EDB SINGAPORE

SG

Manufacturing the Future

from Singapore

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Contents

Why **Manufacture** in Singapore?

As a leading industrial hub, Singapore's vibrant manufacturing landscape is primed to support manufacturers in achieving high-yield operations and innovation from a reliable and stable base. Here are some of the reasons why Singapore is the destination of choice for global manufacturers looking to set industry trends in a world increasingly shaped by Industry 4.0 (i4.0).

01 Robust Infrastructure

Despite its limited land resources, Singapore has built up a wide range of commercial, industrial and innovation spaces to cater to the needs of manufacturers across different sectors.

- These include the nation's premier advanced manufacturing hub, Jurong Innovation District (JID) and Singapore's first smart district, Punggol Digital District (PDD), along with six industrial parks dedicated to high value-added and knowledge-intensive activities.

02 Skilled and Adaptable Workforce

Singapore hosts a world-class talent pool equipped with the necessary skills for high-value manufacturing, with the city-state ranking 1st in the world for high-level skills and talent impact.

- The government and industry players seek to continually upgrade the skills of the local workforce through programmes like the SkillsFuture Series for Advanced Manufacturing and the i4.0 Human Capital Initiative.

03 Extensive Network of Global Manufacturing Leaders

With manufacturing as Singapore's core growth engine, the city-state is home to a deep network of leading manufacturing firms.

- In 2020, Singapore was the world's 5th largest exporter of high-tech goods[1], such as pharmaceutical drugs, electrical machinery and scientific equipment.
- With crucial industry insight and expertise, these pioneers in advanced manufacturing stimulate the manufacturing ecosystem through the adoption of i4.0.

04 Global-Asia Node of Technology and Innovation

As one of the world's most innovative cities, Singapore is a hotbed for manufacturers looking to make the leap to i4.0.

- The country is home to over 4,000 tech start-ups, and 220 accelerators and incubators.
- Supported by the nation's advanced industrial and urban infrastructure, manufacturers can leverage Singapore's rich ecosystem of partners, which includes leading technology and solution providers, as well as world-class research institutions and institutes of higher learning (IHLs), for digital transformation.

05 Strong Connections with Key Markets in Asia

A member of 27 Free Trade Agreements globally and with 600 port links in over 120 countries, Singapore is well-connected to key Asian markets and the world.

- The country's location in the heart of Southeast Asia (SEA) allows manufacturers to tap regional partnerships, such as the SG+ Twinning model and Southeast Asia Manufacturing Alliance, to build supply chain resilience.

[1] TheGlobalEconomy.com (2020). High Tech Exports - Country Rankings. Retrieved from https://www.theglobaleconomy.com/rankings/high_tech_exports/

Powering Singapore's Vision for Manufacturing

The World's **Leading Manufacturing Hub**

Barely 730km^2 in size, Singapore embarked on a bold policy shift towards export-led industrialisation in 1965, overcoming limitations in land, natural resources and talent to grow its manufacturing sector.

Today, manufacturing is a key economic pillar of growth for Singapore and contributes about 20 per cent of the country's annual gross domestic product (GDP). This is significantly higher than other developed nations, such as Japan and Germany, where manufacturing's share of national GDP is below 10 per cent.

To better prepare for the future, Singapore has embraced innovation over the past few decades, deepened its ecosystem of trade and manufacturing partners, and developed a range of diverse capabilities that has made the nation a global leader in sectors such as aerospace, semiconductors and biomedical sciences.

Coupled with a nationwide digital movement and a strong pool of highly skilled engineers, Singapore is also one of the best places to digitalise and automate factory processes, allowing manufacturers to optimise their value chain for higher productivity and yield with ease.

Key Developments

1965

Announcement of the Charter for Industrial Progress, the start of tripartite cooperation between government, business and industry to synergise and develop pro-economy policies for the benefit of both manufacturers and workers

1995

Extensive land reclamation to develop Jurong Island, Singapore's leading chemicals manufacturing site, which expanded in size from 10km^2 to 32km^2, transforming the country into one of the top 10 exporters of chemicals globally

2015

Launch of the Future of Manufacturing (FoM) Initiative to support the adoption of i4.0 technologies by connecting manufacturers with research institutes, IHLs and key industry partners

2020

Establishment of the Research, Innovation and Enterprise 2025 (RIE) Plan to enhance Singapore's research capabilities, with S$3.3 billion out of a record S$25 billion channelled into research and development (R&D) for advanced manufacturing and engineering

2021

Announcement of 10-year Manufacturing 2030 Plan to attract frontier investments and develop a strong talent pipeline for Singapore, with the aim of growing the nation's manufacturing sector by 50 per cent

2022

Launch of refreshed Industry Transformation Maps for five sectors from the Advanced Manufacturing & Trade Cluster to train talent, as well as drive innovation and sustainability efforts in the industry

Driving Global Impact

with a World-Class Manufacturing Ecosystem

Extensive Network of Leading Manufacturers

Leading firms across different industrial sectors, such as Micron and Evonik, have set up next-generation manufacturing facilities in Singapore to leverage the expertise available in the local ecosystem for growth.

With Singapore's nationwide focus on adopting i4.0, global manufacturers based in the city-state can better navigate transformations in the industry by accessing and developing cutting-edge technologies for their manufacturing strategies. This has made Singapore one of the world's largest exporters of high-value goods, such as pharmaceutical drugs, machinery and equipment.

At the same time, the presence of these global manufacturers in Singapore has facilitated collaborations between public and private industry players, stimulating growth across the sector and moving the local manufacturing base up the value chain.

Micron Singapore

PROPELLING GROWTH THROUGH SMART MANUFACTURING

Based in Singapore since 1998, the city-state's innovation capabilities help support Micron's adoption of i4.0 technologies, such as artificial intelligence (AI), in tackling manufacturing and business problems. This has resulted in:

↑18%
improvement in labour productivity

↑20%
reduction in new-product ramp time

↑15%
savings in energy

Over the past six years, the company has implemented a series of smart manufacturing initiatives to derive, share and apply insights from industry peers.

In 2018, Micron expanded its largest and most advanced NAND fabrication facility in Singapore.

① Aims to facilitate transitions to 3D NAND technology nodes

② **500,000 sqft**
in clean room space

③ **1,500**
high-skilled jobs in advanced manufacturing to be added

Evonik

ACCELERATING INNOVATION THROUGH COLLABORATION

The market-leading specialty chemicals company is keeping at the forefront of the industry by expanding R&D collaborations with Singapore's private and public institutions. This will further grow its portfolio in customised polymer materials and additives for 3D printing applications as one of its key R&D focus areas.

With innovation as a core part of its growth strategy, Evonik opened the Evonik Asia Research Hub in Singapore in 2018 to drive research activities in additive manufacturing, life sciences and functional surfaces. Their research is further elevated by two factors:

Proximity to highly qualified researchers from leading science faculties in Singapore

Flexible and agile environment for innovation enabled through the support of local government agencies

Furthermore, their research activities are continuously strengthened through R&D in process innovation and digitalisation.

"As part of our increasing focus on Asia Pacific, Evonik has put its Asia Pacific headquarters in Singapore. The country's well developed and connected innovation ecosystem supports us in revolutionising the advanced manufacturing industry, particularly in life science and advanced materials, to create sustainable solutions for the global needs of tomorrow."

DR. CLAUS RETTIG

PRESIDENT ASIA PACIFIC AND MEMBER OF THE EXTENDED EXECUTIVE BOARD, EVONIK INDUSTRIES

Vibrant Network of Technology and Solution Providers

Situated amongst a great diversity of technology and solution providers in Singapore, manufacturers can readily connect with industry players, whether multinational corporations (MNCs) or small and medium-sized enterprises (SMEs), to develop new capabilities and achieve world-class operations.

Setting up a base in Singapore has allowed companies like Omron, EDP Renewables APAC and Nanofilm to deliver customised solutions to clients based locally and in the region with ease, which has helped companies generate higher productivity and yield through digital transformation. The country's rich ecosystem of partners thus provides global manufacturers with the expertise and resources they need to refine manufacturing processes and pilot new products before exporting them to the rest of the world.

OMRON • INTEGRATING INDUSTRY 4.0 TO MEET GLOBAL DEMAND

OMRON has provided solutions that have led to technological advances, solutions to labor shortages, and improved productivity in many industries through collaborative creation with its customers.

OMRON's vision is about enriching the future for people, industries and the world using Innovative-Automation - a manufacturing innovation concept that solves social issues at manufacturing sites.

Automation beyond human abilities: Maximising on-site productivity from a new global perspective

Advanced collaboration between people and machines: A new production site that allows for human-machine collaboration

Digital Engineering Transformation: Seamlessly integrating the production site through the Digitalized Three Reality Philosophy

"Embracing the pulse of manufacturing, OMRON is at the forefront of innovation, crafting dynamic solutions that cater to ever-evolving on-site needs. Our mission is to empower manufacturing processes with solutions that not only meet demands but also foster unprecedented flexibility and adaptability."

DON TENG
MANAGING DIRECTOR
OMRON ASIA PACIFIC PTE LTD

EDP Renewables APAC

POWERING THE TRANSITION TO CARBON NEUTRALITY

A leading solar energy solutions provider in Singapore, EDP Renewables APAC is helping to power operations of all kinds — from those of residential homes in Singapore to those of tech companies across the globe — sustainably.

EDP Renewables has a ready pipeline of renewable energy projects across Asia with a combined installed capacity of more than 15 gigawatts across the globe, and the ability to export such energy to firms worldwide in support of manufacturing operations.

In 2021, they opened one of the world's largest offshore floating solar farms in Singapore:

40
inverters

30,000
floats

13,312
solar panels

6,000,000
kilowatt hours of energy expected to be produced per year

Nanofilm

DEEP TECH NANOTECHNOLOGY SOLUTIONS FOR MULTIPLE INDUSTRIES

Nanofilm stands as a deep tech company at the forefront of nanotechnology, specialising in the invention, design and manufacturing of state-of-the-art vacuum coating equipment.

The company offers global vacuum coating, nanofabrication and hydrogen fuel cell solutions, addressing the intricate demands of the market in a sustainable manner.

Nanofilm has consistently demonstrated a commitment to R&D, production and driving advancements in the field. Headquartered in Singapore, the company has established presence in other regions of the world such as China, Europe, Japan and Vietnam.

1 Billion
parts coated annually

165,000 sqm
floor area worldwide

7
coating centers

3,000
staff worldwide

Robust Research Community for Innovation

Singapore remains at the forefront of innovation for advanced manufacturing as the most innovative country in Asia-Pacific, with local institutions such as the NTU, Singapore University of Technology and Design (SUTD), and the Agency for Science, Technology and Research (A*STAR) ranked amongst the top globally for research in fields like semiconductor and biotechnology.

On top of world-class research capabilities, international manufacturers can leverage government initiatives and platforms like the National Robotics Programme and the National Additive Manufacturing Innovation Cluster to catalyse innovation and accelerate commercialisation. For more comprehensive support, the locally developed Smart Industry Readiness Index (SIRI) comprises a suite of frameworks and tools that will help manufacturers start, scale and sustain their i4.0 journey.

In line with the government's RIE plan, Model Factories have also been built within A*STAR's Singapore Institute of Manufacturing Technology (SIMTech) and Advanced Remanufacturing and Technology Centre (ARTC) with the goal of turning research into reality through collaborations with industry partners.

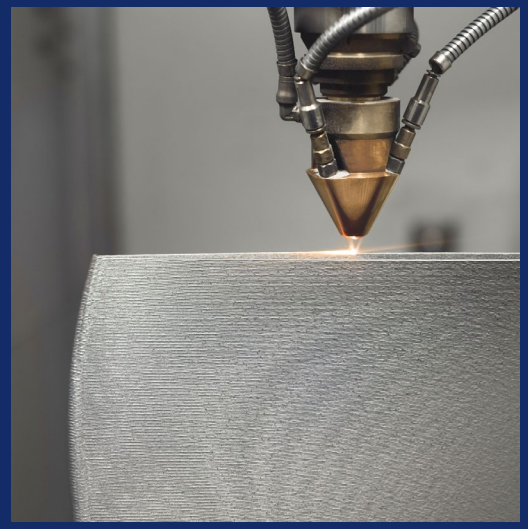
National Additive Manufacturing Innovation Cluster (NAMIC)

Hosted by A*STAR and supported by the National Research Foundation under the Prime Minister's Office and the Ministry of Trade and Industry (MTI), this national platform aims to:

Translate research into commercially viable outcomes for the industry

Catalyse and lower barriers for the adoption of additive manufacturing technologies

Foster and grow the additive manufacturing ecosystem by supporting existing enterprises towards new adjacencies and growing new businesses



>3000 organisations engaged

>420 projects initiated

>300 projects approved for funding

8 hubs established within IHLs or research institutes in Singapore

National Robotics Programme (NRP)

This multi-agency national programme supports the end-to-end development of robotics enablers and solutions by funding robotics R&D projects and facilitating private–public partnerships to accelerate the translation and adoption of such technologies for use across Singapore.

Supported by:

9
public agencies and offices

13
research institutes and IHLs

Partnered with

16
companies across sectors such as healthcare, built environment and environmental services under the Robotics Domain Specific (RDS) funding initiative

"We envision a vibrant and innovative robotics ecosystem capable of providing solutions to fuel the Smart Nation initiative and to establish Singapore as a global centre of excellence for the study, research, development, making and applications of robotics solutions."

PROFESSOR QUEK TONG BOON
CHIEF EXECUTIVE, NRP

Advanced Remanufacturing and Technology Centre (ARTC)

Led by A*STAR in partnership with NTU, the ARTC aims to provide a platform to help translate research into industry applications for advanced manufacturing.

In collaboration with A*STAR, local manufacturing software company Arcstone launched a digital manufacturing joint laboratory at ARTC in 2021. With a total investment of S$18 million over three years, the lab aims to transform Arcstone's existing solutions into a next-generation manufacturing execution systems suite that will help optimise production processes.

"It is an immense opportunity for A*STAR across our research network to be able to access industry talent and work with them to identify and solve issues that matter. This will further help raise the innovation quotient of Singapore and help us transform into an advanced economy together."

DR DAVID LOW
CEO, ARTC

Future-Ready Workforce Primed for Transformation

As the 2nd most attractive destination in the world for global talent, and with a highly-skilled and adaptable workforce, Singapore offers the manufacturing sector a robust talent pool.

Robotics and software engineers, as well as operators and technicians, are crucial in helping manufacturers accelerate digital transformation, while optimising production efficiencies to better meet global demand.

Labour representatives and industry partners work in close collaboration with the government as well to develop schemes so the local workforce remains in tune with the latest skills needed to meet i4.0 needs.

SkillsFuture Singapore

This government platform provides courses and training for workers' lifelong learning and continual skills upgrading.

S$1.2 billion in skills training invested in 2021, a 40 per cent increase from 2019

>400 new courses over 8 areas, including Advanced Manufacturing, Cybersecurity and Tech-Enabled Services

Industry 4.0 Human Capital Initiative (IHCI)

Launched by Workforce Singapore and the Singapore Business Federation to strengthen human resource strategies for the transition into i4.0, this initiative complements existing schemes by helping companies develop and execute roadmaps for upskilling workers.

Eight-weeks hands-on IHCI Enabler Programme to kickstart i4.0 transformation in a controlled and low-risk environment

Companies enjoy funding, with locally registered and Singapore-based SMEs receiving additional subsidies

Has assisted as many as 90 companies with i4.0 integration since its launch in 2020, which has led to marked improvements in operational processes, including reduced cycle times and increased revenues

Global Ready Talent Programme

Initiated by Enterprise Singapore, the programme helps with the expansion of businesses by building a pipeline of highly skilled, global-ready talent for companies to tap into.

Internship and management associate placements are facilitated by Enterprise Singapore, trade associations and IHL partners for qualified Singapore enterprises

Enterprises can have access to promising young talent through the programme and receive funding support of up to 70 per cent

ASEAN Leaders' Programme

The programme helps regional business leaders and C-suite executives to connect with others in the region, so that they can better understand SEA markets for further expansion.

Participants will be taught to develop Cultural Intelligence (CQ) skills for complex problems and given the opportunity to network with leaders across government, business and civil society sectors

Focuses on themes of digital growth, climate action and the future of work, which are growing concerns in the manufacturing sector

Fostering Innovation

for the Factories of Tomorrow

Why i4.0?

The past decades have seen the global manufacturing sector profoundly transformed by advances in technology and globalisation.

Driven by the growing momentum of i4.0 in Singapore, manufacturers are increasingly incorporating cutting-edge solutions such as automation, advanced analytics and data-governed systems in their production lines to boost productivity, and pivot for growth.

Situated at the forefront of this transformative change, Singapore serves as a dynamic springboard for manufacturers to launch their i4.0 journeys by facilitating the adoption of best practices and fast-tracking co-innovation.

> “Singapore offers ready access to world-class engineering and supply chain talent. We have the world’s brightest minds working on artificial intelligence, machine learning, robotics, fluid dynamics, vision systems to bring hardware, electronics, and software together. The talent base allows us to develop our digital motor, connected machine, Supersonic hairdryer, and vision system robotics products — all in Singapore.”

MR SCOTT MAGUIRE
FORMER DYSON CHIEF OPERATING OFFICER

Singapore: **Global Manufacturing Lighthouse**

Launched in 2018 by the World Economic Forum (WEF), the Global Lighthouse Network identifies leading adopters of i4.0 technologies to shed light on successful transformation journeys.

Termed “Lighthouses”, these manufacturing sites have implemented advanced technologies at scale to transform factories, value chains and business models for significant financial and operational impact.

Four Singapore manufacturing sites are recognised as Lighthouses - Agilent Technologies, Micron, HP and Infineon. With this, Singapore ranks first in SEA and fifth worldwide in terms of its manufacturing sites. As a beacon for manufacturers looking towards i4.0, Singapore’s Lighthouses are shaping the future of manufacturing by providing companies with the expertise and know-how to navigate the complexities of digital transformation.

Agilent Technologies

- LEADER IN THE FOURTH INDUSTRIAL REVOLUTION

Started with the goal of simplifying high tech manufacturing in complex instruments to meet rising customer demand

Leveraged AI and robotic automation solutions to overcome bottlenecks arising from specialised manpower

This has led to a number of benefits for the company:

80%
increase in output

60%
improvement in productivity

30%
improvement in cycle time

25%
reduction in overall manufacturing cost

Enabling Digital Transformation with the Right Environment

By investing in strategic infrastructure and nurturing a strong ecosystem of partners, Singapore offers manufacturers the ability to access i4.0 technologies for their digital transformation plans, while fostering innovation through cross-collaboration between MNCs and SMEs.

01 Ready-Built Facilities to Support Digital Transformation

Singapore's next generation industrial estates enable easy access to a collaborative innovation ecosystem, R&D facilities and a strong talent pool, where the opportunities for partnerships are plentiful.

Jurong Innovation District (JID)

As Asia's leading i4.0 hub, JID's advanced manufacturing ecosystem allows companies to pilot and testbed new products, as well as kick-start production and distribution, all in one place.

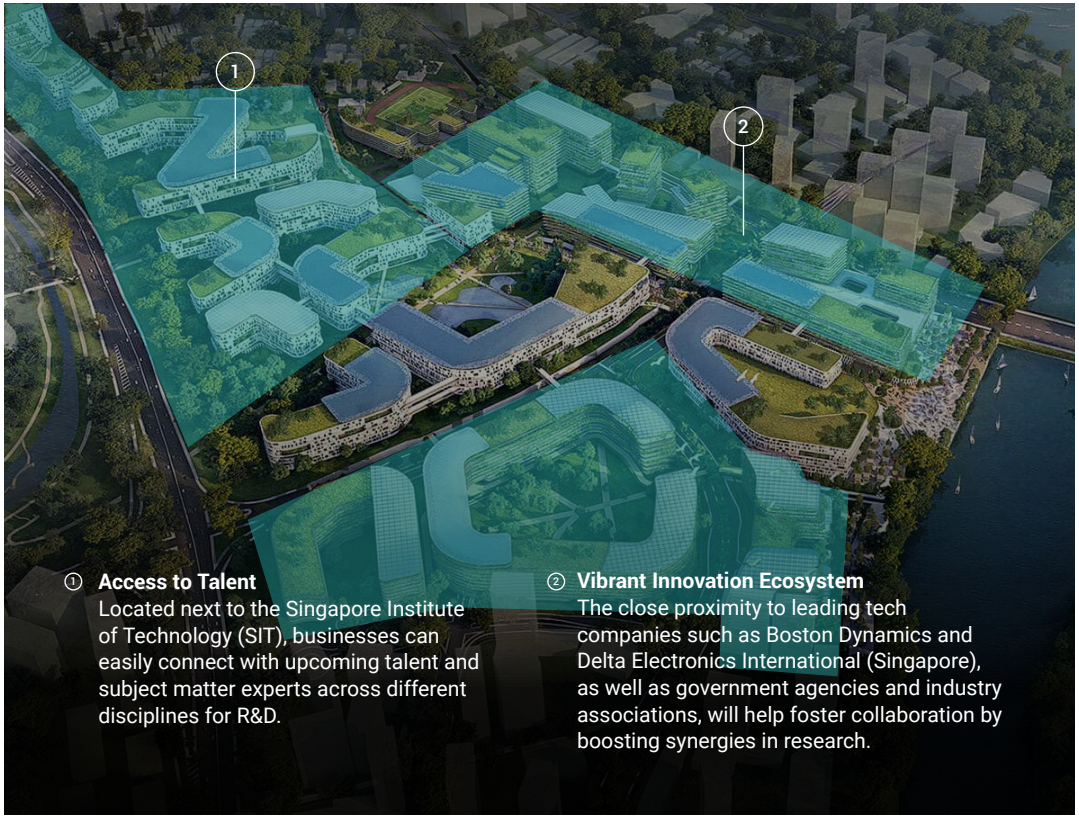
620 hectares of land	**33,000** strong talent pool
95,000 expected jobs	**S$420m** new investments attracted in 2020

① **Talent & Training**
Access a robust pipeline of skilled talent from nearby educational institutes, such as NTU, to facilitate R&D and innovation.

② **R&D**
Partner with leading local research institutes like A*STAR's Advanced Remanufacturing and Technology Centre (ARTC) to adopt industry-ready solutions and translate research to real-life application.

③ **Technology Providers**
Leverage JID's ecosystem of automation, robotics and Internet of Things (IoT) technology providers, from Sodick Singapore Techno Centre to Makino's Additive Manufacturing Centre of Excellence, for digitalisation solutions that can help upgrade manufacturing value chains.

④ **Factories of the Future**
Learn from pioneers in the advanced manufacturing landscape, such as Hyundai Motor Group and Surbana Jurong Campus, on how best to implement i4.0 best practices.



① **Access to Talent**
Located next to the Singapore Institute of Technology (SIT), businesses can easily connect with upcoming talent and subject matter experts across different disciplines for R&D.

② **Vibrant Innovation Ecosystem**
The close proximity to leading tech companies such as Boston Dynamics and Delta Electronics International (Singapore), as well as government agencies and industry associations, will help foster collaboration by boosting synergies in research.

HERE'S HOW PDD IS GEARED TOWARDS HELPING MANUFACTURERS TO ACCELERATE INNOVATION:

Open Digital Platform (ODP)
With an integrated operating system, ODP allows manufacturers in PDD to have access to data from the entire district at their fingertips, enhancing operational efficiency.

Digital Twin
A virtual version of the district created from real-time information provides a risk-free but realistic simulation environment for companies to experiment and testbed their products.

Punggol Digital District (PDD)

Set to open progressively from 2024, PDD is Singapore's first tech-enabled smart business district, which aims to facilitate innovation through access to world-class infrastructure and cutting-edge technologies.

02 Empowering Global Manufacturing Through Local Startups

Singapore's vibrant startup landscape is supported by a network of innovation catalysts and aggregators that foster cross-company collaboration. Through these platforms, manufacturing MNCs seeking innovative solutions to business challenges are connected to startups that are nimble and well-versed in developing cutting-edge technologies.

- Notable platforms catalysing such partnerships include SGInnovate's Open Innovation Forum, Infocomm Media Development Authority's (IMDA) Open Innovation Platform, NUS Enterprise's BLOCK71, and the Innovation Partner for Impact's (IPI) Innovation Marketplace.
- These collaborations in turn create solutions that allow manufacturers to address i4.0 pain points, such as visual quality inspection, wireless monitoring, and enhanced security for industrial IoT systems.

COLLABORATIONS FOR PROBLEM-SOLVING

Procter & Gamble and MyrLabs

Consumer goods manufacturer Procter & Gamble (P&G) sought a solution that could help them track their assets over long distances and in industrial environments in a bid to remain competitive in the fast-moving consumer goods and energy sector.

To solve this, Singaporean startup MyrLabs developed a family of hardware devices to facilitate real-time asset tracking that can be used in both indoor labs and a diversity of external locations.

Shell and Zuno

To solve industry-wide challenges faced by global manufacturers, local tech startup Zuno developed an integrated smart sensor prototype compatible with different wireless sensor protocols that allowed for them to be manually controlled.

The solution was tailored to the business needs of Shell, the global energy player, which allowed the company to centrally manage their network of wireless sensors and engage in real-time monitoring for process visibility.

The International Centre for Industrial Transformation (INCIT)

The International Centre for Industrial Transformation (INCIT) is an independent non-profit Environmental, Social, and Governance (ESG) institution that advocates for i4.0 transformation. In pursuit of enhancing the global manufacturing sector's resilience and productivity, INCIT collaborates with manufacturing-related organisations from the public and private sectors to catalyse digital transformation efforts

7,300
ESG improvements made

264
collaboration partners

>540
assessors trained

Established in more than **50 countries**

INCIT provides a range of frameworks and tools to help manufacturers make the leap to i4.0:

01 The Smart Industry Readiness Index (SIRI)

The world's first independent assessment for digital maturity, which comprises a suite of frameworks and tools to enable manufacturers to start, scale, and sustain their manufacturing transformation journeys.

02 Global Executive Industry Talks (GETIT)

A thought leadership platform that offers prominent figures within the manufacturing industry a stage to engage with fellow experts. Through GETIT, industry experts can share their latest insights on global challenges and industrial solutions, fostering discussions on advanced manufacturing transformation.

- GETIT offers a panel of webinars where manufacturing leaders discuss industry-wide challenges, as well as the latest technologies and solutions that are driving digital transformation, efficiency and sustainability.

03 ManuVate

A global collaborative problem-solving platform that seeks to accelerate global i4.0 innovation by connecting innovators to manufacturers looking for solutions to address business challenges, thus enabling digitisation and sustainable growth.

04 Consumer Sustainability Industry Readiness Index (COSIRI)

A platform to facilitate manufacturers in monitoring sustainability progress.

- It offers a quantifiable, independent framework to assess sustainability maturity and ESG reporting transparency, aiding manufacturers to better integrate sustainability into their i4.0 journey.
- COSIRI has provided manufacturers such as Viesmann and Ball Corporation with a visible and transparent view of their sustainability performance benchmarked against other companies.

TOOLS FOR DIGITAL TRANSFORMATION

The Smart Industry Readiness Index (SIRI)

Manufacturers looking to implement their own i4.0 transformation initiatives can tap the Smart Industry Readiness Index (SIRI) from INCIT in the development and execution of their plans.

The world's first global measure for i4.0 transformation maturity, SIRI evaluates the readiness of a manufacturer's facilities, enabling manufacturers to plan their digital transformation roadmaps in a systematic and methodical manner. The Index comprises a suite of structured frameworks and tools so that manufacturers can benchmark their facilities quantitatively against other manufacturing facilities that have completed the Official SIRI Assessment (OSA).

Created in partnership with certification company TÜV SÜD and validated by an advisory panel of academic and industry experts, SIRI aims to be a simple and comprehensive tool for all companies, regardless of industry, size or geography.

Learn more about how SIRI can accelerate your digital transformation.

Download the Manufacturing Transformation Insights Report 2022

- Through the assessment process, SIRI helps manufacturers to better understand the weaknesses and gaps in their operations. This allows companies to develop targeted strategies in the adoption of i4.0 by implementing solutions that can resolve current issues and translate productivity enhancements into business value.

Takeda

Using the SIRI framework as a blueprint, the pharmaceutical company utilised smart analytics to optimise its inventory and drive down the cost of its goods.

15%
increase in efficiency levels
through strategic investment in digital technologies

"When you speak to people about what the roadmap is, everyone has a different view; level setting and contextualising that took some time, and the SIRI framework was a very credible and tangible way to do that and bring that across the organisation, which is fundamental in the journey to transformation.

VIGHNESH BALAN
DIRECTOR OF GLOBAL SUPPLY CHAIN, TAKEDA

HP Enterprise

Using SIRI's insights as a guiding framework, HP Enterprise was able to integrate automation, analytics, and IoT into their smart factory to improve performance while ensuring uninterrupted operations.

20% reduction in manufacturing costs

70% improvement in efficiency

Recognised as a **Lighthouse** by WEF

SIRI's Impact in Enabling Digital Transformation

600
manufacturers across **30 countries** have completed the Official SIRI Assessment since its launch in 2019

5-10%
increase in production efficiency in two major product units
(photoelectric and ultrasonic sensors)

Pepperl+Fuchs

German industrial technology company Pepperl+Fuchs, which specialises in sensor technology and electrical explosion protection, chose to carry out an OSA on its manufacturing site in Singapore to identify ways to modernise the facility.

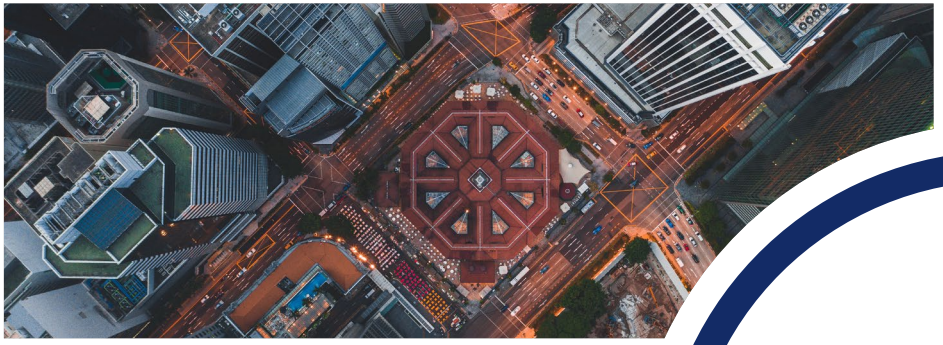
Based on the insights gained from SIRI, the company decided to digitalise its shop floor processes, reducing the total number of workflows from 10 to six.

Accelerating Expansion
in Southeast Asia and Beyond

Strengthening Your Manufacturing Footprint in SEA

Southeast Asia (SEA) offers both land and maritime connections to key markets across the Asia-Pacific region, including China, India, Australia and Japan.

Companies with operations in SEA are able to tap into the region's fast-growing consumer markets and benefit from the region's young and skilled workforce, modern infrastructure and diverse capacities to support i4.0 transformation as they look to weather global disruptions by building supply chain resilience and operational efficiency.



Leverage SEA's manufacturing capacities

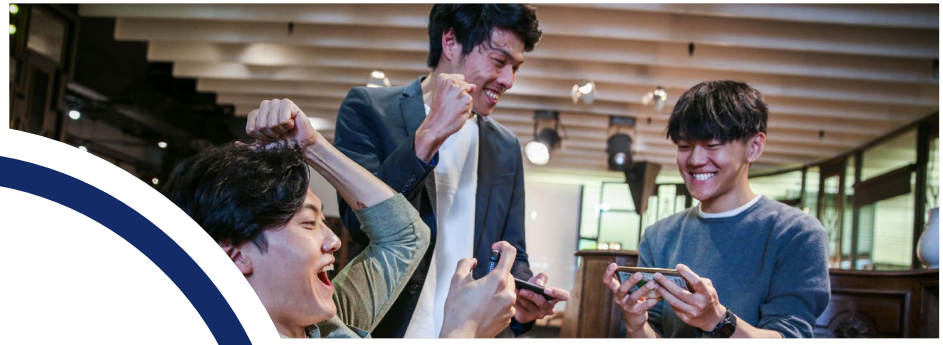
134%
in manufacturing foreign direct investments worth **around S$66.6 billion** in 2022

S$627 BILLION
expected in productivity gains from i4.0

Integrated regional initiatives to enhance logistics connectivity and efficiency

Why SEA?

As an emerging manufacturing powerhouse and with a growing middle-class population, SEA presents tremendous growth opportunities for global manufacturers.



Capitalise on a vibrant growth market

664 MILLION
Total population of SEA, with **more than half** under the age of 35

4th largest
economy in the world by 2030

65% of SEA's population will be middle class with increased purchasing power by 2030

Here's how global manufacturers can benefit by expanding into SEA:

01 Global Connectivity to Markets

SEA's key business hubs are located within a 3 hour flight radius of Singapore. The region's robust air and sea connectivity allows companies to easily access neighbouring markets for expansion, while ensuring smooth transportation of goods and resources from manufacturing sites to end markets.

- These close ties are further strengthened through enhanced economic collaboration within the Association of Southeast Asian Nations (ASEAN), as well as the signing of Free Trade Agreements with key economic blocs.
- ASEAN's active involvement in the Regional Comprehensive Economic Partnership (RCEP), the world's largest free trade agreement which covers 30 per cent of global GDP, provides access to an extensive network of deep economic linkages.

02 Leading Logistics Hub

SEA has emerged as a thriving logistics hub, offering cost-competitive logistics solutions that enable manufacturers to diversify their supply chains in a region experiencing significant global growth. With rising consumption, the region is actively enhancing its forecasting capabilities for more efficient supply chain management.

- Situated strategically at the heart of SEA, Singapore provides an ideal base for manufacturers, like apparel company VF Corporation, to oversee their regional and global supply chain operations. Two-thirds of logistics companies have chosen Singapore as their base to manage regional operations.

03 Greater Agility Through SEA's Digital-Readiness

SEA offers a wide range of i4.0 solutions that make it easy and cost effective for manufacturers to integrate. Regional industrial solutions firms like Auk Industries, which provide 'plug-and-play' Internet of Things (IOT) systems, enable manufacturers to access machine statistics and operations data with ease.

- Across the region, numerous manufacturers have also begun to adopt digital transformation by using real-time tracking systems for products, raw materials and logistics to optimise supply chain management.

04 Highly Skilled Workforce

With a strong emphasis on advanced education, research and innovation, SEA countries offer access to a tech-enabled workforce that is boosted by a steady supply of tertiary graduates equipped with digital skillsets. This is further supported by its young and growing workforce, set to increase by 40 million by 2030.

- Singapore, in particular, ranks 1st globally in high-level skills and talent impact. The country has strong capabilities in scientific and engineering research and development for specialised sectors like computer parts, pharmaceuticals, scientific instruments, and electrical machinery.

Find out how Singapore's open trading economy can benefit your business.

Explore Enterprise Singapore's Free Trade Agreement or Tariff Finder

Twin to Win:
SG+ Twinning Model

Singapore's pro-business environment, coupled with its proximity to cost, competitive manufacturing locations with high quality infrastructure, position the city-state as an ideal base for manufacturers to build their supply chains and enhance operational resilience in SEA.

The SG+ Twinning Model plays to this advantage, helping companies to combine Singapore's business advantages with the manufacturing strengths of nearby production bases — Johor in Malaysia, and the Batam, Bintan and Karimun (BBK) islands in Indonesia — to establish a holistic and integrated strategy for SEA.

With the SG+ Twinning Model, manufacturers can:

Access diverse supply chain offerings:

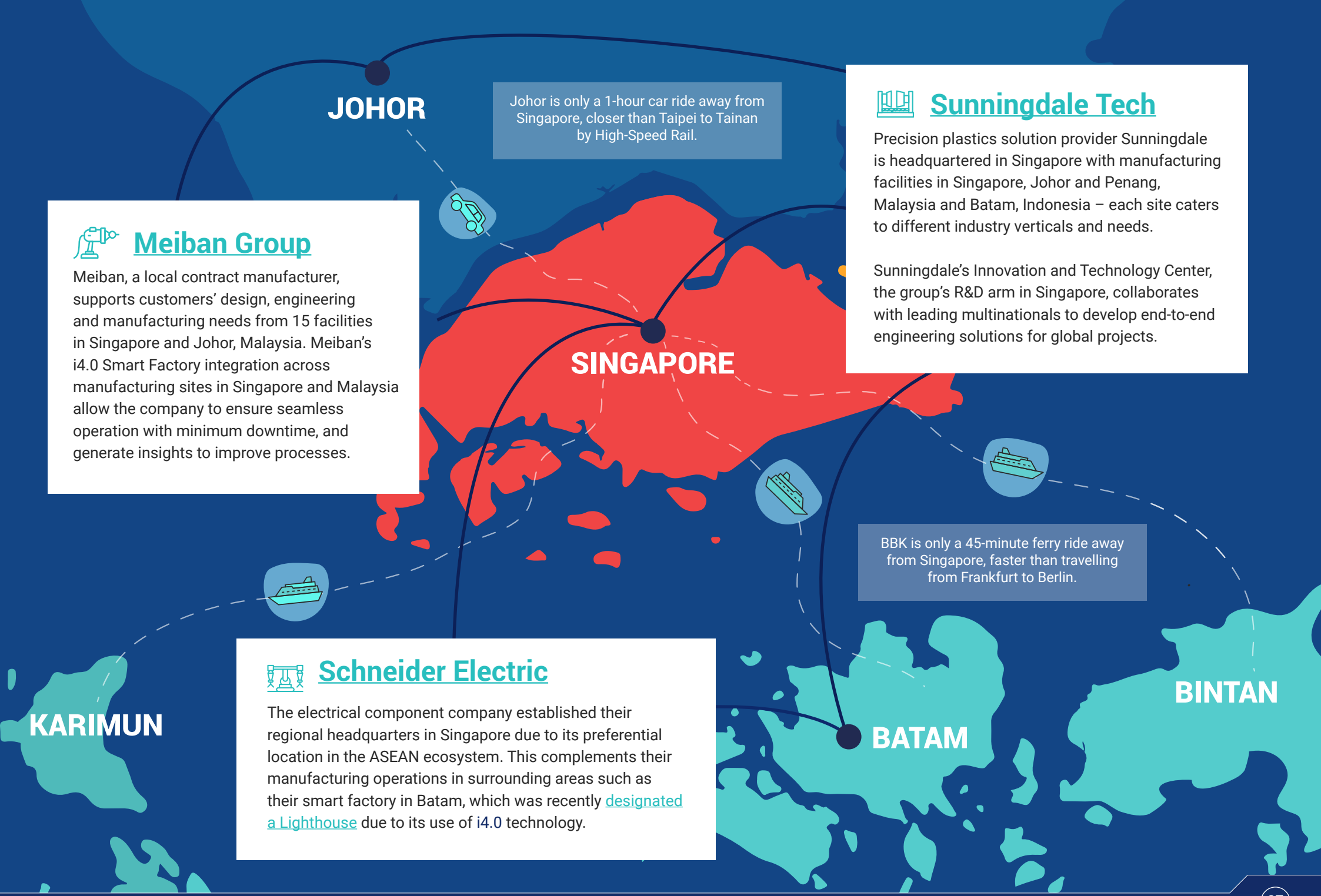
Customised end-to-end facilities and tech solutions, as well as plug-and-play industrial parks that can be tailored to businesses' manufacturing needs

Keep production cost competitive:

An educated talent pool with specialised skills in tech, engineering and corporate functions, on top of lower rent and utility costs in Johor and BBK

Leverage high-quality infrastructure:

Strong ecosystem of partners to enhance operational resilience and innovation



Johor is only a 1-hour car ride away from Singapore, closer than Taipei to Tainan by High-Speed Rail.

Meiban Group

Meiban, a local contract manufacturer, supports customers' design, engineering and manufacturing needs from 15 facilities in Singapore and Johor, Malaysia. Meiban's i4.0 Smart Factory integration across manufacturing sites in Singapore and Malaysia allow the company to ensure seamless operation with minimum downtime, and generate insights to improve processes.

Sunningdale Tech

Precision plastics solution provider Sunningdale is headquartered in Singapore with manufacturing facilities in Singapore, Johor and Penang, Malaysia and Batam, Indonesia – each site caters to different industry verticals and needs.

Sunningdale's Innovation and Technology Center, the group's R&D arm in Singapore, collaborates with leading multinationals to develop end-to-end engineering solutions for global projects.

BBK is only a 45-minute ferry ride away from Singapore, faster than travelling from Frankfurt to Berlin.

Schneider Electric

The electrical component company established their regional headquarters in Singapore due to its preferential location in the ASEAN ecosystem. This complements their manufacturing operations in surrounding areas such as their smart factory in Batam, which was recently designated a Lighthouse due to its use of i4.0 technology.

Southeast Asia Manufacturing Alliance

The Southeast Asia Manufacturing Alliance (SMA) is a partnership between EDB and strategic private sector partners to help businesses leverage Singapore as a gateway to harness the potential of manufacturing in SEA by tapping on the complementary strengths of different locations in the region. Under the SMA, manufacturers that establish and grow their operations in Singapore, while setting up new industrial activities in other SMA locations, can unlock differentiated benefits to aid their regional expansion.

Eligible businesses may apply for a differentiated tier of benefits from participating organisations.

EDB:

Offers grants up to S$1.5million for eligible R&D and innovation activities undertaken in Singapore.

Strategic Partners such as CapitaLand, Gallant Venture and Sembcorp Development will offer benefits including:

- Differentiated pricing for logistics services
- Complimentary business services, such as consultation on business set-up, supplier identification and matching services, and streamlined setup processes
- Support for eligible innovation and Industry 4.0 pilot implementation activities undertaken in Singapore

Kickstarting Your Advanced Manufacturing Journey in Singapore

Getting Started in Singapore

We know that setting up in a new country comes with unique challenges. But Singapore is here to make it straightforward for you.

Keen to leverage our manufacturing ecosystem for growth? We've listed out some key resources here.

Find out more on how you can get your business up and running in Singapore with ease.

Check out EDB's Guide to Setting Up Your Business in Singapore

Build your A-team with Singapore's world-class talent pool.

Download EDB's Guide to Hiring in Singapore

LOCATION

Secure a suitable location to meet your operational needs, whether it is for a production facility, R&D centre or corporate office.

JTC	JTC oversees the development of over 8,000 hectares of industrial land and 6 million square metres of ready-built facilities.
CapitaLand	CapitaLand manages more than 120 workspace developments in Singapore, including industrial buildings, business and science park buildings, and logistic warehouses.
Mapletree Industrial Trust	Mapletree manages 85 properties in Singapore, including data centres, hi-tech buildings, business park buildings, flatted factories, stack-up/ramp-up buildings and light industrial buildings.

TALENT

Recruit experienced professionals, both local and global, with the skillsets and expertise for objectives in the field of advanced manufacturing.

MyCareersFuture	Enables employers to post job vacancies and facilitates online job matching between employers and local job seekers based on skills and competencies.
Employment and Employability Institute (e2i)	Partners with employers to address their recruitment, training and job redesign needs
HRnetGroup	HR consultancy firm that provides recruitment services for the chemical and industrial, finance, life sciences, and technology fields, as well as functional roles
PERSOLKELLY	Workforce solution provider that caters to the rising workforce employment needs of an emerging Asia Pacific market
Hiring global talent	All foreigners who intend to work in Singapore must obtain a valid pass, commonly known as a work visa, before they start work. Employers must ensure that their employees hold a suitable and valid pass throughout their employment. Visit the Ministry of Manpower's website for more information about the different work passes available in Singapore.
Collaborating with IHLs	To contact local IHLs to recruit fresh graduates for training or to collaborate with such institutions for R&D activities, you may peruse EDB's list of useful links and access our guide titled Institutes of higher learning, infrastructure and utility service providers for more information.
Salary benchmarking	If you need information on how much employees across different industries and roles should be paid in Singapore, please refer to the Morgan McKinley 2023 Salary Guide Singapore.

Scaling Up in Singapore

For manufacturers looking to transform operations in Singapore, here are some essential resources to help you ramp up speedily.

GOVERNMENT SUPPORT

Benefit from governmental initiatives that support manufacturing businesses and activities in Singapore.

National Additive Manufacturing Innovation Cluster **(NAMIC)**	National platform that supports the transformation of businesses toward innovation and high-value manufacturing. It offers a range of grants that will fund next-generation additive manufacturing technology R&D projects towards commercial scale-up
National Robotics Programme **(NRP)**	National programme that facilitates partnerships between industry players, and local research institutions and IHLs to develop robotics products and solutions for manufacturers
Pioneer Industries (Manufacturing) Incentives **(PC(M))**	Offers tax exemption for eligible companies carrying out manufacturing activities in Singapore on a significant scale that generates tangible economic spin-offs, such as introducing manufacturing technology, skillsets or know-how more advanced than what is available in Singapore
Development and Expansion Incentive for Manufacturing **(DEI(Mfg))**	Offers tax concessions for eligible companies carrying out high value-added manufacturing activities in Singapore that generate tangible economic spin-offs, such as setting up or expanding such existing operations in Singapore
Government Grants and Support Schemes	If you want to discover other schemes your business might benefit from, please refer to this comprehensive list of grants, schemes and programmes that the Singapore Government offers

Interested in accelerating your manufacturing operations from Singapore?

Contact EDB to get comprehensive insights on how they can facilitate your set-up journey

STRATEGIC MANUFACTURING PARTNERS

Get in touch and partner with local Singapore-based service providers to innovate solutions, improve operations or outsource your manufacturing processes. Singapore's rich ecosystem of partners, suppliers and contract manufacturers will help to realise your manufacturing ambitions through collaborative partnerships. Here are just a few of them:

Accuron Technologies Ltd	Aerospace Automotive Semiconductor Equipment Advanced Industrial	Provides manufacturing services like precision machining and secondary processes like heat treatment and coating processes. Other services include New Product Introduction and mass production for global clients in various sectors like Aerospace and Semiconductor. AS9100 and ISO9001 accredited.
AMT Pte. Ltd	Automotive Advanced Industrial Medtech	Provides Metal Injection Moulding (MIM), precision tooling fabrication, cleanroom injection moulding, precision machining, 3D metal printing and medical device assembly. ISO9001, ISO13485, ISO14001 and IATF16949 accredited.
Meiban Corp Holdings	Automotive Business Equipment Cleantech Consumer Electronics Medtech	Provides mould fabrication, design and engineering services, plastic injection moulding, secondary processes and automation and assembly services, as well as electronic manufacturing services (EMS). ISO9001, ISO13485, ISO 14001, and ISO 22301 accredited.
Nanofilm	Automotive Cleantech Consumer Electronics Medtech Semiconductor	Specialises in versatile coating solutions. Key capabilities include surface solution nanotechnology application and combining nanofabrication and coating technologies to customise coating equipment, cleaning lines and automation systems.
Sunningdale Tech	Automotive Business Electronics Consumer Electronics Medtech	Specialises in precision-engineered plastic components and turnkey plastic solutions. Key capabilities include product and mould design, mould fabrication, injection moulding, Class 7 and Class 8 clean room moulding and assembly, secondary processes and precision assembly. ISO9001 and ISO13485 accredited.
Venture Corporation	Advanced Industrial Consumer Lifestyle Products Medtech (Life Science & Geonomics) Communications & Networking Industrial Equipment	Provides electronic manufacturing services and technology solutions throughout the value chain from new production introduction, procurement and manufacturing to fulfilment and reverse logistics. ISO9001 and ISO13485 accredited.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