

University Industry Forum on Advanced Manufacturing

Wednesday 15 February 2023



From left: Prof Joseph M Cacciottolo, Dr Emanuel Said, Mr Martin Hignett, Prof Tanya Sammut-Bonnici, Ms Marisa Xuereb, Dr Laurent Filipozzi, Prof Ing Andrew Sammut, Dr Ing Emmanuel Francalanza, Prof Ing Simon G Fabri, Dr Ing Paul Refalo.

As part of the strategy process, the Rector, Prof Alfred J Vella, is hosting a series of [University Industry Fora](#) throughout the academic year. The events are dedicated to Malta's economic pillars and aim to disseminate academic knowledge and industry expertise.

The [Forum on Advanced Manufacturing](#) took place on 15 February 2023, led by experts from University academia and the industry, with speakers sharing insights on activities across the University that reflect cutting-edge practices in the industry in the field. The discussion was coordinated and moderated by Prof Tanya Sammut-Bonnici, Pro-Rector for Strategic Planning and Enterprise.

The [Forum on Advanced Manufacturing](#) reflects the objectives on industry impact in the [University of Malta Strategic Plan 2020-2025](#) and resonates with the University of Malta's commitment and mission to empower the nation and to bring innovation into all aspects of operations, including management, training and research.

Forum Transcript - Summary

Rector Prof Alfred J Vella opened the Forum and welcomed the participants, adding that the intention throughout this academic year was to bring together students, staff, external stakeholders and industry experts. The Rector explained how the meetings resonate with the University's commitment and mission to empower the nation and bring innovation into all aspects of operations, including management, training and of course research.

Ms Marisa Xuereb, Managing Director of Raesch Quarz (Malta) Ltd and President of The Malta Chamber of Commerce, Enterprise and Industry, thanked the University for organising this Forum in the process of bridge-building between academia and industry. Ms Xuereb said that the manufacturing industry prides itself in having international brands in a wide spread of manufacturing subsectors, which is quite remarkable for Malta. It is also worth noting that the large brands have significant research activities locally, with many local companies

providing support services. In addition, the Chamber has worked closely with the University Knowledge Transfer Office to deliver schemes enabling post-doctoral researchers to conduct industry research. The five pilot projects running at this point will pave the way for schemes operating on a larger scale in future years. Projects of this nature enable the student to be more ambitious towards a steep learning curve after finishing their studies and to be enticed to enter the manufacturing industry.

Dr Laurent Filipozzi, General Manager of STMicroelectronics, Malta, said that the company is one of the world's largest semiconductor companies, with over 50,000 employees worldwide. Dr Filipozzi said it was essential to understand how advanced manufacturing can support carbon neutrality, with ST managing this topic globally for a responsible business. Dr Filipozzi said that ST approaches sustainability through energy efficient and responsible technologies, aiming to reduce its manufacturing impact and to protect the planet through its commitment to carbon neutrality. ST is targeting compliance with the Carbon 1.5C scenario, which is very challenging worldwide, using the Science Based Targets to become carbon neutral by 2027. The process entails the reduction of emissions and an increase in the use of renewable energy. The Malta site focuses on advanced manufacturing to reduce carbon emissions and is committed to tackling water scarcity with a water consumption reduction programme. Dr Filipozzi said energy renewables were crucial to meeting its carbon neutrality objective, using solar panel farms or buying renewable energy from other sources. Since it is paramount to reduce energy consumption, ST has an ongoing energy reduction programme in place to improve energy efficiency. There is close collaboration with the University regarding robotisation and digitalisation to have a zero-paper environment with full automation in three years. ST is also looking at the Internet of Things (IoT) by increasing the number of system sensors for the daily energy conception to plan and react accordingly through a control room, which can monitor efficiency in real time. Robotisation is also being addressed for greater productivity and efficiency while reducing energy consumption.

Mr Martin Hignett, Managing Director at Trelleborg Sealing Solutions, Malta, stated that the company is a large international group, with Malta holding the most prominent site. The company has been in Malta since 1961, focusing on developing and producing rubber products through continuous innovation. The R&D area is the company's most important and critical sector, with the Malta site being the prime R&D site globally. Mr Hignett gave an example on biofuels and said that Trelleborg was the very first company, in the 70s, to actually come up with a rubber suitable for fuel injection with current production of 25 million O-rings per week. Electric cars are also creating different opportunities since they have multiple cooling systems that need critical seals and valves to ensure efficiency. Hydrogen is being touted as the next product with electricity for mobilisation, but this will likely be challenging to implement. However, it may be applied for trucks due to battery weight-related issues. Mr Hignett said it would be fascinating for students to work on such topics, develop a specific product, and resolve issues within the industry, considering that the current green movement is opening up new challenges resulting in ongoing new development.

Dr Emanuel Said, Dean of the Faculty of Economics, Management and Accountancy, University of Malta, said that Malta's advanced manufacturing sector requires human resources with knowledge, capability and skills to navigate organisations and functions through challenges that impact this sector. However, there is a high development and integration cost when segmenting, targeting and positioning value offerings aimed at small and specialised niches taking into consideration the economies of scale. Dr Said added that the high cost of production is also related to the post-Covid-19 rising cost of materials. Service industries strive to attract qualified and experienced human resources from the local labour pool and seek overseas labour, resulting in

additional costs. Dr Said added that soaring energy prices in mainland Europe entails manufacturing firms to search for alternative value points, with shortages and cost competitiveness remaining as major concerns. Dr Said emphasized that the University is required to focus on how managers can respond swiftly to a fast-changing context. Funds are being invested in changing the traditional teaching mode to address modern workplace and social realities. Dr Said added that the University is collaborating with leading universities in Europe and other countries to bring expertise and insight emerging from diverse realities by adopting modern approaches involving more experiential learning that helps graduates face various management situations and swiftly make decisions.

Prof Claude A Farrugia, Associate Professor at the Department of Chemistry, Faculty of Science, University of Malta, looked into the evolving tertiary assessment practices to support a strategy for advanced manufacturing. Prof Farrugia said there is a need in the advanced manufacturing industry, with the word 'advanced' being a relative term since some technologies are 30 to 50 years old and the speed of development is not necessarily progressive. Business sectors need to stay ahead of the curve, identify new niches and evolve their technology, with the key being human resources which is challenging when trying to retain existing resources. Prof Farrugia said that The University's Strategic Plan for 2020 – 2025 has a section dedicated to learning and teaching, which reflects the path to be taken to produce a graduate cohort that can support this objective and to have quality graduates at all levels to sustain an advanced manufacturing strategy through a flexible workforce. Prof Farrugia said that the syllabi at educational levels are over-packed with knowledge which does not leave space for assimilation. Prof Farrugia added that leveraging technology is also essential for self-reflection and student-oriented activity, which teaches professionalism and attention to timeframes.

Dr Ing Emmanuel Francalanza, Head of the Department of Industrial and Manufacturing Engineering, Faculty of Engineering, University of Malta, elaborated on smart and advanced manufacturing research directions. Dr Francalanza remarked how manufacturing is a very dynamic and evolving sector that is affected by various external effects, such as material shortages and the Covid-19 disruptions amongst others. Another such change driver is the move towards electrification especially within the automotive industry. The European Parliament's approval of the new legislation to see fossil fuel vehicles banned from being sold post-2035, will entail significant challenges in the manufacturing sector. Research advances are therefore required in order to develop and promote smart and intelligent manufacturing. Within this context, manufacturing data and its analysis using artificial intelligence techniques is gaining importance, since understanding data can provide companies with a competitive advantage. Together with advances in the Industrial Internet of Things, this approach can for example facilitate the possibility of predictive maintenance, based on data analysis in real time. Dr Ing Francalanza remarked that this is also opening up new issues and challenges, such as Cybersecurity, which can be tackled by training students and researchers in these topics. The Maltese manufacturing industry must therefore have available the required human resources in order to utilise the right technologies to drive them forward. Whilst, within the Maltese industry perspective, larger companies may have the correct infrastructure to support this development, there are significant challenges at an SME level. Dr Ing Francalanza concluded by outlining how through the SME5.0 HORIZON project, the Department of Industrial and Manufacturing Engineering is carrying out specific research on how Industry 4.0/5.0 approaches can be implemented within small to medium companies.

Dr Ing Paul Refalo, Senior Lecturer at the Department of Industrial and Manufacturing Engineering, Faculty of Engineering, University of Malta, explored the subject of sustainability in manufacturing in Malta and explained how the University is approaching manufacturing from an environmental perspective, considering the Sustainable Development Goals as a primary factor. Dr Refalo referred to the Malta Low Carbon Development Strategy, which highlights manufacturing as one of the industries needing decarbonization. The University tackles sustainable manufacturing by developing sustainable products/systems and by carrying out research on sustainable production processes. It performs life cycle assessments to value and compare the various environmental impacts by studying the materials and components used in relation to their functionality, reusability and recycle-ability amongst others. Dr Refalo explained how research projects dealing with specific manufacturing processes are improving their environmental and financial burdens. Dr Refalo added that the Department is working with different industrial entities on the project AIR SAVE to create an intelligent system that will autonomously monitor and control compressed air consumption in factories in real-time. He also explained how other projects such as VacuUM and CONFORM are working towards sustainable injection moulding by reducing energy and material consumption and improving product quality.