

MANUFACTURING MATTERS

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boosts productivity of
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Feature

LOCALISING HOME-GROWN SUPPLIERS

PE COI upgrades SMEs' technological capabilities and innovations

NOTE FROM EDITOR...

Dear Friends and Industry Partners,

The local PE enterprises are confronted with industry-wide challenges: high-mix, low-volume manufacturing, insufficient local value chain support, shortage of surface and heat treatment expertise, lack of computational modelling capabilities, the need to fabricate larger components and the shift to green manufacturing processes. PE COI introduced evolving industry-targeted initiatives to address these issues (see Feature in pages 2-3 for details).

Through its industry-specific initiatives, PE COI has spearheaded more than 39 Collaborative Industry Projects (CIPs), completed more than 396 industry projects and 145 consultancies and organised 238 events, attracting more than 9,200 participants. PE COI has also enhanced the capabilities of SMEs to become OEM suppliers, diversified local enterprises into growing manufacturing clusters, equipped companies to develop new products, creating new value-add and R&D investments.

To reach out to more industries, PE COI is engaging the Association of Aerospace Industries (Singapore), Singapore Business Federation, Singapore Dental Association, Singapore Manufacturing Federation and the Singapore Precision Engineering and Technology Association.

To sustain and advance in the PE industry, please contact msyong@SIMTech.a-star.edu.sg or visit us at www.SIMTech.a-star.edu.sg/PECOI

Swee Heng



LOCALISING HOME-GROWN SUPPLIERS

PE COI upgrades technological capabilities and innovations through initiatives to benefit the PE industry. It is engaging associations in sustaining and advancing the industry

SIA Engineering Company (SIAEC)

SIAEC is one of the aerospace MNCs that PE COI collaborates with its local suppliers to build up capabilities. The needs of SIAEC and the gaps of SME suppliers are identified for SIMTech to provide the necessary technical support.

SIAEC, a subsidiary of Singapore Airlines provides aircraft maintenance, repair and overhaul services to more than 80 international airlines worldwide.

Through the PE COI Aerospace Initiative, SIAEC and several local SMEs successfully localised the manufacture of polymeric aircraft cabin components that meet strict aviation standards. Leveraging the Collaborative Industry Project, a cost-effective R&D platform, participating companies worked jointly with SIMTech to develop the required manpower competence and technology.

The participating companies include four SMEs are now equipped with knowledge in mould design and fabrication, metal insert and plate fabrication, injection moulding process and control, spray coating and



“With a pool of qualified local suppliers to produce aircraft parts at its doorstep, SIAEC’s competitiveness is enhanced,”

assembly processes. The SMEs were audited and approved as SIAEC’s service providers, enabling them to migrate seamlessly into the aviation industry business.



About PE COI

PE COI offers technology development, expert consultancy and manpower training to address technological capabilities and innovations holistically.

In addition, attachment of researchers as well as Graduate and Specialist Diplomas with the Singapore Workforce Development Agency (WDA) are available to upgrade industry manpower with relevant skills to meet changing technology requirements. As the industry evolves, the following sectoral initiatives are launched after assessment of their needs:

- **Aerospace Initiative** assists local injection moulding and metal fabrication companies to upgrade capabilities in manufacturing aircraft cabin parts, process modelling and simulation including machining processes and explore advanced technologies to make aerospace components.
- **Medtech Initiative** engages dental clinics and laboratories to use 3D Additive Manufacturing technologies to produce prosthetics and orthodontic parts. It focuses on coating technologies to enhance properties and surfaces as well as process technologies for implants.

- **Oil & Gas Initiative** develops Unsupported Gun Drilling capabilities for industry to undertake complex machining using conventional machines. This initiative also evaluates, adapts and implements advanced technology to prolong tool life.

- **Complex Equipment Initiative** upgrades the capabilities of local PE companies in machining of super hard materials, welding and development of electromechanical modules to support Complex Equipment OEMs.

- **Metal Machinery Initiative** enhances the capabilities and transfers knowledge in precision casting, hybrid forming, heat treatment process and develop novel materials for engineering applications to diversify PE companies into growing sectors.

- **Surface Engineering Initiative**, based on industry requests, provides capabilities in high-performance wear and corrosion-resistant coating, biomedical and functional coatings including coatings for metal surface protection and scratch resistance on polymer.

- **Engineering Design, Simulation and Prototyping Initiative** transfers simulation and engineering design capabilities and rolls out courses on design and development of engineering products and equipment.

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PE COI Precision Engineering
Centre Of Innovation

Sustaining and Advancing PE Industry



Scan for more information
on Precision Engineering
Centre of Innovation



NEW BUSINESS OPPORTUNITY WITH GREEN COATING

When a new coating with “green” process is urgently needed by Nico Steel Solutions (S) Pte Ltd, a provider of international grade metal alloys and innovative metallurgical solutions, it licensed the SIMTech-developed sol-gel technology.

Nico Steel Solutions requires anodised parts for LCD, LED, Notebook and Keyboard and other IT products of leading brand owners. Although a subsidiary factory is providing the conventional coatings, the environmental control of wet chemical discharge compels the subcontractor to cease operation of the anodising process.

“**Happy with the performance of the sol-gel based coating material and process, Nico Steel Solutions invested in R&D and new production facilities. Projected annual sales is expected to increase by more than \$5 million due to this new process**”

Mr Steven Tang, Marketing/Purchasing Director,
Nico Steel Solutions

The sol-gel based coating material and process is a wholly “green” and easy-to-use manufacturing process for decorative and protective coating for IT products. The coating can be applied to both metal and polymer, offering precise colour matching and appearance on different surfaces, providing great freedom in product design for a wide range of IT products. Customers can experience metallic appearance with a “cool touch” feeling, in a full range of colours using the sol-gel coating technology. The coated surface is easy-clean, anti-fingerprint, and durable.

For more information, please contact **Dr Alex Thoe** at 6793 8571 or email to tbthoe@SIMTech.a-star.edu.sg

FINDING MARKED CABLE DRUMS MADE EASY



Keystone Cable is a manufacturer and supplier of cables for the building & infrastructure, oil & gas and data communication markets. Keystone Cable makes thousands of different products that look similar at its Singapore factory, and it needed a more efficient tracking process.

The collaboration with SIMTech created an Android application and Web-based location database to track the marked cable drums. The drums are constantly moving during the coil and recoil processes, and it is difficult to place each drum at a specific location. An RFID system featuring Xerify tags provided accurate location management for drums and storage locations. The read-on-metal performance was very important for Keystone Cable because its drums are stored on metal racks, which make many common RFID tags unreadable.

Whenever a drum is moved in the more than 100,000 square feet factory, the operator uses an Android phone with an ARETE Mobile POP plug-in RFID reader to read the location tag and the drum ID tag. The RFID reads the tag automatically and updates the drum location in the database. It takes only a few seconds to record item locations using RFID, which saves on time later when Keystone Cable needs to find a drum from thousands of potential storage locations to fill an order.

“**Now we can simply type in the drum number into the smart device and the corresponding location of the drum would be displayed. The process of locating a drum, which would sometimes take 30 to 45 minutes before, now only takes less than five minutes**”

Mr Derek Zhu, Senior Strategy Manager,
Keystone Cable

For more information, please contact **Mr Wong Ming Mao** at 6793 8381 or email to mmwong@SIMTech.a-star.edu.sg



OMNI PROGRAMME BOOSTS PRODUCTIVITY OF SMALL AND MEDIUM-SIZED ENTERPRISES AND LARGE LOCAL ENTERPRISES

Initiative teaches enterprises “to fish” for ongoing productivity improvements. Since 2010, 331 productivity champions from 124 companies are trained. SIMTech reaches out to more companies in this initiative through ASMI and SCCC

The Workforce Skills Qualifications (WSQ) Operations MaNagement Innovation (OMNI) Methodology Programme trains Professionals, Managers, Engineers (PMEs) and senior staff to be productivity champions to improve productivity and achieve operational excellence. The jointly developed training programme with Singapore Workforce Development Agency (WDA) is a “Learn-Practise-Implement” training model. Classroom training and on-site project mentoring sessions are provided. The classroom training transfers knowledge in operations management and use of OmniMethodology™. In the on-site project mentoring session, operations improvement areas, generation of suitable initiatives and development of implementation plans are conducted in the company, supervised by SIMTech’s mentors.

The **Association of Singapore Marine Industries (ASMI)** representing the local ship repair, shipbuilding and rig building industry, partners with SIMTech to improve the productivity of shipyards and their sub-contractors. The Operations MaNagement Innovation for Marine Industry Programme or OMNI@Marine was launched in 2012. To date, 3 major shipyards and 20 of their subcontractors and other marine subcontractors, participated in this programme. Together, they are pushing for holistic productivity improvements ranging from 15 per cent to 259 per cent throughout their value chains.

Success Stories

- **Sembawang Shipyard** initiated 6 projects to improve productivity. Some of these are:
 - pipe-line system to improve pipeshop fabrication productivity
 - automation for welding process
 - equipment/Tool Inventory and Material Management to reduce material
 Sembawang Shipyard and their contractors achieved productivity enhancements as well as mitigated labour costs.
- **Jurong Shipyard** initiated several projects such as automated cutting process, semi-automate process with robotics, and automated welding process to raise productivity. Jurong Shipyard and their contractors achieved productivity benefits from 15 per cent to 100 per cent.

Similarly, the collaboration with **Singapore Chinese Chamber of Commerce and Industry (SCCCI)** yielded productivity improvements from 30 per cent to 120 per cent. Involving 37 companies since 2013, an important outcome of OMNI Initiative is the launch of follow-up productivity projects which leverage technologies to improve productivity.

- **Huatong**, one of the winners of Enterprise 50 Award 2014, is a logistics solutions provider for the oil and gas, construction and marine port sectors.



As staff efficiency and productivity improvement are crucial for its continuous growth, Huatong sent its management team of 15 participants for the OMNI Programme. Many productivity initiatives were identified, spanning from establishing clear and easily understood operating procedures, to setting up maintenance scheduling programme to sustain the equipment functioning and performance. Manpower productivity improved ranging from 10 per cent to more than 100 per cent in various areas.

“ With the enhanced efficiency and competitiveness, the company is more confident to grow its business abroad ”

Mr Jimmy Chua, Group GM
Huatong

For more information, please contact **Mr Seow Yit Yuee** at 6793 3712 or email to yseow@SIMTech.a-star.edu.sg



Scan for more information on SIMTech Knowledge Transfer Office



THE EMERGING APPLICATIONS CENTRE

Newly Launched, the Centre Seeds and Grows Emerging Industries

The Emerging Applications Centre (EAC) is set up to identify, implement and grow the emerging applications of microfluidics and large area processing technologies developed by SIMTech.

MISSION

EAC seeds and grows emerging industry sectors through their adoption and commercialisation of SIMTech - developed technologies. It achieves this by identifying emerging applications and industry collaborators to commercialise the technologies. EAC also drives technology transfer to grow the supply chains of these emerging industries in Singapore.

SIMTech MICROFLUIDICS FOUNDRY (SMF)

Core Capabilities

SMF spearheads innovations in value creation of polymer microfluidics manufacturing and provides design, prototyping and production services for microfluidics development and applications. The SMF houses a micro fabrication line with robust processes to ensure unparalleled quality and value for the manufacturing needs of microfluidics devices. In end-2012, SMF successfully passed the audit of ISO

9001 and 13485 on the production of in-vitro diagnostics devices.

Services & Products

Design and simulation for microfluidics devices; prototyping and pilot production of polymer-based microfluidics devices which include Poly(methyl methacrylate) (PMMA); Polycarbonate (PC), Cycle Olefin Copolymer (COC) and others. It employs a comprehensive array of cutting-edge manufacturing technologies to address unique requirements.

A range of SMF standard size microfluidics chip and chip holders; universal chip holders; microfluidic test stations integrated with pumps and camera for detection; microdroplet generator with disposable components to eliminate cross contamination are products offered by SMF.

LARGE AREA PROCESSING FOUNDRY (LAPF)

Capabilities

A pilot roll-to-roll line for prototyping and pilot production of functional films and printed electronics products is established. Capabilities include roll-to-roll coating process, roll-to-roll printing

process; formulation and processing of printable functional materials; large area and roll-to-roll additive patterning and lamination; high precision roll-to-roll web handling and web inspection; roll-to-roll system process monitoring and control as well as system design and planning; roll-to-roll embossing including thermal and UV embossing.

Services

LAPF provides design, prototyping and pilot production of products for emerging applications in printed lighting for illuminated advertisements, furniture and building façade lightings; printed circuitry, heater, sensor and touch for consumer electronics, medical devices; smart packaging and other smart integrated systems as well as printed energy devices such as printed batteries and printed photovoltaics.

For enquiries, please contact

Mr Rick Yeo, Director

Email: ricky@SIMTech.a-star.edu.sg

EAC Emerging Applications Centre

Seeding and Growing Emerging Industries



Scan for more information on Large Area Processing Programme



IMPLEMENTING LEAN IN MTQ ENGINEERING PTE LTD

19 Kaizen Projects were shortlisted from 85 proposals, fully implementing 6 Kaizen Projects within three months from programme commencement

MTQ management holds strongly to the view that more can be achieved by maximising the collective efforts of its workforce. A wholly-owned subsidiary of MTQ Corporation Limited that was first established in Singapore in 1959 as Metalock (Far East) Ltd, MTQ Engineering has become a trusted and leading engineering solution provider for the global oilfield equipment and drilling companies.

MTQ collaborated with SIMTech on the Lean Implementation Programme in September 2014, coinciding with the job commencement of a Continuous Improvement Champion. 14 staff from different functions and levels enthusiastically participated with the full support and involvement of MTQ's management. Guided by SIMTech, the respective MTQ teams methodically analysed the problems, proposed and implemented suitable and effective solutions.

The major Lean Tools employed were 6S, Visual Management, Standardised Work and Business Process Streamlining. Every Kaizen Project (Improvement Project) was based on an approved A3 Report which summarises the background, current condition, goals, analysis, plan, achievements and follow-up actions. Another lean tool taught to



MTQ was Systematic Layout Planning (SLP) for planned factory expansion.

The setting up of a Production Planning Board in the production facility where Morning Standing Meeting occurs, creates visibility to the entire organisation on the job status as well as the next impending job. Machining jobs can now be prepared ahead of time, resulting in time saving of 10 hours per week, registering a 67 per cent improvement.

By streamlining and standardising the setup procedure across different machinists, machining time was reduced by about 21 hours, resulting in 12 per cent improvement. Additionally, technical drawings from suppliers are now converted by adding in detailed process steps and procedures to ensure consistency and adherence to standards. The drawing time has also been reduced by referencing tables which reduced the time taken from 40

“ It was a great learning experience. This has set the direction of the company moving forward ”

Managing Director,
MTQ Engineering Pte Ltd

to 5 minutes, resulting in 87.5 per cent improvement.

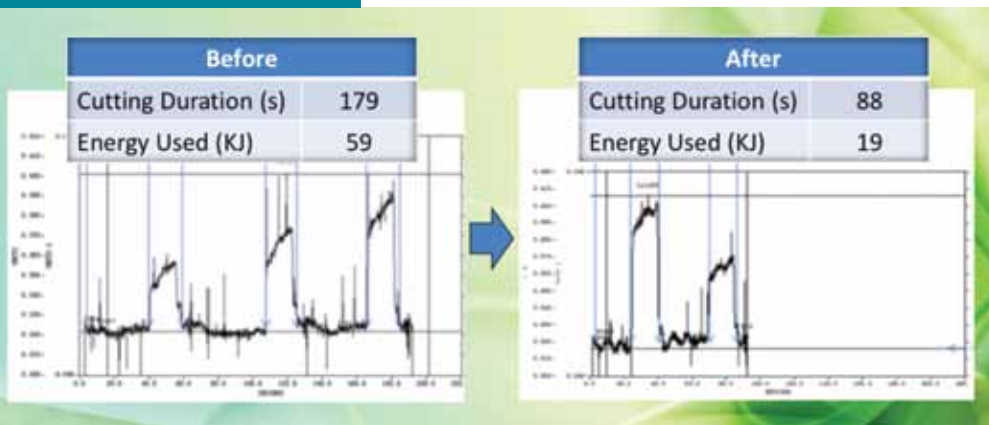
To permeate Lean throughout the organisation, MTQ created Lean slogans and displayed large banners. Lean awareness training and 6S training have been conducted for all 125 employees, encouraging them to submit individual improvement proposals (A3 Report). An innovative points system has been developed, in which employees are able to exchange points for gifts of their choice.

For enquiries, please contact
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Web: www.SIMTech.a-star.edu.sg/MPTC

MPTC Manufacturing Productivity
Technology Centre
Enhancing Manufacturing Productivity



Scan for more information on
Manufacturing Productivity
Technology Centre



Optimised grinding wheels based on energy data analytics able to reduce the cutting time and energy consumption by 51 per cent and 68 per cent respectively.

ENERGY DATA ANALYTICS FOR EFFICIENCY, QUALITY AND PRODUCTIVITY IMPROVEMENT

An Energy Efficiency course uncovers hidden values of untapped resources in manufacturing operations

Energy usage in manufacturing is a black box where opportunities for energy savings and productivity improvement are mostly untapped. With the advent of low cost monitoring systems and big data analytics, manufacturers can now visualise operations energy consumption behaviour in real-time. This visualisation of energy usage allows them to identify effective measures for greater energy efficiency within their manufacturing operations. Consequently, energy becomes a strategic asset for value creation instead of a cost item.

“You cannot manage what you do not measure”

The WDA WSQ course, **Productivity Improvement through Energy Usage Pattern Monitoring and Analysis**, is designed to suit shop floor operations and equipment where participants

can acquire knowledge and skills in monitoring and analysing energy usage pattern to improve productivity and achieve energy saving.

About the Course

The single module WDA course is based on actual industry cases with experiential learning on manufacturing process equipment. The course covers the essentials of hardware and software for the energy usage pattern monitoring and analysis in manufacturing operations. At the end of the course, the participants and the company would be able to address painstaking issues related to energy efficiency and productivity. It has appropriate levels of strategic energy management for operations directors, production facilities managers and supervisors. The course also provides specialised knowledge in energy data analytics and planning, which complements the competencies of corporate energy managers or energy champions. Technicians and engineers who are responsible for implementing energy efficiency related projects will find the course highly practical and can transfer the knowledge to their projects immediately.

Course Fee

- The course fee for the module is S\$4,000 before WDA funding & GST
- Singaporeans and Permanent Residents are entitled to 70 per cent funding of the course fee from WDA
- Enhance SME Funding support of 90 per cent course funding is available for companies with less than 200 staff.

For enquiries, please contact

Dr Chen Wei Long, Director

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Web: www.SIMTech.a-star.edu.sg/SMC

SMC Sustainable Manufacturing Centre

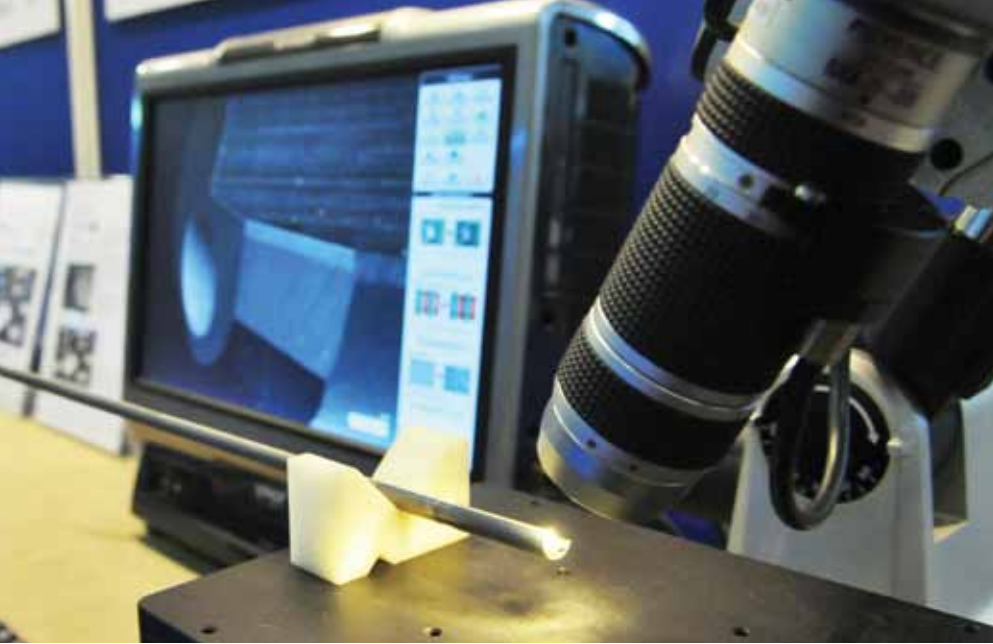
Embracing Sustainable Manufacturing



The central theme of the course is using advanced statistical tools for energy data analysis.



Scan for more information on Sustainable Manufacturing Centre



A FIRST FOR INDUSTRY A MECHANISTIC MODEL FOR DEEP HOLE GUN DRILLING OPTIMISATION

Invention can be used in an array of industries, and is critical for next-generation ultra-precision systems

The SIMTech-NUS Joint Lab collaboration, led by Dr Woon Keng Soon, developed a novel mechanistic model uniting the underlying forces, drill deflection, wall deformation and process kinematics to optimise the drilling strategy, process parameters and tool design. It addresses the current challenges of the industry in drilling corrosion resistant alloys such as Inconel-718.

Market demand for deep holes with thin walls on Inconel-718 is growing in the oil and gas sector for the manufacturing of advanced downhole equipment. To construct such deep

holes, gun drilling is a natural choice with its vast successful applications on aluminium alloys, cast irons and other alloyed steels. But the same drilling technology has not been gaining ground with Inconel-718 applications due to stringent requirements such as extreme length to diameter ratios and high yield strengths.

Rapid degradation of the carbide gun drill tips is one of the most serious production issues, largely driven by continuous work hardening. An ever increase in cutting force and heat generation is resulted throughout the process, coupled with the strong heat

resistivity properties of Inconel-718 gun drills fail catastrophically under severe thermo-mechanical loading conditions, despite the use of special coolant or oil at high pressure. To prevent such drill failures, industry practitioners often suppress drilling speed and feed, which activates the tool edge radius effects at a critical threshold. This shifts the chip formation mechanism from cutting to ploughing and deteriorates the self-piloting capability of the drills – leading to uncontrollable drill deflection and misalignment of the holes produced.

This model accounts for both cutting and ploughing mechanisms on the cutting edges of a gun drill under conservative drilling conditions. Transforming these localised forces to the main drilling axes, deflection of the long and slender drill through compression and buckling can be quantitatively described. Associated with drill deflection, thin walls along deep holes are cyclically deformed by the bearing pads while the drill is rotating and advancing. As a result, the drill deviates at the same magnitude as the wall deformation on the same plane.

“ With this mechanistic model, deep hole drilling can be used to optimise drilling strategies, process parameters and tool designs to achieve better hole straightness results ”

With such quantitative understanding of the unique process characteristics, the spatial trajectory of the drilling as well as the resultant hole straightness can now be predicted.

This work was recently published in the Annals of CIRP.

For enquiries, please contact

Dr Woon Keng Soon at 6793 8418 or email to kswoon@SIMTech.a-star.edu.sg



A number of events were organised in 2015 to engage the industry and forge partnerships

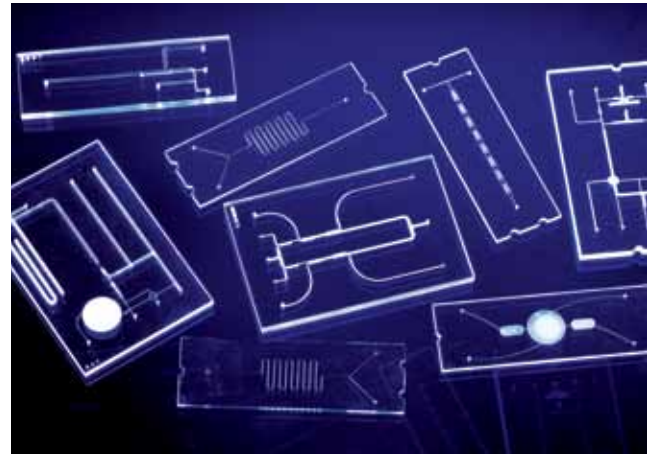


SIMTech Membership Networking Night, 26 February

140 representatives from industry, associations and government agencies attended the SIMTech yearly networking and loh hei dinner. Members and attendees were updated on SIMTech's activities. In a survey carried out, members also indicated their interest to join the SIMTech Special Interest Groups and provided feedback on the newsletter, Manufacturing Matters.

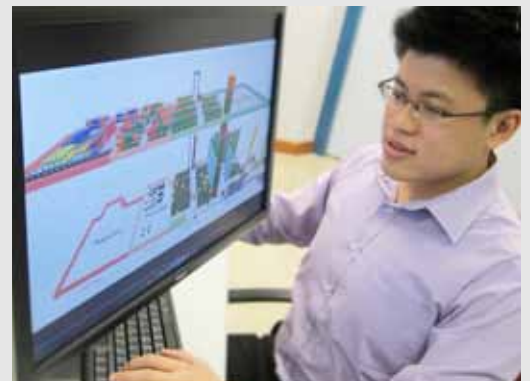
Microfluidics Collaborative Industry Project (CIP) Launch, 4 February

Attended by 35 representatives from industry, the event promotes Design, Prototyping and Characterisation of Polymer Microfluidics Devices in this CIP.



Seminar and Roundtable: Impacts of Industry 4.0 on the Manufacturing Industry, 27 January

Insights on the trends of InfoComm Technology (ICT) in manufacturing, particularly Industry 4.0 and how industry can leverage the ICT-enabled capabilities to enhance manufacturing productivity and competitiveness were shared by Prof Jay Lee, Ohio Eminent Scholar, L.W. Scott Alter Chair Professor, and Distinguished University Professor at the University of Cincinnati as well as Dr Tan Puay Siew of SIMTech. 70 participants from industry, universities and SIMTech attended the event.



SAB Visit, 20-23 January

Technical updates and in-depth discussions to review research progress and directions as well as overview of the industry innovation centres (MPTC, PE COI and SMC) and advice were shared by the SIMTech Scientific Advisory Board (SAB) members during their visit.

Collaborative Industry Projects (CIPs) are cost-effective R&D platforms where groups of companies facing similar issues work jointly with SIMTech to develop manpower and technology



High-Mix Low-Volume (HMLV) Lite Programme

21 April 2015 | SIMTech Training Room

This CIP trains production planners and production supervisors in key planning concepts and shop floor tracking concepts respectively.

For enquiries, please contact **Mr Chua Tay Jin** at:
Tel: 6793 8397 | Email: tjchua@SIMTech.a-star.edu.sg



Programme in Carbon Management

4 May 2015 | SIMTech Training Room

The Programme in Carbon Management trains managers, engineers and consultants in carbon footprint quantification and communication. SIMTech helps companies develop a carbon footprint initiative and link it to improvements, effectively strengthening their competitiveness.

For enquiries, please contact **Mr Jason Yip** at:
Tel: 6793 8430 | Email: kwyip@SIMTech.a-star.edu.sg

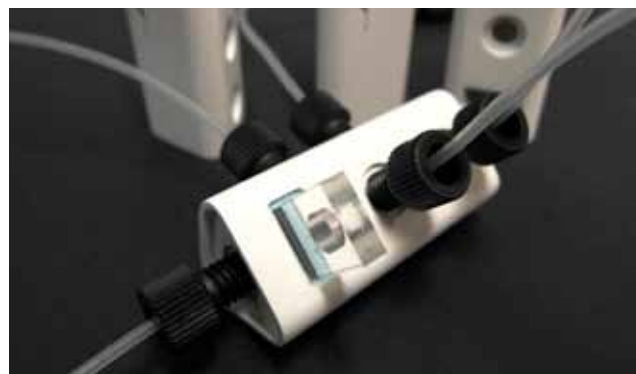


Unsupported Deep Hole Drilling

June 2015 | SIMTech Training Room

The objective of this CIP is to collaboratively develop core capabilities in the evaluation of tool geometry and edge finishing, as well as the ideal cutting parameter and maximum depth achievable in unsupported gun drilling.

For enquiries, please contact **Dr Lim Beng Siong** at:
Tel: 6793 8370 | Email: bslim@SIMTech.a-star.edu.sg



Dental 3D AM Applications

June 2015 | SIMTech Training Room

The objectives of this CIP are to assist local dental laboratories to adopt new 3D Additive Manufacturing (AM) technologies to overcome manual and skilled labour shortage, and to push the development and formulation of new material system to be used in standard low cost AM machines to enable the making of metallic and ceramic components with a range of porosity and intricate shapes.

For enquiries, please contact **Mr John Lim Kee Yong** at:
Tel: 6793 8248 | Email: kyylim@SIMTech.a-star.edu.sg

PE COI Annual Conference 2015 : Singapore PE Industry - The Past 50 Years and its Future

15 April 2015 | 9.00am-5.00pm | Peridot 204 and 205, Level 4, Max Atria, Singapore Expo

Jointly organised by SIMTech and Singapore Precision Engineering and Technology Association (SPETA), the PE COI Annual Conference 2015, held in conjunction with MTA2015, provides an invaluable opportunity for SMEs in Singapore to explore business partnerships with industry leaders. In celebration of Singapore's Jubilee Year, SG50, the theme for the Conference is The Singapore PE Industry: The Past 50 Years and its Future.

For enquiries, please contact **Mr Cedric Yon** at xyyon@SIMTech.a-star.edu.sg or 6793 8561

Swiss-Singapore Workshop on Large Area Processing Technology

19 May 2015 | 9.00am-5.00pm | SIMTech Auditorium, Tower Block

The workshop, focusing on Roll-to-Roll Manufacturing, includes topics on printed lighting, flexible sensor, wearable technology and solar panel. Overseas and local speakers from the industry and academia will share on the trends, developments and applications of these areas.

For enquiries, please contact **Dr Jeffery Chen** at jfchen@SIMTech.a-star.edu.sg or 6793 8259

SIMTech Annual Manufacturing Forum 2015 (AMF'15)

23 July 2015 | 9.00am-5.00pm | SIMTech Auditorium, Tower Block

AMF'15 with the theme, Future Automation—More than Robotics, highlights and gives an insight on the new automation technologies that create impact for future manufacturing. A flagship Conference of SIMTech, AMF'15 is a platform for industry and Institutes of Higher Learning to exchange ideas to address the current challenges in manufacturing to improve the companies' productivity.

For enquiries, please contact **Ms Samantha Chan** at samantha@SIMTech.a-star.edu.sg or 6793 8423



Scan for more events

**PE WSQ Graduate Diploma in MedTech Manufacturing
Module 2: MedTech Manufacturing and Quality System**

22 April 2015 | 6.30pm - 9.30pm, SIMTech, Tower Block

**PE WSQ Programme in Strategic Technology & Operation
Roadmapping (STORM)**

27 April 2015 | 6.30pm - 9.30pm, SIMTech, Tower Block

PE WSQ Programme in Carbon Management (Batch 6)

4 May 2015 | 6.30pm - 9.30pm, SIMTech, Tower Block

**PE WSQ Operations Management Innovation (OMNI)
Programme (Batch 31)**

5 May 2015 | 6.30pm - 9.30pm, SIMTech, Tower Block

**PE WSQ Graduate Diploma in Metal Manufacturing
Processes****Module 1: Evaluate Advanced Metal Machining Techniques**

14 May 2015 | 6.30pm - 9.30pm, SIMTech, Tower Block

**PE WSQ Operations Management Innovation (OMNI)
Programme (Batch 32)**

24 June 2015 | 6.30pm - 9.30pm, SIMTech, Tower Block

**PE WSQ Graduate Diploma in MedTech Manufacturing
Module 3: MedTech Manufacturing Processes**

1 July 2015 | 6.30pm - 9.30pm, SIMTech, Tower Block

**PE WSQ Graduate Diploma in Manufacturing Operation
Management****Module 3: Manage Manufacturing Execution System (MES)**

1 July 2015 | 6.30pm - 9.30pm, SIMTech, Tower Block

PE WSQ Graduate Diploma in Mechatronics**Module 3: Design and Analysis for Machine Vibration**

1 July 2015 | 6.30pm - 9.30pm, SIMTech, Tower Block

**PE WSQ Improve Productivity through RFID-enabled
Workflows Innovation Framework (Batch 3)**

6 July 2015 | 6.30pm - 9.30pm, SIMTech, Tower Block

**PE WSQ Graduate Diploma in Advanced Welding
Technologies****Module 1: Design Arc Welding**

28 July 2015 | 6.30pm - 9.30pm, SIMTech, Tower Block

For course details and registration, please visit
<http://kto.SIMTech.a-star.edu.sg>

For general enquiries, please contact Tel: 6793 8383 |
Email: kto-enquiry@SIMTech.a-star.edu.sg



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About SIMTech

The Singapore Institute of Manufacturing Technology (SIMTech) develops high-value manufacturing technology and human capital to enhance the competitiveness of Singapore's manufacturing industry. It collaborates with multinational and local companies in the precision engineering, medtech, aerospace, automotive, marine, oil & gas, electronics, semiconductor, logistics, and other sectors.

SIMTech is a research institute of the Agency for Science, Technology and Research (A*STAR). With a pool of more than 400 researchers, we are committed to serving the manufacturing industry to develop the human, intellectual, and industrial capital in Singapore.

