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### Please note:

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## Green Manufacturing

### 1. Introduction

Manufacturing plays a very strategic role in an organisation, particularly in building competitive advantage and improving performance. Manufacturing is constantly transforming and evolving, due to the rapid changes in technology, customer needs and globalisation.

Increasingly, going green has made its way in the mission statement of several manufacturing companies in recent years. With the increasing concern on the environment and awareness on the global warming, these companies aim to be more environmental friendly.

### 2. What is Green Manufacturing?

The concept of green manufacturing is not new. It has been around for a couple of decades, but has never received much attention. However, with heightened focus on climate change and a transformation of mindset, green manufacturing is increasingly gaining the attention of many.

Green manufacturing encompasses the integrated development of manufacturing processes and practices to optimise usage of resources, energy and capital over the entire lifecycle of a product, so as to achieve sustainability in the long run. It is a method of manufacturing with minimal impact on the environment. It reduces and minimises waste and pollution, and is often achieved through product and process design. Hence, green manufacturing supports and sustains a renewable way of manufacturing products, which ultimately minimise environmental impact while also trying to maximise resource efficiency.

Green manufacturing is also known by a plethora of different names such as sustainable manufacturing, clean manufacturing, environmentally benign manufacturing, etc. Regardless of the name, their primary goals remain the same.

The six primary goals of green manufacturing are;

- Selecting and using low environmental impact materials
- Avoiding toxic or hazardous materials
- Choosing cleaner production processes
- Maximising energy and water efficiencies
- Designing for waste minimisation
- Designing for recyclability and reuse of material

### 3. The Drivers of Going Green

There are many drivers that are expanding the boundaries for green manufacturing. A survey conducted by Frost & Sullivan revealed that a growing number of organisations today feel that going green will help them to compete more effectively in the marketplace in the long term. Also, organisations tend to conform to implicit expectations of their communities, which is another driver of change.

The major drivers are grouped into three key areas;

#### 1. Competitiveness

The natural desire of manufacturing firms is to improve its processes and capabilities for competitive advantage. This can manifest in terms of technology, new product and process development, as well as opportunities for business.

#### 2. Corporate Social Responsibility

The growing pressure on manufacturing firms to become more responsible to the social and environmental impact it creates. Companies would like to brand themselves with a “green” image.

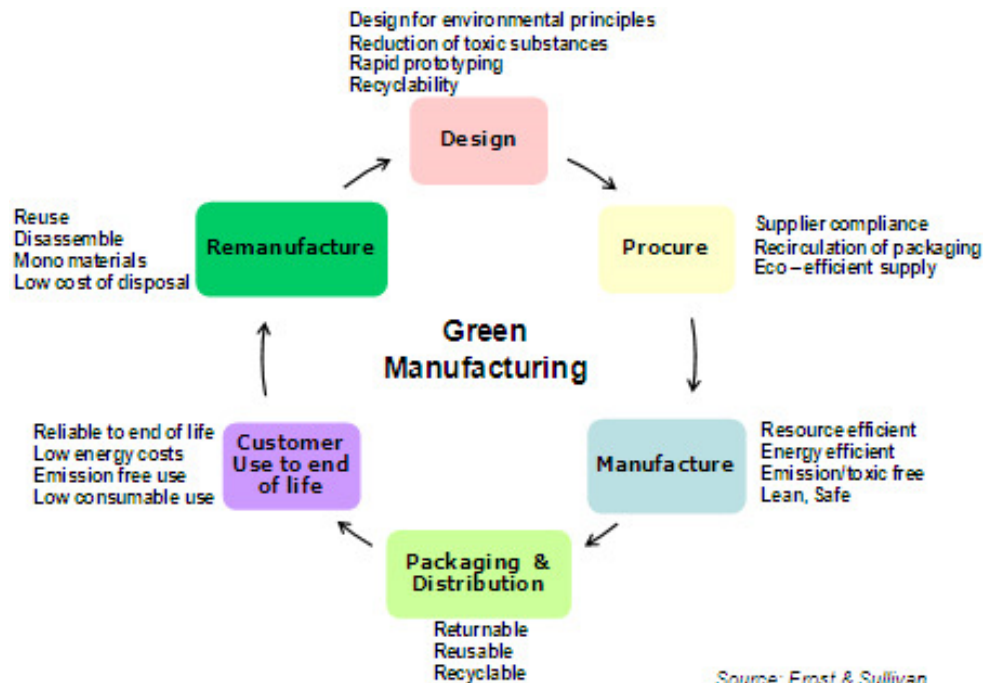
#### 3. International Standards, Protocols and Regulations

Manufacturing firms have to constantly strive to meet current and upcoming stricter environmental regulations.

## 4. Fundamentals of Green Manufacturing

The fundamentals of green manufacturing are pretty simple and relate to minimising the use of resources and the environmental impact of a product. This philosophy is extended to all the elements of its life cycle – from its design to its end of life.

It is expected that tremendous opportunities will arise with green manufacturing. Each element of the cycle, as presented in the figure below, has the potential to be an industry by itself. This is given that the rapid growth rate and demand it is expected to generate in the mid to long term. Green manufacturing is also expected to be very significant in the coming decade by the industry experts. As governments, companies and consumers realise the importance of going green, the barriers for investment in these technologies are also expected to fall rapidly.



Source: Lele, S. (2009, December 21). *Getting serious about green manufacturing*. Retrieved February 20, 2011 from <http://www.frost.com/prod/servlet/market-insight-top.pag?docid=188029142>

## 4.1. Green Manufacturing: Key Focus Areas

The following are four key areas of green manufacturing;

### (i) Operations

Manufacturers must lessen their energy and resource usage, reduce emissions and waste generated across facilities, plants, or offices, yet still maintaining product quality. The solution lies in implementing concrete plans based on comprehensive assessment and analysis of the as-is landscape or operations with assistance from IT-enabled decision making.

### (ii) Compliance

Increasingly, stringent and government-driven regulations are being implemented. Hence, organisations should always be ready. This requires putting all the relevant facility, product and material sustainability data points that may be lying across the organisation into a single repository. This move enables reporting and complying in all the required formats.

### (iii) Product Sustainability

Consumers and industry watchers are increasingly demanding products that have a reduced environmental impact during their life cycle of usage. The challenge lies in ensuring that an organisation has visibility into the life cycle environment impact of a product through all the life cycle stages from raw material acquisition, design and manufacturing to usage and disposal.

### (iv) Supply Chain Sustainability

Today, manufacturers have to enforce their manufacturing procedures across their complete value chain. Manufacturers have to have end-to-end knowledge of the best practices across their multi-tier supplier organization as well as their logistics and fulfilment practice. This allows them

to enable and enforce a sustainable supply chain, which is critical and important both for short-term compliance as well as long-term business viability.

## 5. Challenges to Going Green

As a concept, green manufacturing is easy to define. However, it is far harder to practically interpret and adopt. Organisations trying to embrace the concept face a variety of challenges. One of the most significant challenges to going green is the economic mindset and rationalities of organisations. It is important for organisations to note that although the initial cost of going green is high, potential savings will be achieved much later.

Often, organisations also struggle to:

- Define their collaborative sustainability road map as multiple divisions own the sustainability.
- Arrive at a measurable and quantifiable return on investment (ROI) from green projects.
- Execute and manage green projects because multiple stakeholders are involved.
- Find appropriate reporting systems because sustainability data lies across the enterprise in multiple systems and formats. The current reporting systems are incapable of providing sufficient intelligence to aid in decision making.

## 6. Lean Manufacturing and Green Manufacturing

Lean manufacturing is the “business model and collection of tactical methods that emphasise eliminating non-value added activities (waste) while delivering quality products at lowest cost with greater efficiency”. Originally derived from the Toyota Production System, lean manufacturing involves a three-pronged approach that eliminates waste, ensures quality, and embraces employee involvement. Hence, lean manufacturing is often linked to green manufacturing.

While embracing green manufacturing requires more focus on environmental and energy concerns during the

implementation of reliability improvement projects, equipment reliability is the predominant foundational element that enables lean operational performance. Improvements that are geared toward improving equipment reliability have distinct linkages to environmental performance. Examples of such linkages are; reducing the amount of product and raw material waste through the elimination of catastrophic breakdowns through formalised root cause analysis, providing routine monitoring of system parameters through predictive technologies and preventing interruptions to production cycles with a focus on overall equipment effectiveness (OEE).

As such, implementing lean manufacturing is one the initiatives that organisations can undertake in their journey towards going green. Some of the lean tools that can be used include 5S methodology, kanban, preventive maintenance, setup reduction, etc.

## 7. Green Manufacturing in Singapore

In Singapore, green manufacturing is said to be in its infancy stage of development. In November 2009, the Sustainable Manufacturing Centre (SMC) was launched. Spearheaded by the Singapore Institute of Manufacturing Technology (SIMTech), the SMC aims to showcase and promote the concept of sustainability in manufacturing. It creates a platform to converge relevant government agencies, industry associations, research community and industry to engage in R&D and implementation of sustainable manufacturing technologies and methodologies.

In May 2010, the Singapore Workforce Skills Qualifications (WSQ) Graduate Diploma in Process Technology (Sustainable Manufacturing) was jointly launched by the Singapore Institute of Manufacturing Technology (SIMTech) and the Singapore Workforce Development Agency (WDA). The programme aims to help companies and professionals in the manufacturing sector to acquire the expertise to put in place sustainable manufacturing practices.

Meanwhile in the pharmaceutical industry, drug giant, GlaxoSmithKline (GSK), taps on Singapore for its green manufacturing operations. The GSK-Singapore Partnership for Green and Sustainable Manufacturing is a partnership with the Singapore Economic Development Board (EDB), which has set up a S\$50 million fund to grow Singapore's

capabilities and talent in green and sustainable manufacturing as well as healthcare policy.

## 8. The Future of Green Manufacturing

The change to green manufacturing will not happen overnight but over time. However a tipping point is expected after which adoption will be very rapid, when it moves beyond a continuous improvement approach. Until today, organisations have always operated on the concept of producing quality and technology products at lowest cost to achieve competitiveness. Manufacturing processes were designed to make products faster and better on purely economic terms.

The leap into green manufacturing will follow with the fundamental change in the way companies design, procure, manufacture, distribute, dispose and recycle their products. It has now been proved beyond doubt through increasing experience of companies implementing green manufacturing practices that the payback periods of such investment is generally 1 to 3 years. But industry by itself cannot bring about this change. The government, no doubt, has to play a very critical role of creating the right environment in which adopters of green manufacturing do not lose competitive edge in the short term.

## Case Study

### **Mohawk Industries Inc.**

Mohawk Industries Inc. is a manufacturer of carpet, rugs, hardwood floors, laminate, ceramic tile and vinyl flooring. In recent years, the carpet giant aimed to weave sustainability into every fibre of its operations.

Among the examples of its commitment to green manufacturing include;

- Mohawk takes in 3 billion plastic containers each year. Those made from polyethylene terephthalate are used to produce approximately 170 million pounds of recycled fibre at its Summerville, Georgia plant. The fibre is then used to make Mohawk carpets.
- Mohawk operates a 40,000-square foot recycling facility in Chartsworth, Georgia – called the Greenworks Center, which takes in post-consumer residential carpet from all over the country. The centre processes 100% of the carpet-fibre, backing and latex and covers about 90% of all materials into useable products. Mohawk claims this is the highest recovery rate in the industry – approximately three times that of the next-best carpet-recycling programme.
- Mohawk also boasts a growing number of product materials that contain recycled content and that are made with sustainable processes. For example, Mohawk's Colorstrand Solution dyed nylon fibre for commercial carpet products contains 15% pre-consumer recycled content and is manufactured in a process that consumes no water or steam. The company has also developed what it calls Permalink adhesive film, which can be placed directly on top of old carpet, allowing post-consumer carpet to be repurposed as carpet pad and diverted from landfills.
- Additionally, Mohawk also operates an 877 carpet-recycling hotline through its "ReCover" program. When consumers nationwide call the hotline, the company arranges for pick-up of their carpet and transports it to its growing network of recyclers.



Mohawk's Group President Al Kabus said that green manufacturing involves more than just reducing, reusing and recycling. He explains that firstly, product sustainability needs to be in place, where products are made as responsible as they can, but also keeping the quality of those products great. To build a 100% recycled product but have it fall apart in two years versus making a product that is built halfway environmental but lasts 15 or 20 years – there is a lot of argument that could go on that says the latter might be better than the former. Hence, it is really important to get the balance right on performance and quality versus making sure that conscious indexing of materials is incorporated.

Another part of the equation, according to Kabus, is process sustainability, which involves making products in a way that minimises the consumption of energy, water and other natural resources. A third and crucial component, is financial sustainability.

## **Samsung Electronics**

Samsung Electronics Co., Ltd., founded in 1969 in Korea, has grown to become one of the leading electronics companies in the world. Samsung specialises in digital appliances and media, semi-conductors, memory and system integration. The company's innovative and top quality products and processes are recognised world-wide.

As a leading global company, Samsung Electronics was no exception in its rush to ride the green-growth wave. In 2009, the company announced its green management strategy, which includes four key strategies to boost green management – cutting carbon emissions, expanding eco tech-embedded product line-ups, investing to build green operations, and strengthening partnerships with suppliers for green management. In the same year, Samsung also launched its PlanetFirst initiative and spent US\$865 million in developing greener products and making its manufacturing sites more efficient.

The PlanetFirst initiative is “a commitment, a mindset, and a fundamental approach” where Samsung will always consider the impact on the environment first as they continue to work, develop, engineer and design innovative products and solutions to inspire and satisfy their customers. Among the targets are; a 50% reduction in greenhouse gas emissions, improving the energy efficiency of Samsung products by more than 40% and investing US\$4.28 billion in its eco-management programmes.

In August 2010, Samsung revealed that its new products are now 16% more energy efficient as compared to 2008 levels. Several products are helping drive the efficiency gains, such as LED TVs that consume less energy and standby power, in addition to its F2380 monitor which uses 24% less energy annually, with 19% fewer materials. As of the first six months of 2010, Samsung's greenhouse gas emissions declined 31%, more than halfway to its 2013 goal of halving GHG intensity.

The table below shows Samsung's performance for 2009.

## Eco-Management 2009 Progress

Objective	Basis	2009		2010	
		Target	Result	Target	
GHG Emissions	Reduction (%) (Basic unit, t-CO <sub>2</sub> /100 mil. Korean won)	8%↓ ( 6.85 )	22%↓ ( 5.83 )	24%↓ ( 5.65 )	
Eco-Product	Good Eco-Product (%)	60%	69%	90%	
	Premium Eco-Product (%)	5%	5.3%	8%	
Eco-Device	Good Eco-Device (%)	Established Eco-Device rating system in 2009		70%	
	Premium Eco-Device (%)			10%	
Energy Consumption	0.5W Standby Power (%)	15%	29%	44%	
	Energy Saving & CO <sub>2</sub> Reduction in product use-phase	9.1%	12.5%	21.8%	
Resource Saving	Post-consumer Recycled Plastics Use (%)	0.5%	0.4%	0.6%	
	Product Recyclability (%)	Large	75%	85%	75%
		IT/CE	65%	77%	65%
Small		50%	82%	50%	
Product Recycling	Recycled rate (%)	7%	10.5%	11%	
Hazardous Substances	Hazardous substances within products	Compliant with the standard OQA-2049			
Eco Label	Eco Label Certification (%)	80%	85%	80%	
Waste Recovery	Recovery (%)	84%	88%	92%	
Certifications ( ISO 14001 / OHSAS 18001 )	Plants in Korea (%)	100%	100%	100%	
	Plants other than Korea (%)	97%	97%	100%	
ESH & Facility Management System	Management System (%)	80%	84%	85%	
Process Chemical Management		Compliant with the standard			

Samsung Electronics' other green initiatives include its Take Back and Recycling programme and waste management. The company has established take back systems to comply with global recycling laws, and is expanding voluntary take back programmes globally to reduce environmental impacts by recycling and recovery of waste electronic products. Meanwhile, its waste management includes waste wafers recycling, waste glass recycling and air and water pollutant control.

## Maruti Suzuki India

Maruti Suzuki India Limited, formerly Maruti Udyog Limited, is a subsidiary of Suzuki Motor Corporation of Japan and is India's leading automaker. The company has also paved its way towards sustainable development by implementing incremental changes in few areas which resulted in big savings.

Maruti Suzuki India has made big gains in conserving energy and water and eliminating waste through small, incremental steps. In the last nine years, the company has reduced its electricity consumption by 20% per vehicle, water consumption by 46% and land fill waste by 67%. Its carbon dioxide emission has also declined 27% in 7 years. Additionally, Maruti has become a zero discharge company and recycles all its water.

Some of the initiatives that are undertaken by the company towards sustainability are;

- In the assembly line, where axles are installed, the components are placed on an inclined bar, on which they slide towards the worker due to gravity which helped in eliminating the use of conveyor belts.
- Water pumps in cooling towers were made to consume less electricity by slightly reducing the size of the impeller.
- The power supply of machines that run intermittently, such as air compressors, is cut off when they are idling to save energy.
- Earlier, waste water from all sources was dumped into the government-owned sewers, for which the company paid the government. However, after improvements in the treatment processes, sewage is no longer discharged into the government

sewers. Instead, all waste water is recycled and goes into various processes in the factory.

- Instead of corrugated boards and wooden packaging, steel crates are used for storage and transporting of components coming in from Japan. After use, the steel crates are folded and sent back for reuse. Meanwhile, the components supplied by Indian vendors come in reusable plastic bins.

These steps implemented by Maruti Suzuki India not only resulted in economic growth for the company, but also in environmental and social progress. Through these small initiatives, big savings were gained. Maruti Suzuki India pointed out that firms need to have clear objectives before sustainability principles are implemented, and only programmes that are implemented effectively and well communicated to all employees would result in value for the organisation.

Articles can be retrieved from NLB's e-Resources – <http://eresources.nlb.gov.sg>

Books are available at the Lee Kong Chian Reference Library.

## Recommended Readings

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## THE CERTIFIED PRODUCTIVITY PRACTITIONER COURSE

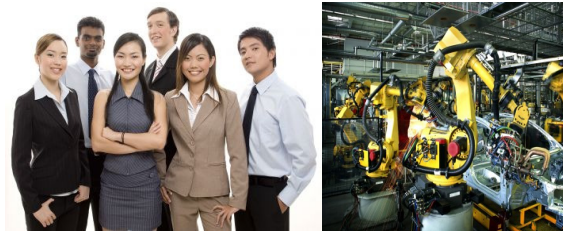
### PRODUCTIVITY • COMPETITIVENESS • PROFITS

- What keeps you awake at night?
- Is it the constant pressure to generate a greater yield?
- Problems with leading productivity changes in the workplace?
- Need to improve the quality of your products and services?

**Productivity is the answer to all these burning issues.**

Entailing efficiency and effectiveness, productivity is crucial in fulfilling the raison d'être of all companies – delivering ever-growing business goals. It is imperative for business leaders to be constantly committed to productivity improvement and take the lead in driving productivity and innovation to sharpen the company's competitive edge by ensuring the most efficient utilization of resources at all times and consistently creating optimum value for customers.

Capabilities have to be developed to deliver higher productivity and training and education is required to develop those credentials and keep the cycles of improvement rolling.



The **Certified Productivity Practitioner** course is the answer to developing the awareness, concepts, skills and techniques, and most importantly, mindset, required to build up those capabilities.

Why CPP?

- It is focused on solving productivity issues **at the enterprise.**
- A **diagnostic approach** is taken, so that Strengths and Areas for Improvement are identified and interventions can be decided easily.
- It **teaches** productivity techniques, tools and methodologies.
- Participants will undertake a company project for their own company on a previously identified productivity issue, for which **project guidance** is provided.

**“These sessions provided excellent insight into the fundamentals of productivity, history and importance of productivity in Singapore” – Neil Todd, Courts**

**“I recommend this course to those who want to know the overview of productivity implementation and its framework. Very experienced trainers make this course a must to attend before engaging on productivity journey.” – Ng Lye Kiat, Acco Technology**



## About the Course

At the Singapore Productivity Association, we recognise that there may be specific industries that face different sets of KPIs from others. As such, the course content for the CPP will be contextualized for these industries. Currently, we have developed a general CPP course that will be suitable for most industries, as well as the CPP (Retail), which we have contextualized specially just for the Retail sector. The course content can be found below:

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

As part of the CPP curriculum, participants are required to implement 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 SMEs:	Net Fee	Nett Fee with GST
<b>SPA Member (S\$3,700)</b>	S\$1,110	S\$1,187.70
<b>Non-Member (S\$3,950)</b>	S\$1,185	S\$1,267.95
For MNCs/LLEs/Statutory Boards	Net Fee	Nett Fee with GST
<b>SPA Member (S\$3,700)</b>	S\$1850	S\$1979.50
<b>Non-Member (S\$3,950)</b>	S\$1975	S\$2113.25

*\*Funding applicable for up to 2 participants (Singaporeans/PRs only) from any single company.*

### **Course Schedule**

The schedule for the first quarter of 2011 is appended below:

Run 8: CPP (Retail)		
Date	Module	Time
Tuesday, 5 April 2011	Module 1	9-5 pm
Thursday, 7 April 2011	Module 2	9-5 pm
Tuesday, 12 April 2011		9-5 pm
Thursday, 14 April 2011		9-5 pm
Tuesday, 19 April 2011		Module 3
Thursday, 21 April 2011	9-5 pm	
Tuesday, 26 April 2011	9-5 pm	
Thursday, 28 April 2011	Module 4	9-5 pm

8th Run (Target Participants - 25)		
Date	Module	Time
Wednesday, 30 March 2011	Module 1	9-5 pm
Friday, 1 April 2011	Module 2	9-5 pm
Wednesday, 6 April 2011		9-5 pm
Friday, 8 April 2011		9-5 pm
Wednesday, 13 April, 2011		9-5 pm
Friday, 15 April 2011	Module 3	9-5 pm
Wednesday, 20 April 2011		9-5 pm
Wednesday, 27 April 2011		9-5 pm
	Module 4	9-5 pm

## Core Faculty Members

### **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 Asia cities such as Seoul and Beijing.

### **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 companies 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 organizations 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 companies 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 companies in improving productivity, quality control and business excellence, including organizations such as Cycle & Carriage, Motorola, PUB and DBS. On top of that, he has also served as an Asian Productivity Organisation (APO) expert 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.

***For more information on the course, please visit the Singapore Productivity Association at [www.spa.org.sg](http://www.spa.org.sg), or write to us at [CPP@spa.org.sg](mailto:CPP@spa.org.sg). Alternatively, you could also contact our secretariat:***

***Ms. Leanne Hwee    Mr. Ashton Chionh  
DID: 6375 0938    DID: 6375 0940***

# The Singapore Productivity Association Productivity Seminar

## BASICS OF PRODUCTIVITY

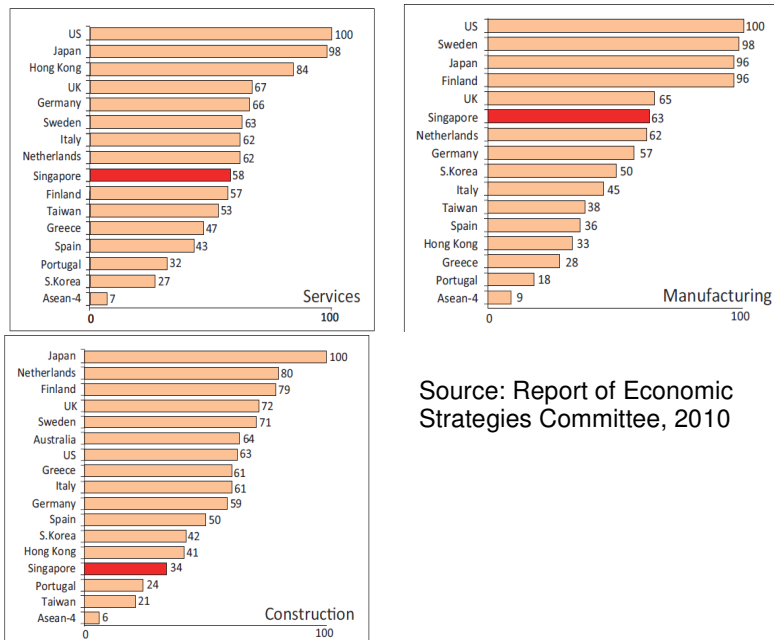
### Why a Productivity Seminar?

Singapore businesses and the workforce are gearing up to address productivity challenges that have arisen in the past decade.

Key findings from the recently disseminated Report of the Economic Strategies Committee highlighted that:

“In absolute levels, Singapore’s productivity in manufacturing and services are only 55 to 65 percent of those in the US and Japan (see Figure 1). In the retail sector for example, our average level of productivity is about 75 percent of that in Hong Kong and one-third that of the US. In construction, productivity levels are half that of the US and one-third that of Japan.”

Figure 1: Cross Country Productivity Comparisons<sup>5</sup>



Source: Report of Economic Strategies Committee, 2010

### ***What is the Seminar about?***

The Singapore Productivity Association has developed this Seminar for the purpose of providing information to all parties on the basics of productivity. Specifically, the seminar aims to:

- Refresh – everyone on the meaning and concepts of productivity
- De-myth – explain what productivity is and is not, especially in the current day context
- Inform – about the Tools, Techniques and Methodologies

### ***What would you learn?***

At the end of the seminar, you would understand:

- the key productivity concepts, including how productivity is measured
- the relevance and types of tools available to improve productivity
- the way forward to implementing productivity in your company.

### ***Who should attend?***

This seminar is targeted at employee that needs to understand the importance and relevance of productivity at work. They may be involved in developing and managing; or are part of teams that implement Productivity initiatives.

### ***Targeted employee could include:***

- Managers
- Senior Executives
- Supervisors
- Senior workers with team leadership responsibilities.

### ***When and Where would this be held?***

Please look out for our schedule on our website: [www.spa.org.sg](http://www.spa.org.sg) or contact Ms Leanne Hwee at DID: 6375 0938; Email: [leanne.hwee@spa.org.sg](mailto:leanne.hwee@spa.org.sg)

### ***How to register?***

To register, please fill out our Registration Form here:

<http://www.spa.org.sg/images/events/downloads/RegistrationForm-PS.doc>

### ***Contact us***

For more information about the seminar or future runs, please contact:

Ms Leanne Hwee at DID: 6375 0938; Email: [leanne.hwee@spa.org.sg](mailto:leanne.hwee@spa.org.sg)



**International Exposition on Team Excellence IETEX 2011**  
**14-17 June 2011 Resorts World Sentosa**  
**Theme: Team Excellence – Enabling Innovation and Productivity**

The Singapore Productivity Association (SPA) is pleased to bring to you again IETEX 2011!

The International Exposition on Team Excellence (IETEX) 2011 will be held from 14-17 June 2011 at the Resorts World Sentosa.

The theme '**Team Excellence – Enabling Innovation and Productivity**' has been adopted for **IETEX 2011**.

IETEX provides a platform for quality experts, quality circles practitioners and enthusiasts from all over the world to learn from the experiences and good practices of international organizations and teams.

**Programme outline:**

Date	Morning	Afternoon	Evening
14 June (Tue)	Pre-convention Seminar	Pre-registration	Free & Easy
15 June (Wed)	Opening Ceremony Plenary Session	Concurrent Sessions	Free & Easy
16 June (Thur)	Concurrent Technical Sessions	International Team Competition	Gala Dinner
17 June (Fri)	Industrial Visit (Location to be confirmed)		

*Please note that programme is subject to changes*

**Objectives of IETEX 2011:**

- Share knowledge on best practices in promoting teaming excellence in organizations
- Provide an opportunity to learn from the 'Best of the Best' circles and scale new heights
- Network and exchange ideas, knowledge and experiences, on continuous improvement and innovation through the power of teams



## *The subjects for the presentation can be related to the following:*

- Implementing Team Excellence in an organisation
- Team excellence in Small and Medium Enterprises
- Best Practices on Teaming
- Coaching a Winning Team
- Business Strategy and Team Excellence
- Monitoring and evaluating teaming activities
- Team Excellence in Service Sector
- Critical Success Factors to Team Excellence
- Innovation and Quality
- Business Strategy & TQM
- Business Excellence through Quality
- Linking Team Excellence to TQM
- Excellence in Teaming
- Management Role in Teaming activities
- Assessment on teaming activities
- Team Excellence and Value Creation

## ***INTERNATIONAL TEAM COMPETITION***

The International Team Competition is open to any QCC / IQC / WIT / Project Team that has completed its project within the last 18 months. Such project must have been recognized in its home country. Teams are to provide information on such recognition.

### ***Call for Papers***

Abstract Submission Deadline: **15 April 2011** (To be received by the Secretariat)  
A 250 words paper abstract in English

### ***Registration***

For local participants:

- Please email your interest to [ietex@spa.org.sg](mailto:ietex@spa.org.sg)
- For programme brochure, please click:  
<http://www.burnaby-solutions.com/ietex2011/downloads/local-delegate.pdf>



## **Contact Information**

### **IETEX 2011 Secretariat**

Mr Ashley Chen / Ms Hazel Wong  
Singapore Productivity Association  
DID: +65 6278 3344  
Fax: +65 6272 5095  
Email: [ietex@spa.org.sg](mailto:ietex@spa.org.sg)  
Website: [www.spa.org.sg](http://www.spa.org.sg)

### **For Registration and Travel Arrangements**

Ms Jeron Ong  
Burnaby Solutions Pte Ltd  
Tel: +65 6848 1345  
Fax: +65 6848 1357  
Email: [jeronong@burnaby-solutions.com](mailto:jeronong@burnaby-solutions.com)  
Website: [www.burnaby-solutions.com](http://www.burnaby-solutions.com)

*Thank you and SEE YOU AT IETEX 2011!!*

## **Organising Committee**

**International Exposition on Team Excellence-IETEX 2011**



innovation &  
quality circles

## Team Excellence Symposium

### 29 March – 1 April 2011

The Singapore Productivity Association (SPA) is pleased to bring you the Team Excellence Symposium in March 2011!!

The Team Excellence Symposium will be kicked off with a half day seminar and it will be followed by 3 days of the NIQC assessments showcase by the various organizations. The event promises to be an insightful session for IQC practitioners to come together to network and exchange ideas and experiences.

The details are as follows:

<b>Venue</b>	<p><b><u>SPRING SINGAPORE</u></b></p> <p>2 Bukit Merah Central 3rd Storey Podium Block Singapore 159835</p> <p><i>For directional map: <a href="http://www.spring.gov.sg/aboutus/ci/pages/map-bukit-merah.aspx">http://www.spring.gov.sg/aboutus/ci/pages/map-bukit-merah.aspx</a></i></p>
<b>Date</b>	<p><b><u>Seminar</u></b></p> <ul style="list-style-type: none"> <li>• 29 March 2011 (Tuesday)</li> <li>• 9.00am – 2.00pm (Registration starts at 8.30am)</li> <li>• Room: SPRING Auditorium @ 3rd Storey</li> </ul> <p><i>For programme outline, please see attached. For Seminar registration, email your interest to <a href="mailto:iqc@spa.org.sg">iqc@spa.org.sg</a> by 15 March 2011</i></p> <p><b><u>NIQC assessments</u></b></p> <ul style="list-style-type: none"> <li>• 29 March 2011 (Tuesday), 2.00pm – 5.00pm</li> <li>• 30 – 31 March 2011 (Wednesday – Thursday), 9.00am - 5.00pm</li> <li>• 1 April 2011 (Friday), 9.00am - 12.00pm</li> <li>• Room: P302 / P303 @ 3rd Store</li> </ul>

Ms Hazel Wong/Mr Ashley Chen  
Singapore Productivity Association  
DID: +65 6278 3344  
Fax: +65 6272 5095  
Email: [iqc@spa.org.sg](mailto:iqc@spa.org.sg)

## TEAM EXCELLENCE SYMPOSIUM

**29 MARCH 2011**

SPRING AUDITORIUM  
SPRING SINGAPORE  
3TH STOREY PODIUM BLOCK 2  
BUKIT MERAH CENTRAL  
SINGAPORE 159835



<b>8.30 AM</b>	<b>REGISTRATION</b>
<b>9.00 AM</b>	<b>WELCOME</b>
<b>9.05 AM</b>	<b>SUSTAINING ENTERPRISE PRODUCTIVITY: THE CHALLENGES AHEAD</b> MR LOW CHOO TUCK MEMBER, MANAGEMENT COMMITTEE SINGAPORE PRODUCTIVITY ASSOCIATION
<b>9.45 AM</b>	<b>ENABLING TEAM INNOVATION</b> MR ANDREW CALVERT REGIONAL DIRECTOR AND SOLUTION ARCHITECT ACHIEVEGLOBAL ASIA
<b>10.50 AM</b>	<b>REFRESHMENT</b>
<b>11.10 AM</b>	<b>PRESENTATION BY STAR WINNER AT TEAM EXCELLENCE SYMPOSIUM SEPT 2010</b> CIRCLE: THUNDERBOLT FROM MINDEF
<b>11.50 AM</b>	<b>SHARING ON ASQ WORLD CONFERENCE ON QUALITY AND IMPROVEMENT</b> MR DERRICK TANG PRINCIPAL CONSULTANT ADVENT MANAGEMENT CONSULTING PTE LTD
<b>12.30 PM</b>	<b>UPDATE FOR TEAM EXCELLENCE INITIATIVE</b> SINGAPORE PRODUCTIVITY ASSOCIATION
<b>12.40 PM – 2.00 PM</b>	<b>NETWORKING LUNCH</b>

\*\*PROGRAMME IS SUBJECT TO CHANGE