SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

27 March 2021 – 24 June 2021

TOPICAL REPORT

ADVANCED MANUFACTURING

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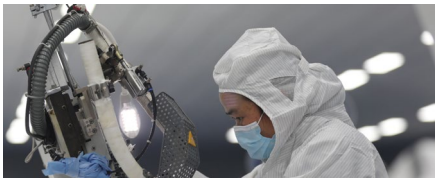
SMART MANUFACTURING



Why we must learn to trust our "cobots"

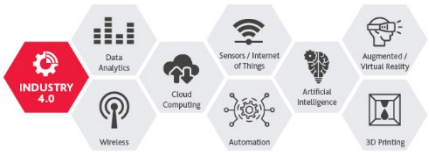
"With advanced manufacturing set to grow, how can we develop smart factories in Asia?
The "rise of the robot" has been a fear factor cited by futurologists and sci-fi movie-makers for decades. Hyper-intelligent machines won't just take millions of our jobs; no, ultimately, they will turn on their creators."
Source: Business Times

Smart manufacturing and the rise of IIoT

"Smart manufacturing is no longer just a buzzword. Its practices allow production companies to harness the power of data and enhance overall production efficiencies. At the heart of smart manufacturing are industrial internet of things (IIoT) technologies, which is one of the biggest enablers of Industry 4.0. The development of the internet of things (IoT) to support consumer-focused activities has expanded into the industrial sector, creating factory and warehouse operations. Exploiting the opportunities presented by IIoT, which is expected to generate economic value from US$1.2 to US$3.7 trillion by 2025, is crucial for manufacturers."
Source: FutureIOT

Why medtech should now lead the way in smart manufacturing

ADVANCED MANUFACTURING



Advanced manufacturing techniques and advancements in biodegradable biomaterials

"Recently, researchers are focussing on biodegradable materials that do not need to be explanted from the organism. This review highlights the recent advancement in biodegradable materials i.e., magnesium, zinc, and iron, their manufacturing technique, challenges with present biomaterials, and some improvements that can help resolve the problems with current biomaterials."
Source: Materialstoday

The evaluation of Conventional manufacturing to an advanced manufacturing systems-A case study

"The mass productions have produced the products irrespective of market demands, but present days without customization of the product and demand of the product, no production is come forward to produce their products. Due to the competency and reputation of the product in the market is very less and the competition of the product is very high. These reasons may affect manufacturing systems. In this regard, the manufacturing systems are switch

MANUFACTURING

2021 State of Manufacturing Report

"From work models to supply chains and from innovation to production, change has been accelerated across all businesses and departments. While a lot of the past year has been responding to the crisis, now is the time to plan and execute a full reset. And as we are evaluating what our "next normal" will look like, we can't help but see the massive opportunities this disruption has created for digital manufacturing."
Source: Fictiv

Factory of the Future: Four Market Trends to Keep an Eye on

"Attributed to the rise in ecommerce, changing consumer purchasing behaviour, the increase in outsourcing supply chain services by manufacturers, and the need for cost effective services, the global third party logistics (3PL) market valued US$919.12bn in 2020."
Source: Manufacturing Global

INDUSTRY 4.0

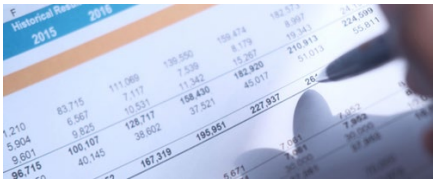
2021 Industry 4.0 Survey

"Rachel Shelley, head of medical technologies, IDA Ireland, explains why medtech is well placed to lead in 'lights-out' manufacturing, and how companies in Ireland are being helped towards this."
Source: MedTech News

5G-SMART – a research collaboration for 5G in manufacturing

"The manufacturing sector is entering a period of disruptive change and digital transformation towards Industry 4.0. 5G will be a key enabler for making the vision of highly efficient, connected and flexible factories reality. In the 5G-SMART research collaboration project, Ericsson and industry partners run three industrial field trials to validate and demonstrate how 5G can improve manufacturing. All three trials are 5G-ACIA endorsed testbeds."
Source: Ericsson

SMART FACTORIES



Intel: Paving the Way For Smart Factories of the Future

"In collaboration with EXOR International and Telecom Italia, Intel looks to demonstrate the benefits of on-premise 5G private network and AI"
Source: Manufacturing Global

The Smart Sustainable Factory – The Innocent Drinks story

"Ahead of The Manufacturer's Sustainable Manufacturing Symposium, which takes place on 17 June, we caught up with Christopher Fielden, Group Supply Chain Director at Innocent Drinks, to find out how the company has gone the extra mile to future proof the business for the Net Zero age."
Source: The Manufacturer

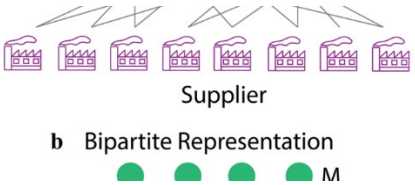
Smart factories get smarter with AI inspection systems

"The smart factory is a key feature of Industry 4.0, and key to the smart factory is the ability for the things inside it to be connected in real time in what is known as the Industrial Internet of Things (IIoT)."
Source: Imeche

Gartner: Leaders Lack Skilled Smart Manufacturing Workers

"While more connected factory workers are leveraging digital tools and data management techniques to improve decision accuracy, increase knowledge and lessen on automation technology. When the new technology is adopted in the manufacturing firms, there are huge benefits occurred by the Computer Numerical Controlled machines (CNC) machines utilization. The Automated CNC machine utilization factor is greater than traditional manufacturing machine utilization."
Source: Materialstoday

INDUSTRY 4.0



Analysis of Industry 4.0 challenges using best worst method: A case study

"This study aims to identify key challenges pertaining to Industry 4.0 adoption in automotive sector and analyse the identified challenges to derive rank for systematic implementation in Indian automotive industries. In this regard, thirty-six challenges are identified related to Industry 4.0 adoption and categorized into four dimensions and are analysed using Indian automotive component manufacturing firms based on Best Worst Method (BWM)."
Source: Computers & Industrial Engineering

Design Strategies Enabling Industry 4.0

"Industry 4.0 focusses on digitalization and developing intelligent products and processes. There exists need to develop robust products with enhanced process efficiency. Also, it includes integration of technologies to facilitate interoperability, modularity and so on. Design strategies would facilitate design engineer's rapid decision making for product development. In this context, this article deals with analysis of 15 design strategies. The strategies are prioritized using multi-criteria decision-making (MCDM) approach. The priority order of design strategies is derived for further deployment in terms of developing products and processes."
Source: Smart Innovation, Systems and Technologies

Automation technology as a key component of the Industry 4.0 production development path

"The aim of this paper is to represent an exemplary production development way towards Industry 4.0 using eminent formalization approaches and standardized automation technologies."
Source: The International Journal of Advanced Manufacturing Technology

"American manufacturers are entering a new stage of the Industry 4.0 era where their digital investments are beginning to pay dividends. Not all manufacturers have embraced Industry 4.0 equally, however. Those that adopted Industry 4.0 strategies prior to the pandemic were better equipped to navigate its disruptive impacts and are now positioned to reenter growth mode ahead of their less digitally advanced peers."
Source: BDO

In-depth: Industry 4.0 2021

"Industry 4.0 or the fourth industrial revolution is quite simply the use of digital technologies in the manufacturing process to produce higher-quality goods at reduced costs. A part of it is thus also the smart factory."
Source: Statista

variability, 57% of manufacturing leaders feel that their organisations lack the skilled workers needed to support their smart manufacturing digitalisation plans."
Source: Manufacturing Global

Factories of the Future: Five Manufacturing Market Trends

"Manufacturing Global takes a look at the latest manufacturing market trends in CPG, predictive maintenance, Big Data security, AI and industrial robotics"
Source: Manufacturing Global

Smart Factories Need Smart Power

"Understanding the transformative potential of Industry 4.0 requires examining a number of technological advancements that have been underway for some time. From artificial intelligence and automation to machine learning and the Internet of Things (IoT), a new wave of digital technology is converging to reshape operations across the supply chain."
Source: Industry Week

Case Study: The smart lab that mimics the smart factory

"Most manufacturers agree that this is where the future lies. But with the disruption and uncertainty brought about by the pandemic, moving ahead with the latest competitive trend may be taking a back seat for manufacturers. That would be a mistake—and not only because smart factories will be a key differentiating factor in the marketplace of the future. It may also very well be the key to weathering the kind of volatility and disruption we're experiencing right now. The following are key ideas to keep in mind as you consider a smart factory transformation."
Source: Smart Industries

INDUSTRY 4.0

McKinsey: Eight Industry 4.0 Value Drivers

"The Industry 4.0 market expected to reach US$337.1bn by 2028, we look at McKinsey & Company's 'Digital Compass', a diagnostic framework designed to help manufacturing organisations identify and prioritise optimisation opportunities along the digital thread."
Source: Manufacturing Global

Brief review of methods and techniques used in Learning Factories in the context of Industry 4.0

"This paper is an analysis of recent studies and seeks to briefly present the evolution of industrial production processes and systems and Industry 4.0 but also the concept of learning factory. The paper also presents a review of the main methods and techniques used in innovative industrial training, learning and production processes and systems. Finally, some conclusions related to the use of these methods and techniques are summarized."
Source: IOP Conference Series: Materials Science and Engineering

Industry 4.0 and Prospects of Circular Economy: A Survey of Robotic Assembly and Disassembly

"In this paper we try to alleviate these shortcomings by comprehensively investigating the state-of-the-art in robotic assembly and disassembly. We consider and review various aspects of manufacturing and remanufacturing frameworks while particularly focusing on their desirability for supporting a circular economy."
Source: Cornell University

Industry 4.0 Learning Factory: A Canvas for Specifications

"In this paper we propose a model and a canvas to develop pertaining specifications for a LF 4.0. The originality of our work is to consider the analysis of the technological, industrial and pedagogical needs to formalize the specifications. Based on these proposals, the University of Strasbourg evolved its existing LF for the manufacturing industry for the 4.0. In this paper, we illustrate our proposal from this project."
Source: Proceedings of the Conference on Learning Factories (CLF) 2021

A Traceability Scorecard (TSC) for Smart Manufacturing in the Era of Industry 4.0

"To complete the MTC Concept, we need to develop methods/tools in Traceability and Connectivity. To this end, we propose a Traceability Scorecard (TSC) by utilizing Quality Trust Index (QTI) and QSC as primary resources and Quality Function Deployment (QFD) as the direct approach. In addition, we are also seeking performance measures for each TSC aspect by proposing a set of tangible metrics that are critical in smart manufacturing. This paper is the first paper mentioning the guideline in establishing TSC based on Open Quality for the smart manufacturing area."

Renault: Industry 4.0 transformation with RFID solutions

"Global automotive manufacturer - Renault - has selected Zebra Technologies Corporation to drive modernisation into its manufacturing operations. The selection of Zebra's RFID solutions has helped the company to increase its operational efficiency and improve the traceability of finished cars from the production plant to dealerships."
Source: Manufacturing Global

Industry 4.0 in legacy environments

"Manufacturers understand that they need to start leveraging the benefits of Industry 4.0 to remain competitive. But legacy environments, fragmented IT estates and resistance to change at a factory level are all barriers they need to overcome if they are to realise their Industry 4.0 aspirations."
Source: The Manufacturer

Factories of the Future: Industrial Manufacturing 1.0 to 4.0

"From the first industrial revolution to Industry 4.0 and beyond, Manufacturing Global looks at the past, present and future for industrial manufacturing"
Source: Manufacturing Global

MANUFACTURING TECHNOLOGY

Get Ahead With These Next-Generation Smart Manufacturing Technologies

"As the fourth industrial revolution continues, smart manufacturing technologies are coming out increasingly faster, providing benefits to manufacturing enterprises worldwide. They're becoming more powerful and more capable with each generation."
Source: Forbes

Source: Korea

Substantial capabilities of robotics in enhancing industry 4.0 implementation

"This paper discusses the significant potential of Robotics in the field of manufacturing and allied areas. The paper discusses eighteen major applications of Robotics for Industry 4.0."
Source: Cognitive Robotics

Industry 4.0 and its Implementation: a Review

"this study presents a systematic review of the scope of Industry 4.0, its goals and implementations, as well as the barriers to the implementation of Industry 4.0. Solutions for overcoming the barriers and challenges are discussed."
Source: Information Systems Frontiers

Special Issue: Design Engineering in the Age of Industry 4.0

"There are five papers on this special issue on smart manufacturing technologies. The use of a digital twin to establish a real-time mapping between physical space and virtual space has emerged as a powerful technique for decision support to design in the era of Industry 4.0, such as real-time analysis, reliability assessment, predictive maintenance, and design optimization of products."
Source: Journal of Mechanical Design

The influence of industry 4.0 on product design and development: Conceptual foundations and literature review

"This research presents a literature review to; 1) understand the concept of industry 4.0 from an implementation (state of practice) viewpoint, 2) learn about approaches and considerations currently deployed for developing products to be produced in manufacturing plants progressively transforming into industry 4.0 environments. Results reveal that the potential of industry 4.0 is underexploited within product design and development, especially in the conceptual stages lacking methods, tools, and approaches. While later stages of the product development (production planning, ramp-up) have received some attention in regards with optimizing production operations, several publications acknowledge its potential to benefit earlier process stages."
Source: International Conference on Research into Design (ICoRD) 2021

Human-centred design in industry 4.0: case study review and opportunities for future research

"This study is a unique attempt to bridge the gap through the literature characteristics and lessons learnt derived from a collection of case studies regarding human-centred design (HCD) in the context of Industry 4.0. This objective is achieved by a well-rounded systematic literature review whose special unit of analysis is given to the case studies, delivering contributions in three ways: (1) providing an insight into how the literature has evolved through the cross-disciplinary lens; (2) identifying what research themes associated with design methods are emerging in the field; (3) and setting the research agenda in the context of HCD in Industry 4.0, taking into account the lessons learnt, as uncovered by the in-depth review of case studies."

Source: Journal of Intelligent Manufacturing

Fusion of Blockchain and IoT: The Future of Industry 4.0

"Industry 4.0 consists of the integration of manufacturing networks by cyber-physical structures, thereby allowing manufacturing facilities and development processes to transition into automated and complex networks. This autonomous system involves communication between the components of the "smart factory" both internally and with other factories that are built using IoT. This relationship also provides trust between IoT participants, as well as control over resource allocation (e.g., repair time, electricit) and finished products, which can best be accomplished by implementing blockchain technology. This chapter describes one of the possible ways that IoT and Blockchain technologies can be integrated to solve these problems. The chapter also examines the feasibility of integrating blockchain with IoT technology, potential obstacles, and the advantages that such convergence can bring."

Source: Blockchain Applications in IoT Ecosystem

Development of the Key Competencies of Experts for Industry 4.0

"This work focuses on the professional development of the key competencies of four professionals working in the key work positions in the conditions of Indsutry 4.0. To fulfill the first and second goal of the thesis, the specification of the term Industry 4.0 and its definition in the field of human resources development in organizations in the Czech Republic and defining the concept of

competencies for Industry 4.0 and determining competencies for expertsin the key work positions from the perspective of Industry 4.0 is part of the theoretical overview of the work. As part of the qualitative research, this professional development is captured in the form of the case studies."
Source: Economics Working Papers

Collaborative Robotics and Industry 4.0: An Engineering, Sociology and Activity-Centered Ergonomics Cross-Experience

"In this communication, we propose to relate such an experience on the basis of a research project - funded by the French National Agency for Research (ANR), and focused on transformation of French Small and Middle Companies (SMC's) in relation to introduction of Collaborative Robotics. Collaborative Robotics is of particular interest for us as it embeds promises and pitfalls of articulation between technologies and work. However, these promises may be discussed and tempered by confronting them to actual design issues, work organization and transformation of work management."
Source: Proceedings of the 21st Congress of the International Ergonomics Association (IEA 2021)

SMART FACTORY

An Open Platform for Smart Production: IT/OT Integration in a Smart Factory

"the purpose of this research
is to capture the development of the software stack and identify the required target architecture for the platform. This is further used for discussing potential future challenges in demonstrating new and innovative Smart Production concepts."
Source: Aalborg University

A Study on the Virtual Data Generator for Simulation in Smart Factory

"this study developed a data generator that can more realistically simulate data from different processes in smart factory to help research on smart factory. In addition, functions such as setting presets and intuitive UI configurations were developed for the convenience of data creators. This data generator will help you simulate smart factory environments by providing more

realistic data easily and simply when you create the different systems needed for smart factory environments."
Source: Korea Science