Advanced Manufacturing Training Board

# Manpower Update Report
## Advanced Manufacturing Industry
# 2025

# ACKNOWLEDGEMENT

The Advanced Manufacturing Training Board (AMTB) would like to express its gratitude to the members of the focus group for their valuable time and insights into the manpower situation of the advanced manufacturing industry. The views of the focus group members and information from some major recruitment websites formed an integral part of this report.

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# Introduction

## Background

The Advanced Manufacturing Training Board (AMTB) of the Vocational Training Council (VTC) is responsible for determining manpower demand of the industry, assessing whether the manpower supply matches manpower demand, and recommending the development of vocational and professional education and training (VPET) to meet the assessed training needs.

To better reflect the dynamics of the manpower situation, one manpower survey collecting quantitative results is conducted every four years. It is supplemented by two manpower updates focusing on qualitative feedback. The AMTB completed the manpower survey in 2022, followed by the first manpower update in 2025 and the second one in 2026.

This manpower update report comprises:

(a) views from industry experts expressed in the focus group meeting on the latest developments, manpower demand, recruitment difficulties, training needs, and measures to tackle the challenges the industry faces; and

(b) desk research and analysis of recruitment information from major recruitment portals.

## Objectives

The objectives of the manpower update report are:

(i) to examine the latest trends and developments of the industry;

(ii) to explore the job market situation and recruitment challenges;

(iii) to identify the training needs; and

(iv) to recommend measures to meet training needs and ease the problem of manpower shortage.

# Methodology

## Overview

This manpower update report aims to provide the latest development of the advanced manufacturing industry through views collected from a focus group meeting, supplemented by desk research on job advertisements from major recruitment portals.

## Focus Group Meeting

The focus group meeting was conducted on 15 November 2024 and the topics discussed were supported by the AMTB. To collect the best insights possible, the focus group members are representatives from the following sectors:

a. Industrial IoT and Big Data Analysis;

b. Smart Manufacturing and Automation;

c. Artificial Intelligence and Robotics; and

d. Innovation Technology and Research.

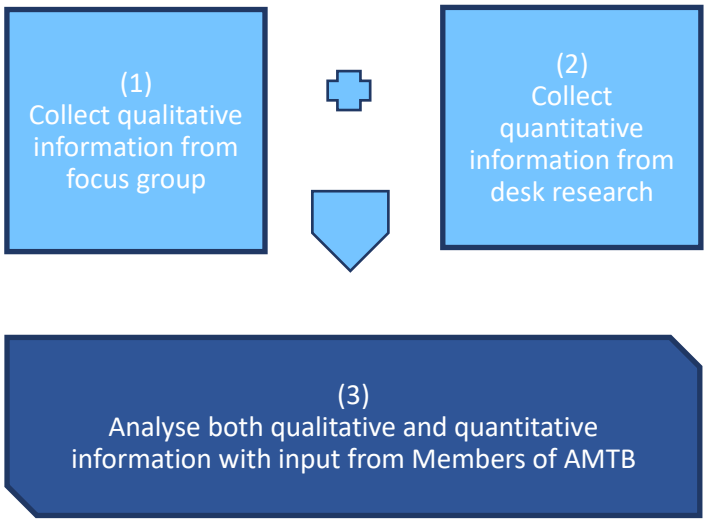
The discussion at the focus group meeting was recorded and transcribed to facilitate analysis.

## Desk Research

An information system was developed to capture relevant recruitment data from major online recruitment portals, covering the period from December 2023 and November 2024. Collected information was mapped against the list of related sectors under the Hong Kong Standard Industrial Classification devised by the Census and Statistics Department. After mapping and de-duplication of records, a total of 4,429 recruitment records were collected during the research period and served as indicative information of the job market trend.

# Data Analysis

The analysis consists of three steps:




# Limitations

As this is not a manpower survey, the findings and recommendations of the focus group meeting are more qualitative in nature and the report focuses on the manpower trends. The job advertisements were collected from major recruitment portals, such as CPJobs, CTGoodJobs, JobsDB, Recruit and Labour Department. Other channels, such as recruitment through human resources vendors and referrals, were not covered. Since the data does not reference to any historical data, this can only serve as supplementary information to the findings of the focus group meeting.

# Findings

## Factors Affecting the Industry Development

### Evolving technologies

The manufacturing landscape is evolving rapidly in Hong Kong, driven by several prevailing technologies that enhance efficiency and productivity. One of the key technologies is additive manufacturing, or 3D printing, which facilitates rapid prototyping and the production of customised components, allowing manufacturers to respond quickly to market demands while minimising lead times and costs.

Additionally, the integration of robotics and automation streamlines production processes by utilising both traditional and collaborative robots, which greatly improves assembly and material handling, resulting in a substantial increase in overall productivity.

The Internet of Things (IoT) also plays a pivotal role in modern manufacturing by utilising connected devices for real-time monitoring and data collection. This technological integration enhances operational efficiency and responsiveness.

Moreover, Artificial Intelligence (AI) and machine learning are increasingly applied for quality control and process optimisation, empowering decision-makers with actionable insights that drive continuous improvement.

Looking ahead, emerging technologies are set to further transform the manufacturing industry. Industry 4.0 marks a strategic shift towards fully integrated digital manufacturing systems that facilitate real-time data exchange and process optimisation. This transition is enhanced by digital twin technology, which creates virtual replicas of physical assets, significantly improving predictive maintenance and operational efficiency.

Furthermore, advancements in robotics are leading to the development of sophisticated machines capable of performing complex tasks while collaborating seamlessly with human operators. This evolution is supported by smart sensors and IoT devices, which enhance data collection and analytics, fostering proactive maintenance and improving operational insights.

The rise of intelligent micro-factories also promotes flexibility and responsiveness to changing consumer demands, enabling the production of smaller batch sizes and personalised products and positioning manufacturers to effectively meet the diverse needs of the market.

Lastly, the emerging concept of the industrial metaverse creates virtual environments for collaboration, simulation, and immersive training. All these trends highlight Hong Kong's shift toward a more innovative and technology-driven manufacturing industry, positioning it for future growth and enhanced competitiveness on the global stage.

## Sustainable Practices and Green Manufacturing

Sustainable practices and green technologies are becoming more prevalent in Hong Kong's manufacturing industry. A key trend is the research and development of advanced materials that contribute to sustainability goals. As companies strive to reduce their environmental impact and comply with stricter regulations, these materials play a vital role in this transition.

Advanced materials including composites, nanomaterials, and biomaterials, offer superior properties such as greater strength, lighter weight, enhanced durability, and improved thermal conductivity. By utilising these materials, manufacturers can lower fuel costs and improve overall performance, making this a critical focus for innovation and environmental responsibility.

Sustainability also drives research into eco-friendly options that minimise waste and energy consumption. Many advanced materials promote recycling and reusability, aligning with global efforts to lessen environmental impacts and meet regulatory requirements. While adopting sustainable methods often requires investment, it opens new market opportunities. Companies that commit to sustainability can attract eco-conscious consumers, enhance their brand reputation, and potentially lower operational costs over time. This commitment benefits the environment and positions businesses to thrive in a market that increasingly values responsible practices.

Overall, the exploration of advanced materials is transforming the manufacturing landscape, paving the way for innovative products and processes that meet the demands of a rapidly changing market while prioritising sustainability and efficiency. This shift creates a win-win for the industry and the society, generating job opportunities while supporting broader environmental goals.

## Availability of a Skilled Workforce

The availability of a skilled workforce is crucial for driving innovation and operational efficiency in the industry. A robust talent pool enables companies to effectively implement advanced technologies and sustainable practices. However, the industry faces challenges of shortage of qualified workers, which can

hinder development and competitiveness. One significant factor contributing to this shortage is the ageing workforce. As experienced workers retire, a growing gap emerges that must be filled by younger, skilled professionals. This demographic shift poses a risk of lack of expertise and knowledge transfer, which is essential for maintaining high standards in manufacturing processes and innovation.

Furthermore, the rapid pace of technological advancement necessitates a workforce that is not only skilled but also adaptable to change. As new technologies and methodologies are introduced, the ability to learn and integrate these innovations becomes essential for sustaining operational efficiency. The lack of a sufficiently trained workforce may hinder the ability of companies to leverage these advancements fully, ultimately affecting productivity and profitability.

Additionally, the competitive landscape of the manufacturing sector demands a workforce with specialised skills that align with industry needs. Without a strong pipeline of talent, companies may struggle to remain competitive in a global market that increasingly prioritises innovation and efficiency. Thus, addressing the skills gap is vital for ensuring that Hong Kong's manufacturing industry can thrive in the face of ongoing challenges and opportunities.

## Government Support and Incentives

In the Chief Secretary's 2024 policy address, several initiatives were highlighted to develop new quality productive forces tailored to local conditions, aiming to establish Hong Kong as an international innovation and technology (I&T) hub by transforming traditional industries and fostering emerging sectors.

A key element of this strategy is the establishment of the Hong Kong New Industrialisation Development Alliance, which will foster collaboration among government entities, industry stakeholders, academia, and research institutions to enhance partnerships and financing for innovation initiatives.

Additionally, the third InnoHK research cluster will be launched, concentrating on advanced manufacturing, materials, energy, and sustainable development, aimed at attracting world-class research teams to collaborate with local institutions.

To support research activities, a new round of $1.5 billion Research Matching Grant Scheme will be allocated to attract more organisations to support research endeavours of institutions. Emphasising investment in the I&T sector, a $10 billion I&T Industry-Oriented Fund will be set up to channel more market capital to invest in specified emerging and future industries

of strategic importance, including health technology, AI, robotics, semi-conductors, and advanced materials. Furthermore, $1.5 billion Innovation and Technology Venture Fund will be allocated for start-ups of strategic industries.

To assist small and medium enterprises (SMEs) in adopting emerging technologies, the government offers various funding programmes such as the Innovation and Technology Fund (ITF) provides financial assistance for R&D initiatives; and the BUD Fund (Branding, Upgrading, and Domestic Sales) enhances SME competitiveness through branding and process upgrades. All these measures create a robust framework for SMEs to embrace new technologies and advance in a competitive market.

# Manpower Demand

## Skilled Workers in Precision Engineering

The current manpower demand in Hong Kong's advanced manufacturing sector is characterised by a robust need for skilled workers, particularly in precision engineering. This segment requires machinists and computer numerical control (CNC) operators who can operate advanced machinery with a high degree of precision, adhering to stringent specifications essential for maintaining quality standards in production.

## Technicians and Engineers in Manufacturing

In addition to skilled labour, there is a substantial demand for technicians and engineers. Mechanical and electrical engineers are crucial for designing, testing, and maintaining manufacturing equipment and systems. Engineers with expertise in automation and control systems are particularly sought after, as these skills are vital for enhancing operational efficiency.

## Importance of Quality Assurance Technicians

Quality assurance technicians are also essential, responsible for implementing and monitoring quality control processes to ensure that products meet industry standards and regulations.

## Growing Demand for Robotics and AI Professionals

In light of the new industrialisation and the ongoing transformation of Hong Kong's manufacturing sector, there is a growing requirement for professionals skilled in robotics, artificial intelligence (AI), and automation. These technologies are transforming traditional manufacturing processes, necessitating a workforce capable of designing, implementing, and maintaining automated systems.

## Rising Need for Data Scientists in Manufacturing

Moreover, as the manufacturing sector embraces digital transformation, there is a growing demand for data scientists and analysts who can leverage big data to optimise production processes and improve decision-making. These roles require individuals skilled in data analytics, machine learning, and statistical modeling to extract valuable insights from complex datasets.

## Essential Role of Cybersecurity Experts

As manufacturers connect their operations to the internet and utilise cloud-based systems, protecting sensitive data and ensuring the security of operational technologies becomes paramount importance. Experts in cybersecurity will play a crucial role in

safeguarding systems against potential threats and breaches.

### Growth of Research and Development Roles

Research and development (R&D) roles are expected to grow as companies prioritise innovation. There will be an increasing need for product development specialists, particularly in fields like materials science and technology. These professionals will be essential in driving new product initiatives and improving existing offerings to maintain competitive advantages in the market.

### Emergence of Digital Twin Engineers

The role of digital twin engineers will gain prominence, focusing on creating and managing digital replicas of physical assets to optimise operational performance. The emergence of the industrial metaverse is also expected to create positions such as virtual environment designers, responsible for developing virtual spaces that enhance collaboration and simulation within manufacturing processes.

### Demand for Intelligent Micro-Factory Specialists

Furthermore, there will be a demand for intelligent micro-factory specialists, who will design and manage highly automated, decentralised production facilities that leverage advanced technologies for improved efficiency and flexibility.

### Increasing Need for Sustainability Experts

Lastly, as most industries are shifting towards sustainable practices, there is a rising demand for sustainability experts to develop and implement strategies that promote sustainable and eco-friendly practices within advanced manufacturing industry.

In summary, the emerging manpower demand in Hong Kong's advanced manufacturing sector is increasingly focused on technological proficiency, innovation, cybersecurity, and sustainability. Professionals equipped with these skills are essential for driving growth and maintaining competitiveness in a dynamic market.

## Desk Research

A total of 4,429 collected during the period from December 2023 to November 2024. The top three principal jobs in each sector were identified as follow:

### Manufacturing (1,889 job ads)

1) Technician (621, 32.9%)
2) Engineer (286, 15.1%)
3) Repairing and Maintenance Skilled Worker (209, 11.1%)

**Trading**
**(2,041 job ads)**

1) Merchandiser (330, 16.2%)
2) Technician (270, 13.2%)
3) Marketing Executive/Sales Executives (196, 9.6%)

**Manufacturing - Engineering Services**
**(354 job ads)**

1) Engineer (135, 38.1%)
2) Chemist/Laboratory Technician (112, 31.6%)
3) Technical Officer (40, 11.3%)

**Manufacturing services – Material Suppliers, Smart Manufacturing, New Industrialisation 4.0, Solution Providers**
**(145 job ads)**

1) Consultant (AI, New Industrialisation 4.0, Advanced Materials) (34, 23.5 %)
2) Researcher (Robotics and AI, Engineering) (23, 15.9%)
3) Technical Officer (AI Development, Smart Sensors, Additive Manufacturing, Intelligent Manufacturing) (22, 15.2%)

# Training Needs

As Hong Kong's manufacturing industry evolves with the integration of new technologies and a heightened emphasis on sustainability, employees must acquire a diverse set of skills to navigate this changing landscape effectively.

### Data Analysis Skills for Industry 4.0

A critical area of focus is data analysis. With the advent of Industry 4.0 and the Internet of Things (IoT), workers need training in analysing and interpreting data gathered from smart devices. This competency is vital for making informed decisions that enhance efficiency and productivity in manufacturing processes.

### Embracing Artificial Intelligence in Manufacturing

Incorporating Artificial Intelligence (AI) into manufacturing processes is becoming imperative. Workers should be trained in understanding AI applications, from machine learning algorithms to automation systems. This knowledge will enable them to leverage AI for optimising operations, improving quality control, and predicting maintenance needs.

### Essential Technology Proficiency for Workers

Technology proficiency is another essential skill. Workers must receive training to operate and maintain advanced manufacturing technologies, such as robotics and digital twin systems, and AI-driven tools. A solid understanding of these tools is crucial for their successful integration into daily operations.

### Sustainability Practices in Manufacturing

Furthermore, knowledge of sustainability practices is becoming increasingly important. Employees should be educated on eco-friendly materials and sustainable manufacturing processes to minimise waste and energy consumption, aligning with global sustainability goals.

### Fostering Creative Thinking for Innovation

As manufacturing processes become more complex, fostering creative thinking is essential. Workers must be equipped to innovate solutions to challenges that arise during production. Training in design thinking methodologies can empower employees to approach problems from different perspectives, encouraging a culture of innovation that drives continuous improvement.

### Enhancing Problem-Solving and Critical Thinking Skills

As manufacturing processes become more complex, problem-solving and critical thinking skills are necessary.

Employees must be equipped to swiftly tackle challenges, whether troubleshooting machinery or optimising workflows. Training programmes should emphasise analytical reasoning and decision-making frameworks that enable employees to identify root causes and implement effective solutions.

### Importance of Risk Management Training

In an ever-evolving manufacturing landscape, a solid ground in risk management is crucial. Employees need training to identify potential risks associated with new technologies and processes. Understanding risk assessment methodologies will help them develop strategies to mitigate these risks, ensuring operational resilience and compliance with industry standards.

### Collaboration and Communication in Interdisciplinary Teams

Lastly, strong collaboration and communication abilities are essential. As teams become more interdisciplinary, workers must effectively interact with colleagues from diverse fields, including engineering, IT, and environmental science. Training should focus on promoting teamwork, enhancing interpersonal skills, and using collaborative tools that facilitate seamless communication across departments.

In summary, the evolving landscape of Hong Kong's manufacturing industry necessitates a focus on training to equip the workforce with new skills and innovative mindset. By investing in education and training, workers can effectively navigate these changes, ensuring the industry remains competitive while aligning with sustainability objectives.

# Recruitment Challenges

### Importance of Career Planning in Education

In today's rapidly evolving socio-economic landscape, young people have more educational opportunities, leading to diversified career choices. Many parents are also in a better financial position to support their children's educational aspirations. As families increasingly prioritising education as a pathway to success, parents are willing to invest in higher education, allowing their children to focus on their studies rather than entering the workforce immediately after secondary education.

### Skills Gap

The advanced manufacturing sector is experiencing a significant skills gap, characterised by a shortage of candidates possessing the necessary technical expertise in areas such as advanced robotics, data analytics, and sustainable manufacturing practices. This gap is particularly profound as the industry rapidly evolves with a high demand for a workforce that is proficient in cutting-edge technologies. Companies often find it challenging to locate qualified candidates who can meet these demanding requirements.

### Competition for Talent

As the landscape of advanced manufacturing become increasing competitive, organisations are competing for a limited pool of highly skilled talent. This competition intensifies the challenge of attracting and retaining employees who possess the requisite knowledge and experience. Companies may resort to aggressive recruitment strategies, including offering attractive remuneration packages to secure the best candidates.

### Ageing Workforce

The manufacturing sector in Hong Kong is facing a significant demographic challenge, as many skilled workers are nearing retirement age. This situation will likely lead to a significant contraction in the available talent pool and the loss of invaluable knowledge and expertise that is often difficult to pass on to new employees. This highlights the urgent need for strategic workforce planning to address this talent gap and ensure the industry remains competitive and sustainable in the future.

### Perception Issues

Many individuals perceive job roles in the manufacturing industry as less appealing when compared to opportunities in other industries such as finance or technology. This prevailing stigma can discourage a

younger, more educated workforce from exploring careers in manufacturing, consequently hindering the industry's ability to attract new talent. As a result, it becomes difficult to engage candidates who could bring valuable skills and innovative perspectives to drive future growth.

# Recommendations

## Government

### Industry Image Enhancement

The government and industry can join hands in enhancing the image of industry practitioners as professional and dynamics, supporting the growth of local manufacturing industry hence the economy. The promotion could highlight the importance of manufacturing industry to Hong Kong and the professionalism of the industry practitioners, attracting potential talents to join the industry. To further elevate the industry's image, the government should actively promote the innovative aspects of modern manufacturing sectors, highlighting their critical roles in technological advancements and sustainability.

### Comprehensive Platform for Advanced Manufacturing Resources

The government is recommended to launch a comprehensive resource platform to provide companies with essential information and resources on advanced manufacturing. This user-friendly platform would provide businesses with reference materials, latest technologies, best practices, and case studies relevant to their specific needs. Key features could include industry reports, government funding information, and networking forums to connect companies with different expertise. Furthermore, regular updates on the latest technological advancements, trends, and regulations would keep businesses informed and competitive. With the resources platform, companies can enhance innovation, productivity, and drive business growth.

### Mentorship Programme for Start-Ups in Advanced Manufacturing

The government is recommended to foster mentorship for start-ups in the advanced manufacturing industry by implementing structured mentorship programmes. These programmes can pair experienced professionals and industry leaders with start-ups, providing tailored guidance and support. The mentorship programme can effectively contribute to cultivating innovation and encourage more start-ups to venture in the advanced manufacturing sector. This mentorship programme will benefit not only the start-ups, but also contributes to the overall growth and sustainability of the industry.

### Inspiring the Next Generation

The government should fund and promote gamified educational platforms that make learning about advanced manufacturing more interesting and engaging, so that to attract young people and spark their interest in the field. Additionally, the

government should support youth engagement programmes like science and technology camps or workshops that highlight advanced manufacturing technologies. Introducing students to this exciting field early on can ignite their curiosity and help them understand various career opportunities.

Furthermore, the strategy to engage students early on through manufacturing events, workshops, and industrial visits such as the Business-School Partnership Scheme, enables students to connect with industry professionals and receive firsthand information about career in the industry. These interactions not only help students gain insights into industry prospects and build meaningful relationships but also pave the way for job placements and future career advancement.

## Training Institutions

### Technologies and Sustainability in Education Programmes

Training institutions should prioritise the integration of advanced immersive technologies, such as virtual reality (VR) and augmented reality (AR), into their educational programmes. This allows students to engage in simulated manufacturing environments, linking theoretical concepts to practical applications within a STREAM (Science, Technology, Reading, Engineering, Arts, and Mathematics) framework. This approach deepens the understanding of advanced manufacturing processes and boosts student engagement. Collaborating with industry partners on real-world projects, internships, and co-op programmes allows students to apply their STREAM knowledge in practical settings, ensuring they develop skills that align closely with current industry practices and enhance their employability upon graduation.

Additionally, it is essential to introduce students to Environmental, Social, and Governance (ESG) elements early in their education. By equipping them with foundational ESG knowledge and practical insights, students will be better prepared to adopt sustainable practices in their future careers. Similarly, this strategy can also benefit experienced industry practitioners who may lack a comprehensive understanding of ESG. By familiarising them with ESG principles and providing practical insights, these professionals can enhance their skills in sustainable practices, thereby fostering a workforce dedicated to sustainability.

### Continuous Curriculum Improvement

Nowadays, industry's participation in shaping the future workforce is eminent in the competitive market. Continuous improvement of the curriculum is essential for training institutions to stay ahead in the rapidly evolving landscape of advanced manufacturing. By integrating feedback from industry stakeholders and regularly

updating curriculum and course content, institutions can ensure that their graduates are well-prepared to meet industry demands. More importantly, industry can infuse authentic cases for students' learning and hone students' industrial experience before they entered the workforce.

## Employers

### Competitive Remuneration Package and Clear Career Pathways

Employers should offer competitive remuneration packages including benefits such as health insurance, better retirement savings plans, and performance-based bonuses for attracting and retaining both younger talent and experienced workers. Furthermore, the development of clear career progression pathways that outline potential advancement opportunities can enhance employee engagement and retention.

### Open and Innovative Leadership Culture

Employers are encouraged to embrace a leadership style that promotes openness and innovation. Creating an environment where feedback is welcomed, and employees are empowered to share their ideas can help bridge generational gaps in the workforce. Leveraging the insights of experienced workers alongside the fresh perspectives of younger employees can drive creativity and continuous improvement in advanced manufacturing processes.

### Employee Development Programmes

Employers should prioritise investments in targeted training and development initiatives that address the specific skills needed in advanced manufacturing. This includes offering workshops and hands-on training in emerging technologies automation, robotics, and data analytics. Additionally, programmes focused on knowledge transfer can help younger employees learn from seasoned workers, ensuring that valuable skills and expertise are not lost as the workforce ages.

## Employees

### Continuous Skill Enhancement

Employees should consistently update their technical skills and knowledge to align with advancements in manufacturing technologies and processes. Actively participating in specialised training programmes focused on areas such as automation, robotics, and data analytics is crucial for enhancing productivity and driving innovation. This commitment not only benefits individual performance but also contributes to the organisation's overall success.

### Stay Informed on Industry Developments

Regularly engaging with industry publications, attending trade shows, and joining professional organisations enables employees to remain informed about market trends and technological advancements. This proactive approach allows them to identify emerging opportunities and challenges, ensuring they can adapt strategies effectively to maintain a competitive edge.

### Innovation Initiatives and Knowledge Sharing

Employees can actively engage in workshops and brainstorming sessions on developing new products or enhancing existing ones which is vital for fostering a culture of innovation. Additionally, employees should share their knowledge and best practices with new hires to facilitate their acclimatisation. This supportive environment enhances overall team performance and collaboration, ultimately driving the company's growth and success in the market.