

SPEECH BY MR LOH KHUM YEAN, PERMANENT SECRETARY, MINISTRY OF TRADE AND INDUSTRY (INDUSTRY), AT THE LAUNCH CEREMONY OF THE NATIONAL ADDITIVE MANUFACTURING INNOVATION CLUSTER (NAMIC) ADDITIVE MANUFACTURING (AM) SUMMIT SERIES AT PAN PACIFIC HOTEL ON MONDAY, 23 JANUARY 2017, 9.40 AM.

Prof Low Teck Seng, Chief Executive Officer, NRF

Dr Lim Jui, Chief Executive Officer, NTU Innovation - NTUitive

Dr Ho Chaw Sing, Managing Director, NAMIC

Ladies and gentlemen,

Good morning.

Introduction

1. I am pleased to join you this morning for the launch of the Additive Manufacturing (AM) Summit on Precision Engineering (PE), and the opening of the National Additive Manufacturing Innovation Cluster (NAMIC).

2. In September 2015, Minister for Industry Iswaran announced the formation of NAMIC. This inaugural summit represents another milestone in Singapore's efforts to prepare our manufacturing sector for the future. I am encouraged that representatives from a range of industries have convened at this Summit to discuss how AM can be incorporated into their strategies and operations.

Technologies, such as additive manufacturing, are changing the nature of manufacturing

3. The manufacturing industry is a key pillar of Singapore's economy. In 2015, it contributed about 20% of our GDP and employed over 500,000 workers. The sector generates good jobs for Singaporeans, contributes significantly to productivity growth, and generates positive spillovers for the rest of the economy, including our services industries.

4. The nature of manufacturing is evolving with the emergence of new technologies, such as AM. AM encompasses a range of technologies and applications¹, of which one of the most commonly known is 3D Printing.

¹ AM is the official industry standard term for all applications of the technology. It is the process of joining materials to make objects from 3D model data, usually layer upon layer, as opposed to subtractive technologies. AM encompasses many technologies including 3D Printing, Rapid

5. Indeed, AM has come a long way from a technology that was initially used for prototyping. According to Wohlers Associates, the AM industry grew by 25.9% between 2014 and 2015, to over US\$5.1 billion². AM is entering manufacturing operations that require short time-to-market builds, unique design requirements and low-volume production runs. The 2016 Gartner annual report³ predicts that by 2020, 75% of manufacturing operations worldwide will be using 3D-printed tools, jigs and fixtures to produce finished goods.

The Government is committed to prepare our manufacturing sector for the future.

6. To ensure that Singapore's manufacturing sector remains competitive, we will continue to invest in advanced manufacturing technologies, encourage public-private partnerships, and develop our workforce. The Committee on the Future Economy (CFE), which envisions strategies to position Singapore's economy well for future opportunities, has identified Advanced Manufacturing as a possible growth area for Singapore.

Investing in advanced manufacturing technologies

7. It is important to ensure that our manufacturing sector is able to harness advanced technologies like AM to raise productivity, create novel products and develop new business models. Under the Research, Innovation and Enterprise 2020 plan (RIE 2020), we have set aside S\$3.2 billion for Advanced Manufacturing and Engineering, to develop technological capabilities for our manufacturing and engineering sectors. This will include investing in cross-cutting technologies such as AM, digital manufacturing, robotics and automation as well as advanced materials.

Encouraging partnerships

8. Partnerships are central to our efforts to transform the manufacturing sector, and the Government will continue to encourage partnerships between public and private sector stakeholders, including our Trade Associations and Chambers (TACs), Institutes of Higher Learning (IHLs) and Research Institutes (RIs). These partnerships are critical enablers of the Industry Transformation Programme, which was introduced last year. The ITP will help to bring our economy to the next phase of development by helping industries and firms create value and drive growth through productivity, innovation and

Prototyping (RP), Direct Digital Manufacturing (DDM), layered manufacturing (2D printing), additive fabrication and 4D printing (changes shape post production).

² Wohlers Report 2016

³ The report is entitled *Forecast: 3D Printers, Worldwide, 2016*

internationalisation. It involves dedicated Industry Transformation Maps for 23 sectors across the economy. Several of these sectors, including Precision Engineering and Aerospace, will benefit from AM technologies.

9. NAMIC, which oversees NTU's Singapore Centre for 3D Printing, NUS's 3D Printing initiative for medical technologies, and SUTD's Digital Manufacturing and Design Centre, plays an important role in forging public-private partnerships to translate AM research into commercial applications for industry. In that regard, later today there will be an MOU will be signed between NAMIC and industry players⁴ to establish an AM user-group. The group will identify and address important market and regulatory topics to support the advancement of AM adoption in Singapore and the region.

10. Since its inception, NAMIC has actively engaged more than 380 companies and institutions, and supported several promising projects by our SMEs and start-ups.

11. For instance, IDI Laser, a local SME, is currently developing an intelligent multisensory-based Build Quality Monitoring System for Selective Laser Melting (SLM) technology, with technical and funding support from NAMIC and NUS. The project involves the development of an online monitoring system to diagnose internal defects before parts are printed via the SLM process, thereby reducing material wastage and build times.

12. NAMIC has also supported start-ups which are venturing into new applications and scaling up. One example is Structo, a 3D Printing dental solutions provider originating from NUS, which has developed industrial-grade 3D printers for various dental applications. NAMIC worked with Structo on the commercialisation strategy for its patented technology, and Structo has since garnered keen interest from key industry players and investors.

13. Another example is Nanosun, an NTU start-up which uses AM to develop microfiltration membranes that enable the supply of clean water for emerging economies. NAMIC partnered Nanosun in pioneering the 3D Printing technique to increase the efficiency of its membranes, and supported its scale up efforts. Nanosun has since sold its membranes in China, Indonesia and Philippines.

Talent Development

⁴ The companies involved are UCT, UL, DMG-Mori Seiki and HP.

14. As we transform our manufacturing sector, we will also need to equip our workforce with the requisite skills to benefit from the new job roles created, such as robot coordinators and industrial data scientists.

In that vein, the Precision Engineering Skills Framework was launched in October 2016 to serve as a common reference guide for employers and employees in identifying key skills and competencies for different job roles. This complements our efforts to provide reskilling opportunities for workers keen to embark on new careers in advanced manufacturing.

15. In February 2016, the then-Workforce Development Agency, in partnership with our local institutions⁵, launched a series of advanced manufacturing masterclasses, covering topics such as AM and advanced robotics. There are also many Workforce Skills Qualifications (WSQ) programmes in Precision Engineering, which are supported by SkillsFuture Singapore (SSG).

16. Mr. Maideenkunju Noushad, a 40-year old Singaporean, is a good example of an individual who took advantage of the WSQ courses to acquire new skills, and enter the AM industry. Mr. Noushad was previously a Tool & Design Engineer for over 10 years. After completing a Specialist Diploma in AM from Nanyang Polytechnic in 2016, he joined 3D Matters, a local manufacturer providing end-to-end AM solutions, as an Operations Specialist⁶. The company is currently in the process of opening a new metal printing AM facility in Singapore, where Mr. Noushad's skills will be put to good use.

17. The government will continue to support our workforce in the effort to deepen skills, stay relevant to changing market needs, and ensure that we are well-positioned for new job opportunities.

Closing

18. Let me close by reiterating that the manufacturing sector remains an important pillar of our economy. We are committed to transform the sector by investing in advanced manufacturing technologies, encouraging partnerships and developing our workforce. With all of us playing our part in this journey, I am confident that our manufacturing sector will remain competitive and create good job opportunities for Singaporeans.

19. I wish all of you a fruitful event. Thank you.

⁵ The partners include the Advanced Remanufacturing and Technology Centre (ARTC), Institute of High Performance Computing (IHPC), the Centre of Optical and Laser Engineering (COLE), the Singapore Centre for 3D Printing (SC3DP), and Nanyang Polytechnic (NYP)

⁶ As an Operations Specialist, Mr Noushad interacts closely with the clients, designs products to meet their specific requirements, and is extensively involved in the production activities using 3D Printing.