

Media Release
21 October 2017



Energy & Chemicals Industry Transformation Map

Building a Globally Competitive Energy & Chemicals Hub

1. Mr Lim Hng Kiang, Minister for Trade and Industry (Trade), launched the Energy & Chemicals Industry Transformation Map (“ITM”) today at the 10th edition of the Singapore Chemical Industry Experience (“CHEMEX”), an event organised by the Singapore Chemical Industry Council (“SCIC”) to raise awareness of career opportunities in the Energy & Chemicals industry amongst tertiary students. Developed by a multi-agency team together with industry partners, unions and trade associations, the ITM maps out strategies that will steer Singapore’s future development as a globally competitive and leading Energy & Chemicals hub. Through the ITM efforts, the industry is expected to achieve a manufacturing value added of S\$12.7 billion and introduce 1,400 new jobs by 2025.

The Singapore Energy & Chemicals Industry

2. The Energy & Chemicals industry has been a mainstay of Singapore’s economy with a long history dating back to before pre-independence. Singapore has developed an extensive and integrated chemicals value chain spanning refining to olefins production and chemicals manufacturing that is supported by research and development, even though the country does not produce a single drop of oil.

3. Today, Singapore has three refineries with a refining capacity of more than 1.3 million barrels a day and four crackers with an ethylene output capacity of four million tonnes per annum, which makes Singapore the world’s top fifth largest refinery export hub¹ and amongst the top ten global chemical hubs by chemicals

¹ BP World Statistical Review 2017

export volume². In 2015, Energy & Chemicals accounted for close to S\$78 billion in total output, employing over 28,400 workers.

4. The Energy & Chemicals ITM identifies opportunities that the industry can capture as a result of megatrends such as the rise of Asia, as well as emerging business and manufacturing developments due to technological disruptions. It takes into consideration challenges that the industry will face in terms of resources such as land, carbon and labour, as well as competition from the region and globally.

5. To prepare Singapore to capitalise on these global trends and opportunities, the ITM has identified a two-pronged strategy, focused on innovation, to ensure the long-term competitiveness and sustainable growth of the Energy & Chemicals industry – firstly, to transform its existing base of chemicals manufacturing through the adoption of innovative technologies and secondly, to diversify into new growth markets and develop new innovation capabilities to capture growth opportunities. The ITM will also have a strong emphasis on growing a pipeline of local talent, and fostering strong collaborations with industry associations to better support the industry.

Transforming the Energy & Chemicals Industry

6. Singapore will transform its existing base of chemicals manufacturing through the adoption of innovative Advanced Manufacturing technologies. The emergence of such disruptive technology which favours technology intensive economies such as Singapore presents the Energy & Chemicals industry with an opportunity to transform itself and improve productivity and safety, rejuvenate asset and overcome resource constraints.

7. To catalyse the adoption of Advanced Manufacturing technologies, Singapore has developed an ecosystem of support comprising enablers such as technology and solution providers, educational and research institutes as well as

² World Trade Statistical Review 2017

a fast growing start-up sector. The government will place emphasis on driving adoption and will also foster collaboration between multinational corporations (“MNCs”), small medium enterprises (“SMEs”), as well as research institutions and institutes of higher learning to develop new solutions. For example, Chevron Oronite has partnered Emerson to install a pervasive sensing unit that will help increase worker safety and bolster productivity, which is estimated to save 30,000 man-hours. Shell is collaborating with local SME Avetics to deploy drones for plant maintenance and inspection, which offers a safer way to inspect tall structures at its site, and manpower savings of 25%.

8. The ITM targets for at least 20 plants, including all refineries and crackers, to adopt Advanced Manufacturing technologies by 2020. This will provide a strong foundation for the effort to be scaled to the rest of the industry. Following which, Singapore will also be focusing on systems level digitalisation efforts across companies to improve logistics and utilities management.

Diversifying into New Growth Markets and Growing Innovation Capabilities

9. Singapore will play an increasingly significant role in the Energy & Chemicals industry, as it sits in the heart of Asia, the world’s fastest and largest growing market for chemicals. Megatrends such as the growing middle class, rapid urbanisation, climate change and water and food security will require sophisticated yet cost-efficient chemicals tailored to Asia’s needs. To capture these growth opportunities, Singapore will diversify and upgrade its olefin derivative portfolio towards high value added petrochemical products, and specialty chemicals. Focus end-markets include lubricant additives, oilfield and water chemicals, consumer care, agricultural chemicals and animal health and nutrition, as well as functional chemicals such as surfactants and function polymers. Industrial biotechnology and synthetic biology are also technology focus areas that will be explored.

10. To further support the growth of Singapore’s specialty chemicals segment, Singapore will strengthen its innovation ecosystem by building the necessary

capabilities such as applied research or novel platform technologies to help companies accelerate and shorten innovation cycles. The government will work with leading players to develop domain knowledge in their labs in Singapore as well as support companies who adopt “open innovation” as a means to co-innovate and co-develop system solutions with their partners.

11. For example, EDB and A*STAR has embarked on a joint technology road mapping exercise to identify scientific and technological needs and gaps of companies, and then invest in developing them so as to support and foster companies’ innovation. The ITM targets 20 new or expanded application development centres by 2025, with an increase of S\$55 million in business expenditure on research and development.

Ensuring Good Jobs for Singaporeans

12. The transformation and growth of the Energy & Chemicals industry is expected to bring about 1,400 new jobs by 2025. To equip Singaporeans with the necessary skills to take on these jobs, SkillsFuture Singapore (SSG), EDB and Workforce Singapore (WSG), together with industry stakeholders such as employers, industry associations, unions, and education and training institutions, have developed the Skills Framework for Energy & Chemicals.

13. The Skills Framework for Energy & Chemicals covers six career tracks, involving 53 job roles in the sector. The six tracks are Production and Process Engineering; Health, Safety and Environment (HSE); Engineering and Maintenance; Quality Assurance and Quality Control (QA&QC); Technical Service, Application and Product Development; and Research and Development (R&D). The framework provides key information about the industry, and identifies 95 technical skills and competencies required across the different job roles, with the relevant training programmes to acquire them. To support industry trends such as digitalisation and innovation, the framework also includes emerging skills and competencies such as Internet of Things Management, Robotic and Automation Technology Application, and Applied Research and Development.

14. Oiltanking, a company that provides terminal storage facilities and related services for Energy and Chemicals industry key players, has adopted the Skills Framework to develop an in-house career, competency and training roadmap for its operations and commercial functions. The roadmap allows the company's employees to better understand their career progression and prepare for desired job roles. It provides them with the information on skills needs and opportunities within the company. Line managers will also be able to use the framework to benchmark and identify skills gaps of employees, and assess their competency levels.

15. To attract fresh polytechnic and ITE graduates into the Energy & Chemicals industry, SSG also launched four SkillsFuture Earn and Learn Programmes (ELP) for job roles such as process technicians and laboratory analysts. The ELP is a work-learn programme that gives fresh Polytechnic and ITE graduates opportunities to progress in their careers by deepening their skills and knowledge. To date, more than 40 ELPs have been launched in over 20 sectors. Through the ELPs in the Energy and Chemicals industry, over 65 Polytechnic and ITE graduates were placed in more than 20 Energy & Chemicals companies and another two ELPs catering for ITE graduates will be rolled out for the sector in 2018.

16. Under WSG's Adapt and Grow initiative, there are several Professional Conversion Programmes ("PCPs") to help mid-career PMETs transit into different job roles and new careers within the Energy & Chemicals industry. These programmes include the PCPs for Chemicals Manufacturing, Associate Researcher (Consumer Chemicals), Manufacturing Associate, Manufacturing Professional and Technical Sales Engineer/Manager.

Trade Associations and Chambers as a Key Partner

17. Taking a broader industry perspective, the Government will foster closer collaborations with Trade Associations and Chambers (TACs) to further the development of the industry. For instance, SCIC and EDB co-chairs the Chemical Industry Manpower Advisory Committee ("CHIMAC") which looks into present

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and future manpower issues related to the industry such as labour supply, training and hiring practices. Government agencies together with Association of Process Industries (“ASPRI”) and SCIC have also formed the Process Construction and Maintenance (“PCM”) Management Committee to look into improving the overall productivity of the PCM sector, a key supporting sector of the Energy & Chemicals industry.

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About the Singapore Economic Development Board (EDB)

The Singapore Economic Development Board (EDB), a government agency under the Ministry of Trade and Industry, is responsible for strategies that enhance Singapore's position as a global centre for business, innovation, and talent. We undertake investment promotion and industry development, and work with international businesses, both foreign and local, by providing information, connection to partners and access to government incentives for their investments. Our mission is to create sustainable economic growth, with vibrant business and good job opportunities for Singapore.

For more information on EDB, please visit www.edb.gov.sg.

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Annex A: FACTSHEET ON SKILLS FRAMEWORK FOR ENERGY AND CHEMICALS

About Skills Framework for Energy and Chemicals

- The Skills Framework for Energy and Chemicals is an integral component of the Energy & Chemicals Industry Transformation Map and it supports the manpower strategies by identifying pivotal jobs in the Energy and Chemicals sector, outlining possible career pathways for talent attraction and retention, as well as articulating existing and emerging skills to support the growth and transformation of the sector.
- Jointly developed by SkillsFuture Singapore (SSG), Workforce Singapore (WSG), and the Singapore Economic Development Board (EDB), together with employers, industry associations, education and training providers and unions, the Skills Framework for Energy and Chemicals provides information on the sector, career pathways, occupations/job roles, skills and competencies and training programmes.

Who is it for?

- The target groups for Skills Framework for Energy and Chemicals are as follows:
 - **Individuals** who wish to join or progress within the Energy and Chemicals sector, will be able to assess their career interest, identify relevant training programmes to upgrade their skills, and prepare for their desired jobs;
 - **Employers** will be able to recognise these skills and invest in training their employees for career development and skills upgrading;
 - **Education and training providers** can gain insights on sector trends, existing and emerging skills that are in demand, and design programmes to address the sector needs accordingly; and
 - **Government, unions and professional bodies** will be able to analyse skills gaps and design appropriate SkillsFuture initiatives to upgrade the manpower capability and professionalise the sector.

Key components of the Skills Framework

- The Skills Framework for Energy and Chemicals contains information on the sector, career pathways, occupations/job roles, skills and competencies, and training programmes*. The key components include:
 - Sector information – provides information on key statistics, trends and workforce profiles in the sector;

- Career pathways – depicts the pathways for vertical and lateral progression for advancement and growth. Six tracks have been identified, covering 53 job roles:
 - Production and Process Engineering
 - Health, Safety and Environment (HSE)
 - Engineering and Maintenance
 - Quality Assurance and Quality Control (QA&QC)
 - Technical Service, Application and Product Development
 - Research and Development (R&D)
- Occupations and job roles – covers a total of 95 existing and emerging technical skills and competencies, 18 generic skills and competencies, and their respective descriptions. Some of the emerging skills identified include Internet of Things Management, Robotic and Automation Technology Application, and Applied Research and Development; and
- Training programmes* for skills upgrading and mastery – provides information on training programmes, which will help aspiring individuals and in-service employees acquire skills necessary for various jobs.

**The training programmes for the Skills Framework for Energy and Chemicals will be made available at www.skillsfuture.sg/skills-framework*

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Annex B: PROFESSIONAL CONVERSION PROGRAMMES (PCPS) RELEVANT TO THE ENERGY & CHEMICALS INDUSTRY

As part of Workforce Singapore's (WSG) Adapt and Grow initiative to support mid-career Professionals, Managers, Executives and Technicians (PMETs) jobseekers and help them move into new occupations and sectors in the Energy & Chemicals Industry, WSG worked with Singapore Chemical Industry Council (SCIC) and the industry to develop five Professional Conversion Programmes (PCPs), with the support from the Singapore Economic Development Board (EDB). The PCPs integrates job-matching and training to help PMET jobseekers join the industry, and to reskill those with the necessary competencies to take on new job roles.

The PCPs are administered on a Place-and-Train mode, where companies will hire and reskill PMET-level mid-careerists for their new roles and positions. Participants will undergo facilitated classroom sessions with the programme managers and structured On-the-Job-Training (OJT) at the companies. Upon successful completion of selected PCPs, the participants will be awarded Singapore Workforce Skills Qualification (WSQ) Statements of Attainment (SOAs) issued by SkillsFuture Singapore.

PCP for Chemicals Manufacturing

Duration: 12 months

Programme Manager: Singapore Polytechnic

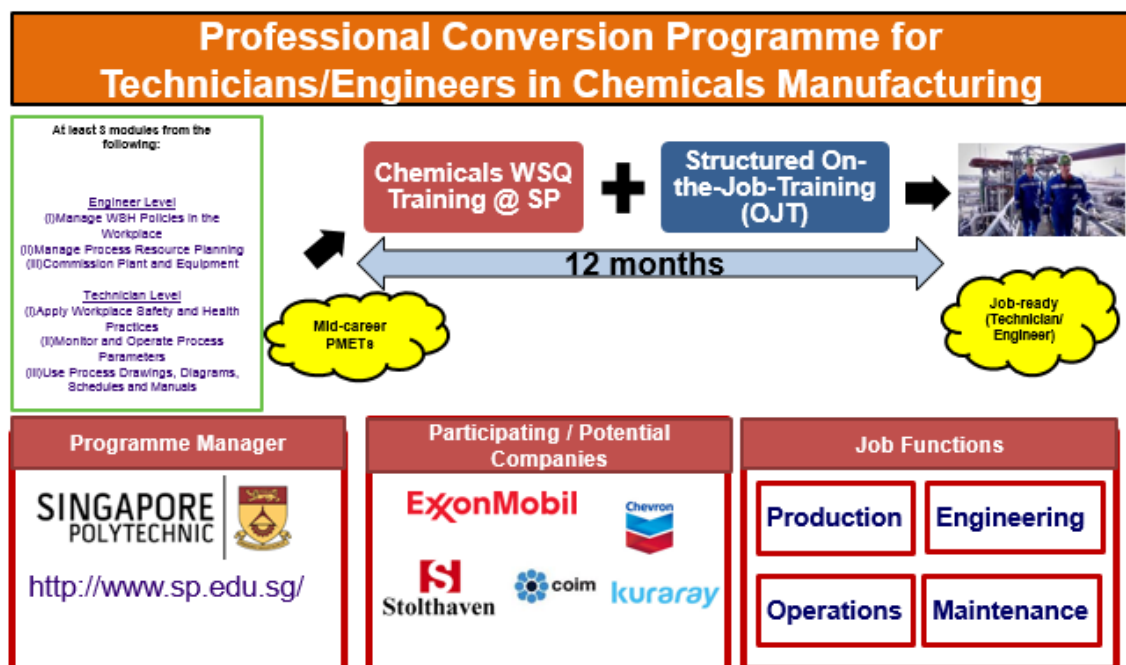
Technician-level Modules

- WSQ Apply Workplace Safety and Health Practices
- WSQ Monitor and Operate Process Parameters
- WSQ Use Process Drawings, Diagrams, Schedules and Manuals

Engineer-level Modules

- WSQ Manage Workplace Safety and Health System
- WSQ Manage Process Resource Planning
- WSQ Commission Plant and Equipment

Archetype of PCP for Chemicals Manufacturing



PCP for Associate Researcher (Consumer Chemicals)

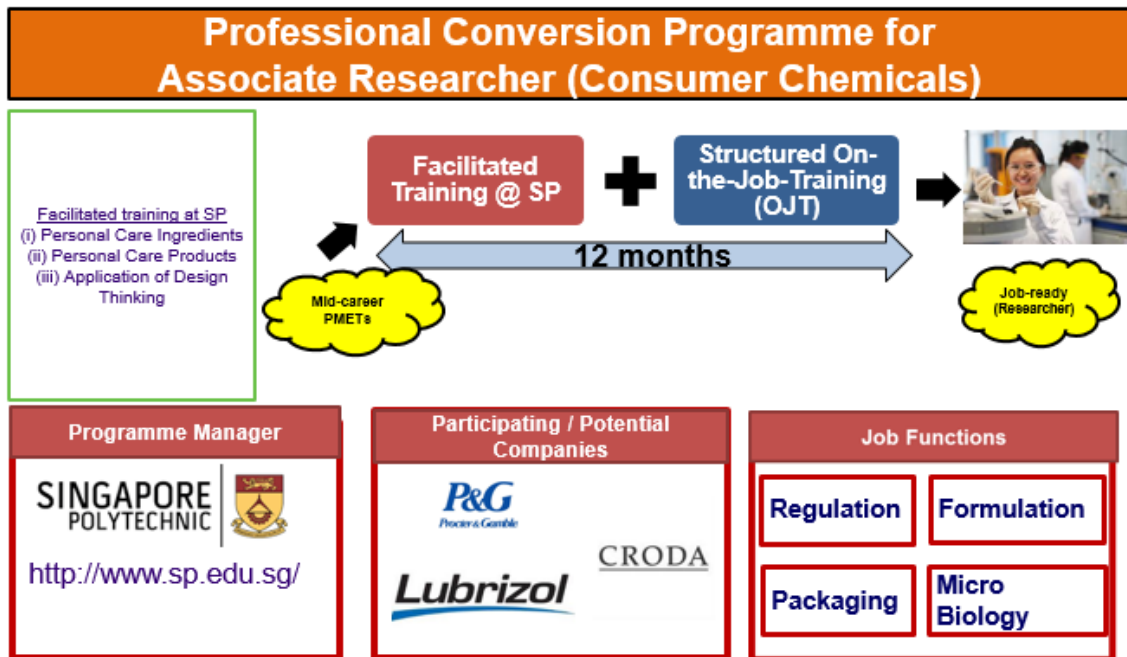
Duration: 12 months

Programme Manager: Singapore Polytechnic

Researcher-level Modules

- Personal Care Ingredients
- Personal Care Products
- Application of Design Thinking

Archetype of PCP for Associate Researcher (Consumer Chemicals)



PCP for Manufacturing Associate

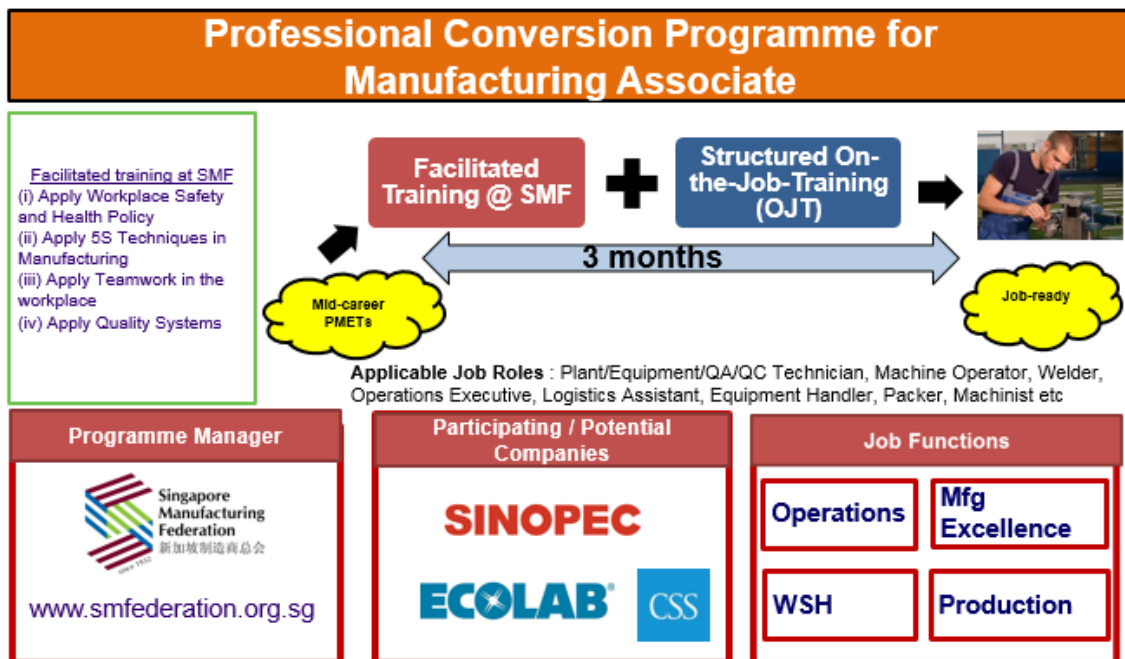
Duration: 3 months

Programme Manager: Singapore Manufacturing Federation (SMF)

Manufacturing Associate-level Modules

- WSQ Apply Workplace Safety and Health Practices
- WSQ Apply 5S Techniques in Manufacturing
- WSQ Apply Teamwork in the Workplace
- WSQ Apply Quality Systems

Archetype of PCP for Manufacturing Associate



PCP for Manufacturing Professional

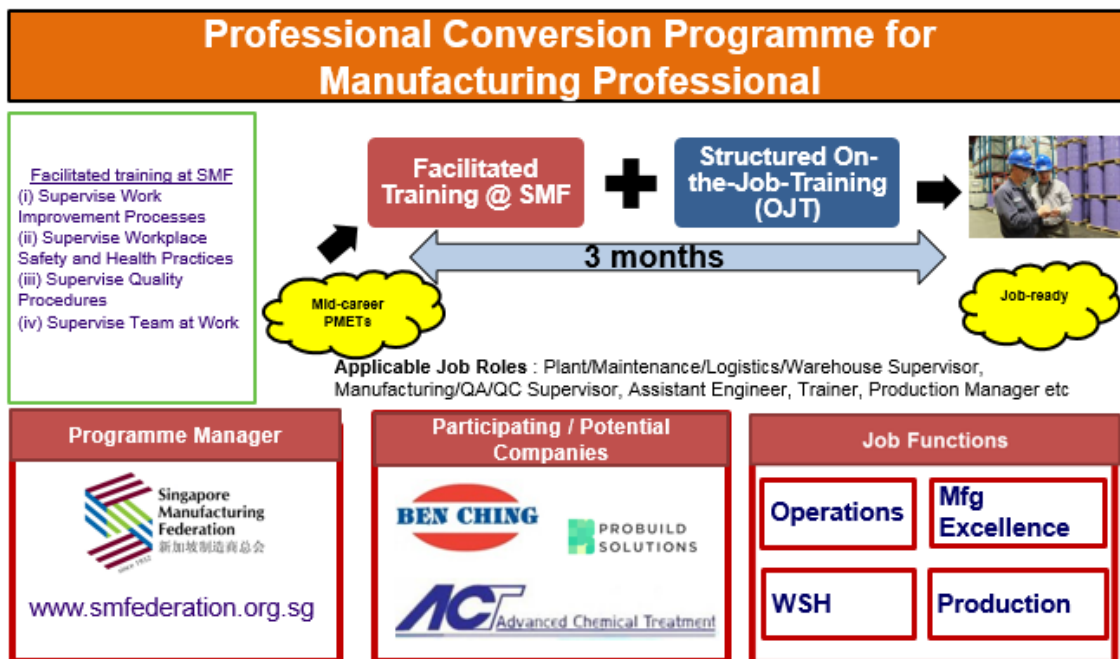
Duration: 3 months

Programme Manager: Singapore Manufacturing Federation (SMF)

Manufacturing Professional-level Modules

- WSQ Supervise Work Improvement Processes
- WSQ Supervise Workplace Safety and Health Practices
- WSQ Supervise Quality Procedures
- WSQ Supervise Teams at Work

Archetype of PCP for Manufacturing Professional



PCP for Technical Sales Engineer/Manager

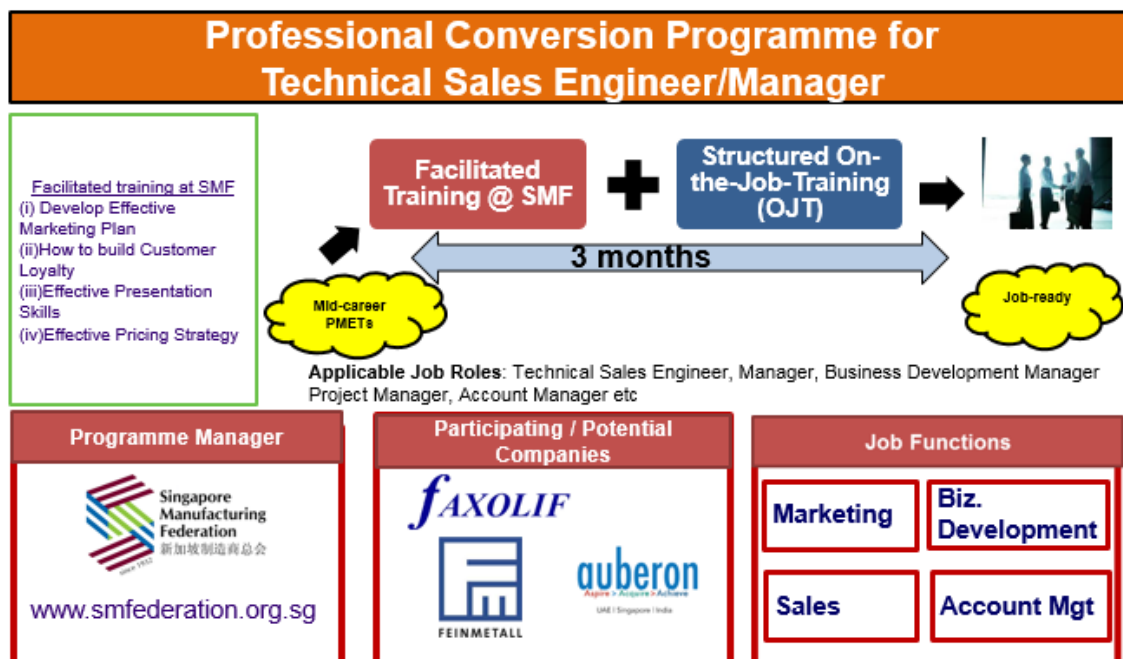
Duration: 3 months

Programme Manager: Singapore Manufacturing Federation (SMF)

Technical Sales Engineer/Manager-level Modules

- Develop Effective Marketing Plan
- How to build Customer Loyalty
- Effective Presentation Skills
- Effective Pricing Strategy

Archetype of PCP for Technical Sales Engineer/Manager



Programme Support for Companies

The PCPs aim to help lower the companies' cost of hiring mid-career switching PMETs by providing salary support at 70% of participant's monthly salary capped at \$4,000 per month for the PCP training period. Enhanced salary support of 90% of participant's monthly salary capped at \$6,000 per month will be applicable for Singapore Citizens (SC) who have been unemployed and actively seeking employment for more than 6 months, or mature SC PMETs who are aged 40 and above.

In addition to salary support, participating companies would also receive course fee support of up to 90%.

Eligibility Criteria

Participants must fulfil the following criteria:

- Be a Singapore Citizen or Singapore Permanent Resident;
- Be a newly-hired PMET and nominated by an eligible participating company for the PCP; and
- Must not be in a similar job role prior to joining PCP and have at least two years working experience

Participating companies must fulfil the following criteria:

- Registered or incorporated in Singapore;
- To issue a valid employment contract; and
- To be able to provide structured OJT training for the participant/s.

For further information, please contact:

| PCP | Contact |
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