

MARINE & OFFSHORE ENGINEERING | INDUSTRY DIGITAL PLAN

A Guide for Small and Medium Enterprises (SMEs) to Assess Their Digital Readiness and Opportunities to Go Digital



Sector Lead:



In Collaboration With:



In Support Of:



Supported By:



Made Possible In:



CONTENTS

01 OUR MARINE & OFFSHORE
ENGINEERING INDUSTRY

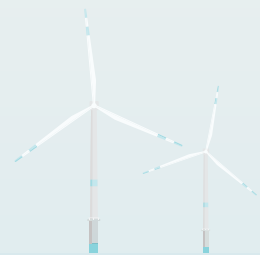


02 TRENDS IMPACTING MARINE & OFFSHORE
ENGINEERING INDUSTRY



03 SMEs GO DIGITAL

04 DIGITAL ROADMAP



05 DIGITAL SKILLS & TRAINING

06 PROFESSIONAL CONVERSION PROGRAMME
FOR MARINE ENGINEER/ASSISTANT ENGINEER
/TECHNICIAN



07 GET STARTED TODAY



08 ADDITIONAL INFORMATION

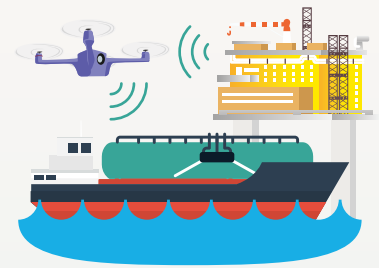


01 OUR MARINE & OFFSHORE ENGINEERING INDUSTRY

Our Marine & Offshore Engineering industry plays a significant role in Singapore's economy. The industry has grown from its humble beginnings with four domestic marine firms, to an ecosystem of more than 1,000 companies, comprising world-leading large local enterprises, globally competitive small and medium enterprises, and multinational corporations.



02 TRENDS IMPACTING MARINE & OFFSHORE ENGINEERING INDUSTRY



Decarbonisation

Population growth and rapid urbanisation is driving long term growth in energy demand. Decarbonisation is key to ensure energy demand is met in a sustainable way. This supports the increased use of cleaner energy sources (e.g. Liquefied Natural Gas (LNG), renewables, hydrogen) for power generation, transportation and industrial processes.

Digitalisation

In an increasingly competitive world, businesses need to adopt digital technologies to improve process efficiencies, optimise cost structures and enhance business resilience. Building strong digital capabilities will help businesses improve products, enhance service delivery and seize new growth opportunities.

Disruption

The proliferation of technologies (Artificial Intelligence (AI), robotics, cloud computing etc.) is driving fundamental changes in society and businesses. In the Marine & Offshore Engineering (M&OE) sector, the advent of the Industrial Internet of Things (IIOT), maritime robotics and autonomous systems will disrupt traditional business models and spur the growth of new ones.

Industry Transformation Map (ITM)

The Marine & Offshore Engineering (M&OE) Industry Transformation Map (ITM) was launched on 22 February 2018.

It outlines the approach in which the sector can capture opportunities in the evolving energy landscape, amid technological disruptions and resource challenges.

Digitalisation plays an important role in helping SMEs streamline workflows, improve operational processes and provide the foundations for SMEs to build future-ready capabilities.



Click [here](#) or scan this QR code for more details on the Marine & Offshore Engineering ITM

03 SMEs GO DIGITAL

Aligned to the ITM, the Industry Digital Plan (IDP) is part of the SMEs Go Digital programme that helps to make going digital simple for SMEs.



SMEs GO DIGITAL

3 STEPS TO GO DIGITAL



For more information

Scan the QR code or visit
www.imda.gov.sg/SMEsGoDigital

Support available

- Chief Technology Officer-as-a-Service (CTO-as-a-Service)
- Industry Digital Plans
- Pre-Approved Solutions
- Start Digital
- Grow Digital
- Advanced Digital Solutions
- Government Grants e.g. Productivity Solutions Grant (PSG)

1

Is your business digital-ready?

Find out using the Industry Digital Plan (IDP) for your sector.

2

How do you get started?

Take up pre-approved solutions with grant support.

3

Where can you get help?

Access the CTO-as-a-Service for support.

SMEs Go Digital comprises the following:

CTO-as-a-Service

Assess your digital readiness, explore digital solutions and request for digital advisory and project management services.

INDUSTRY DIGITAL PLANS (IDP)s

Step by step guide on digital solutions and training required at each stage of your business growth.

PRE-APPROVED SOLUTIONS

Proven off-the-shelf digital solutions pre-approved by IMDA to meet your business needs. Government grants, e.g. Productivity solutions Grant (PSG), are available for the adoption of these solutions.

START DIGITAL

Foundational digital solutions for new SMEs to get a head start in going digital.

GROW DIGITAL

Leverage Business-to-Business (B2B) and Business-to-Consumer (B2C) e-commerce platforms to go international, without a physical presence overseas.

ADVANCED DIGITAL SOLUTIONS

Advanced and integrated digital solutions to help you strengthen business continuity and build longer term resilience.

04 DIGITAL ROADMAP

This digital roadmap serves as a guide for your company as you embark on your digital journey.

STAGE 01

Getting Ready for the Digital Economy

STAGE 02

Growing in the Digital Economy

STAGE 03

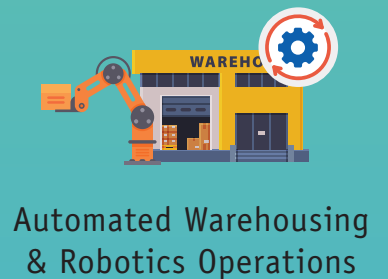
Leaping Ahead

Streamlined Operations, Optimised Resources

Integration of Assets, Enhanced Production Capabilities

Autonomous Operations, Intelligent Business

M&OE Enterprise Resource Planning (ERP):



BUSINESS CAPABILITIES

Document Management, Fleet Management, Cybersecurity

Note: This roadmap will be updated over time as digitalisation of the industry progresses and new technologies are introduced.

DIGITAL SOLUTION	DESCRIPTION	BENEFITS
 <p>Sales & Accounting Management</p>	<p>Sales Management involves automating processes such as quotation and invoice generation, as well as tracking of deliverables to ensure fulfilment of sales orders.</p> <p>Automate manual accounting tasks and provide a consolidated overview of financial activities to enable the management to make informed, data-based business decisions.</p>	<ul style="list-style-type: none"> • Effective sales tracking and management • Timely payment and reconciliation of supplier invoices • Reduced manual reconciliation/human error in processing of paperwork
 <p>Relationship Management</p>	<p>Consolidate engagements with various customer/lead/supplier groups across multiple sources on a central platform.</p> <p>Track the performance of all engagements and campaign activities to provide demographic and behavioural analysis of customer/lead/supplier groups for a comprehensive overview of the ongoing trends.</p>	<ul style="list-style-type: none"> • Higher customer retention and better relationships with customers • Deeper understanding of customer's preferences
 <p>Workforce Optimiser</p>	<p>Manage and optimise manpower resources with the following functions:</p> <ul style="list-style-type: none"> • Automatic recordings of employees' timesheets and availability to facilitate accurate manpower allocation; • Tracking of workers' training certification, permits, passports and visas, with additional features to provide notifications for upcoming renewals or expiry dates; • Multi-level appraisal system. 	<ul style="list-style-type: none"> • Improved workforce planning • Decreased operational costs • Efficient tracking of work hours and attendance • Insights to workers' engagement and productivity • Optimised training, coaching and processes to improve workers' performance and morale

STAGE
01

GETTING READY FOR THE DIGITAL ECONOMY

Streamlined Operations, Optimised Resources

Automate laborious tasks and streamline tedious processes to improve productivity

M&OE Enterprise Resource Planning (ERP)

DIGITAL SOLUTION	DESCRIPTION	BENEFITS
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Project and Scheduling Management

Manage the end-to-end project cycle from planning, scheduling, budgeting and execution, to completion.

Monitor jobs and projects in real time via dashboards and generate real time reports of their progress.

- Near real time status reporting of project schedules, risk, budget and quality
- Improved decision making and communication with stakeholders
- Standardised project management approach



Asset Monitoring and Management System

Provide an overview of equipment and materials movement to ensure sufficient inventory and meet the demands of ongoing projects.

Track the condition of the equipment through an online scheduler and checklists. Provide notifications when maintenance and servicing are required.

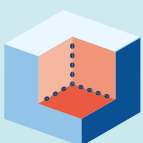
- Real time materials and equipment tracking
- Optimised stock levels and storage space to improve materials and equipment planning
- Reduced costs of holding inventory



e-Permit to Work

Submit, track and monitor Permit to Work (PTW) applications for high-risk activities via a centralised system. This can be integrated with the workforce optimiser module.

- Enhanced productivity through reduced paperwork and waiting time
- Increased accountability with real time tracking of approved PTW applications
- Increased ease of access and visibility of permits through auto-generation of dashboards and reports
- Enhanced detection of potential incompatible works



3D Scanning & Modelling

Capture virtual models of a product to enable reverse engineering and innovation.

Design products with surface modelling software package based on preliminary arrangement drawings or visualise the design from scratch.

- Accurate virtual visualisations of products
- Engineering optimisations based on analysis of visualisations
- Easy comparison of product design with the actual manufactured products

STAGE
02

GROWING IN THE DIGITAL ECONOMY

Integration of Assets, Enhanced Production Capabilities

Enhance production capabilities through the adoption of more advanced solutions and/or integrated assets management

DIGITAL SOLUTION	DESCRIPTION	BENEFITS
 e-Procurement	<p>Buy and sell equipment, supplies and services seamlessly in real time with different suppliers and buyers.</p> <p>Capture new markets and buyers via B2B/B2C e-marketplace platforms.</p>	<ul style="list-style-type: none">• Reduced administrative work and streamlined procurement processes• Increased transparency of product pricing• New business opportunities
 Augmented Reality and Virtual Reality (AR/VR) Simulation	<p>Use augmented reality and virtual reality (AR/VR) tools for training on demand or for visualising the design and final product.</p> <p>Visualise ship interiors for design application and mark out possible areas for equipment placement and quality checks.</p> <p>Apply AR during building and refitting processes to avoid mistakes, increase efficiency and effectiveness.</p>	<ul style="list-style-type: none">• Realistic simulation of real-world situations in a safe and controlled environment• Improved training effectiveness for new employees, with reduced onboarding costs• Reduced risks and errors in carrying out the tasks• Faster completion of tasks with less rework
 Predictive Monitoring & Maintenance	<p>Provide predictive analysis to anticipate equipment failures and map out maintenance cycles.</p> <p>Use condition-monitoring tools and techniques to track overall equipment performance.</p>	<ul style="list-style-type: none">• Reduced unscheduled equipment downtime and increased productivity• Reduced maintenance costs and duration
 Centralised Platform with Data Analytics	<p>Integrate multiple software applications onto a common digital platform hosted on cloud for monitoring, control, data analytics and Artificial Intelligence (AI).</p> <p>Capture data on the platform to help identify new commercial opportunities as well as process and product optimisation.</p>	<ul style="list-style-type: none">• Easier monitoring and control across multiple applications in different locations with a unified view using a common platform• Better data-driven decisions for process, product, as well as safety improvements

STAGE
03

LEAPING AHEAD

Autonomous Operations, Intelligent Business

Leverage advanced technologies to capture new business prospects and global opportunities

DIGITAL SOLUTION	DESCRIPTION	BENEFITS
 <p>Virtual Inspection & Certification</p>	<p>Conduct inspections using mobile devices with the help of cameras and/or in-built inspection software.</p> <p>Use drones for inspections at sites that are hard to reach or inaccessible.</p> <p>Generate reports with e-signatures in real time.</p>	<ul style="list-style-type: none"> • Safer and remote inspections • Real time retrieval of reports • Easy inspection of hard to reach and unsafe spaces • Real time insights on inspection progress and defects found
 <p>Autonomous Robots & Drones for Operations</p>	<p>Use autonomous robots and drones to perform repetitive tasks such as monitoring work conditions or delivering parts to vessels.</p>	<ul style="list-style-type: none"> • Higher value roles for workers due to fewer repetitive, laborious and high-risk tasks • Fewer workplace accidents (e.g. fall from height)
 <p>Automated Warehousing & Robotics Operations</p>	<p>Use robots to pick and retrieve tools and materials.</p> <p>Automated Guided Vehicles (AGVs) move goods around the warehouse, replacing manually-operated forklifts.</p> <p>Automated Storage and Retrieval Systems (AS/RS) store and retrieve inventory on demand.</p>	<ul style="list-style-type: none"> • After hours warehouse operations • Easy retrieval of materials and stock taking • Real time monitoring of stock levels
 <p>Digital 3D Twin</p>	<p>Create 3D digital replicas of physical products using sensors, digital scanning and imaging.</p> <p>Together with data analytics and AI, digital models can predict corrosion or wear and tear to enable preventive maintenance for equipment.</p>	<ul style="list-style-type: none"> • Early detection and resolution of problems • Real time monitoring of wear and tear • Improved traceability and accountability • Reduced mistakes in the design and build phases

05 DIGITAL SKILLS NEEDED

Marine & Offshore Engineering job roles will evolve to meet the changing needs of customers and support the growth of companies. Upskilled workers will help companies harness the potential of digital technology to remain competitive and relevant.

All Users

Require broad-based digital literacy and awareness

“TECH BASICS” COURSES

Broad-based innovation mindset and digital literacy/awareness

SkillsFuture Singapore (SSG) funded courses - e.g. SkillsFuture for Digital Workplace

Solution-specific user level digital skills

Vendor solution-specific training

Advanced Users

Require higher proficiency digital skills

“TECH ADVANCED” COURSES

Higher proficiency level digital skills

Training mapped to the Skills Framework for Marine & Offshore and Infocomm Communication Technology (ICT)

Job Roles (Examples)



Design Engineer

Responsible for day-to-day designing and engineering activities. Develops models and conducts numerical simulations for prototypes and applies automation to concept designs.



Production Engineer

Oversees the various processes in shipyards, serves as a product specialist, and ensures that the manufacturing processes and production methods are in line with product designs and requirements.



Workplace Safety and Health (WSH) Officer

Implements and maintains the organisation's WSH procedures to promote a safe work environment by conducting incident investigations, identifying cases of non-compliance, evaluating risks and hazards in the workplace and reporting progress of corrective and preventive actions taken.



Quality Assurance Engineer

Responsible for inspections and technical testing activities that measure, monitor, and improve quality compliance with the organisation's quality policies, and external regulations and standards.



Project Engineer

Ensures proper adoption of resource, quality, and risk standards, and handles all administrative processes related to a project, including the final project handover documentation.



Technician

Performs activities related to manufacturing, installation, calibration, repair and maintenance of electrical circuits and components and/or mechanical equipment.



Procurement Executive/Manager

Establishes procurement plans, policies and processes required to obtain the materials, equipment and services necessary for the timely delivery of projects involving ships, rigs and/or conversions.



Supervisor

Oversees workers in the completion of individual tasks relating to manufacturing, servicing and repairs, troubleshooting and/or machinery calibration to meet schedules, budget and client requirements.

05 DIGITAL ROADMAP ON TRAINING

This training roadmap serves as a guide to prepare companies and their workforce to adopt digital solutions at each stage of growth.

	STAGE 01 GETTING READY FOR THE DIGITAL ECONOMY	STAGE 02 GROWING IN THE DIGITAL ECONOMY	STAGE 03 LEAPING AHEAD
“TECH BASICS” All employees	<ul style="list-style-type: none"> • SkillsFuture for Digital Workplace (SFDW) • Effective Digital Marketing and Sales • Robotic Process Automation • Fundamentals of Data Analytics • Digital Learning Basic Workshop (for employees to learn “how to learn online”) 	<ul style="list-style-type: none"> • Introduction to Predictive Analytics for Maintenance • Intermediate Robotic Process Automation • Strategies for Effective Data and Information Management • Internet of Things (IoT) for Engineers 	<ul style="list-style-type: none"> • Fundamentals of Drones/ Unmanned Aerial Vehicle (UAV) • Learn how to implement Internet of Things (IOT) Solutions in a 2-day Bootcamp • Introduction to Artificial Intelligence (AI) and Machine Learning
Vendor Solution-Specific Training			
“TECH ADVANCED” Employees that use or are exploring advanced tech in their work /organisation	<ul style="list-style-type: none"> • Analytics for Enterprises • Data Analytics for Engineers • Project Planning & Scheduling (Microsoft Project 2016) • Data Storytelling (TeSA) • Tableau Desktop I and Desktop II (TeSA) 	<ul style="list-style-type: none"> • Appreciation of IoT and Data Management • Industrial Robotised Polishing • DS101: Introduction to Python Programming (TeSA) • DS102: Data Analytics with Python (TeSA) 	<ul style="list-style-type: none"> • Introduction to Advanced Robotics • Analytics and Computational Modelling • Collaborative Robots Programming and Applications
Training programmes are aligned to the Skills Framework and emerging areas under the SkillsFuture Series			

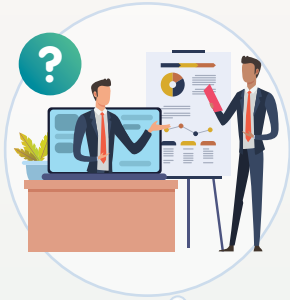
“Tech Basics” and “Tech Advanced” Courses Directory:

<https://www.myskillsfuture.gov.sg/courses>

TeSA Courses Directory:

<https://www.go.gov.sg/TeSA>

06 PROFESSIONAL CONVERSION PROGRAMME FOR MARINE ENGINEER/ASSISTANT ENGINEER /TECHNICIAN



WHAT support is available?

The Professional Conversion Programme for Marine Engineer /Assistant Engineer/Technician (Marine PCP) is a 6-month skills conversion programme. It aims to support companies in their digital transformation journeys through a structured hybrid training programme consisting of both course training and on-the-job training. It provides companies with course fee and salary support of up to 90%*, to reskill new hires and existing workforce to acquire skillsets and competencies that are aligned with growth areas.



WHO is eligible?

Companies that are hiring new mid-career PMETs* or redeploying existing PMETs* to undergo skills conversion and move into new areas of work aligned to business transformation.



Marine & Offshore Engineering PCP

HOW to apply?

1. Companies submit applications to the Association of Singapore Marine Industries (ASMI) for approval
2. Approved companies will receive course fee and salary support for the training duration of 6 months

To find out more about the programme, please visit <https://go.gov.sg/marinepcp> or email admin@asmi.com



WHEN to apply?

For new hires, companies should submit the application no later than 3 months from the start of their employment, with training only commencing upon approval.

For redeployments, which are subjected to approval, companies should submit the application at least 1 month prior to commencement of training.

* Depending on eligibility
PMETs - Professionals, Managers, Executives and Technicians

07 GET STARTED TODAY

You will be supported at every stage of your digital journey, through three simple steps:



1 | Is your business digital-ready?

- Find out if you are digital ready by using the IDP resources [here](#) or scan the QR code.



Marine & Offshore Engineering IDP



2 | How do you get started?

- Tap on the [CTO-as-a-Service](#) to complete your Digital Readiness Self Check in the web app and select from the recommended digital solutions that best meet your business needs.
- Visit [GoBusiness Gov Assist](#) for the contact information of solution providers. If funding support is required, apply for the Productivity Solutions Grant (PSG) on the [Business Grants Portal](#), before purchasing and implementing digital solutions.
- You can also apply for training subsidies under the [SkillsFuture Enterprise Credit \(SFEC\)](#).



CTO-as-a-Service



GoBusiness Gov Assist



Business Grants Portal



SFEC



3 | Where can you get help?

- Tap on the [CTO-as-a-Service](#) for digital consultancy and project management services.
- Visit [SME Centre](#) if you require business advisory.



SME Centre

08 ADDITIONAL INFORMATION

For SMEs

Digital Consultancy and Solutions

CTO-as-a-Service

go.gov.sg/CTOaaS

SMEs Go Digital

<https://imda.gov.sg/SMEsGoDigital>

GoBusiness Gov Assist

<https://www.gobusiness.gov.sg/productivity-solutions-grant/>

Be Safe Online

https://www.csa.gov.sg/~media/csa/documents/publications/be_safe_online/be_safe_online_handbook.pdf

Business Advisory

SME Centres managed by Trade Associations:

- SME Centre@ASME
- SME Centre@SCCCI
- SME Centre@SICCI
- SME Centre@SMCCI
- SME Centre@SMF

<https://www.enterprisesg.gov.sg/smecentre>

Enterprise Infoline: +65 6898 1800

Association of Singapore Marine Industries (ASMI)

<http://www.asmi.com/>

For ICM Vendors

SMEs Go Digital

<https://imda.gov.sg/icmvendors>

For Individuals

Capability Upgrading and Career Facilitation

Course Directory:

<https://www.myskillsfuture.gov.sg/content/portal/en/training-exchange/course-landing.html>

SkillsFuture Enterprise Credit (SFEC)

<https://www.skillsfuture.gov.sg/sfec>

SkillsFuture Series

<https://www.skillsfuture.gov.sg/series>

Skills Framework for Marine & Offshore:

<https://www.skillsfuture.gov.sg/skills-framework/marineandoffshore>

TechSkills Accelerator (TeSA)

<https://www.go.gov.sg/TeSA>

Marine PCP

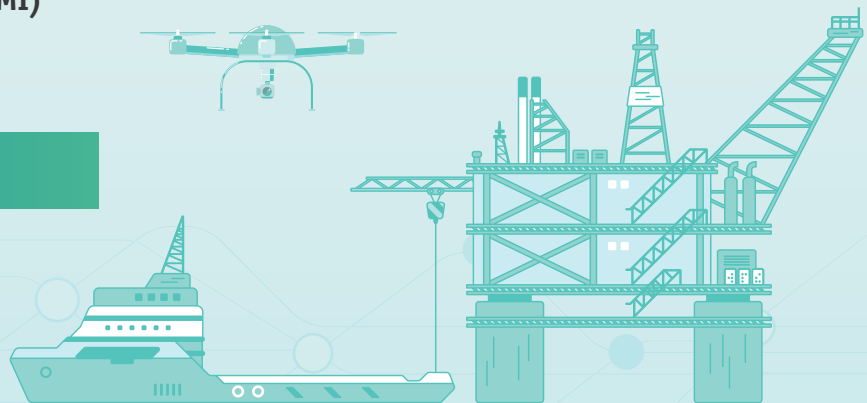
<https://go.gov.sg/marinepcp>

WSG's Careers Connect

<http://www.wsg.gov.sg/career-services.html>

e2i Centres

<http://e2i.com.sg/app>



This Industry Digital Plan is part of the SMEs Go Digital programme.

For programme information and feedback: <https://imda.gov.sg/SMEsGoDigital>

#SGDIGITAL

Singapore Digital (SG:D) is a nation-wide movement to unify Singapore's digitalisation efforts. Whether it is help for different industries to start their digitalisation journeys, or creating new ecosystems, opportunities and capabilities for the future, SG:D is set to take us ahead as a leading digital global node. The :D smiley face icon in the logo signifies the optimism of Singaporeans advancing together with digital innovation. As we progress into the digital economy, it is all about the people – the heart of all we do.



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enterprisesg.gov.sg
edb.gov.sg



facebook.com/IMDAsg
facebook.com/enterprisesg
facebook.com/EDBsg



twitter.com/IMDAsg
twitter.com/EDBsg



youtube.com/IMDAsg
youtube.com/enterprisesingapore
youtube.com/SingaporeEDB



instagram.com/IMDAsg



linkedin.com/company/imdasg
linkedin.com/company/enterprisesg
linkedin.com/company/singapore-economic-development-board



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