2007/08 [1]	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	Total
Operating expenditure	10.4	10.6	13.4	33.6 [2]	30.8	29.8	31.0	32.3	33.6	34.9	260.4

Table 2 Operational Expenditure for the Financial Years from 2006/07 to 2015/16 (in HK$ million)

[1] Actual figures

[2] Including around HK$9.0 million for the manpower costs of 21 additional technical and administrative staff, and around HK$4.3 million for the establishment of new laboratories and offices at Hong Kong Science and Technology Parks.

2.7 Past and Projected R&D Projects

To promote the collaboration between the local industry and academic community on market-driven applied research, the following criteria are used to assess the feasibility of new research project proposals:

- Identification of market opportunities
- Strength and uniqueness of the technology to be developed
- Suitability of the technology for commercial exploitation by the local industry
- Enhancement of the R&D capability and infrastructure of Hong Kong

The principle is there should be an increasing focus on commercial viability in the R&D project approval process and the following aspects are mandatory in the assessment of a project proposal:

- Product concept and preliminary specification
- Market requirement and business plan
- Competitive analysis
- How innovative is the technology proposed to be developed
- Commitment and ability of the sponsor(s) to commercialize the technology
- Market requirements as well as production constraints should be built in as part of the problem definition and tackled in the development of the technology

In terms of future research focus, some details were given in section 2.1 of this document. The forecasts in Table 3 below is based both on historical data and the initiatives to address current market needs in the form of new R&D projects and the projected expenditure on R&D projects for the financial years from 2008/09 to 2009/10.

The projected cumulative number, ITF funding required and industrial sponsorship of R&D projects and contract research projects by the financial years 2010/11 and 2015/16 respectively are given in Table 4.

	2006/07 [3]	2007/08 [3]	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	Total
ITF required	0 [4]	3.1 [4]	39.0	106.1	162.5	103.8	93.3	115.3	105.8	114.7	843.6
Total project expenditure (excluding contract research)	0 [4]	5.5 [4]	48.4	155.8	242.5	150.7	121.9	147.4	135.2	146.5	1,153.9

Table 3 R&D Project Expenditure for the Financial Years from 2006/07 to 2015/16 (in HK$ million)

[3] Actual figures

[4] Excluding ITF funding for four R&D projects approved before NAMI's establishment and subsequently subsumed under it. The ITF funding amounts of these projects for 2006/07, 2007/08 and the period from April to September 2008 were HK$17.1 million, HK$9.2 million and HK$29.4 million respectively.

	Cumulative total up to December 2008 [5]			Cumulative total up to 2010/11			Cumulative total up to 2015/16		
	Number of projects [5]	Industry contribution (in HK$ million) [5]	ITF required (in HK$ million) [5]	Number of projects	Industry contribution (in HK$ million)	ITF required (in HK$ million)	Number of projects	Industry contribution (in HK$ million)	ITF required (in HK$ million)
Platform research	12	12.9	109.7	60	36.5	245.0	134	88.0	578.8
Collaborative research	7	5.7	8.8	30	113.6	139.4	65	231.0	338.5
Contract research	6	3.0	-	8	3.5	-	13	5.0	-

Table 4 Projected Cumulative Number, ITF Funding Required and Industrial Sponsorship of R&D Projects and Contract Research Projects

[5] Actual figures

2.8 An Invigorated Collaboration Scheme with Industry and Research Institutions

Building and extending a network of industry and academic communities will be done via three related but distinct groups of activities.

- Consortium membership (open to anyone who would be interested in NAMI's activities)
- NAMI affiliates (a group of invited technical experts from the local research community as a source of expertise to support various areas of focus). NAMI affiliates will be called upon for consultation and/or participation in NAMI R&D projects.
- Marketing focus groups (a group of invited business and technical experts from both industry and the research community for each area of focus to develop new innovative ideas and to facilitate technology commercialization)

Marketing focus group meetings per area of focus will be organized on a regular basis. The definition of focus groups here is broader than its usual meaning and covers a wide range of activities which can be in the form of symposium, workshop, conference, expert group, etc. The main purpose of these meetings is to provide a platform for:

- Updating on market situations and requirements
- Presenting new ideas, research results, case studies of technology applications
- Widening the network and deepening the collaboration between local industry and research institutions
- Identifying new opportunities for R&D projects and technology commercialization and applications

In the event that the industrial needs cannot be fully met by NAMI affiliates and other local talents, NAMI will identify the appropriate technology/experts elsewhere to work jointly with local research institutions to address those needs.

The activities of these groups will be supplemented by:

- A corporate website which provides better information distribution and sharing such as feedback on member interests
- e-newsletter to maintain NAMI's company profile, technology, business and event updates
- Marketing communications

The prime objective of marketing communications is to strengthen the public image of NAMI and to highlight the 'value-added' aspects of NAMI's operation.

2.9 Recommendations on R&D Projects

Based on the experience and lessons learned from the past years of operation of NAMI, the following recommendations can be made to ensure the best use of the public funding entrusted to NAMI. The main objective behind these recommendations is to ensure a research program would meet real market needs in the window of opportunity afforded by the market.

- The duration of the project approval process should be reviewed and optimized in order to shorten the time to market.

- In addition to industrial sponsorship, more effort should be made to get end-user commitment to try out the technology and to include these trials as part of the research program.

- Project monitoring should be done from both the business and technical perspectives in order to ensure that technical development is carried out according to the research plan, and that commercial opportunities can be identified as soon as possible and where necessary to re-align the technical development if there is any change in market requirements.

Appendix I – Summary of Past and Ongoing R&D Projects

Summary of First Round R&D Projects

1.	Title	Industrialization of Liquid TiO_2 Hydrosol Production and Extensive Application in Indoor Air Purification
	Reference No.	ITP/016/07NI
	Type	Collaborative
	Research Organization	The Hong Kong Polytechnic University
	Commencement Date	1 December 2007
	Completion Date	Not applicable
	Total Project Cost	HK$1,995,000
	Status	Terminated
2.	Title	Demonstration Line for the Production of Low-cost Humidity Sensor
	Reference No.	ITP/020/07NI
	Type	Collaborative
	Research Organization	The Hong Kong University of Science and Technology
	Commencement Date	16 July 2007
	Completion Date	15 January 2009
	Total Project Cost	HK$583,000
	Status	Completed
3.	Title	Industrial Scale Sonochemical Fabrication of Mesoporous Photocatalysts
	Reference No.	ITP/021/07NI
	Type	Collaborative
	Research Organization	The Chinese University of Hong Kong
	Commencement Date	16 July 2007

	Completion Date	15 October 2009
	Total Project Cost	HK$1,000,000
	Status	Ongoing
4.	Title	LED Arrays on Silicon Substrates by Flip-chip Technology
	Reference No.	ITP/025/07NP
	Type	Platform
	Research Organization	The Hong Kong University of Science and Technology
	Commencement Date	1 July 2007
	Completion Date	30 June 2009
	Total Project Cost	HK$4,005,000
	Status	Ongoing
5.	Title	Nano-enhanced Hot-dip Galvanizing Process
	Reference No.	ITP/026/07NI
	Type	Collaborative
	Research Organization	Nano and Advanced Materials Institute Limited
	Commencement Date	1 September 2007
	Completion Date	31 August 2009
	Total Project Cost	HK$2,500,000
	Status	Ongoing

Summary of Second Round R&D Projects

1.	Title	High Performance Polymer Nanocomposite Fibers for Electronic Applications
	Reference No.	ITP/041/07NI
	Type	Collaborative-51
	Research Organization	The Hong Kong University of Science and Technology
	Commencement Date	1 March 2008
	Completion Date	28 February 2010
	Total Project Cost	HK$5,711,000
	Status	Ongoing
2.	Title	Novel Negative Air Ion Materials without External Power and Products
	Reference No.	ITP/042/07NP
	Type	Platform
	Research Organization	Nano and Advanced Materials Institute Limited
	Commencement Date	1 March 2008
	Completion Date	28 February 2009
	Total Project Cost	HK$968,000
	Status	Ongoing
3.	Title	Development of Blue OLED Materials and Device
	Reference No.	ITP/043/07NI
	Type	Collaborative
	Research Organization	Hong Kong Baptist University
	Commencement Date	15 April 2008
	Completion Date	14 April 2009
	Total Project Cost	HK$600,000

	Status	Ongoing
4.	Title	Development of the Layered Nanostructured Metallic Sheet/Plate for Structural Applications
	Reference No.	ITP/004/08NP
	Type	Platform
	Research Organization	The Hong Kong Polytechnic University
	Commencement Date	16 July 2008
	Completion Date	15 July 2010
	Total Project Cost	HK$5,300,000
	Status	Ongoing
5.	Title	Precision Polishing Method for Complex Shape Sample and Polishing Slurry Used for the Method
	Reference No.	ITP/005/08NP
	Type	Platform
	Research Organization	Nano and Advanced Materials Institute Limited
	Commencement Date	1 April 2008
	Completion Date	31 March 2010
	Total Project Cost	HK$2,300,000
	Status	Ongoing
6.	Title	Developing and Manufacturing Nano-structured Oral Dosage Forms of Isoflavone and Insulin with Improved Bioavailability
	Reference No.	ITP/006/08NP
	Type	Platform
	Research Organization	The Hong Kong University of Science and Technology South China University of Technology
	Commencement Date	1 March 2009

	Completion Date	28 February 2011
	Total Project Cost	HK$4,190,000
	Status	Pending approval
7.	Title	Development of Advanced Composite Pellets and a Novel Supercritical Fluid Extraction Process for Micro-powder Injection Moulding Technology
	Reference No.	ITP/007/08NP
	Type	Platform
	Research Organization	Hong Kong Productivity Council
	Commencement Date	1 May 2008
	Completion Date	30 April 2010
	Total Project Cost	HK$3,222,000
	Status	Approved
8.	Title	Nanotechnology-enabled Organic Light Emitting Devices for Illumination and Decorative and Special-effect Lighting Purposes
	Reference No.	ITP/011/08NP
	Type	Platform
	Research Organization	City University of Hong Kong
	Commencement Date	27 June 2008
	Completion Date	26 June 2010
	Total Project Cost	HK$3,518,000
	Status	Ongoing
9.	Title	Next Generation Display Technology
	Reference No.	ITP/013/08NP
	Type	Platform
	Research Organization	The Hong Kong University of Science and Technology

	Commencement Date	23 April 2008
	Completion Date	22 October 2009
	Total Project Cost	HK$8,498,000
	Status	Ongoing
10.	Title	Research and Development of New Materials for Printable Electronics
	Reference No.	ITP/016/08NP
	Type	Platform
	Research Organization	The University of Hong Kong
	Commencement Date	1 July 2008
	Completion Date	30 June 2010
	Total Project Cost	HK$12,532,000
	Status	Ongoing
11.	Title	To Enhance the Attachment of Cells, Proteins and Peptides on Microplates by Surface Treatment for Enzyme-linked Immunosorbent Assay (ELISA) Applications
	Reference No.	ITP/018/08NI
	Type	Collaborative
	Research Organization	The Hong Kong University of Science and Technology
	Commencement Date	1 January 2009
	Completion Date	31 December 2010
	Total Project Cost	HK$2,402,000
	Status	Ongoing
12.	Title	Carbon Nanotube Production and Its Application as Catalyst Support and Advanced Material for Energy Storage
	Reference No.	ITP/026/08NP

	Type	Platform
	Research Organization	The Hong Kong University of Science and Technology South China University of Technology
	Commencement Date	1 March 2009
	Completion Date	28 February 2011
	Total Project Cost	HK$5,641,000
	Status	Pending approval

Summary of Third Round R&D Projects

1.	Title	Development of Novel Antibacterial Composite Materials Based on Maifan Stone
	Reference No.	NAMI/C01/08
	Type	Collaborative-51
	Research Organization	The Hong Kong Polytechnic University
	Commencement Date	Pending approval
	Completion Date	Pending approval
	Total Project Cost	HK$2,000,000
	Status	Pending approval
2.	Title	Development of Functional Nanomaterials with Aggregation-Induced Emission (AIE) Characteristics for Biotechnological Applications
	Reference No.	NAMI/C03/08
	Type	Platform
	Research Organization	The Hong Kong University of Science and Technology
	Commencement Date	Pending approval
	Completion Date	Pending approval
	Total Project Cost	HK$1,996,000
	Status	Pending approval
3.	Title	Flexible Liquid Crystal Displays Based on Nanotechnology
	Reference No.	NAMI/C04/08
	Type	Collaborative
	Research Organization	The Hong Kong University of Science and Technology
	Commencement Date	Pending approval

	Completion Date	Pending approval
	Total Project Cost	HK$533,000
	Status	Pending approval
4.	Title	Nano Photochromic Additives and Functional Coatings
	Reference No.	NAMI/C05/08
	Type	Collaborative
	Research Organization	Nano and Advanced Materials Institute Limited
	Commencement Date	Pending approval
	Completion Date	Pending approval
	Total Project Cost	HK$1,005,000
	Status	Pending approval
5.	Title	Advanced Surface Treatment Technology for High Value-added Brass-based Zipper Products
	Reference No.	NAMI/C08/08
	Type	Platform
	Research Organization	Nano and Advanced Materials Institute Limited
	Commencement Date	Pending approval
	Completion Date	Pending approval
	Total Project Cost	HK$2,000,000
	Status	Pending approval
6.	Title	High-speed III-V Transistors on a Silicon Platform
	Reference No.	NAMI/C11/08
	Type	Platform
	Research Organization	The Hong Kong University of Science and Technology
	Commencement Date	Pending approval

	Completion Date	Pending approval
	Total Project Cost	HK$16,540,000
	Status	Pending approval
7.	Title	Synthesis of Polyhydroxyalkanoate (PHA) Nanocapsules as Protein Drug Carriers
	Reference No.	NAMI/C12/08
	Type	Platform
	Research Organization	The Hong Kong Polytechnic University
	Commencement Date	Pending approval
	Completion Date	Pending approval
	Total Project Cost	HK$486,000
	Status	Pending approval
8.	Title	Process Development for Batch Production of Fine-structured Magnesium Alloy Sheets Using Thermo-mechanical Macro-deformation Processing System
	Reference No.	NAMI/C13/08
	Type	Collaborative
	Research Organization	The Hong Kong Polytechnic University
	Commencement Date	Pending approval
	Completion Date	Pending approval
	Total Project Cost	HK$1,749,000
	Status	Pending approval
9.	Title	Development of a ‘Green’ and Low-cost Process for Synthesizing Nanoparticles for Advanced Ceramic Applications
	Reference No.	NAMI/C16/08
	Type	Platform
	Research Organization	The Hong Kong Polytechnic University

	Commencement Date	Pending approval
	Completion Date	Pending approval
	Total Project Cost	HK$1,190,000
	Status	Pending approval

Summary of the Guangdong-Hong Kong Technology Cooperation Funding Scheme 2008

1.	Title	Development of Photocatalytic Condensate-recovery Air-conditioning System for High Energy Efficiency and Good Indoor Air Quality
	Reference No.	NAMI/D11/08
	Type	Platform
	Research Organization	The University of Hong Kong
	Commencement Date	Pending approval
	Completion Date	Pending approval
	Total Project Cost	HK$1,230,000
	Status	Pending approval

Summary of Contract Research Projects

1.	Title	Development of High Strength LCP/CNT Composite Fibers
	Research Organization	The Hong Kong University of Science and Technology
	Commencement Date	15 January 2007
	Completion Date	14 July 2008
	Total Project Cost	HK$159,000
	Status	Completed
2.	Title	Formulation of a Sunscreen Lotion Containing Functionalized Nano ZnO and TCM
	Research Organization	The Hong Kong University of Science and Technology
	Commencement Date	19 January 2007
	Completion Date	18 January 2009
	Total Project Cost	HK$580,000
	Status	Completed
3.	Title	High Value Added Products from Orange Peel (Phase I)
	Research Organization	The Hong Kong University of Science and Technology
	Commencement Date	15 May 2007
	Completion Date	14 November 2008
	Total Project Cost	HK$406,000
	Status	Completed
4.	Title	Mold Compound and Die Attach Compatibility Study
	Research Organization	The Hong Kong University of Science and Technology
	Commencement Date	1 October 2007

	Completion Date	30 September 2010
	Total Project Cost	HK$1,121,000
	Status	Ongoing
5.	Title	White Product of Anodized Aluminum Oxide
	Research Organization	Nano and Advanced Materials Institute Limited
	Commencement Date	12 December 2007
	Completion Date	11 December 2008
	Total Project Cost	HK$460,000
	Status	Completed
6.	Title	Functional Mirror-like Nanocoating of Low Cost on Metal and Plastic Products Respectively
	Research Organization	Nano and Advanced Materials Institute Limited
	Commencement Date	2 May 2008
	Completion Date	31 August 2009
	Total Project Cost	HK$293,000
	Status	Ongoing

Appendix II – Details of Granted or Pending Patents

1.	Patent Title	The In-situ Synthesis of Hydroxy Benzoic Acid/Hydroxy Naphthoic Acid Polyesters Containing Carbon Nanotube
	Filing No.	61/006423
	Filing Place	US (provisional)
	Filing Date	14 January 2008
	Status	Filed
	Project No.	FIB001N
	Project Coordinator	Prof. Ping Gao
2.	Patent Title	Process for the Fast Fixation of Heavy Mineral Oil under Microwave Irradiation Using Ultra-high-molecular Weight-polyethylene (UHMWPE)/Multi-wall Carbon Nanotubes (MWCNTs) Composite Particles with a Core-shell Structure
	Filing No.	61/136281
	Filing Place	US (provisional)
	Filing Date	5 August 2008
	Status	Filed
	Project No.	Others
	Project Coordinator	Dr. Jiyun Feng
3.	Patent Title	負離子矽酮彈性體複合材料及其製備方法
	Filing No.	200810173690.5
	Filing Place	China
	Filing Date	7 November 2008
	Status	Filed (pending examination)
	Project No.	ITC/042/07NP
	Project Coordinator	Dr. Jiyun Feng

4.	Patent Title	負離子矽酮彈性體複合材料及其製備方法
	Filing No.	09101229.2
	Filing Place	Hong Kong
	Filing Date	10 February 2009
	Status	Filing (search report gathering)
	Project No.	ITC/042/07NP
	Project Coordinator	Dr. Jiyun Feng
5.	Patent Title	Method for Producing Nanoscale Hydrophobic Materials Dispersible in an Aqueous Medium
	Filing No.	61/193968
	Filing Place	US (provisional)
	Filing Date	14 January 2009
	Status	Filed
	Project No.	KEL001N
	Project Coordinator	Prof. Robert Ko
6.	Patent Title	Process for the Formation of Hollow Poly(methyl methacrylate) (PMMA)/Multi-wall Carbon Nanotubes (MWCNTs) Nanocomposite Cylinders by Microwave Irradiation
	Filing No.	Pending
	Filing Place	US (provisional)
	Filing Date	Pending
	Status	Filing
	Project No.	Others
	Project Coordinator	Dr. Jiyun Feng

Appendix III – R&D and Corporate Communications Activities

The R&D activities undertaken during the financial year 2006/07 were as follows:

Date	Activity	Role
7-10 May 2006	2006 NSTI (Nano Science and Technology Institute) Nanotechnology Conference and Trade Show (Boston, Massachusetts, USA)	Attendee
1-8 June 2006	The 1st Fudan Conference of Quantum Control, 2006 (FCQC2006), and visits to nanoscience centres (Shanghai, China)	Speaker and visitor
11-14 June 2006	2006 Process Development Symposium, American Institute of Chemical Engineers (AIChE) (Palm Springs, California, USA)	Speaker
27-30 June 2006	The Fifth Joint Meeting of Chinese Physicists Worldwide (OCPA5), and visit to nanophotonics facility at National Taiwan University (Taipei, Taiwan)	Speaker and visitor
27-30 June 2006	The 8th International Symposium on High Density Microsystem Design, Packaging and Component Failure Analysis in Electronics Manufacturing (HDP '06) (Shanghai, China)	Keynote speaker
15-22 July 2006	International Conference on Optical and Optoelectronic Properties of Materials and Applications 2006 (ICOOPMA 2006) (Darwin, Australia)	Speaker
August 2006	Research Experience for Talented Students (RETS) Program (for form 5 students)	Mentor and coordinator
23-25 August 2006	The 2006 International Workshop on Quantum Measurements and Manipulation at the Molecular Scale (IWQ3MS) (Hefei, China)	Speaker
26-29 August 2006	7th International Conference on Electronics Packaging Technology (ICEPT) (Shanghai, China)	Organizer and speaker
29 August – 1 September 2006	Conference on Computational Physics 2006 (CCP 2006) (Gyeongju, Korea)	Speaker

5-7 September 2006	1st Electronics Systemintegration Technology Conference (ESTC 2006) (Dresden, Germany)	Organizer and speaker
7-9 September 2006	ACCMS (Asian Consortium for Computational Materials Science) Working Group Meeting on Clusters and Nanomaterials (Sendai, Japan)	Speaker
21-26 September 2006	Lecture tour in photonic crystal and nanophotonics (Taiwan)	Speaker
27-29 September 2006	Taiwan Nano-X Exhibition plus education (Taipei, Taiwan)	Speaker
16 October 2006	International Symposium on Bio-photonics, Nano-photonics and Metamaterials (Hangzhou, China)	Speaker
5-10 November 2006	2006 ASME (American Society of Mechanical Engineers) International Mechanical Engineering Congress & Exposition (Chicago, Illinois, USA)	Speaker
8-10 November 2006	The 31st International Electronics Manufacturing Technology Symposium (IEMT 2006) (Kuala Lumpur, Malaysia)	Speaker
27 November – 1 December 2006	Symposium R: Meta-materials at the Milli-, Micro-, and Nanoscale (Boston, Massachusetts, USA)	Speaker
6-8 December 2006	8th Electronics Packaging Technology Conference (EPTC 2006) (Singapore)	Speaker
9-11 December 2006	The 5th Cross-strait Workshop on Nanoscience and Nanotechnology	Organizer
11-13 December 2006	International Workshop on Computational Methods for Nanoscale Systems	Speaker
11-14 December 2006	The 8th International Conference on Electronics Materials and Packaging (EMAP 2006)	Organizer
16-19 December 2006	Visit to Center of Nanoscience and Nanotechnology at Wuhan University (Wuhan, Hubei, China)	Speaker and visitor

20-22 February 2007	International Nanotechnology Business Summit (Tokyo, Japan)	Speaker
5-9 March 2007	2007 APS (American Physical Society) March Meeting (Denver, Colorado, USA)	Attendee

The corporate communications activities undertaken during the financial year 2006/07 were as follows:

Date	Activity	Role
20 April 2006	Launching ceremony of the Hong Kong R&D Centres	Speaker and exhibitor
18 May 2006	Lunch talk for the Federation of Hong Kong Industries to introduce NAMI	Speaker
29-30 May and 8-9 June 2006	Guangdong-Hong Kong R&D Innovation and Technology Collaborations Joint Roadshows (Guangdong Province, China)	Speaker and exhibitor
5-9 June 2006	3rd Pan-PRD Regional Economic & Trade Cooperation Fair (Yunnan Province, China)	Promoter
17-19 June 2006	2006 Fujian Technology and Projects Fair (Fujian Province, China)	Participant
19-21 June 2006	The International Symposium on Nanotechnology in Environmental Protection and Pollution (ISNEPP 2006)	Speaker, exhibitor and sponsor (by the Institute of NanoMaterials and NanoTechnology)
23 June 2006	The Hong Kong General Chamber of Commerce Talk to the Innovation and Technology Committee	Speaker
26-30 June 2006	Venture Forum 2006 cum visits in the United States led by ITC together with other R&D Centres (San Jose, California, USA)	Speaker, exhibitor and visitor
14 July 2006	Visit by winning teams of Hong Kong Student	Host

	Science Project Competition 2006	
16 August 2006	Symposium for R&D Project Solicitation	Organizer
22 September 2006	Visit by representatives of Economic Analysis and Business Facilitation Unit, Financial Secretary's Office	Host
12-17 October 2006	China Hi-Tech Fair 2006 (Shenzhen, China)	Exhibitor
24 October 2006	Meeting with the Chief Executive of HKSAR at Hong Kong Science and Technology Parks	Exhibitor
27 October 2006	Visit by representatives of Office of Scientific Research, United States Air Force	Host
1-3 November 2006	2006 International Conference on NanoTechnology and Advanced Materials, Third Asia Nano Forum Summit 2006, and Nanotechnology Commercialization Forum 2006	Organizer, speaker and exhibitor
9-13 November 2006	Innovation Festival 2006 (Youth Innovation Exhibition)	Exhibitor
12-16 November 2006	2006 AIChE (American Institute of Chemical Engineers) Annual Meeting (San Francisco, California, USA)	Speaker and promoter
23 November 2006	Visit by the Hong Kong Trade Development Council	Host
29 November - 1 December 2006	Innovation & Design Expo 2006	Exhibitor
12 December 2006	Visit by The Chinese Manufacturers' Association of Hong Kong	Host
15 December 2006	Visit by a delegation of the Shanghai Municipal Government	Host
15 December 2006	Visit to The Hong Kong Association of Textile Bleachers, Dyers, Printers and Finishers	Visitor
3 January 2007	Visit to the Hong Kong Productivity Council	Visitor

15 January 2007	Visit to the Federation of Hong Kong Machinery and Metal Industries	Visitor
23 January 2007	Luncheon with representatives of technology transfer units of local universities	Organizer
26 January 2007	Nansha Science & Technology Forum: Materials (Nansha, Guangdong Province, China)	Speaker and organizer
30 January 2007	Visit by the Hong Kong Productivity Council and the Hong Kong Trade Development Council	Host
6 March 2007	Visit by Yau Tsim Mong Committee on Promotion of Hong Kong Economy	Host
2006/07	Expansion of NAMI's website <http://www.nami.org.hk> to include technical updates, business opportunities, educational and promotional materials (e.g. presentation slides, e-version of brochures and posters, etc.), etc.	Publisher
2006/07	Publication of newsletters of the Consortium of NanoTechnology and Advanced Materials and updating its website <http://www.ust.hk/inmt/CNTAM>	Publisher

The R&D activities undertaken during the financial year 2007/08 were as follows:

Date	Activity	Role
8-11 April 2007	Photonic and Electromagnetic Crystal Structures VII (Monterey, California, USA)	Committee member
25 May 2007	Metal Treatment and Energy Forum	Organizer and speaker
1-6 July 2007	International Conference on Materials for Advanced Technologies 2007 (Singapore)	Speaker
26-30 August 2007	The International Society for Optical Engineering (SPIE) Plasmonics: Nanoimaging, Nanofabrication, and Their	Speaker

	Applications III (San Diego, California, USA)	
31 August 2007	Green Nanotechnology Forum	Organizer and speaker
16-21 September 2007	European Congress of Chemical Engineering – 6 (Copenhagen, Denmark)	Keynote speaker
19-22 November 2007	The 9th International Conference on Electronics Materials and Packaging (Daejeon, Korea)	Speaker
23 November 2007	Nanotechnology for Medical and Healthcare Forum	Organizer
1 December 2007	Asia Nano Forum Summit 2007	Attendee
11-14 December 2007	2007 International Conference and Exhibition on Nanotechnology and Advanced Materials, and Federation of Hong Kong Machinery and Metal Industries Conference 2007	Co-organizer and exhibitor
25 January 2008	Nanotechnology Forum – Electronics and Electrical Appliances	Organizer and speaker

The corporate communications activities undertaken during the financial year 2007/08 were as follows:

Date	Activity	Role
Roadshows		
11 May 2007	Roadshow for the Hong Kong Screw & Fasteners Council	Promoter
22 May 2007	Roadshow for The Hong Kong Mould and Die Technology Association Limited	Promoter
26 May 2007	Roadshow for the Hong Kong Plastic Machinery Association Limited	Promoter
28 May 2007	Roadshow for The Hong Kong Metals Manufacturers Association	Promoter
5 June 2007	Roadshow for the Hong Kong Critical Components Manufacturers Association	Promoter

12 June 2007	Roadshow for the Hong Kong Metal Finishing Society Limited	Promoter
18 June 2007	Roadshow for the Hong Kong Electro-plating Merchants Association Limited	Promoter
25 June 2007	Roadshow for the Hong Kong Medical and Healthcare Device Manufacturers Association Limited	Promoter
8 October 2007	PRD Tour 2007 with the Innovation and Technology Commission (ITC)	Promoter
Conferences/Seminars/Workshops		
19 April 2007	Seminar: New Era for Food Safety Monitoring and Control by the Hong Kong Productivity Council	Attendee
20 April 2007	Technology Symposium for Textiles and Apparel: New Ideas, New Opportunities by The Hong Kong Research Institute of Textiles and Apparel	Attendee
30 May 2007	Seminar: SME Branding Development by the Hong Kong Brand Development Council	Attendee
2 August 2007	Seminar: The Implementation of Registration, Evaluation, Authorization and Restriction of Chemicals (REACH) by the Hong Kong Green Manufacturing Alliance	Attendee
18 December 2007	Seminar: Research and Technology Transfer in Nanoelectronics and Microelectromechanical Systems (MEMS) by the City University of Hong Kong	Attendee
Exhibitions		
16 April 2007	Hong Kong Electronics Fair	Exhibitor
13 June 2007	Taiwan Nano 2007 (Taipei, Taiwan)	Exhibitor
24 June 2007	International Conference on Nanoscience and Technology, China 2007 (ChinaNANO 2007) (Beijing, China)	Exhibitor
14 September	Innovation Expo 2007	Exhibitor

2007		
12 October 2007	China Hi-Tech Fair (Shenzhen, China)	Exhibitor
5-8 December 2007	2007 China (Changsha) Sci-tech Achievement Transformation Fair (Changsha, China)	Exhibitor
9 December 2007	Chongqing Hi-Tech Fair with ITC (Chongqing, China)	Exhibitor
Other Publicity Activities		
10 April 2007	Visit by the Italian Chamber of Commerce	Host
3 May 2007	Reception for Technology Companies by InvestHK	Participant
14 May 2007	Visit by the Hong Kong Productivity Council	Host
21 May 2007	Visit by Shanghai government delegation	Host
8 June 2007	Visit by Jiangxi and Guangdong government delegation	Host
13 July 2007	Visit by the University of Alberta	Host
29 August 2007	Visit by The University of Hong Kong	Host
4 September 2007	Media Workshop by ITC	Participant
7 September 2007	Visit by the South China University of Technology	Host
9 September 2007	Visit by the Hong Kong Baptist University	Host
7 December 2007	Visit by World Harmony Organization	Host
12 December 2007	CEO Forum, Inno Design Tech Expo 2007	Participant
28 December 2007	Visit by Chekiang government delegation	Host
10 January 2008	Visit by Savantas Policy Institute	Host
18 January 2008	Visit by Guangdong government delegation	Host

2 February 2008	Visit by Zhongshan government delegation	Host
4 February 2008	Visit by National Institute of Advanced Industrial Science and Technology (AIST), Japan	Host
4 February 2008	Visit by King Abdullah University of Science and Technology (KAUST), Saudi Arabia	Host

The R&D activities undertaken during the financial year 2008/09 were as follows:

Date	Activity	Role
3 June 2008	ASME Nanotechnology Conference	Keynote speaker
16 June 2008	Nanotechnology Forum – Plastic Processing and Products	Organizer and speaker
29 September 2008	Nanotechnology Forum – Solar Energy	Organizer
16 January 2009	Nanotechnology Forum – Environmental Technology	Organizer

The corporate communications activities undertaken during the financial year 2008/09 were as follows:

Date	Activity	Role
9 April 2008	Visit by Hungary delegation	Host
11 April 2008	Visit by Shunde delegation	Host
17 April 2008	Chongqing Hi-Tech Fair	Exhibitor
29 April 2008	Visit by a delegation of The University of Johannesburg	Host
14 May 2008	Jiangxi Symposium (江西在港座談會)	Participant
23 May 2008	Visit by a delegation of the Ministry of Science and Technology, PRC (中華人民共和國科學技術部基礎研究司)	Host
10 June 2008	The 5th Pan-PRD Trade Fair	Exhibitor

13 June 2008	Visit by Dongguan delegation (東莞市科技局)	Host
2 July 2008	東莞松山湖 2008 推介會	Participant
13 July 2008	Visit by a delegation of the University of Alberta	Host
8 August 2008	Visit by a delegation of The Chinese Manufacturers' Association of Hong Kong	Host
18 September 2008	Visit by a delegation of the University of Konstanz	Host
24 September 2008	Launching Ceremony cum Premiere of YV Series	Participant
12 October 2008	China Hi-Tech Fair	Exhibitor
5 November 2008	Capital magazine's interview with the Chief Executive Officer	Interviewee
6 November 2008	Visit by the Deputy Director-General of the Guangdong Science and Technology Department	Host
21 November 2008	Visit by Hungarian delegation	Host
10 December 2008	IDT Expo 2008	Co-organizer and exhibitor
12 December 2008	Visit by Dr. Wan Gang, Minister of Science and Technology, PRC	Host
15-16 December 2008	Visit by a delegation of Chongqing Productivity Council (重慶生產力促進中心)	Host
17 December 2008	Visit by a delegation of Wuyi University	Host
6 February 2009	The Chinese General Chamber of Commerce's interview with the Chief Executive Officer	Interviewee
20 February 2009	Nanotechnology Seminar at UBS	Speaker
2 March 2009	Visit by a delegation of STIP at Georgia	Host

	Institute of Technology	