COMMON ADVANCED MANUFACTURING TERMS*

(*Non-referenced terms are sourced from the AMGC Sector Competitiveness Plan)

ADDITIVE MANUFACTURING (OFTEN REFERRED TO AS 3D PRINTING)

Additive manufacturing refers to the use of digital 3D design data to make a component by successively depositing layers of material, enabling mass customisation and on-site printing.

ADVANCED MATERIALS AND COMPOSITES

Advanced materials and composites refer to new materials developed to provide superior performance across a variety of dimensions (e.g. strength, weight and flexibility), enabling greater product differentiation and customisation for manufacturers.

AUGMENTED AND VIRTUAL REALITY SYSTEMS

Augmented or virtual reality systems refers to technology that engages workers with a computer-generated representation of the physical world, enabling remote control of machinery or guiding workers through operations on-site and ultimately improving cost and safety outcomes.

BIO-MANUFACTURING AND BIOLOGICAL INTEGRATION

Bio-manufacturing and biological integration refer to the use of biological systems to produce molecules that cannot be extracted or synthesised directly, enabling the development of innovative products and materials.

CYBER-PHYSICAL

Cyber-Physical Systems (CPS) are integrations of computation, networking, and physical processes. Embedded computers and networks monitor and control the physical processes, with feedback loops where physical processes affect computations and vice versa (https://ptolemy.berkeley.edu/projects/cps).

DESIGN OPTIMISATION

Design optimization is an engineering design methodology using a mathematical formulation of a design problem to support selection of the optimal design among many alternatives (https://en.wikipedia.org/wiki/Design_Optimization).

DIGITAL DESIGN AND RAPID PROTOTYPING

Digital design and rapid prototyping refer to the product development cycles enabled by ICT visualisation and analytic tools95, providing lower product development costs and greater product customisation opportunities to manufacturers.

GCLOUD SOFTWARE

Google Cloud Platform, offered by Google, is a suite of cloud computing services that runs on the same infrastructure that Google uses internally for its end-user products, such as Google Search and YouTube. Alongside a set of management tools, it provides a series of modular cloud services including computing, data storage, data analytics and machine learning (https://en.wikipedia.org/wiki/Google_Cloud_Platform).

GLOBAL VALUE CHAIN

Manufacturing is increasingly occurring across global value chains, where the different functions of design, production, marketing and services occur across different countries.

HIGH-SKILLED LABOUR

Those occupations with education or training requirements of: long-term on-the- job training lasting one or more years; work experience in a related occupation; post-secondary vocational training associate degree; bachelor's, master's or doctoral degree etc.
(http://lmi2.detma.org/lmi/pdf/Definition_high_demand_high%20wage_high%20skill.pdf).

INDUSTRY 4.0

Industry 4.0 refers to the suite of digital technologies augmenting industrial processes, including:

1) the rise of data volumes, computational power and connectivity
2) emergence of business intelligence capabilities
3) new forms of human-machine interactions; and
4) improvements in transferring digital instructions to the physical world, e.g. 3D printing'.

Industry 4.0 is the fourth industrial revolution, though there is disagreement over how to define the revolutions. The first industrial revolution took place at the end of the 18th century and was marked by mechanisation made possible by steam and water power. The second industrial revolution, which occurred at the start of the 20th century, was aided by electricity and marked by mass production, assembly lines, and divisions of labour. The third, around the start of the 1970s, came through the use of computers to further automate machines and production processes.(https://searcherp.techtarget.com/definition/Industry-40)

INDUSTRIAL INTERNET OF THINGS (IIOT)

The industrial internet of things, or IIoT, is the use of internet of things technologies to enhance manufacturing and industrial processes. Also known as the industrial internet or Industry 4.0, IIoT incorporates machine learning and big data technologies to harness the sensor data, machine-to-machine (M2M) communication and automation technologies that have existed in industrial settings for years
(https://internetofthingsagenda.techtarget.com/definition/Industrial-Internet-of-Things-IIoT).

INTERNET OF THINGS (IOT)

The Internet of Things (IoT) is the network of devices such as vehicles, and home appliances that contain electronics, software, actuators, and connectivity which allows these things to connect, interact and exchange data (https://en.wikipedia.org/wiki/Internet_of_things).

MASS CUSTOMISATION

Mass customization is the process of delivering wide-market goods and services that are modified to satisfy a specific customer need. Mass customization is a marketing and manufacturing technique that combines the flexibility and personalization of custom-made products with the low unit costs associated with mass production. Mass customization products may also be referred to as made to order or built to order
(https://www.investopedia.com/terms/m/masscustomization.asp).

MATERIALS RESILIENCE AND REPAIR

Materials resilience and repair refers to the ability of a material under stress to absorb energy and return to its original state98, enabling product performance characteristics including strength, flexibility and durability.

NANO, MICRO AND PRECISION MANUFACTURING

Nano-manufacturing, micro-manufacturing and precision manufacturing refers to production that uses very small-scale components and materials or applies high-precision tools100 to improve product performance characteristics, enabling a high degree of product differentiation and customisation opportunity for manufacturers.

OEM

An OEM is a manufacturer that produces goods for other companies to sell under their own name. OEM is an abbreviation for 'original equipment manufacturer. (https://www.collinsdictionary.com/dictionary/english/oem)

PROCESS ENGINEERING

Process Engineering provides the chemical or biochemical processes and equipment that are used to turn raw materials into an end-product and is an essential part of the manufacturing industry. Process Engineers are responsible for designing, implementing, controlling and optimizing industrial processes, especially continuous ones within the chemical, petrochemical, agriculture, mineral processing, advanced material, food, pharmaceutical, and biotechnological industries. (https://www.getreskilled.com/what-is-a-process-engineer)

REFERENCE SITE

Mmanufacturers or project participants that are willing to be a case study (a reference site) for other manufacturers to learn about a particular technology, service, or product.

ROBOTICS AND AUTOMATED PRODUCTION PROCESSES

Robotics and automated production processes refer to the design and operation of robots in manufacturing, enabling greater productivity, lower costs, improved workplace safety and higher product quality.

SENSORS AND DATA ANALYTICS

Sensors and data analysis refer to the use of devices to monitor, control and diagnose issues with production lines in real time, enabling increased production volumes and reduced downtime

SERVITISATION

Servitisation is the provision of services to clients by manufacturing firms39, with services typically supporting or complementing products and helping manufacturers to establish long-term relationships with consumers.

STREAMING ANALYTICS

Streaming Analytics is the ability to constantly calculate statistical analytics while moving within the stream of data. Streaming Analytics allows management, monitoring, and real-time analytics of live streaming data. (https://www.dataversity.net/streaming-analytics-101)

SUSTAINABLE MANUFACTURING AND LIFE CYCLE ENGINEERING

Sustainable manufacturing and life cycle engineering refer to the development of products with lower energy consumption, improved durability or maintenance costs, and higher potential for recycling or collaborative consumption.96 Sustainable manufacturing presents an opportunity to reduce costs and greater ability to meet eco-conscious market demand.

TECHNICAL AND KNOWLEDGE LEADERSHIP

Developing and disseminating knowledge is key to helping Australian manufacturing differentiate itself on value and technical leadership.

UNDERSERVED MARKETS

A place or market where fewer goods or services are available than there should be. (https://dictionary.cambridge.org/dictionary/english/underserved)

VALUE DIFFERENTIATION

The sources of value creation for customers beyond product cost, such as product leadership, reputation and reliability, flexibility and service offering.