MANUFACTURING MATTERS

July 2018 | Issue 3
A publication of the Singapore Institute of Manufacturing Technology

FEATURE
LET THERE BE LIGHT

PRECISION MATTERS
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NOTE FROM EDITOR...

Dear Friends and Industry Partners,

The use of electroluminescent (EL) Printed Lighting in interior design, buildings, F&B outlets, exhibitions and events is capturing the imagination of Small and Medium Enterprises (SMEs). A case in point is The Mill International Printing Industries Pte Ltd (The Mill International) which is in the business of innovative carpet solutions for exhibitions and offices. It is capturing business opportunity in the rapid demand for smart carpets by incorporating Printed Lighting (PL) and Printed Electronics (PE) to its carpets. This is not surprising as Printed Lighting and Printed Electronics is expected to grow rapidly to US$ 45 Billion by 2021 (IDTechEx 2013 report).

EL Printed Lighting panels or strips are low-energy, cost effective and flexible lighting tools. Large area EL had been used in backlight for advertisements, decoration, interactive packaging and entertainment. Being flexible, light weight and thin, EL panel can be safely shaped into many eye-catching forms, generating interests in decoration, intelligent packaging, entertainment and advertisement. Its applications are unlimited.

Convinced of these benefits and applications as well as the intention of The Mill International to grow regional through high value products and services, the company is collaborating with SIMTech to integrate EL Printed Lighting panel with translucent flooring material to develop innovative and functional products. Read on for details of the 12-month collaboration, comprising 3 projects in two phases, in the feature in this and the opposite pages.

Swee Heng
Editor, Manufacturing Matters
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LET THERE BE LIGHT

The project integrates Electroluminescent (EL) Printed Lighting panel with translucent flooring material to deliver innovative and functional products

For the first time in Singapore and possibly the world, novel technologies are to be used in EL Printed Lighting and printed touch control for events and floor advertisements. The effects of EL Printed Lighting for these applications can be astounding. For example, the illuminated floor for trade show enables the lighted-up exhibition floor to guide the flow of attendees in events. Similarly, incorporating printed touch control creates an interactive floor. With this, consumers can now interact with the event floor achieving desired outcomes for the advertiser. The printed lighting carpet for advertisement, as a new media platform, generates brand awareness for customers. Meanwhile, EL Printed Lighting included onto wall space for exhibition and interiors creates the wow.

The Mill International Aspiration and Journey

Combining the benefits of EL Printed Lighting and imagination to create unconventional and wow products to tap business opportunities is the aspiration of The Mill International Printing Industries Pte Ltd, a provider of innovative carpet solutions for commercial, interior as well as the events and exhibitions sectors. With this aspiration, The Mill International embarks on its journey with SIMTech to develop in-house competency in

EL Printed Lighting process technology and equipment for roll-to-roll manufacturing of Printed Lighting strip with EL connectors.

With the new capability, The Mill International moves from a traditional SME carpet solution provider to offer smart EL Printed Lighting for better business margin. The company can also differentiate itself from its competitors and meet the growing demands from its key customers for ever increasing creative solutions. More importantly, this smart packaging platform enables The Mill International to capture the overseas regional market.

Comprising three projects, these aim to enable The Mill International to:

- design, deploy and package EL Printed Lighting and electronics into the company's existing carpet tiles or carpets for identified applications
- develop capability to determine power connection and operation parameters based on panel size and applications to create maximum effect
- incorporate printed touch control to create interactive lighted carpet
- acquire knowledge in programming the multi-plexer to create segmented sequential lighting control for advertisement, event and interior design use
- establish the methodology to recycle key components of EL Printed Lighting and Printed Electronics from one project to another for re-use to save costs
- acquire capability to do cost analysis and estimate accurately the project cost at the proposal stage
- assist The Mill International to undertake prominent projects in Singapore and ASEAN

In this collaboration, SIMTech fabricates EL Printed Lighting panels for the company. It also integrates EL panels with electrical connector and selects power supply. Lamination and packaging of EL panels for flooring materials integration and incorporation of touch (step on) control to switch on EL panel are included. SIMTech will also provide expertise and advise The Mill International on the technical feasibility of their clients' designs.

From the company, it supplies suitable translucent flooring materials for integration, provides technical assistance on packaging EL Printed Lighting panel into flooring materials as well as designs and fabricates flooring materials for actual application. Application test and reliability test of manufactured functional floorings will be carried out by the company. The Mill International also commercialises the product by co-creating design with customers in the exhibition and interior design market.

On completion of phase 1 of the collaboration, the technology of roll-to-roll manufacturing of EL Printed Lighting will be transferred to The Mill International. The roll-to-roll manufacturing line will also be set up in the company. SIMTech will continue to work with the company to improve manufacturing quality and yield after the roll-to-roll line is transferred.

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"The Mill International partners with SIMTech and government agencies not only for grants, but more importantly for technological advancements to build capabilities. This is critical for enlarging our territory beyond our shores"

Mr Mathew Fong, Director, The Mill International

EAC Emerging Applications Centre
Seeding and Growing Emerging Industries

Scan for more information on Emerging Applications Centre

T-UP EXPANDS AND COMMERCIALISES SIMTech-DEVELOPED SYSTEM

Laser optics manufacturers, such as Wavelength Opto-Electronic (WOE) Singapore, need to conduct quality control and verify the absorption rate of the coating and bulk properties of their laser optics components. However, there are no commercial systems available for absorption coefficient measurement of laser optics at 1µm and 10.6µm. Companies typically send their components overseas for such coating quality measurement. To resolve this problem, WOE worked with SIMTech from 2011 to 2013, to develop the Vacuum Laser Calorimetry System (MatCalorie™) which can conduct required measurements.

In 2016, a seconded SIMTech researcher helped to expand the range of applications of the SIMTech-developed MatCalorie™, automate the entire measurement process, and add on industry 4.0 capability to monitor the system health for optimal performance.

Through this T-Up, WOE has filed a patent application. The calorimeter has enabled the company to promptly conduct quality control for their products, reducing cost and lead time, as well as enabling them to rectify any detected flaws quickly. Since the calorimeter was implemented in its production lines for grading lens quality, the company's annual sales has increased by more than 20 per cent. MatCalorie™ is also useful to other companies facing similar coating quality measurements challenges. Potential clients from Japan, France and China have already expressed interest in it.

> **"In collaborating with SIMTech, we have access to a pool of excellent scientists who have great innovative ideas and methodology"**
>
> Mr Robert Huang, CEO, Wavelength Opto-Electronic (WOE) Singapore

*Note: The T-Up initiative, a multi-agency effort by A*STAR, the Economic Development Board, SPRING Singapore (now Enterprise Singapore), IE Singapore (now Enterprise Singapore), and the Infocomm Development Authority (now Media Development Authority), involves seconding RSEs to local enterprises to access the pool of R&D talent in Research Institutes.*

*For more information, please contact **Dr Kok Shaw Wei** at swkok@SIMTech.a-star.edu.sg*

NEW BUSINESS OPPORTUNITY AFTER OTR

Plasmotech Pte Ltd, a Singaporean manufacturer of plastic components, embarked on their Operations and Technology Roadmapping (OTR) journey in November 2015 to plan their strategy and innovate on their business model. At that time, their focus was on supplying connectors to the electronics industry which was facing major economic headwinds.

During the OTR exercise, the executive team at Plasmotech realised that to stay robust and profitable, they had to expand into the automotive industry. Their turning point began in 2016 by supplying critical plastic components to autonomous vehicles (AVs), the proliferation of which was identified during the OTR as an external driver. Since then, Plasmotech's sales have diversified and increased by around 20 per cent year-on-year. Its business is no longer solely dependent on the volatile electronics industry. In line with various other initiatives identified during their OTR, Plasmotech has also invested close to $1.7million into equipment and infrastructure and have increased their professionals, managers, executives and technicians headcount.

Plasmotech staff shared that the soft skills and techniques in prioritisation and decision-making that they acquired during their OTR exercise have been indispensable in helping them in their timing and capital investment strategies. An example was to consider the external drivers first and the capabilities needed before such decisions are made.

> **"The OTR exercise gave Plasmotech much-needed clarity and direction for the future"**
>
> Mr Chong Boo Yeong, Managing Director
> Plasmotech Pte Ltd

*For more information, please contact **Mr Jeffrey Pan** at sppan@SIMTech.a-star.edu.sg*

ANTIMICROBIAL EASY-CLEAN COATING BOOSTS HYGIENE

An alternative to daily cleaning and wipe-down with detergents and antibacterial solutions

Two local SMEs, Aluputer Industrial Pte Ltd and FRP Products Co Pte Ltd, protective coating specialists, engaged SIMTech to develop air-curable antimicrobial non-stick coatings for textile, plastic and painted wooden surfaces on-site, particularly for childcare centres, and potentially for other commercial applications. The coating also incorporates chemical additives for hydrophobic easy-to-clean properties for easy removal of Hand Foot Mouth (HFM) virus in childcare centres.

In this project, SIMTech synthesized a new antimicrobial agent and formulated a sol-gel with easy-to-clean properties, durable and biocompatible which is safe for use in childcare centres. There are currently more than 1,400 childcare centres operating in Singapore (Source: Early Childhood Development Agency, 2018).

On completing a series of lab tests, the next stage is the deployment of antimicrobial surface coating technology at childcare centre sites. Participating companies will be trained on coating application methods, curing and monitoring of the coating effectiveness.

> **"One of the reasons why the company participated in this CIP is to improve the health and wellness of the young, teachers and co-workers in childcare centres citing "Healthy Bodies, Happy Learnings",,**
>
> Mr Raymond Seow, Operations Manager, FRP Products Co Pte Ltd

The antimicrobial coating technology applied to these surfaces reduces the frequency of daily cleaning and wipe-down with detergents and antibacterial solutions. This will also allow the childcare centres to institute a standard practice for safety healthcare/wellness for these facilities to potentially prevent disease transmission.

Through this collaboration, the participating companies will have new revenue stream entering into new markets with innovative products and services, extending to other establishments such as nursing homes, hospitals, clinics and high human traffic areas or installations.

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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

DIGITISED PAPER-BASED DATA COLLECTION SAVES WORK

eDataLogger for electronic form creation, tracking and report generation

Many companies are still using paper forms to collect data. This process is manual, slow and error-prone as this involves back and forth movements of papers and sending papers to the office for additional back-end editing before generating the report.

To solve the problem, SIMTech developed an Android-based solution, eDataLogger that automates the routine data entry, retrieval and report generation. With eDataLogger, companies can convert their paper forms into electronic versions and create high-quality reports on their mobile phones/tablets. Companies tap on the smart in-built functions such as photo insertions, signature, auto-complete with database, barcode, QR code and Optical Character Recognition (OCR) scanner to reduce time and error in generating reports.

In 2016 when it was rolled out, more than 20 companies from diverse industries such as precision engineering, manufacturing, engineering services, retail, logistic, and others have used eDataLogger. MegaChem Manufacturing Pte Ltd, an integrated solutions provider with the capability to offer customised blending services and international distribution of chemicals, is one of the early adopters. Before implementing eDataLogger, it was heavily reliant on paper-based data collection and documentation for laboratory testing, site preventive maintenance and human-resource administrative works.

> **"eDataLogger has motivated our company employees to suggest creative and innovative ideas to improve our productivity"**
>
> Mr Chan Khai Leong, Group General Manager, MegaChem Manufacturing Pte Ltd

The lab staff carry out chemical tests in the lab, record the test result on papers, take photos, and physically pass the papers back to the office. The office staff would then interpret the handwritten paper record, enter the test result into computer, edit report layout and format, manually insert the photos into the report, pass the report to the manager for approval and create Certificate of Analysis before sending the certificate to clients. With the use of eDataLogger, the lab staff can now record the test result with their mobile phones/tablets, take pictures, get signature and generate Certificate of Analysis instantly. The staff can also email or WhatsApp the certificates to the clients or share the test reports on a centralised Cloud in real-time.

Another company that adopted eDataLogger technology is CS21 Design Pte Ltd, a design-and-build company which fabricates and installs cosmetic counter/shop. eDataLogger enables the company to replace their old manual way of generating report with the new electronic method. It also used eDataLogger to generate project checklist, maintenance report and purchase order.

Based on companies' feedback, eDataLogger can improve productivity of up to 50 per cent by reducing cycle time for report generation, reducing transportation cost and time for document transfer as well as optimising manpower utilisation.

Some other companies that implemented eDataLogger are Megafab Engineering Pte Ltd, JBB Groupage Pte Ltd, Oceanblu Shipping (S) Pte Ltd and Convergent Engineering Pte Ltd.

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MPTC Manufacturing Productivity Technology Centre
Enhancing Manufacturing Productivity

Scan for more information on Manufacturing Productivity Technology Centre

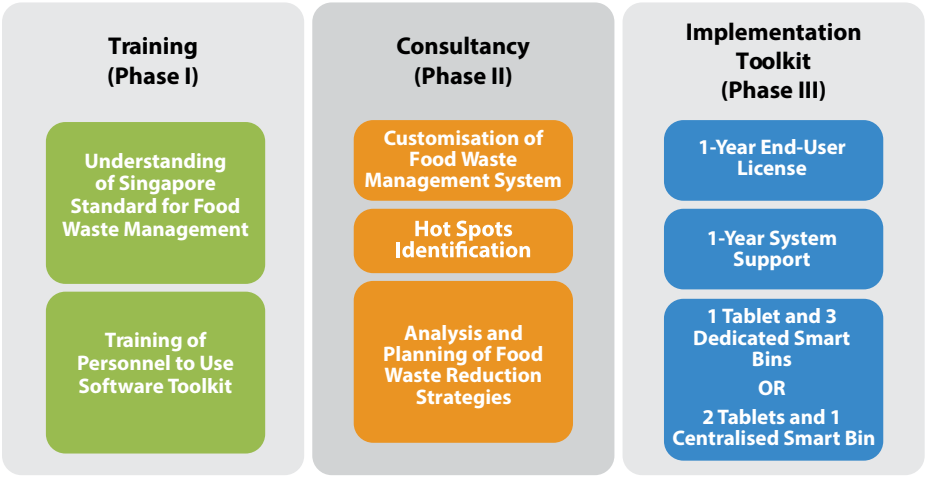
FOOD WISE™ – A SMART SYSTEM FOR FOOD WASTE MANAGEMENT

Paving the path to a Zero Waste Singapore

A whopping close to 810 million kg of food waste was generated in Singapore in 2017. This works out to about 144 kg of food wasted per person, a growing trend since a decade ago. Of this amount, only 16 per cent is recycled while the rest is incinerated at the waste-to-energy (WTE) plants. Due to the high moisture content, the energy recovered from food waste via incineration is both inefficient and unsustainable.

To help tackle this problem in the F&B industry, the Singapore Standard on Food Waste Management for Food Processing/ Manufacturing Establishments was launched by the Food Standards Committee (FSC) and SIMTech on 11 May 2018. During the launch, Food Wise™ – a SIMTech-developed smart system for food waste management was introduced. Designed as an accompanying toolkit to support the standard adoption, the system enables companies to track their food waste generation in real-time, receive auto-alerts on process inefficiencies that will result in increased food waste, and plan for food waste reduction measures. Food Wise™ is a smart and user-friendly toolkit that does away with the hassle of pen and paper-based food waste auditing and reporting.

Industry's adoption of the toolkit not only alleviates the food waste problem in Singapore, but also helps F&B companies to save on raw materials and waste disposal costs. The utility of Food Wise™ will be extended to, and pilot-tested at hotels, canteens and food courts.



Through the launch event, SIMTech has gathered valuable feedback from the industry in gauging the interest and areas of improvement with regard to the toolkit. The launch event also included a workshop where SIMTech demonstrated to the industry how the toolkit can be applied to their operations and how it can help them to manage their food waste. The event has garnered positive feedback from the industry and with a waiting list already filled with ready participants for the workshop, SIMTech has scheduled a second round of the workshop within this year.

> **"If the problem of food waste remains unresolved, the F&B industry's sustainability will be disrupted, the costs of production increased and the product competitiveness impaired"**
>
> Mr Wong Mong Hong, Former President, Singapore Food Manufacturers Association

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SMC Sustainable Manufacturing Centre
Embracing Sustainable Manufacturing

Scan for more information on Sustainable Manufacturing Centre

GROWTH OPPORTUNITIES IN THE LASERS & OPTICS SECTOR

A roundtable was held and brought together the industry, academia, and government agencies to look into future opportunities in lasers and optics

More than 70 participants from the lasers and optics industry, academia, and government agencies attended the Joint Industry Sector Planning (JISP) Roundtable, organised by A*STAR, the Economic Development Board (EDB), and Enterprise Singapore (ESG) on 11 May 2018. Participants converged to learn about advancements in research and development (R&D) in this field, and to brainstorm on opportunities for the local industry.

Since the unveiling of the Precision Engineering Industry Transformation Map in October 2016, SIMTech has been working with other agencies, trade associations and chambers to study and explore growth opportunities for the local precision engineering industry. Lasers and Optics is one such industry sub-sector. Apart from its market projected growth at a compound annual rate of 8 per cent, lasers and optics technologies are also enabling new applications and growth in other industries. Examples are laser annealing in the fabrication of flat panel displays, deep ultra-violet lasers in fabricating ever smaller features in semiconductor manufacturing, and the ubiquity of sensors in consumer electronics and automotive such as light detection and ranging (LiDAR) systems.

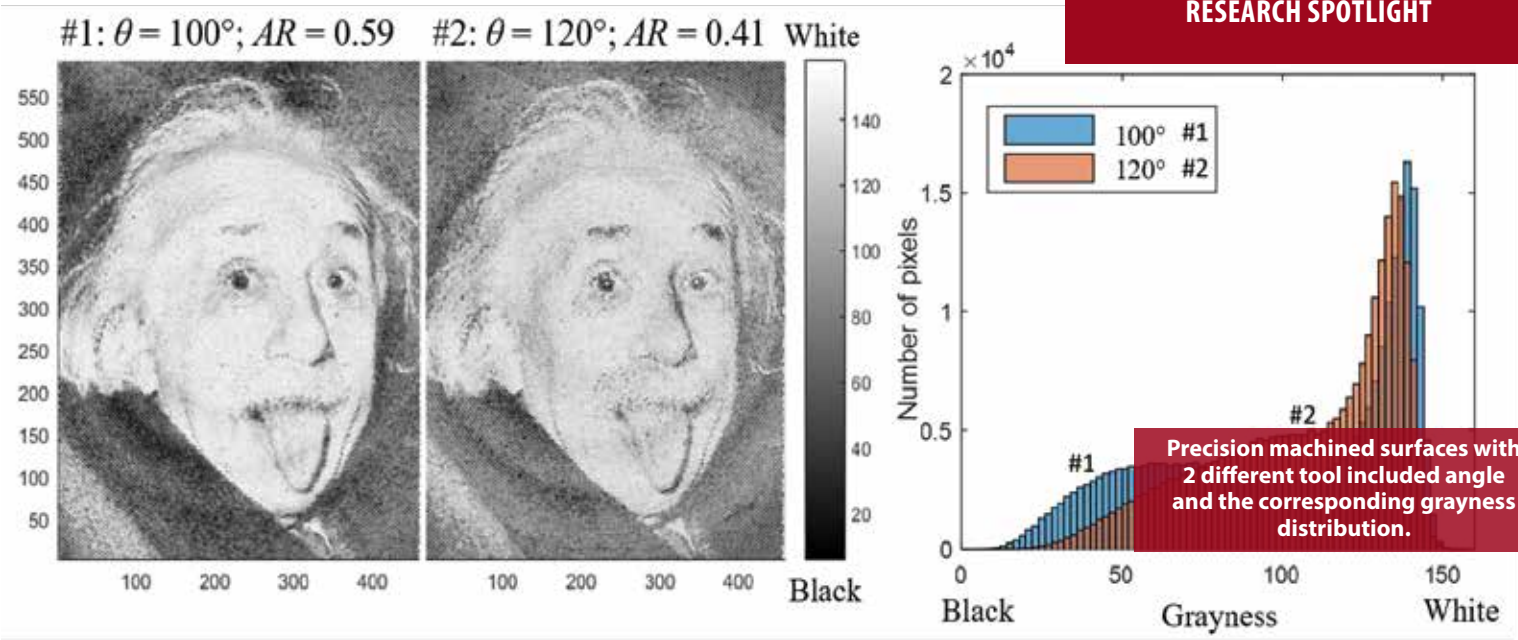
> **"The roundtable is a great opportunity for us to coordinate our R&D activities and build up connections for potential cooperation in Singapore"**
>
> Mr Zhu Chuanggui, General Manager, Sunny instruments Singapore Pte Ltd

The roundtable, organised into four parallel break-out tracks, explored opportunities and gaps relevant to these applications: lasers, optics in semiconductor manufacturing, optics in life science tools, and optics in consumer electronics and automotive. The brainstorming and discussion was facilitated by the Operations & Technology Roadmap (OTR) Team using SIMTech's OTR methodology.

A subsequent workshop will be held with the research community to identify potential capabilities development initiatives and R&D programmes to address the challenges and opportunities identified at the roundtable, and to complete the Lasers & Optics Technology Roadmap. The organisers are also planning a seminar in the second half of the year to share the completed Lasers & Optics Technology Roadmap with participating companies.

> **"The Lasers and Optics Roundtable was timely in discussing the multitude of applications of lasers and optics in the industry currently and in the near future, in view of changes and disruptions in the world of photonics. It also provided the opportunity for representatives from the industry to interact and strengthen the networks with potential for collaboration"**
>
> Dr Ahmad Magad, Group Managing Director, II-VI Singapore Pte Ltd

For more information, please contact:
***Dr Yong Ming Shyan, John** at*
msyong@SIMTech.a-star.edu.sg



Precision machined surfaces with 2 different tool included angle and the corresponding grayness distribution.

UNIQUE MACHINING TECHNIQUE CREATES HIGH FIDELITY ANTI-COUNTERFEITING FEATURES

Technique can be used on metal surface and mouldable polymers

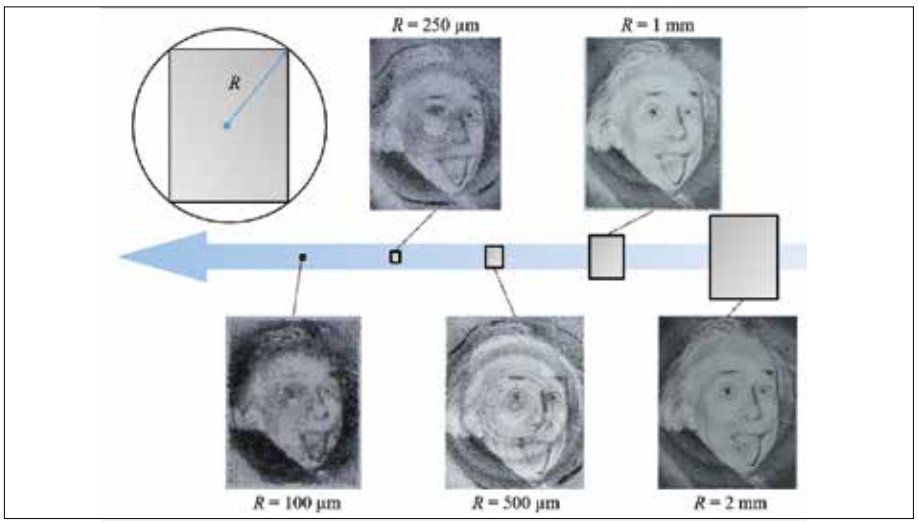
Anti-counterfeiting protects both intellectual property and manufacturing originality. As an effective anti-counterfeiting method, micro image has been widely used for several decades on money, paper and plastic packages.

Diamond Micro Engraving (DME) is a novel machining technique developed by SIMTech to generate grayscale micro images on metal moulds or inserts. By employing DME, a given grayscale image with either large or small image size can be machined on a metal surface achieving high recognisability, demonstrating this technology's flexibility to be used for anti-counterfeiting or other decorative and brand-recognition purposes. This technique can also be used for fabrication of mould for secondary replication of such features for anti-counterfeiting or other decorative and brand-recognition on mouldable materials like polymers.

For anti-counterfeiting application, it is difficult to duplicate an identical image on a metal surface without having the original image source and the exact specific process conditions. However, this is possible through the SIMTech-developed technique as the micro cell, which is the constituent pixel, can be engraved by a sharp diamond tool using a multi-axis ultra-precision machining system. This technique is capable of converting any given grayscale image to a pixelated array of customised micro features. The detailed grayness can be precisely controlled by manipulating the pixel feature size.

The technology's flexibility can be used for other decorative and brand-recognition purposes

Besides the unique cutting strategy and engineering know-how on micro engraving, this technology also includes a customised software to convert the pixelated image to complex machine codes for ultra-precision machining. To enable such conversion of a square image to an array of micro/nano features, a customised methodology is developed in-house. All of these could potentially serve as barriers against counterfeiting.



Scaling down of the machined grayscale images on metal surfaces

For more information, please contact ***Dr Zhang XinQuan****, Machining Technology Group at zhangxq@SIMTech.a-star.edu.sg*

Major corporate events were organised to engage industry and forge partnerships

PE COI Annual Conference 2018, 18 April

MOU Signing between SIMTech and OHLF to establish a globally recognised competence for Lightweight Structure technologies

The Precision Engineering Centre of Innovation (PE COI) was set up in 2007 to assist industry in R&D, capabilities development and technology transfer through Collaborative Industry Projects, One-to-One collaborations and consultancy. This year, PE COI marks a decade of supporting PE companies and helping them to transform.

The PE COI Annual Conference 2018, graced by Mr Ted Tan, Deputy CEO, Enterprise Singapore (ESG), attracted 262 attendees from industry, government agencies and trade associations.

This event was held in collaboration with the Singapore Precision Engineering and Technology Association (SPETA), with the support from e2i, ESG, EDB, SSG, WSG and NTUC SME.

The theme for this year's conference was **Precision Engineering Transformation.** Mr Lim Tse Yong, from EDB shared the PE Industry Transformation Map (PE ITM) at the event. A Memorandum of Understanding was signed between SIMTech and Open Hybrid Lab Factory (OHLF) to establish a globally recognised competence for Lightweight Structure technologies across the value chain of the automotive and aerospace industries in Germany and Singapore.

Mr Sam Chee Wah, General Manager of Feinmetall Singapore Pte Ltd highlighted the importance of skills upgrading. In the area of innovation, Mr Goh Khoon Seng, Chief Executive of Osteopore International presented on Home Grown Technology in Medical Application using 3D Additive Manufacturing.

A panel discussion with some of the speakers and Mr Low Ming Wah, Chairman of SPETA, Mr Edwin Chow, Executive Director, (Manufacturing & Engineering), ESG as well as Mr Azzil Jamain, Director (Industry Development Division 1), SSG and moderated by Dr John Yong, Director, Industry Development Office, SIMTech, discussed the role of government agencies, trade association and research institutes in supporting the ITM.

Complementing the conference is a showcase of SIMTech technologies, solutions and training programmes to assist industry in the transformation journey.

NTUC, MOM and SNEF Tripartite Learning Journey, 29 June

National Trades Union Congress (NTUC) Secretary-General (SG), Ng Chee Meng, visited the A*STAR Model Factory@SIMTech. Senior officials from Ministry of Manpower (MOM) and Singapore National Employers Federation (SNEF), senior staff from the Ministry of Trade and Industry, A*STAR and NTUC were also present. During the visit, SG Ng emphasised that implementing the 23 Industry Transformation Maps (ITMs) and explaining to workers the benefits ITMs bring to the workforce and country require a whole-of-industry approach.

The visit was part of a series of Tripartite Mixers, organised since 2017 by NTUC, MOM and SNEF as an informal platform for top-tier staff from the tripartite partners to forge stronger bonds.
(Source: NTUC)

Collaborative Industry Projects (CIPs), initiatives, programmes and ready-to-go technologies are available to assist industry

Large Format 3D Printing with Laser Aided Additive Manufacturing (LAAM)

The LAAM technology utilises high energy laser beam for material deposition which enables 3D additive manufacturing, surface modification and repair with high flexibility to achieve good mechanical properties, wear and corrosion resistance.

*For enquiries, please contact **Mr Tan Lye King** at tanlk@SIMTech.a-star.edu.sg*

Functional Coatings for Glass and Ceramics

Functional coatings provide additional functions apart from the protective and decorative uses. Glass and ceramics are used to assist companies in developing functional coatings for various functional purposes.

*For enquiries, please contact **Mr Goh Chee Chien** at gohcc@SIMTech.a-star.edu.sg*

Freeform Lens Design and Fabrication

Freeform lenses are advantageous in the replacement of bulky spherical optics with a single element or in improving the lens performance. This programme equips companies with competencies in freeform lens design, fabrication and characterisation.

*For enquiries, please contact **Mr Tan Chee Tat** at cttan@SIMTech.a-star.edu.sg*

Energy Efficiency Monitoring and Analysis

A tool to help assess equipment's energy usage in real-time and identify hotspots of excessive energy usage hotspots.

*For enquiries, please contact **Mr Joshua Thong** at cmthong@SIMTech.a-star.edu.sg*

Last Mile Logistics Management

A planning and tracking solution to improve the management of drivers/vehicles to effectively meet customer imposed pick-up and delivery requirements amidst resource constraints.

*For enquiries, please contact **Mr Chai Lai Sing** at lschai@SIMTech.a-star.edu.sg*

Real-Time Dashboard

A real-time dashboard that is customised to suit the company needs and to connect to multiple sources for congregation and analysis of real-time data.

*For enquiries, please contact **Mr Chai Lai Sing** at lschai@SIMTech.a-star.edu.sg*

Food Waste Management Toolkit

This toolkit enables food manufacturing companies to do real-time tracking of food waste, auto alert of process inefficiencies, hot spot identifications and automated food waste reporting.

*For enquiries, please contact **Mr Yon Xing Ye Cedric** at xyyon@SIMTech.a-star.edu.sg*

EVENTS

SIMTech Annual Manufacturing Forum 2018 (AMF'18)

18 July 2018 I 8.30am-5.00pm I Hilton Singapore, Grand Ballroom, Level 3

Join us at AMF'18 to learn and understand how innovations emerge, gain adoption and traction in the industry. In its13th edition, AMF'18 features Partnership for Impact with our industry partners sharing on their business journey and how working with SIMTech has helped them to drive business innovation and gain a global competitive advantage by being relevant in today's technology-driven environment.

*For enquiries, please contact **Ms Nadia Chandra Sekar** at sekarn@SIMTech.a-star.edu.sg*

Emerging Applications Centre Annual Conference 2018

12 September 2018 I 8.30am-5.00pm I Matrix, Biopolis Singapore, Breakthrough and Discovery Theatres, Level 4

Come and explore the opportunities of Printed Flexible Hybrid Electronics and forge strategic partnerships to develop products of the future. With the theme, **Building Flexible Hybrid Electronics Eco-system for Singapore Wearable Tech Industry**, the conference not only offers participants an overview of Flexible Hybrid Electronics opportunities and technologies in diverse applications. It also features Wearable Tech Products Innovation by companies which have participated in the SIMTech Collaborative Industry Project (CIP) on Smart Wearable Product Innovation.

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Scan for more events

COURSES

PE WSQ Apply Integrated Carbon Footprint Assessment Methodology (i-CARE)

Batch 10: 24 July 2018 | 9am - 6pm, SIMTech, Fusionopolis 2
Batch 11: 8 October 2018 | 9am - 6pm, SIMTech, Fusionopolis 2

PE WSQ Review Processes for Strategic Technology & Operation Roadmapping (STORM)

27 July 2018 | 8.30am - 5.30pm, SIMTech, Fusionopolis 2

PE WSQ Implement Manufacturing Data Mining Techniques

31 July 2018 | 6.30pm - 9.30pm, SIMTech, Fusionopolis 2

Master Class in Mastering Sales and Operations Planning (S&OP) Process To Align Strategies for Operational Excellence

20 - 21 August 2018 | 8.30am - 5.30pm, SIMTech, Fusionopolis 2

Master Class in Supply Chain Analytics – Descriptive, Predictive & Prescriptive Analytics

17 - 18 September 2018 | 8.30am - 5.30pm, SIMTech, Fusionopolis 2

PE WSQ Understand the Microfluidics Manufacturing Processes

8 October 2018 | 6.30pm - 9.30pm, SIMTech, Fusionopolis 2

Master Class in Mastering Sales and Operations Planning (S&OP) Process To Align Strategies for Operational Excellence

8 - 9 November 2018 | 8.30am - 5.30pm, SIMTech, Fusionopolis 2

Master Class in Supply Chain Analytics – Descriptive, Predictive & Prescriptive Analytics

22 - 23 November 2018 | 8.30am - 5.30pm, SIMTech, Fusionopolis 2

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

For general enquiries, please contact Tel: 6590 3193 or email: KTO-enquiry@SIMTech.a-star.edu.sg

Scan for more courses

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 450 researchers, we are committed to serving the manufacturing industry to develop the human, intellectual, and industrial capital in Singapore.