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Case Study

- *Avi-Tech Electronics Ltd*
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Recommended Readings

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Please note:

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Automation, mechanisation & robotics – SMEs can benefit too

1. Introduction

Today, Singapore's small and medium enterprises (SMEs) face two common problems – manpower shortage and the constant pressure of increasing productivity. Hence, they need to embrace what technology and automation has to offer to solve these problems. SMEs can seek to innovate by employing automation, mechanisation and robotics solutions that provide them with the means to increase their productivity, improve quality and consistency of their products, at the same time reducing their operating costs.

Adopting automation in novel ways impacts all areas of production, providing more flexible approaches to manufacturing and assembly and bringing to these industries the benefits of increased productivity and quality, enhanced health and safety. It also helps improve the environmental impact of manufacturing as energy consumption is reduced through improved energy efficiency. Moreover, the use of automation solutions such as in logistics, for example, helps increase the efficiency of loading and unloading of pallets, allowing the task to be done in a shorter amount of time.

2. What are automation, mechanisation and robotics?

Automation is the use of machines, control systems and IT solutions to improve the productivity of an industrial process that would otherwise be done manually. Mechanisation comprises mechanical solutions operated by workers as part of the manufacturing process. Where automation differs from mechanisation is that automation removes the need for workers to operate the machinery while increasing load capacity, speed, and repeatability. Meanwhile, robotics is the branch of technology that deals with the design, construction, operation and use of machines to perform tasks done traditionally by human beings.

3. The benefits of these automation solutions

Automation and mechanisation ensure quality and compliance with standards and regulations, whilst robotics can provide solutions to improve the manufacturing process. These solutions can assist SMEs to achieve a competitive advantage.

The automation of manufacturing or other industrial processes can help improve the consistency of processes and products. Meanwhile, the mechanisation of stations in a production line can remove some of the variables that can be attributed to human error. For example, workers on a production line can become tired or bored whilst performing monotonous tasks. Thus, removing the variability as a result of human error can help standardise both the manufacturing process and the product.

Additionally, the automation of manufacturing can improve product quality as a result of increased precision in production. For example, some new measurement tools can provide an even more accurate estimation of the product quality, hence making it a superior product. Robots could be implemented to perform a task with a high degree of precision (e.g. perform a cut-out from a mould).

Automation of manufacturing can also help reduce costs. A robot, for example could be programmed by a worker, to perform a task, allowing the worker to be re-allocated to another more important tool. Another example of how automation could help reduce costs would be through the use of integrated measurement solutions. These could autonomously take measurements and require the attention of workers only when necessary, such as in the event of an error or a faulty product.

Automation solutions can also have health and safety benefits; removing the need for workers to operate in hazardous or unsafe environments (e.g. exposure to toxic fumes or extreme temperatures). They can also remove the burden of heavy and repetitive labour that could result in injury for the workers.

Lastly, the use of automation can have environmental benefits through more energy efficient production processes. For example, some industrial robots can operate on an assembly line without the need for lighting, hence saving energy. Ultimately automation

solutions help manufacturers increase their productivity, through a reduction of inputs like energy requirements or production errors, while improving production output and producing quality goods with consistency .

4. Ten tips for a successful automation process

The following are some tips that can assist SMEs keep their business objectives in sight when realising their automation projects.

- (i) Strategic vision of automation that is also familiar to every employee

The success of the automation programme is determined to a great extent by the commitment of the employees. If they are kept informed and maintain their focus on the motivations for implementing automation solutions, they will support the move. Hence, communication among all stakeholders is paramount.

- (ii) Coordinate project objective with the business objective

The implementation of automation solutions is rarely a stand-alone project. It often also affects the company's bottom line. Hence, it is important to carefully coordinate the project with the objective and the phase planning that the company regards as feasible at that point of time.

- (iii) Realistic timeframe

Completing a project on time can give rise to a considerable amount of stress within the company due to the pressure it puts on the normal business. A balanced schedule that takes both factors into account will result in a more methodical and generally more successful implementation.

- (iv) Ensure adequate project resources from within the company

There is usually little or no willingness to supply internal employees for the project. This results in project team members or external consultants having to handle more than what was earlier specified, which at the same time, may impact the schedule and budget.

- (v) Ensure the project team comprises members from a variety of departments and levels within the company

There tend to be knowledge gaps about certain business processes in one-sided teams. This will in turn lead to unsound functional specifications when it comes to specific areas. Thus, companies should form a broad-based project team from the beginning.

- (vi) Ensure that departments are willing to compromise in order to achieve unity of purpose in accomplishing the process

The way to achieve willingness to compromise is by maintaining focus on the pre-defined goals.

- (vii) Ensure that sub-processes are coordinated and try to standardise processes that have diverged over the course of time but can now be dealt with once again in a uniform way

Over the years, the departments within the company may have developed workflows based on the exigencies of day-to-day operational management. Costs can be considerably reduced if the project team examines these operational flows from a strategic perspective and seeks opportunities for standardisation.

- (viii) Select the benchmarks and standards for the project in advance

More and more companies are starting to use Key Performance Indicators (KPIs). The use of KPIs - before, during and after completion of the project - not only gives a better picture but also

produces a comparative picture of the degree of success.

(ix) Document changes

At times, there may be changes of insight while undertaking the project. It is very important, both for the project team and for the organisation, to be clear as to how they wish to deal with such changes. It is critical to keep in mind of the effect that changes have on the project's run time, costs and required resources.

(x) Be pro-active in managing change

After the implementation, things will change for many employees. Failure to properly manage the expectations - and possibly concerns - of the employees can affect the entire project success.

5. Government assistance and schemes

Below are some loans, grants, and tax incentives offered by the Singapore government to assist SMEs in developing new products and improving their business processes.

<p>Loans</p>	<ul style="list-style-type: none"> ▪ Local Enterprise Finance Scheme (LEFS) Strengthen, upgrade and expand the business with the help of a loan. <p>SMEs can loan up to S\$15 million to:</p> <ul style="list-style-type: none"> ○ automate and upgrade factory and equipment ○ purchase factory (only for JTC Corporation or Housing & Development Board (HDB) properties) <p>More information can be obtained from the following website: http://www.enterpriseone.gov.sg/en/Government%20Assistance/Loans/Equipment%20and%20Machinery/gp_spring_lefs.aspx</p>
<p>Grants</p>	<ul style="list-style-type: none"> ▪ Collaborative Industry Projects (CIP) <ul style="list-style-type: none"> ○ To develop and deploy scalable industry specific productivity projects with solution providers.

- To identify and solve industry specific productivity challenges and to encourage industry collaboration for productivity improvements in these 6 priority sectors:
 - Food Manufacturing
 - Food Services
 - Furniture
 - Printing & Packaging
 - Retail
 - Textile & Fashion

More information can be obtained from the following website:

http://www.enterpriseone.gov.sg/Government%20Assistance/Grants/Industry%20Development/gp_spring_cip.aspx

- Innovation & Capability Voucher (ICV)
A voucher worth S\$5,000 to improve business efficiency and productivity through consultancy projects or simple productivity solutions.
 - To encourage SMEs to take the first step towards capability development.
 - To strengthen businesses' core operations through 3rd party consultancy projects in these areas:
 - innovation
 - productivity
 - human resources (HR)
 - financial management
 - To assist SMEs in implementing simple productivity solutions in the following areas:
 - equipment & hardware
 - technical solutions & training
 - design & renovation

More information can be obtained from the following website:

http://www.enterpriseone.gov.sg/Government%20Assistance/Grants/Product%20Development%20and%20Innovation/gp_spring_icv.aspx

- Mechanisation Credit (MechC) Scheme
Raise the construction firm's productivity through technology adoption.

- To help companies improve productivity of construction projects by defraying costs related to technology adoption.

More information can be obtained from the following website:

http://www.enterpriseone.gov.sg/Government%20Assistance/Grants/Technology/gp_bca_mechc.aspx

- Productivity Improvement Project (PIP) Scheme
Operate the business more efficiently by re-engineering work processes and adopting labour efficient technologies.
 - To encourage businesses:
 - improve site processes and boost productivity
 - adopt labour efficient construction technologies
 - develop new capabilities within the company or industry

More information can be obtained from the following website:

http://www.enterpriseone.gov.sg/Government%20Assistance/Grants/Technology/gp_bca_pip.aspx

- ICT for Productivity and Growth (IPG) Programme
Transform the business through high-tech solutions and high-speed Internet connectivity.
 - To accelerate the adoption of information and communications technology (ICT) among SMEs and boost their productivity and growth.
 - The programme's three key initiatives are:
 - Scaling up Proven ICT Sector Solutions – to promote the adoption of ICT-based sectoral productivity solutions
 - Piloting of Emerging Solutions – to promote up-and-coming innovations that can transform businesses (e.g. data analytics and robotics)
 - Enabling High-Speed Connectivity – to subsidise: fibre subscription plans for businesses; and implementation of Wireless@SG services at business premises

More information can be obtained from the following website:

http://www.enterpriseone.gov.sg/Government%20Assistance/Grants/Technology/gp_ida_ipg.aspx

Productivity Link

- iSPRINT (Increase SME Productivity with Infocomm Adoption and Transformation)
A grant to defray costs of infocomm project to improve or innovate the business operations.
 - To encourage SMEs to use technology to improve or innovate their business operations.
 - The infocomm project should lead to:
 - increase in efficiency/ productivity
 - increase in revenue
 - increase in value-added

More information can be obtained from the following website:

http://www.enterpriseone.gov.sg/Government%20Assistance/Grants/Technology/gp_ida_int.aspx

Tax Incentives

- Productivity and Innovation Credit (PIC)
Significant tax deductions or payouts for the investments in research and development, innovation, automation and training.
 - For businesses to invest in a broad range of activities along the innovation value chain to improve innovation and productivity from Years of Assessment (YAs) 2011 – 2018.
 - PIC covers spending on 6 business activities in the following areas:
 - Research & development (R&D) - including R&D projects conducted outside Singapore
 - Registration of intellectual property rights – patents, trademarks, designs and plant varieties
 - Acquisition of intellectual property rights (e.g. when a company buys a patent or copyright for use in its business)
 - Acquisition or leasing of prescribed automation equipment
 - Training of employees
 - Approved design projects

More information can be obtained from the following website:

http://www.enterpriseone.gov.sg/Government%20Assistance/Tax%20Incentives/Product%20Development%20and%20Innovation/gp_iras_pic.aspx

- Productivity and Innovation Credit+ (PIC) Scheme

Claim enhanced tax deduction with PIC+ scheme for investment beyond the expenditure cap for PIC.

- To provide financial support to small and medium enterprises that are making substantive investments to transform their business.
- PIC covers spending on 6 business activities in the following areas:
 - Research & development (R&D) - including R&D projects conducted outside Singapore
 - Registration of intellectual property rights – patents, trademarks, designs and plant varieties
 - Acquisition of intellectual property rights (E.g. when a company buys a patent or copyright for use in its business)
 - Acquisition or leasing of prescribed automation equipment
 - Training of employees
 - Approved design projects

More information can be obtained from the following website:

http://www.enterpriseone.gov.sg/Government%20Assistance/Tax%20Incentives/Product%20Development%20and%20Innovation/gp_iras_pic_plus.aspx

6. Examples of automation solutions for various industries

Below are some examples of automation solutions that can be implemented in the various industries.

Industry	Examples of automation solutions
Cleaning	<ul style="list-style-type: none"> ▪ Air blower ▪ Battery-operated cart ▪ Boom lift ▪ Burnisher ▪ Carpet shampoo machine ▪ Vacuum cleaner ▪ Escalator cleaner ▪ Glass cleaning system ▪ Hi-pressure jet machine ▪ Ride-on scrubber ▪ Walk-behind auto scrubber ▪ Steam cleaner

	<ul style="list-style-type: none"> ▪ Ride-on sweeper ▪ Road sweeper ▪ Suction road sweeper ▪ Pavement sweeper
Construction	<ul style="list-style-type: none"> ▪ Automated tunnel boring machine ▪ Boom lift ▪ Concrete pumps ▪ Mini crane ▪ Mobile crane ▪ Ride-on power float machine ▪ Self-climbing scaffold system ▪ Scissor lift ▪ Telescopic handler
Food & Beverages	<ul style="list-style-type: none"> ▪ Automatic double layer stirrer and cooking machine ▪ Automatic grilling machine ▪ Automatic ice slicer ▪ Combi oven ▪ Dishwasher ▪ Dumb waiter lift ▪ Rolled pasta sheet machine ▪ Vacuum packing machine ▪ Vegetable preparation speciality machine
Food Manufacturing	<ul style="list-style-type: none"> ▪ Automatic capping machine ▪ Automatic filling machine ▪ Automatic thermoforming vacuum machine ▪ Cake filler and conveyor steamer ▪ Combi oven ▪ Horizontal mixer ▪ Rice-roll processing machine ▪ Spiral freezer ▪ Semi-auto egg tart forming machine ▪ Tunnel oven ▪ Vacuum packing machine
Information & Communications	<ul style="list-style-type: none"> ▪ Bar-coding system ▪ Computer-to-plate and computer-to-press systems ▪ Offset printing press ▪ Radio-Frequency Identification (RFID) system
Landscaping	<ul style="list-style-type: none"> ▪ Electric hedge trimmer

	<ul style="list-style-type: none"> ▪ Ride-on mower ▪ Ride-on aerator ▪ Soil mixer ▪ Trencher ▪ Wood chipper ▪ Mechanised leaf shredder ▪ Potting machine
Manufacturing	<ul style="list-style-type: none"> ▪ Blister packaging machine ▪ Boom lift ▪ Computer-to-plate and computer-to-press systems ▪ Extrusion machines ▪ Injection mould machine used for making plastic, ceramic, metal or silicone rubber components ▪ Offset printing press ▪ Automatic vertical cutting machine ▪ Bending machine ▪ Edge bending machine ▪ Hydraulic guillotine shear ▪ Hydraulic hot press machinery ▪ Hydraulic insertion machine ▪ Metal sanding machine ▪ Rotary shearing machine ▪ Rubber trimming machine ▪ Panel saw machine ▪ Taping machine head (with PLC control system and programming)
Retail	<ul style="list-style-type: none"> ▪ Bar-coding system ▪ Computers ▪ Customer relationship management system ▪ Fingerprint recognition device connected to IT system ▪ Interactive shopping carts or kiosks ▪ Point of sale system ▪ Printers
Wellness & Beauty	<ul style="list-style-type: none"> ▪ Complexion analysis system ▪ Electric traction therapy equipment ▪ Smart pressure therapy system
Wholesale	<ul style="list-style-type: none"> ▪ Bar-coding system ▪ Milling machine ▪ Punching and laser cutting machine ▪ Scissor lift

- Shrink wrap packing machine
- Automatic edge banding machine
- Automatic liquid/raw material dispensing machine
- Automatic paper cutter
- Automatic tape cutting machine
- Balancing machine
- Bottle staking machine
- Colour spectrophotometer
- Dry powder refilling machine
- Electric stacker
- Envelope making machine
- Helium leak test system
- Intelligent battery refurbish system
- Laser crystal engraving machine
- Multi-head automated embroidery machine
- Pin marking machine
- Roll forming machine
- Slitting machine
- Sulphur palletized plant and granulator
- Thermal cleaning system
- Vacuum and gas flushing sealer
- Walform machine

Source: Examples of IT and automation equipment qualifying for PIC (By industry). (2014, September 9). *Inland Revenue Authority of Singapore*. Retrieved November 3, 2014, from <http://www.iras.gov.sg/irasHome/page04.aspx?id=14372>

Case Study

Avi-Tech Electronics Ltd

Avi-Tech Electronics Ltd was incorporated in Singapore in 1981. It is a “total solutions provider for burn-In, engineering and manufacturing services for the semiconductor, electronics and life sciences industries”. The company successfully reduced both its operational costs and increased its value-added (VA) per worker by 20 percent after investing in new processes and technologies as well as expanding into new overseas markets. Avi-Tech Electronics knows this winning strategy well. For this 26 year-old company, the endeavour to seek higher productivity is embodied in its three core values: (i) advancement through technology; (ii) maximising value and managing cost; and (iii) innovation.

As the industry they serve continues to evolve rapidly, the company saw that it was a necessity for them to invest in new equipment to meet their customers’ changing needs. Two new high power burn-in ovens were purchased to cater to new and more advanced product line. They later found that the annual revenue from the new products is 12 percent more than that from existing product lines.

Technology has also helped Avi-Tech’s employees to work better and faster. While in the past, a printed circuit board with manually assembled components took 40 minutes for testing, today, a similar board assembled by machines can be tested in barely 15 minutes.

In its effort to improve productivity, Avi-Tech also explored new business models to maximise the value of its products and services while keeping costs low. In 2008, Avi-Tech expanded into the United States market of board manufacturing. It offered a broad range of products, including very high power platforms targeted at high technology applications. Leveraging on a team in the U.S. to service customers and lower-cost operations and materials from Asia, Avi-Tech was able to provide attractive product offerings and increase the size of its value added pie simultaneously.

The year 2009 saw yet another successful business venture for Avi-Tech, this time into the medical and life sciences sector. Within a year, Avi-Tech manufactured and delivered more than 400 units of digital imaging and detection systems. The company’s success is attributed to the value added customer service.

For Avi-Tech, innovation is certainly a key ingredient for higher productivity. They continuously seek product and process innovations. These innovations involve adopting new processes and technologies. In one instance, machines have been re-designed to optimise capacities, resulting in a 20 percent reduction in operational costs. Additionally, the adoption of a new high power thermal solution technology from the U.S. increased the company's Engineering Services and Equipment Business Unit revenue by 392 percent in year 2007.

From Avi-Tech's report card, productivity improvement is evident. Over a short period of three years, Avi-Tech's value added (VA) per worker increased by 20 percent, from S\$74,000 in 2006 to S\$89,000 in 2008.

Koufu

Koufu was established in 2002, with a mission to "provide good food and services that everyone is able to enjoy through their deep roots in traditional Singaporean cooking and in true coffee shop tradition". "Within a short span of 10 years, Koufu expanded its business profile from neighbourhood coffee shops to establishing large scale modern food courts in residential and well as commercial shopping malls. One of the milestone expansion projects of the company is the establishment of Rasapura Masters in Marina Bay Sands, Singapore. In 2012, Koufu celebrated its 10th anniversary with its first overseas food court establishment in Sands Cotai, Macau."

Koufu's pursuit to push for advancements in productivity was made easier with the Capability Development Scheme (CDS) and the Productivity and Innovation Credit (PIC) scheme provided by SPRING Singapore. These two schemes have allowed Koufu to successfully automate some of its processes. The company received a total of S\$150,000 in funding under CDS in 2012, which accounts for 30 per cent of the costs. A significant part of the remaining amount can be reimbursed under the PIC, leaving only about 20 per cent of the burden of increasing productivity on Koufu.

Through the first phase of the CDS that Koufu applied for, the automated processes in the central kitchen resulted in a 10 percent increase of sales per man hour. The automatic rotating oven that Koufu acquired improved the quality and consistency of its trademark buns. More significantly, this has removed the need for manpower to manually rotate the trays in the oven, cutting down labour by 50 per cent, thereby re-

allocating manpower to more efficient use in the central kitchen.

Koufu then moved on to developing its supply chain management system under the second phase of its application of CDS. The system would allow stall holders to improve the procurement process of their supply. This consequently minimises the amount of paper work and processes for both parties.

Asiawide Print Holdings Pte Ltd

Asiawide Print Holdings Pte Ltd was founded in 1977. It provides pre-press, on-press, and post-press printing services to more than 300 multinational companies across a myriad of industries globally.

AsiaWide Print wanted to improve the quality of their deliverables for orders with tight deadlines and cope better with peak seasonal demands. They carried out an analysis and found their pre-press procedures as a critical bottleneck. Hence, the company initiated a productivity project to work towards improving the efficiency of their pre-press procedures such as the manufacture of a printing plate that carries the image, the adjustment of images and texts, and the creation of high-quality print files. These labour intensive and time consuming processes made it difficult for AsiaWide Print to meet heavier demands during festive seasons, particularly for manually-folded brochures.

AsiaWide Print then introduced a new workflow system to speed up processes. They also decided to invest in technology to overcome the challenges. Automated machines were brought in to improve pre-press quality and on-press productivity. The company invested in a plate processor machine which prepares and stacks the printing plates, and a folding automation machine which folds the brochures. Workers are also trained to operate the new automation and do simple troubleshooting of the machines.

These initiatives resulted in shortened pre-press preparation time, from 30 minutes to just three minutes per plate. The company is also able to increase its output from 1,800 to 45,000 brochures folded per hour, a 25 times increase in productivity. AsiaWide Print also invested in a new documentation system which saves time spent on following up with clients on proof-reading of content and reduces errors. This in turn saves money on re-printing.



Productivity Link

The productivity gains from these savings, coupled with the company's increased revenue, are shared with employees through higher performance bonuses.

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CPP Course Syllabus	
CPP	CPP (Retail)
<p>Module 1: Understanding Productivity (Duration: 1 day)</p> <ul style="list-style-type: none"> • Introduction to Productivity and Quality Concepts • Factors Affecting Enterprise Productivity • Productivity Movement in Singapore • Productivity Promotion in Businesses • Productivity Challenges 	
<p>Module 2: Productivity Tools, Techniques & Management Systems (Duration: 3 days)</p> <ul style="list-style-type: none"> • Business Excellence • Productivity Measurement & Analysis • Process management: <ul style="list-style-type: none"> ▪ Cost of Quality ▪ Lean Six Sigma ▪ Process Mapping & Analysis • Integrated Management Systems 	<p>Module 2: Productivity Tools, Techniques & Management Systems (Duration: 3 days)</p> <ul style="list-style-type: none"> • Delivering Service Excellence • Productivity Measurement & Analysis • Process management: <ul style="list-style-type: none"> ▪ Cost of Quality ▪ Lean Six Sigma ▪ Process Mapping & Analysis
<p>Module 3: Innovation & Service Excellence (Duration: 3 days)</p> <ul style="list-style-type: none"> • Knowledge Economy & Innovation • Service Excellence • Team Excellence 	<p>Module 3: Innovation & Service Excellence (Duration: 3 days)</p> <ul style="list-style-type: none"> • Introduction to Service Excellence & Sales Productivity • Store Management & the Roles of a Store Manager • Minimising Operational Constraints & Focusing on Sales • Setting Goals & Analysing Statistics • Coaching & Motivating Sales Staff • Service Behaviours that Encourage Business
<p>Module 4: Critical Success Factors (Duration: 1 day)</p> <ul style="list-style-type: none"> • Management Commitment • Managing & Sustaining Change • Overcoming Resistance to Change • Training and Education • Planning for Implementation and Control of Productivity Improvement Programme • Briefing on project assignment & Role of Productivity Practitioner 	

As part of the CPP curriculum, participants are required to start a productivity improvement project upon completion of the in-class component. Project guidance will be provided by a professional consultant assigned for this purpose and is for a total of 2 man-days.

Funding & Payment

The course is supported by the Singapore Workforce Development Agency (WDA). Funding is available at 70% and 50% of the course fees respectively for SMEs and MNCs/LLEs/Statutory Boards. Please find the prices payable in the net fee table below:

For All Entities:	Nett Fee:	Nett Fee (with GST):
All Entities (\$3950)	\$1,185	\$1,267.95

Here are the schedules for CPP:

Dec-14		
Date	Module	Time
Monday, 24 November 2014	Module 1	9-5 pm
Tuesday, 25 November 2014	Module 1 & 2	9-5 pm
Monday, 1 December 2014	Module 2	9-5 pm
Wednesday, 3 December 2014		9-5 pm
Monday, 8 December 2014	Module 3	9-5 pm
Tuesday, 9 December 2014		9-5 pm
Monday, 15 December 2014		9-5 pm
Tuesday, 16 December 2014	Module 4	9-5 pm

Jan-15		
Date	Module	Time
Monday, 22 December 2014	Module 1	9-5 pm
Tuesday, 23 December 2014	Module 1 & 2	9-5 pm
Monday, 29 December 2014	Module 2	9-5 pm
Tuesday, 30 December 2014		9-5 pm
Monday, 5 January 2015	Module 3	9-5 pm
Wednesday, 7 January 2015		9-5 pm
Tuesday, 13 January 2015		9-5 pm
Wednesday, 14 January 2015	Module 4	9-5 pm

Jan-15 (Mandarin)		
Date	Module	Time
Monday, 12 January 2015	Module 1	9-5 pm
Thursday, 15 January 2015	Module 1 & 2	9-5 pm
Monday, 19 January 2015	Module 2	9-5 pm
Thursday, 22 January 2015		9-5 pm
Monday, 26 January 2015	Module 3	9-5 pm
Thursday, 29 January 2015		9-5 pm
Monday, 2 February 2015		9-5 pm
Thursday, 5 February 2015	Module 4	9-5 pm

Feb-15		
Date	Module	Time
Tuesday, 20 January 2015	Module 1	9-5 pm
Friday, 23 January 2015	Module 1 & 2	9-5 pm
Tuesday, 27 January 2015	Module 2	9-5 pm
Friday, 30 January 2015		9-5 pm
Tuesday, 3 February 2015	Module 3	9-5 pm
Friday, 6 February 2015		9-5 pm
Tuesday, 10 February 2015		9-5 pm
Wednesday, 11 February 2015	Module 4	9-5 pm

Mar-15		
Date	Module	Time
Tuesday, 24 February 2015	Module 1	9-5 pm
Wednesday, 25 February 2015	Module 1 & 2	9-5 pm
Monday, 2 March 2015	Module 2	9-5 pm
Wednesday, 4 March 2015		9-5 pm
Monday, 9 March 2015	Module 3	9-5 pm
Wednesday, 11 March 2015		9-5 pm
Monday, 16 March 2015		9-5 pm
Tuesday, 17 March 2015	Module 4	9-5 pm

Apr-15		
Date	Module	Time
Tuesday, 24 March 2015	Module 1	9-5 pm
Thursday, 26 March 2015	Module 1 & 2	9-5 pm
Tuesday, 31 March 2015	Module 2	9-5 pm
Thursday, 2 April 2015		9-5 pm
Tuesday, 7 April 2015	Module 3	9-5 pm
Thursday, 9 April 2015		9-5 pm
Tuesday, 14 April 2015		9-5 pm
Wednesday, 15 April 2015	Module 4	9-5 pm

Core Faculty Members

MR. LAM CHUN SEE

B. ENG IN INDUSTRIAL & SYSTEMS ENGINEERING (UNIVERSITY OF SINGAPORE)

Chun see manages his own consultancy practice, Hoshin Consulting and is also an associate consultant/trainer to the PSB Corporation and Singapore Productivity Association. Prior to running his own practice, he has had years of experience as an industrial engineer with Philips, and trainer and consultant with the then National Productivity Board, APG Consulting and Teian Consulting. He was conferred the Triple-A Award in 1989 for helping to transfer Japanese know-how, particularly in the area of 5S, into local programmes and packages. Throughout his years of consultancy experience, Chun See has assisted many businesses in analyzing their productivity and quality objectives and performance; primarily through the application of the PDCA technique and basic QC tools.

MR. LEE KOK SEONG

M.SC. IN CHEMICAL ENGINEERING (IMPERIAL COLLEGE, LONDON UNIVERSITY), B.SC. IN CHEMICAL ENGINEERING (NATIONAL TAIWAN UNIVERSITY)

Kok Seong has accumulated vast experience in the areas of productivity training and management consultancy throughout his 30 years of experience with the Standards, Productivity and Innovation Board (SPRING). He has provided consultancy assistance and training for numerous organisations both within and outside of Singapore in the areas of Productivity Management, Operation and Production Management, total Quality Management, Total Productive Maintenance, Shopfloor Management, Occupational Safety Management, Industrial Engineering Applications and Supervisory Management. He has also been greatly involved in the pinnacle Singapore Quality Award (SQA) initiative since its inception in 1993. His track records include the assessments and site visits of award recipients like Micron Semiconductor (formerly Texas Instruments), Motorola, Baxter Healthcare, Philips Tuner Factory and Teck Wah Industrial Corporation Ltd. Mr. Lee is currently a certified SQA Senior Assessor, as well as a resource person for Basic and

Advanced Training Courses for Productivity Practitioners, a position he has taken on since 2007.

MR. LOW CHOO TUCK

M.SC. IN INDUSTRIAL ADMINISTRATION (UNIVERSITY OF ASTON, UK); B.SC. IN PHYSICS (NUS); DIP IN QUALITY CONTROL INSTRUCTORS (INTERNATIONAL QUALITY CENTRE, NETHERLANDS); CERTIFICATE IN PRODUCTIVITY DEVELOPMENT (JAPAN PRODUCTIVITY CENTRE); CERTIFICATE IN ADVANCED MANAGEMENT DEVELOPMENT (INSEASD)

Choo Tuck currently provides training and advisory services in productivity and quality management to businesses and government in the Asean region and Middle East. He was previously the Executive Director of the Restaurant Association of Singapore as well as the Singapore Productivity Association, and was also the Director for Strategic Planning in SPRING Singapore. During his many years of service with SPRING Singapore, he gained wide experience in productivity training, management consultancy and productivity promotion, and has helped more than a 100 businesses in improving productivity, quality control and business excellence, including organisations such as Cycle & Carriage, Motorola, PUB and DBS. On top of that, he has also served as an Asian Productivity Organisation (APO) expert on Productivity for several APO member countries, and was part of a team of experts engaged by the Singapore cooperation Enterprise to provide productivity expertise to the Government of Bahrain in 2007 and 2008.

MR. QUEK AIK TENG

B.ENG (HON.) IN MECHANICAL ENGINEERING (UNIVERSITY OF SHEFFIELD); DIP. IN BUSINESS EFFICIENCY (INDUSTRIAL ENGINEERING_ (PSB-ACADEMY); CERTIFIED MANAGEMENT CONSULTANT (CMC); PRACTISING MANAGEMENT CONSULTANT (PMC); MEMBER, INSTITUTE OF MANAGEMENT CONSULTANTS (IMC) SINGAPORE

Aik Teng currently manages his own consultancy, AT Consulting Services. One of his most recent projects includes being the LEAD Project Manager for the Singapore Logistics Association. Prior to running his own consultancy, he has been with SPRING Singapore for 20 years, and was the Head of the Organisation Excellence Department from 2004-05. He was also

SQA Lead Assessor and Team Leader up till 2008 and has been involved in the SQA initiative since its inception in 1993. tasked to start up the consultancy unit within the then Productivity & Standards Board (PSB) to provide training and consultancy services to organisations, his consulting team assisted close to 30 organisations during that period. He was also involved in a project coordinated by the Singapore Cooperation Enterprise (SCE) to assist the Bahrain Labour Fund in their Labour Reform strategy, which included helping the Bahrain government to initiate a Productivity Movement as well as develop the productivity of the local enterprises. In addition, he was appointed as Project Manager to assist the Government of Botswana to implement a national Productivity Movement, from 1994 to 2003. Botswana is currently held as a model of Productivity in the Pan-Africa region.

MR. WONG KAI HONG

MBA IN STRATEGIC MARKETING (HULL), BSC (NUS)

Kai Hong is a business consultant, management trainer and company director. He has spent almost 2 decades in the consumer products industry, having worked with retailers like Isetan, Metro, Royal Sporting House, The Athlete's Foot and Sunglass Hut; brands like Reebok and Doc Martens; and technology group Wearnes Technology. He has been involved with various functions including operations, business development, project management, human resource, training, marketing, logistics, budgeting and general management. He has developed businesses in Singapore and many Asian cities such as Seoul and Beijing.

For registration or more information, write to us at

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Alternatively, you could also contact our secretariat:

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