Skills Framework For Electronics

An initiative of SKILLSFuture

A Guide to Occupations and Skills

Contents

PUBLISHED IN SEPTEMBER 2017

About the Skills Framework

The Skills Framework is a SkillsFuture initiative developed for the Singapore workforce to promote skills mastery and lifelong learning. Jointly developed by SkillsFuture Singapore (SSG), Workforce Singapore (WSG) and Singapore Economic Development Board (EDB) together with employers, industry associations, education and training providers and unions, the Skills Framework for Electronics provides useful information on:

1. Sector and Employment Opportunities
2. Career Pathways
3. Occupations and Job Roles
4. Existing and Emerging Skills
5. Training Programmes for Skills Upgrading and Mastery

With the Skills Framework, individuals are equipped to make informed decisions about career choices, as well as take responsibility for skills upgrading and career planning.

Assess Career Interests

- Discover employment opportunities
- Understand career pathways
- Recognise personal attributes required

Prepare for Desired Jobs

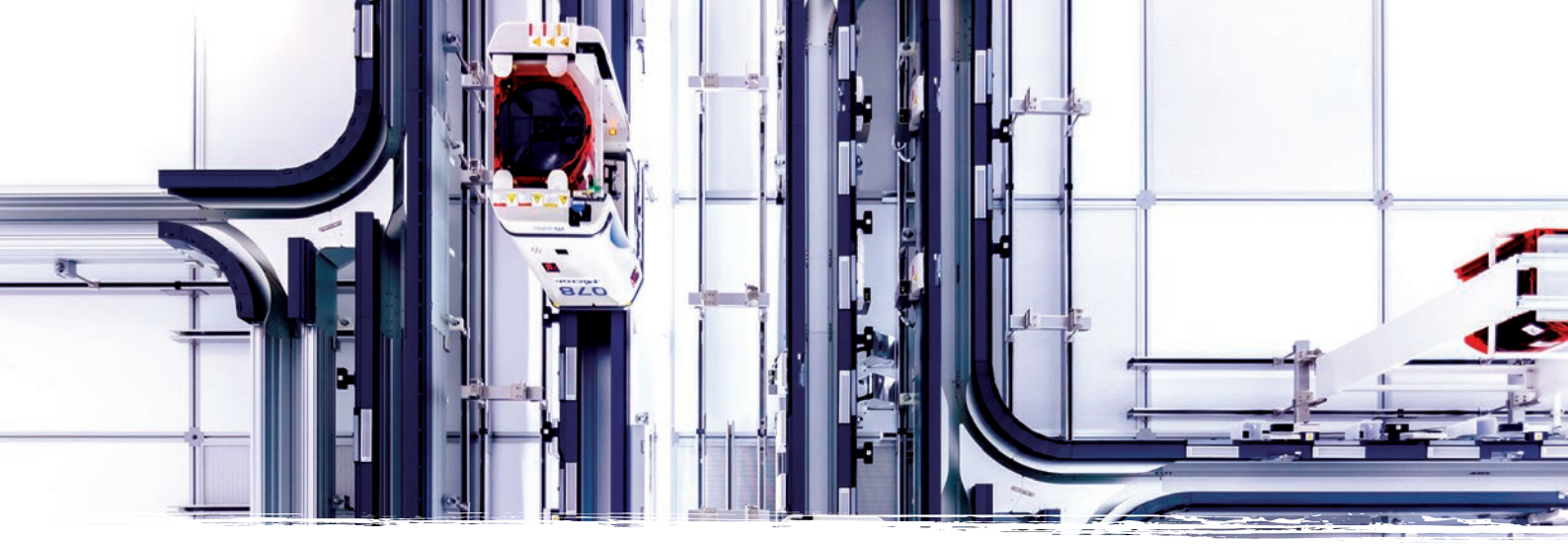
- Understand skills and competencies required

Find Avenues to Close Skills Gap

- Identify relevant training programmes to equip oneself with the required skills and competencies
- Participate in on-the-job training opportunities provided by companies

Renew, Upgrade and Deepen Skills

- Plan for career development / transition
- Recognise skills and competencies required for the intended job role
- Identify training programmes to upgrade and deepen skills



Electronics Manufacturing: Charting Growth and Opportunities

The marvels of electronics are all around us. These tiny circuits store information and process signals to power everyday gadgets, including mobile phones and laptops to more complex navigation systems, lighting controls and medical diagnostic instruments. They are the building blocks that enable many indispensable applications in our lives.

Electronics also form the core of Singapore's manufacturing sector and economy. In 2015, the electronics manufacturing industry recorded $85.6 billion in total output, accounting for 5.4 per cent of Singapore's Gross Domestic Product (GDP). From its modest beginning with assembly plants from pioneers such as Fairchild, National Semiconductor, and Texas Instruments in the late 1960s, Singapore's electronics manufacturing industry has grown to become an important player in the global electronics market, capturing increasingly sophisticated and high value-added activities.

Today, Singapore's semiconductor industry is one of the largest in the Asia Pacific region, having end-to-end capabilities across the value chain, from component design to wafer fabrication, packaging to testing. Singapore has more than 30 integrated circuit (IC) design centres, over 20 wafer fabrication plants, and over 15 companies with research and development (R&D) or manufacturing operations for IC assembly and test.

As the choice location for companies to create and manage new markets, Singapore provides the technology, manufacturing and business solutions to many of the world's leading electronic companies. Among them are eight of the world's top 10 fabless IC design companies[1], two of the world's top three pure-play foundries[2] and some of the world's top outsourced assembly and test companies.

Singapore is a leading manufacturer of hard disk drives and storage media with several multinational corporations (MNCs) having significant operations in Singapore. Beyond semiconductors, Singapore is also a key location for companies manufacturing passive component products, including Murata and RF360, a joint venture between TDK and Qualcomm. Singapore is home to six of the top 10 printer companies, including HP Inc's Printing Group, which designs and manufactures key components for its printers and presses in Singapore.

In addition, the electronics manufacturing industry is supported by a strong ecosystem of materials and equipment players who provide prominent electronics manufacturing and original device manufacturing services. Singapore is also an attractive location for leading original equipment manufacturers, such as Dell, HP, and IBM, to orchestrate their global operations, and develop and commercialise new products. Supported by its established electronics ecosystem, mission-critical and secure electronics products such as high-end servers, storage, and networking equipment are manufactured in Singapore.

As it advances to address the complex demands of the digital age, the electronics manufacturing industry offers exciting career opportunities for Singaporeans who are able to deepen both domain-specific skills and inter-disciplinary competencies.

1 http://press.trendforce.com/node/view/2706.html
2 http://www.icinsights.com/news/bulletins/PurePlay-Foundry-Market-Surges-11-In-2016-To-Reach-50-Billion/

Key Statistics

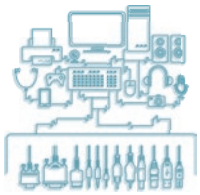
68,000

Singapore's electronics manufacturing sector employs more than 68,000 people in 2015

$85.6
BILLION

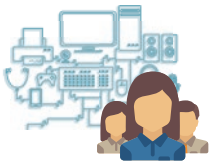
Electronics manufacturing output was $85.6 billion in 2015 and contributed 31.6% of Singapore's total manufacturing output

$2.2
BILLION

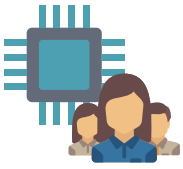


23.4%
across sectors

The electronics manufacturing industry invested $2.2 billion in fixed assets in 2016 which accounted for 23.4% of total investments across all industries



$277,200
/worker



$345,000
/worker

Value-added per worker was $277,200 in the electronics manufacturing industry and $345,000 in the semiconductor industry, higher than the overall manufacturing industry in the past 10 years

Source: Singapore Economic Development Board

Future Developments

The electronics industry in Singapore is positioned for continued growth. As the proportion of electronic content in applications increases, the growth of integrated circuits and electronic components is expected to outpace the growth in the applications. Continued breakthroughs in electronics will fuel the development of exciting applications, such as artificial intelligence, autonomous vehicles and smart factories.

With its push to become a Smart Nation by 2020, Singapore is an ideal place for companies to design, develop, and testbed solutions for these exciting applications. Responding to the Land Transport Authority's Smart Mobility 2030 roadmap, NXP collaborated with the Nanyang Technological University to establish a S$22 million Smart Mobility Consortium to test and develop vehicle-to-everything technology in 2015. A Telematics Centre of Competence was set up to develop telematics solutions – such as fleet monitoring, intelligent engine management and vehicle-to-everything applications — for the Asia-Pacific region.

At the same time, the adoption of advanced manufacturing will transform the way electronics manufacturing is done and keep Singapore globally competitive. Electronics manufacturing companies, in collaboration with solution providers, are leading advanced manufacturing innovation. The vision is for Singapore to be the most globally competitive, efficient and productive site for electronics manufacturing companies.

In addition, the government works closely with companies to implement digitalisation, automation and productivity initiatives. This will increase the sector's competitiveness while further differentiating Singapore as an electronics manufacturing hub that leads in technology innovation and adoption.

Recognising that talent is an important driver of this transformation, Singapore has put in place a comprehensive set of capability development schemes to address the electronics manufacturing industry's talent needs. As jobs in advanced manufacturing require new skill sets, the government partners with the industry to train and upskill the workforce and ensure that workers remain relevant. Instead of troubleshooting or maintaining equipment, the technicians of the future will be trained to programme and work alongside co-bots. At the same time, assistant engineers will be prepared with new skill sets to ensure an optimal zero-footprint production floor function.

Each year, Singapore's universities, polytechnics and vocational schools train more than 13,000 engineers and technicians. The Nanyang Technological University's VIRTUS IC Design Centre of Excellence goes further to train postgraduate students in analogue and mixed-signal design. Several scholarship schemes are available from electronics companies and from co-funded schemes with the Singapore Economic Development Board (EDB) to attract more individuals to be trained for engineering and technical jobs in electronics manufacturing.

Desired Attributes and Skills in Demand

A career in the electronics manufacturing industry provides diverse opportunities to individuals seeking rewarding and enriching careers from all backgrounds. Whether you are a person who excels in business innovation, loves working with people or specialises in information technology solutions, the electronics manufacturing industry offers all kinds of opportunities to develop your passion and grow your career.

As the sector continues to transform, these are some examples of skills in demand now and for the future. Those seeking successful careers in the electronics manufacturing industry can set themselves apart by developing these attributes and acquiring the skills in demand.

DESIRED ATTRIBUTES

Analytical
Enjoys analysing things from all angles and thinking of ways to solve problems

Structured and Systematic
Likes to work with numbers, records or machines in an orderly manner and in compliance with procedures, regulatory and safety requirements

Meticulous
Pays attention to fine details and accuracy

Team Player
Understands that each person is part of a larger team working together to bring about success at the workplace

Responsible
Recognises the importance of accountability to ensure work processes run reliably and efficiently

EMERGING TRENDS

Artificial Intelligence (AI)

Internet of Things (IoT) and Data Analytics

Robotics and Automation

EMERGING SKILLS

- Automated System Design

- Internet of Things Management
- Data Synthesis
- Data Analytics System Design

- Automation System Maintenance
- Automation Process Control
- Automated Operation Monitoring
- Automated System Design

Take Your Career Further

FOR STUDENTS

SUPPORT AND GUIDANCE

Education And Career Guidance (ECG)
Students in secondary schools can approach trained ECG counsellors to gain exposure to a wide range of education and career options to make informed post-secondary education choices. There is continued support while they are at the Institute of Technical Education (ITE), polytechnics, junior colleges and universities to help them make informed choices about their careers.

PRACTICAL EXPERIENCE

Enhanced Internships
The Enhanced Internships, where participating companies work closely with ITEs and polytechnics, are designed to provide students with meaningful internship experiences through more structured learning and support at the workplace. An intern will earn a baseline allowance of $600, participate in a structured training plan with clear learning outcomes and work closely with assigned mentors for guidance as they are rotated to at least two departments during the internship period.

Young Talent Programme (YTP)
Students from the ITEs, polytechnics and universities can embark on overseas internships to take on work and study programmes, which will prepare them for international assignments in their future careers.

AWARDS

Singapore-Industry Scholarship (SgIS)
The SgIS initiative offers scholarships for Singapore citizens at different stages of their university education, locally and overseas. It represents a strong government-industry partnership in talent development and helps participating companies build a good pipeline of fresh talent.

FOR WORKING ADULTS

SUPPORT AND GUIDANCE

Career Support Programme
Singaporeans who are retrenched or unemployed for six months or more can gain access to jobs that pay at least $4,000. These jobs will provide them with structured on-the-job training.

Education And Career Guidance (ECG)
With the help of trained ECG counsellors, Singaporeans in the workforce can benefit from career coaching, employability skills workshops, networking sessions and more through the Workforce Singapore (WSG) Careers Connect and the Employment and Employability Institute (e2i).

MySkillsFuture
MySkillsFuture is a one-stop online portal that enables Singaporeans to chart their own career and lifelong learning pathways, through access to industry information and tools to search for training programmes to broaden and deepen skills. It incorporates the national Jobs Bank, presenting an integrated platform for users to access resources related to jobs, education and skills training.

Place-And-Train Programmes
Individuals on place-and-train programmes can get hired by an employer before starting their training to acquire new skills.

P-Max
Singaporeans or Singapore Permanent Residents can gain access to career opportunities with small and medium-sized enterprises (SMEs), and benefit from workshops and progressive human resource practices designed to help them adapt to the working environment in SMEs.

Private Placement Provider Programme
Singaporeans who are unemployed for six months and beyond can tap on specialist career advisory and placement services provided by appointed private search and placement firms to widen their employer networks.

Professional Conversion Programme

Singaporeans can reskill and acquire the necessary knowledge and competencies to take on new jobs in growing sectors. Employers will receive 70-90% support for both salary and course fee.

Reskilling For Jobs – Work Trial

Singaporeans can gain experience through a short-term work stint and be offered employment to receive incentives of up to $1,100.

SkillsFuture Earn and Learn Programme

This is a work-learn programme for ITE and polytechnic graduates to be placed with employers, with opportunities to learn through structured on-the-job training and institution-based training. Those who successfully complete this programme will receive industry-recognised qualifications and a sign-on incentive.

AWARDS

SkillsFuture Fellowships

The SkillsFuture Fellowships are awards that recognise and help Singaporeans who have achieved significant depth in their skills to continue their pursuit of skills mastery. The Fellowship provides a cash reward of $10,000 to recipients.

SkillsFuture Leadership Development Initiative

This initiative supports aspiring Singaporeans in developing the necessary capabilities to take on new roles and increased responsibilities in their respective companies. Under this initiative, there will be more collaborations with companies to design and enhance developmental opportunities for high-potential talent.

SkillsFuture Mid-Career Enhanced Subsidy

Singaporeans aged 40 and above will receive higher subsidies of up to 90% of course fees for over 8,000 SkillsFuture-supported courses and at least 90% of programme cost for Ministry of Education (MOE)-subsidised full-time and part-time courses.

SkillsFuture Qualification Award

This award recognises the efforts of Singaporeans in attaining full WSQ qualifications, which equip them with a comprehensive and robust set of skills to perform their jobs competently, pursue career progression and explore new job opportunities.

SkillsFuture Study Award

A monetary award of $5,000 is given to adults in their early or mid-career who want to develop and deepen their skills in future growth clusters.

Legend:

- Ministry of Education (MOE)
- SkillsFuture Singapore (SSG)
- Workforce Singapore (WSG)

Realise Your Potential - Take the Next Step Forward

Now that you have some idea of what a career in the electronics manufacturing industry can offer and the available government initiatives and schemes to support your career goals, you are ready to take the next step!

NEW ENTRANTS

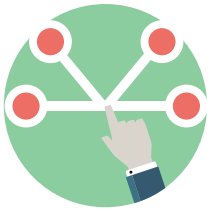
Use the Skills Framework for Electronics to find out about careers in the sector

UNDERSTAND the career pathways and the attributes needed to take on a particular occupation in the sector

UNDERSTAND the skills and competencies required for the job role and identify relevant training programmes to help you become a qualified personnel

EXPERIENCED PROFESSIONALS

Use the Skills Framework for Electronics to find out how to chart your career



PLAN for vertical career progression within the track that you are currently in, or for lateral career moves across the tracks

IDENTIFY skill gaps that you are lacking in your current or next job role

IDENTIFY relevant training programmes

TRAINING PROGRAMMES

Programmes that equip new entrants with skills and knowledge for specific occupations in the sector at their respective entry levels

Programmes for experienced employees or individuals to broaden or deepen specific skills and knowledge for various occupations in the sector

Embark on your career in Electronics Manufacturing

Lifelong learning for skills deepening to meet existing and emerging demands of the sector

For a list of training programmes available for the electronics manufacturing industry, please visit: **www.skillsfuture.sg/skills-framework**

Notes

Skills Maps

Technical and Engineering Page 13-62

Management Page 64-77

11

Technical And Engineering

Operator

JOB ROLE DESCRIPTION

The Operator operates machines and performs operational housekeeping work while adhering closely to standard work instructions and organisational procedures in a cleanroom environment. He/She operates machines in accordance with operational procedures. He conforms to management system requirements by ensuring that products and processes meet quality standards.

The Operator contributes to productivity improvements and is responsible for taking the initiative to implement corrective action. Above all, he needs to perform rotating shift work in accordance with work disposition records.

While performing the work activities, he must be able to interpret operation manuals and procedures. He must have team spirit and be able to interact effectively with others to achieve production and quality targets, while complying with Workplace Safety and Health requirements.

CRITICAL WORK FUNCTIONS AND KEY TASKS

CRITICAL WORK FUNCTIONS	KEY TASKS
Operate Machines	• Operate automated robots and system • Maintain cleanliness of machines during and after each shift • Operate network interface to monitor machines
Conform to Management System Requirements	• Conduct periodic checks on final products • Correct product or process to meet quality standards
Contribute to Continuous Improvement	• Keep records of defective final products • Take initiative to seek opportunities for improvement and implement corrective action

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Automated Operation Monitoring	Level 1
Automation Systems Maintenance	Level 1
Continuous Process Improvement	Level 1
Good Manufacturing Practices Implementation	Level 2
Hazards and Risk Control, and Policy Management	Level 2
Internet of Things (IoT) Management	Level 2
Manufacturing Process Management	Level 2
Quality Control and Assurance	Level 1
Quality Systems Management	Level 2

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Basic
Digital Literacy	Basic
Lifelong Learning	Basic
Problem Solving	Basic
Teamwork	Basic

Technician

JOB ROLE DESCRIPTION

The Technician performs routine maintenance work on the equipment and/or facilities and recommends equipment set-up improvements in accordance with work disposition records. He/She is responsible for controlling and monitoring maintenance processes for issues in accordance to organisational requirements. The Technician contributes to productivity improvements and is responsible for taking the initiative to implement corrective action.

He works on rotating shifts and is responsible for providing basic engineering technical support to ensure smooth production flow and process flow in accordance with organisational requirements.

He must have team spirit and be able to interact effectively with others to ensure that all issues are resolved appropriately and efficiently, while complying with Workplace Safety and Health requirements.

CRITICAL WORK FUNCTIONS AND KEY TASKS

CRITICAL WORK FUNCTIONS	KEY TASKS
Perform Maintenance Works	• Interpret the network and/or dashboard data to troubleshoot defects • Carry out routine preventive maintenance works • Support troubleshooting and process control of automated systems • Conduct routine equipment cleaning and inspection activities
Control Maintenance Process and Manufacturing Issues	• Interpret information provided by the network and/or dashboard for machine monitoring • Monitor process control automation to reduce process variations
Conform to Management System Requirements	• Record equipment performance in assigned lines • Suggest improvements in equipment set-up
Contribute to Continuous Improvement	• Keep records of defective final products • Take initiative to seek opportunities for improvements and implement corrective action

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Automated Operation Monitoring	Level 2
Automation Systems Maintenance	Level 2
Continuous Process Improvement	Level 2
Data Synthesis	Level 3
Electrostatic Discharge Control	Level 3
Equipment Maintenance	Level 2
Facilities Management	Level 2
Good Manufacturing Practices Implementation	Level 2
Hazards and Risk Control, and Policy Management	Level 2
Internet of Things (IoT) Management	Level 2
Quality Control and Assurance	Level 2
Quality Systems Management	Level 2

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Basic
Decision Making	Basic
Lifelong Learning	Basic
Problem Solving	Basic
Teamwork	Basic

> Environmental Health and Safety is a career that requires a lifetime of learning. Manufacturing is always changing due to technological innovation. We need to be able to keep up with newer technologies that are being adopted and to keep on striving for higher standards of safety in the organisation.

Staff Environmental Health and Safety Engineer

Jayavarma s/o Subramaniam
STATS ChipPAC Pte Ltd

GUARDING THE FACILITY'S SAFETY AND HEALTH

When Jayavarma s/o Subramaniam was a technical specialist in a manufacturing environment in his first job, he was given the opportunity to be part of the Environmental Health and Safety (EHS) committee. There he found his true passion. He went on to secure a job as a Staff Environmental Health and Safety Engineer next, at STATS ChipPAC's facilities department.

"After trying out various job functions, I find I really enjoy this role as it is safety-related," says Jayavarma. "It gives me personal satisfaction and fulfilment to ensure the well-being of stakeholders and to know that my contribution promotes their safety in STATS ChipPAC's premises."

His duties now include performing safety inspections, conducting internal training, facilitating regulatory checks, acting as secretary to the company's EHS committee and providing advice on EHS compliance to his colleagues.

Having to work closely with team members and other internal departments and to promote EHS awareness and compliance to the entire organisation, Jayavarma believes in having good communication skills with all levels of staff. One of the most challenging aspects of the job is to persuade the management to implement control measures that require substantial investment and time.

"The key challenge in promoting EHS awareness is to inculcate the right behaviours and create a safety culture; we cannot over-emphasise the importance of safety," he says. "It takes time, dedication and resources. We also have to value everyone's feedback to ensure rules and regulations are adhered to safely."

One of Jayavarma's most fulfilling projects was when he convinced his management to build a centralised chemical storage area to isolate the chemicals away from the main building. In other regular challenges, he looks into the safety aspects of ageing machinery and equipment that require repair and maintenance.

To raise his competency, he completed Level B to Level D in the Workplace Safety and Health Professionals Workforce Skills Qualification (WSH WSQ) Framework. He further underwent the NEBOSH international occupational health and safety general certificate course. As this was an international course, Jayavarma benefitted from the exchange of knowledge with other safety professionals from around the world. He also enrols for specialty courses, including one to improve the management of emergency readiness to help him plan and execute emergency drills.

Moving forward, he intends to broaden his knowledge in the safety sector, specifically in the technical and operational aspects. The Skills Framework for Electronics will guide him on how to complement his core skill set to make him a well-rounded contributor to attain higher standards of EHS for the organisation. His ambition is to gain additional knowledge by taking a Masters in Occupational Health and Safety from the National University of Singapore.

Assistant Facilities Engineer

JOB ROLE DESCRIPTION

The Assistant Facilities Engineer applies engineering principles and techniques to support facilities engineering processes in a manufacturing environment to meet organisational objectives. He/She also assists in analysing facilities maintenance issues.

In addition, the Assistant Facilities Engineer participates in facilities improvement projects, and partakes in the development of maintenance plans in accordance with organisational objectives.

The Assistant Facilities Engineer is required to have strong communication skills, good teamwork and an analytical mind to perform his role well to achieve the desired organisational outcomes.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Facility Engineering	• Assist in overseeing proper maintenance and repair works • Manage a service and repair team to co-ordinate ad-hoc facilities maintenance works • Assist to resolve facilities maintenance issues • Plan resources to support maintenance works
	Manage Facility Systems Capabilities	• Interpret information provided by the network and/or dashboard for facility performance monitoring • Maintain optimal facilities performance
	Conform to Management System Requirements	• Enforce good safety culture and maintenance practices • Ensure adherence to processes and procedures • Supervise maintenance works for Workplace Safety and Health compliance
	Contribute to Continuous Improvement	• Assist in implementation of improvement projects • Identify opportunities for continuous improvement projects • Perform evaluation and/or experiments • Collect data for analysis

Assistant Facilities Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 4
Continuous Process Improvement	Level 3
Data Analytics Systems Design	Level 3
Electrostatic Discharge Control	Level 3
Embedded Systems Integration	Level 4
Emergency Management	Level 3
Facilities Management	Level 3
Failure Analysis	Level 3
Good Manufacturing Practices Implementation	Level 3
Hazards and Risk Control, and Policy Management	Level 3
Innovation Management	Level 3
Internet of Things (IoT) Management	Level 3
Learning and Development	Level 2
Technical Presentations	Level 4
Quality Systems Management	Level 3
Report Writing	Level 3
Solutioning	Level 4
Workplace Safety and Health (WSH) Practices Implementation	Level 3
Quality Process Control	Level 3
Yield Analysis	Level 3

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Basic
Decision Making	Basic
Leadership	Basic
Lifelong Learning	Basic
Teamwork	Basic

Assistant Equipment Engineer

JOB ROLE DESCRIPTION

The Assistant Equipment Engineer applies engineering principles and techniques to support equipment engineering processes in a manufacturing environment to meet organisational objectives. He/She also assists in analysing equipment maintenance issues.

In addition, the Assistant Equipment Engineer participates in equipment improvement projects, and partakes in the development of maintenance plans in accordance with organisational objectives.

The Assistant Equipment Engineer is required to have strong communication skills, good teamwork and an analytical mind to perform his role well to achieve the desired organisational outcomes.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Equipment Engineering	• Perform set-up and conversion to support production • Assist in overseeing proper equipment maintenance and repair works • Assist to resolve equipment maintenance issues • Co-ordinate resources to support maintenance works
	Manage Equipment Capability	• Interpret information provided by the networks and/or dashboard for equipment performance monitoring • Maintain optimum equipment performance
	Conform to Management System Requirements	• Enforce good safety culture and maintenance practices • Ensure adherence to processes and procedures • Supervise maintenance works for Workplace Safety and Health compliance
	Contribute to Continuous Improvement	• Assist in implementation of improvement projects • Identify opportunities for continuous improvement projects • Perform evaluation and/or experiments • Collect data for analysis

Assistant Equipment Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 4
Automated Operations Monitoring	Level 3
Automation Process Control	Level 3
Automation Systems Maintenance	Level 3
Continuous Process Improvement	Level 3
Data Analytics Systems Design	Level 3
Electrostatic Discharge Control	Level 3
Embedded Systems Integration	Level 4
Emergency Management	Level 3
Equipment Maintenance	Level 3
Failure Analysis	Level 3
Good Manufacturing Practices Implementation	Level 3
Hazards and Risk Control, and Policy Management	Level 3
Innovation Management	Level 3
Internet of Things (IoT) Management	Level 3
Learning and Development	Level 2
Technical Presentations	Level 4
Quality Systems Management	Level 3
Report Writing	Level 3
Solutioning	Level 4
Workplace Safety and Health (WSH) Practices Implementation	Level 3

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Basic
Decision Making	Basic
Leadership	Basic
Lifelong Learning	Basic
Teamwork	Basic

Assistant Process Engineer

JOB ROLE DESCRIPTION

The Assistant Process Engineer applies engineering principles and techniques to support the production processes in a manufacturing environment to meet organisational objectives. He/She also assists in analysing manufacturing issues and makes recommendation for 'out of control' processes.

In addition, the Assistant Process Engineer participates in production and manufacturing systems improvement projects in accordance with organisational objectives.

The Assistant Process Engineer is required to have strong communication skills, good teamwork and an analytical mind to perform his role well to achieve the desired organisational outcomes.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Process Engineering	• Troubleshoot process deviations • Monitor manufacturing processes to reduce process variations • Analyse manufacturing process stability • Assist to resolve process engineering issues • Interpret information provided by the networks and/or dashboard for performance monitoring
	Conform to Management System Requirements	• Enforce good safety culture and good manufacturing practices • Ensure adherence to processes and procedures • Ensure the robustness of processes using process control tools • Supervise manufacturing works for Workplace Safety and Health compliance
	Contribute to Continuous Improvement	• Assist in implementation of improvement projects • Identify opportunities for continuous improvement projects • Perform evaluation and/or experiments • Collect data for analysis

Assistant Process Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 4
Continuous Process Improvement	Level 3
Data Analytics Systems Design	Level 3
Data Synthesis	Level 3
Electrostatic Discharge Control	Level 3
Embedded Systems Integration	Level 4
Emergency Management	Level 3
Failure Analysis	Level 3
Good Manufacturing Practices Implementation	Level 3
Hazards and Risk Control, and Policy Management	Level 3
Innovation Management	Level 3
Internet of Things (IoT) Management	Level 3
Learning and Development	Level 2
Manufacturing Process Management	Level 3
Technical Presentations	Level 4
Quality Systems Management	Level 3
Report Writing	Level 3
	Level 4
Workplace Safety and Health (WSH) Practices Implementation	Level 3

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Basic
Decision Making	Basic
Leadership	Basic
Lifelong Learning	Basic
Teamwork	Basic

Assistant Quality Engineer

JOB ROLE DESCRIPTION

The Assistant Quality Engineer applies engineering principles and techniques to support the achievement of quality targets and organisational objectives in a manufacturing environment. He/She also assists in analysing manufacturing and quality issues to make recommendations for 'out of control' processes.

In addition, the Assistant Quality Engineer participates in quality improvement projects in accordance with organisational objectives.

The Assistant Quality Engineer is required to have strong communication skills, good teamwork and an analytical mind to perform his role well to achieve the desired organisational outcomes.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Quality Engineering	• Ensure no expired tools in the production lines • Implement calibration cost reduction activities • Maintain production yield targets • Interpret information provided by the networks and/or dashboard for quality performance monitoring
	Conform to Management System Requirements	• Enforce good safety culture and good manufacturing practices • Ensure adherence to processes and procedures • Ensure all quality plans are properly documented and maintained • Attend to internal or external audit-related issues • Monitor quality control and assurance processes • Facilitate the implementation of quality systems in the organisation • Supervise manufacturing works for Workplace Safety and Health compliance
	Contribute to Continuous Improvement	• Assist in implementation of improvement projects • Identify opportunities for continuous improvement projects • Perform evaluation and/or experiments • Collect data for analysis

Assistant Quality Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 4
Continuous Process Improvement	Level 3
Data Analytics Systems Design	Level 3
Data Synthesis	Level 3
Electrostatic Discharge Control	Level 3
Embedded Systems Integration	Level 4
Emergency Management	Level 3
Failure Analysis	Level 3
Good Manufacturing Practices Implementation	Level 3
Hazards and Risk Control, and Policy Management	Level 3
Innovation Management	Level 3
Internet of Things (IoT) Management	Level 3
Learning and Development	Level 2
Material Qualification	Level 4
Metrology Management	Level 3
Product Testing	Level 3
Quality Control and Assurance	Level 3
Quality Process Control	Level 3
Quality Systems Management	Level 3
Report Writing	Level 3
Solutioning	Level 4
Technical Presentations	Level 4
Workplace Safety and Health (WSH) Practices Implementation	Level 3
Yield Analysis	Level 3

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Basic
Decision Making	Basic
Leadership	Basic
Lifelong Learning	Basic
Teamwork	Basic

Assistant Integration Engineer

JOB ROLE DESCRIPTION

The Assistant Integration Engineer applies engineering principles and techniques to support the analysis of process interactions and improve production yields in a manufacturing environment to meet organisational objectives. He/She also assists in analysing manufacturing processes and yield and/or reliability to ensure successful ramp up of new processes and/or products to production.

In addition, the Assistant Integration Engineer participates in yield improvement projects, and partakes in the development of 'out of control' plans in accordance with organisational objectives.

The Assistant Integration Engineer is required to have strong communication skills, good teamwork and an analytical mind to perform his role well to achieve the desired organisational outcomes.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Integration Engineering	• Interpret manufacturing processes and yields and/or reliability impact to enable successful ramp up of new processes and/or products to production • Support and implement process change requests • Implement robust technical improvement solutions
	Control Integration Processes	• Monitor 'Out of Control' (OOC) plans and maintain the Process Capability • Monitor in-line Statistical Process Control (SPC) parameters
	Conform to Management System Requirements	• Enforce good safety culture and manufacturing practices • Ensure adherence to processes and procedures • Ensure the robustness of processes using process control tools • Supervise manufacturing works for Workplace Safety and Health compliance
	Contribute to Continuous Improvement	• Assist in implementation of improvement projects • Identify opportunities for continuous improvement projects • Perform evaluation and/or experiments • Collect data for analysis

Assistant Integration Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 4
Continuous Process Improvement	Level 3
Data Analytics Systems Design	Level 3
Data Synthesis	Level 3
Defect Density Monitoring	Level 3
Electrostatic Discharge Control	Level 3
Embedded Systems Integration	Level 4
Emergency Management	Level 3
Failure Analysis	Level 3
Good Manufacturing Practices Implementation	Level 3
Hazards and Risk Control, and Policy Management	Level 3
Innovation Management	Level 3
Internet of Things (IoT) Management	Level 3
Learning and Development	Level 2
Manufacturing Process Management	Level 3
New Product Introduction	Level 3
Parametric Testing	Level 3
Process Integration	Level 3
Quality Systems Management	Level 3
Report Writing	Level 3
Solutioning	Level 4
Technical Presentations	Level 4
Workplace Safety and Health (WSH) Practices Implementation	Level 3

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Basic
Decision Making	Basic
Leadership	Basic
Lifelong Learning	Basic
Teamwork	Basic

Assistant Product Engineer

JOB ROLE DESCRIPTION

The Assistant Product Engineer applies engineering principles and techniques to improve the product yield and quality in a manufacturing environment to meet organisational objectives. He/She also assists in qualifying product testing to monitor product quality.

In addition, the Assistant Product Engineer participates in product and yield improvement projects, and partakes in the development of test programmes in accordance with organisational objectives.

The Assistant Product Engineer is required to have communication skills, good teamwork and an analytical mind to perform his role well to achieve the desired organisational outcomes.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Product Engineering	• Assist line support group in the troubleshooting of set-up related downtimes, and assist in site restoration • Assist in the qualification of new testers and test hardware • Assist in new test programmes verification • Monitor product quality to reduce quality deviations
	Control Product Issues	• Interpret information provided by the network and/or dashboard for product yield monitoring • Collaborate with production team to conduct in-depth engineering analysis • Evaluate low yield and quality assurance fail lots • Assist in engineering and reliability testing
	Conform to Management System Requirements	• Enforce good safety culture and manufacturing practices • Ensure adherence to processes and procedures • Supervise manufacturing work for Workplace Safety and Health compliance
	Contribute to Continuous Improvement	• Assist in implementation of improvement projects • Identify opportunities for continuous improvement projects • Perform evaluation and/or experiments • Collect data for analysis

Assistant Product Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 4
Continuous Process Improvement	Level 3
Data Analytics Systems Design	Level 3
Data Synthesis	Level 3
Electrostatic Discharge Control	Level 3
Emergency Management	Level 3
Failure Analysis	Level 3
Good Manufacturing Practices Implementation	Level 3
Innovation Management	Level 3
Learning and Development	Level 2
Manufacturing Process Design	Level 4
Material Qualification	Level 4
Metrology Management	Level 3
New Product Introduction	Level 3
Product Testing	Level 3
Quality Systems Management	Level 3
Report Writing	Level 3
Solutioning	Level 4
Technical Presentations	Level 4
Workplace Safety and Health (WSH) Practices Implementation	Level 3
Yield Analysis	Level 3

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Basic
Decision Making	Basic
Leadership	Basic
Lifelong Learning	Basic
Teamwork	Basic

Facilities Engineer

JOB ROLE DESCRIPTION

The Facilities Engineer applies engineering principles and techniques to optimise the facilities engineering processes in a manufacturing environment to meet organisational objectives. His/Her work includes ensuring proper installations, renovations and maintenance of facilities to minimise production delays. He needs to implement network solutions for facilities capability monitoring.

In addition, the Facilities Engineer leads facilities improvement projects, and develops a robust facilities maintenance plan in accordance with organisational objectives. He is also required to ensure compliance with Workplace Safety and Health and other regulatory requirements in his line.

The Facilities Engineer is required to have strong communication skills to lead a team to meet organisational outcomes. He is expected to guide and mentor the others under his charge.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Facilities Engineering	• Ensure proper facility installations and/or renovations on-site • Take charge of routine servicing teams and repair teams • Assist to plan and track all maintenance works • Investigate root causes of facilities failures
	Manage Facility System Capabilities	• Manage facilities system monitoring • Implement network solutions for capability monitoring • Adopt new technologies to improve facility systems
	Conform to Management System Requirements	• Enforce good safety culture and maintenance practices • Maintain quality assurance systems related to facilities maintenance • Monitor facilities performance data to establish good control parameters • Conduct technical presentations
	Contribute to Continuous Improvement	• Lead continuous improvement projects • Lead working level community to explore opportunities for improvement projects
	Influence Organisational Development	• Provide guidance to others • Develop training programmes for staff

Facilities Engineer

	TECHNICAL SKILLS AND COMPETENCIES		GENERIC SKILLS AND COMPETENCIES (TOP 5)	
SKILLS AND COMPETENCIES	Audit Management	Level 4	Communication	Intermediate
	Continuous Process Improvement	Level 4	Decision Making	Intermediate
	Data Analytics System Design	Level 4	Leadership	Intermediate
	Effectiveness Management	Level 4	Lifelong Learning	Intermediate
	Electrostatic Discharge Control	Level 4	Teamwork	Intermediate
	Embedded Systems Integration	Level 5		
	Emergency Management	Level 4		
	Enterprise Risk Management	Level 3		
	Facilities Management	Level 4		
	Factory Systems Management	Level 4		
	Failure Analysis	Level 4		
	Good Manufacturing Practices Implementation	Level 3		
	Hazards and Risk Control, and Policy Management	Level 4		
	Innovation Management	Level 3		
	Internet of Things (IoT) Management	Level 4		
	Learning and Development	Level 3		
	Operations Management	Level 4		
	Quality System Management	Level 4		
	Report Writing	Level 4		
	Solutioning	Level 5		
	Technical Presentations	Level 5		
	Workplace Safety and Health (WSH) Practices Implementation	Level 4		

> A skills framework provides the systematic menu to allow engineers to plan and upgrade their skills to be competent in multiple disciplines to harness new technology. Young engineers who may not have the depth of working experience will also understand what they really want to do or learn.

Final Test Technology Manager

Yusman Sugianto
Infineon Technologies Asia Pacific Pte Ltd

MANAGING TECHNOLOGY AND PEOPLE BETTER

When new products are introduced, semiconductor companies need to determine the best testing processes and equipment that will ensure the products are manufactured to meet the most demanding specifications, as productively as possible.

At Infineon, the job of coordinating the equipment and hardware strategy for the company's final test manufacturing operations in the region falls on Yusman Sugianto. He joined the company 17 years ago with a Bachelor of Engineering (Mechanical and Production) from the Nanyang Technological University and an inquisitive mind.

He believes that as Final Test Technology Manager at Infineon, he should always be ready to accept new challenges and ideas in his work. Engineers need to be open to embrace and harness new technology naturally, he says. With that mindset, he finds the most exciting aspect of his job is that he has to be in touch with new technology all the time.

"It's challenging to find ways to integrate these new technologies into our current operations, so that we can always reap its benefits, in terms of productivity and quality," he says.

Yusman even had the opportunity to initiate a co-patented idea for manufacturing process improvement once, which was implemented successfully to improve productivity throughout Infineon's manufacturing lines throughout the region. He also led the negotiation effort to sell the patent back to the solution provider, further reaping economic benefits for Infineon from one idea.

In addition to managing technology, another important aspect of Yusman's work is in managing people. Having progressed along the management track, he now leads a team of competent engineers to implement and roll-out new manufacturing solutions for Singapore's operations.

Describing the skill set needed for his job, he says: "With the ever increasing pace of technology innovation, one has to have multiple skills across different disciplines in order to excel in high-technology manufacturing. This is important because new technology normally comes from a fusion of existing technologies across different disciplines."

The Skills Framework for Electronics is therefore timely, in his opinion, as it allows for easy identification and clarity of the necessary skills required for the industry. It also makes the transferable skills more transparent to hiring companies to better assess a candidate's capability.

For Yusman and his team, a comprehensive range of courses is available at Infineon's training departments to upskill them for future demands. Yusman, himself, has taken a number of courses outside his core technical knowledge, for example, Business Model Innovation and effective presentation skills. He has also taken external management-related courses and plans to undergo more training to become a better people manager. He concludes, "Going for these courses has kept my mind attuned to new ideas and helps to open up more possibilities."

Equipment Engineer

JOB ROLE DESCRIPTION

The Equipment Engineer applies engineering principles and techniques to perform equipment engineering processes in a manufacturing environment to meet organisational objectives. His/Her work also includes ensuring proper installations and maintenance of equipment to minimise production delays. He needs to implement network solutions for equipment capability monitoring.

In addition, the Equipment Engineer leads equipment improvement projects, and develops robust equipment maintenance plans in accordance with organisational objectives. He would also be required to ensure compliance with Workplace Safety and Health, and other regulatory requirements in his line.

The Equipment Engineer is required to have strong communication skills to lead a team to meet organisational outcomes. He is expected to guide and mentor others under his charge.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Equipment Engineering	• Ensure proper equipment on-site installations • Take charge of routine servicing teams and repair teams • Assist to plan and track all maintenance works • Investigate root cause of equipment failures
	Manage Equipment Capability	• Manage equipment monitoring • Implement network solutions for capability monitoring • Adopt new technologies to improve equipment system
	Conform to Management System Requirements	• Enforce good safety culture and maintenance practices • Maintain quality assurance systems related to equipment maintenance • Monitor facility performance data to establish good control parameters • Conduct technical presentations
	Contribute to Continuous Improvement	• Lead continuous improvement projects • Lead working level community to explore opportunities for improvement projects
	Influence Organisational Development	• Provide guidance to others • Develop training programmes for staff

Equipment Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 4
Automated Operation Monitoring	Level 4
Automated Systems Design	Level 4
Automation Process Control	Level 4
Automation Systems Maintenance	Level 4
Continuous Process Improvement	Level 4
Data Analytics Systems Design	Level 4
Effectiveness Management	Level 4
Electrostatic Discharge Control	Level 4
Embedded Systems Integration	Level 5
Emergency Management	Level 4
Enterprise Risk Management	Level 3
Equipment Maintenance	Level 4
Factory Systems Management	Level 4
Failure Analysis	Level 4
Good Manufacturing Practices Implementation	Level 3
Hazards and Risk Control, and Policy Management	Level 4
Innovation Management	Level 3
Internet of Things (IoT) Management	Level 4
Learning and Development	Level 3
Operations Management	Level 4
Quality System Management	Level 4
Report Writing	Level 4
Solutioning	Level 5
Technical Presentations	Level 5
Workplace Safety and Health (WSH) Practices Implementation	Level 4

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Decision Making	Intermediate
Leadership	Intermediate
Lifelong Learning	Intermediate
Teamwork	Intermediate

> The Skills Framework has given me greater insights on the programmes that can help me build on the skills I need to be an effective Statistical Process Control champion. With changes in technology happening rapidly in the electronics industry, we have to continuously improve ourselves in skills and methodologies to stay relevant.

Process Engineer

Ryan Lai
STMicroelectronics

CONTINUING THE PROCESS OF IMPROVEMENT

Ryan Lai is a specialist of chemical vapour deposition, an important process in wafer fabrication. As a Senior Process Engineer at STMicroelectronics, he leads a team of engineers to implement real-time problem analysis and solutions to achieve quality, yield and cost targets for the process.

In his role, Ryan sets up and optimises process recipes on different equipment for the production of various technologies. He is also technically competent in statistical process control tools to establish good process margins and inline controls and to maintain process performance.

He has come a long way since he first joined the industry as a shift process engineer after graduating with a degree in Electrical and Electronic Engineering. The wafer fabrication operation is a multi-disciplinary environment with complex product technologies, production equipment and processes. After rotating through various roles and responsibilities and undergoing skills upgrading at the company, he has acquired the knowledge and experience to do his current job confidently and effectively.

"What keeps me going is that I get to learn new things every day," Ryan says. "There are always interesting and new issues and problems to solve. It is important to be willing to learn and upgrade ourselves."

Using the Skills Framework for Electronics, he undertook the Advanced Statistical Process control course to acquire additional statistical knowledge to be able to demonstrate the usefulness of statistical significant testing in engineering and decision making. He also went through the Design of Experiment programme to develop a systematic and efficient approach to analyse a product or system.

These analytical skills complement critical and logical thinking to help Ryan assess situations and solve problems from different perspectives. After 13 years on the job, he says that a process engineer also needs to work calmly under pressure and to pay meticulous attention to detail as small errors could cause an entire production line to stop.

He further stresses the importance of having good communication skills with colleagues. These skills once allowed him to change "old mindsets" to deploy a new system to handle non-production wafer products on the shop floor. He worked closely with operators and engineers on this project to perform shop floor review and to develop a simple but robust system that addressed issues while maintaining quality.

"Process engineers are required to work with people across the manufacturing process," he says. "We do need to be able to communicate new ideas effectively and to listen well to fully comprehend problems. The more you know about a problem, the more likely you are able to solve it."

To progress in his career path, he plans to make further use of the Skills Framework to acquire more management and technical skills to be able to lead a team to spearhead future innovations and systems.

Process Engineer

JOB ROLE DESCRIPTION

The Process Engineer applies engineering principles and techniques to optimise the production processes in a manufacturing environment to meet organisational objectives. His/Her work also includes troubleshooting process engineering issues and developing work instructions for 'out of control' processes. He needs to analyse manufacturing and/or maintenance issues and recommend engineering solutions.

In addition, the Process Engineer leads production and manufacturing systems improvement projects, and is expected to develop operation plans in accordance with organisational objectives. He would also be required to ensure compliance with Workplace Safety and Health, and other regulatory requirements in his line.

The Process Engineer is required to have strong communication skills to lead a team to meet organisational outcomes. He is expected to guide and mentor others under his charge.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Process Engineering	• Develop work instructions and control plans • Troubleshoot process engineering issues • Implement network solutions for production improvements
	Manage Process Capability	• Manage manufacturing processes using statistical modelling • Adopt new technologies to improve process monitoring • Investigate Out of Control (OOC) processes and improve the Process Capability • Review abnormality reports
	Conform to Management System Requirements	• Enforce compliance of safety and good manufacturing practices and processes in production areas • Maintain quality assurance systems • Monitor process performance data to establish good control parameters • Execute benchmarked reliability test plans • Conduct technical presentations • Investigate root causes of process failures
	Contribute to Continuous Improvement	• Lead continuous improvement projects • Lead working level community to explore opportunities for improvement projects
	Influence Organisational Development	• Provide guidance to others • Develop training programmes for staff

Process Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 4
Continuous Process Improvement	Level 4
Data Analytics Systems Design	Level 4
Data Synthesis	Level 4
Effectiveness Management	Level 4
Electrostatic Discharge Control	Level 4
Embedded Systems Integration	Level 5
Emergency Management	Level 4
Enterprise Risk Management	Level 3
Factory Systems Management	Level 4
Failure Analysis	Level 4
Good Manufacturing Practices Implementation	Level 3
Hazards and Risk Control, and Policy Management	Level 4
Innovation Management	Level 3
Internet of Things (IoT) Management	Level 4
Learning and Development	Level 3
Manufacturing Process Management	Level 4
Operations Management	Level 4
Quality Systems Management	Level 4
Report Writing	Level 4
Solutioning	Level 4
Technical Presentations	Level 5
Workplace Safety and Health (WSH) Practices Implementation	Level 4

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Decision Making	Intermediate
Leadership	Intermediate
Lifelong Learning	Intermediate
Teamwork	Intermediate

Quality Engineer

JOB ROLE DESCRIPTION

The Quality Engineer applies engineering principles and techniques to meet the quality targets and organisational objectives in a manufacturing environment. His/Her work also includes troubleshooting and making recommendations on quality. He needs to analyse manufacturing issues and implement network solutions for quality targets tracking.

In addition, the Quality Engineer leads quality improvement projects, and is expected to establish good quality control parameters in accordance with organisational objectives. He would also be required to ensure compliance with Workplace Safety and Health, and other regulatory requirements in his line.

The Quality Engineer is required to have strong communication skills to lead a team to meet organisational outcomes. He is expected to guide and mentor the other Engineers under his charge.

CRITICAL WORK FUNCTIONS AND KEY TASKS	CRITICAL WORK FUNCTIONS	KEY TASKS
	Administer Quality Engineering	• Manage calibration and measurement systems for all operations • Troubleshoot and make recommendations on quality issues • Drive calibration cost reduction activities • Implement network solutions for product quality improvements • Adopt new technologies to improve quality control • Develop effective corrective plans for customers on problem prevention and/or resolution
	Conform to Management System Requirements	• Enforce compliance of safety and good manufacturing practices and processes in production areas • Maintain quality assurance systems • Monitor quality performance data to establish good control parameters • Conduct internal or external audits • Execute benchmarked reliability test plans • Conduct technical presentations • Investigate root causes of product and process failures
	Contribute to Continuous Improvement	• Lead continuous improvement projects • Lead working level community to explore opportunities for improvement projects
	Influence Organisational Development	• Provide guidance to other engineers • Develop training programmes for staff

Quality Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 4
Continuous Process Improvement	Level 4
Data Analytics Systems Design	Level 4
Data Synthesis	Level 4
Effectiveness Management	Level 4
Electrostatic Discharge Control	Level 4
Embedded Systems Integration	Level 5
Emergency Management	Level 4
Enterprise Risk Management	Level 3
Factory Systems Management	Level 4
Failure Analysis	Level 4
Good Manufacturing Practices Implementation	Level 3
Hazards and Risk Control, and Policy Management	Level 4
Innovation Management	Level 3
Internet of Things (IoT) Management	Level 4
Learning and Development	Level 3
Materials Qualification	Level 5
Metrology Management	Level 4
Operations Management	Level 4
Product Testing	Level 4
Quality Control and Assurance	Level 4
Quality Process Control	Level 4
Quality Systems Management	Level 4
Report Writing	Level 4
Solutioning	Level 5
Technical Presentations	Level 5
Workplace Safety and Health (WSH) Practices Implementation	Level 4
Yield Analysis	Level 4

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Decision Making	Intermediate
Leadership	Intermediate
Lifelong Learning	Intermediate
Teamwork	Intermediate

Integration Engineer

JOB ROLE DESCRIPTION

The Integration Engineer applies engineering principles and techniques to analyse process interactions and improve production yields in a manufacturing environment to meet organisational objectives. His/Her work also includes analysing possible issues before New Product Introduction (NPI). He needs to fine-tune existing process technologies for baseline improvements and support continuous yield enhancements.

In addition, the Integration Engineer leads yield improvement projects. He is expected to develop failure mode analysis to address process deviations and run Design for Experiments (DOEs) to optimise process margins and determine process specifications in accordance with organisational objectives. He is also required to ensure compliance with Workplace Safety and Health and other regulatory requirements in his line.

The Integration Engineer is required to have strong communication skills to lead a team to meet organisational outcomes. He is expected to guide and mentor the others under his charge.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Integration Engineering	• Analyse possible issues before New Product Introduction (NPI) • Develop Failure Mode and Effect Analysis (FMEA) to address process deviations • Formulate robust technical improvement solutions • Fine-tune existing process technologies for baseline improvements and support continuous yield enhancements
	Control Integration Processes	• Run DOEs to optimise process margins and determine process and technical specifications • Run prototype lots on new or derivative processes • Identify and resolve process integration issues • Review manufacturing process change requests • Identify and implement yield opportunities and set preliminary yield targets
	Conform to Management System Requirements	• Enforce compliance of safety and good manufacturing practices and processes in production areas • Maintain quality assurance systems • Monitor process performance data to establish good control parameters • Conduct technical presentations
	Contribute to Continuous Improvement	• Lead continuous improvement projects • Lead working level community to explore opportunities for improvement projects
	Influence Organisational Development	• Provide guidance to other engineers • Develop training programmes for staff

Integration Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 4
Continuous Process Improvement	Level 4
Data Analytics Systems Design	Level 4
Data Synthesis	Level 4
Defect Density Monitoring	Level 4
Effectiveness Management	Level 4
Electrostatic Discharge Control	Level 4
Embedded Systems Integration	Level 5
Emergency Management	Level 4
Enterprise Risk Management	Level 3
Factory Systems Management	Level 4
Failure Analysis	Level 4
Good Manufacturing Practices Implementation	Level 3
Hazards and Risk Control, and Policy Management	Level 4
Innovation Management	Level 3
Internet of Things (IoT) Management	Level 4
Learning and Development	Level 3
Manufacturing Process Management	Level 4
New Product Introduction	Level 4
Operations Management	Level 4
Parametric Testing	Level 4
Technical Presentations	Level 5
Process Integration	Level 4
Quality Systems Management	Level 4
Report Writing	Level 4
Solutioning	Level 5
Workplace Safety and Health (WSH) Practices Implementation	Level 4

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Decision Making	Intermediate
Leadership	Intermediate
Lifelong Learning	Intermediate
Teamwork	Intermediate

Product Engineer

JOB ROLE DESCRIPTION

The Product Engineer applies engineering principles and techniques to manage product issues in a manufacturing environment to meet organisational objectives. His/Her work also includes evaluating the process efficiency, quality and safety of finished products. He needs to perform test correlation, evaluation, and test characterisation on new products and implement network solutions for product test results tracking.

In addition, the Product Engineer leads production and manufacturing systems improvement projects, and is expected to develop test programmes in accordance with organisational objectives. He is also required to ensure compliance with Workplace Safety and Health, and other regulatory requirements in his line.

The Product Engineer is required to have strong communication skills to lead a team to meet organisational outcomes. He is expected to guide and mentor the other Engineers under his charge.

CRITICAL WORK FUNCTIONS AND KEY TASKS	CRITICAL WORK FUNCTIONS	KEY TASKS
	Administer Product Engineering	• Interface with customer on product-related issues • Provide assessment and information on test capabilities and provide resolutions to barriers and/or constraints • Provide required test support needs by production team • Implement network solutions for product quality improvements
	Control Product Issues	• Perform required test correlations, evaluations, and test characterisation on new products • Implement test programmes, hardware and major set-up issues in mass production • Review manufacturing process change requests • Handle test requests, reviews and abnormality report status
	Conform to Management System Requirements	• Enforce compliance of safety and good manufacturing practices and processes in production areas • Monitor process performance data to establish good control parameters • Conducts technical presentations
	Contributes to Continuous Improvement	• Evaluate and recommend process changes for improvements to help improve yield, quality and cycle times • Lead continuous improvement projects • Lead working level community to explore opportunities for improvement projects
	Influence Organisational Development	• Provide guidance to other engineers • Develop training programmes for staff

Product Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 4
Data Analytics Systems Design	Level 4
Data Synthesis	Level 4
Effectiveness Management	Level 4
Electrostatic Discharge Control	Level 4
Emergency Management	Level 4
Enterprise Risk Management	Level 3
Factory Systems Management	Level 4
Failure Analysis	Level 4
Good Manufacturing Practices Implementation	Level 4
Innovation Management	Level 4
Learning and Development	Level 3
Manufacturing Process Design	Level 5
Materials Qualification	Level 5
Metrology Management	Level 4
New Product Introduction	Level 4
Operations Management	Level 4
Product Testing	Level 4
Production Resource Management	Level 4
Quality Systems Management	Level 4
Solutioning	Level 5
Workplace Safety and Health (WSH) Practices Implementation	Level 4
Yield Analysis	Level 4

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Decision Making	Intermediate
Leadership	Intermediate
Lifelong Learning	Intermediate
Teamwork	Intermediate

Senior Facilities Engineer

JOB ROLE DESCRIPTION

The Senior Facilities Engineer is responsible for the day-to-day facilities operations including maintaining uptime and operations of facilities to meet business needs. He/She, as the subject matter expert, is required to manage maintenance for all facilities and adopt new technologies to improve facilities system and facilities capability indices. He is responsible for developing a management system to ensure operations meet both internal and external parties' quality requirements.

He has to take the lead in managing cross-functional teams in continuous improvement projects and assist in implementing process improvement projects. He plays an important role in organisational development through the development of on-the-job training and mentoring of team leaders.

The Senior Facility Engineer possesses an analytical mind and leadership skills to steer the team to perform their best and achieve the desired organisational outcomes.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Facility Engineering	• Maintain uptime and operations of facility systems • Manage outsourced services to ensure fulfilment of contract terms and agreements • Coordinate with sub-contractors, vendors or local authorities for any new installations or system re-location • Resolve facility maintenance issues
	Manage Facility System Capabilities	• Manage maintenance for all facilities • Improve facility capability indices to meet organisation goals • Design data monitoring systems to aid data analytics • Adopt new technologies to improve facility systems
	Conform to Management System Requirements	• Develops quality systems to ensure that operations meet both internal and external parties' quality requirements • Enhance safety procedures and ensure good housekeeping in the respective area of responsibilities
	Contribute to Continuous Improvement	• Lead cross-functional teams in continuous improvement projects • Collaborate with stakeholders in improvement activities to meet organisational goals
	Influence Organisational Development	• Develop on-the-job training programmes • Develop workplace learning plans • Develop team leaders through capability development and coaching • Lead team leaders in the development of business unit strategies and operational plans

Senior Facilities Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 5
Change Management	Level 3
Conflict Management	Level 4
Continuous Process Improvement	Level 5
Crisis Situations Management	Level 3
Data Analytics Systems Design	Level 5
Effectiveness Management	Level 5
Enterprise Risk Management	Level 4
Facilities Management	Level 5
Factory Systems Management	Level 5
Failure Analysis	Level 5
Innovation Management	Level 4
Internet of Things (IoT) Management	Level 5
Learning and Development	Level 4
Operations Management	Level 5
Organisational Analysis	Level 4
Organisational Strategising	Level 4
People Capability Development	Level 4
Quality Systems Management	Level 5
Vision Management	Level 3
Workplace Safety and Health (WSH) Systems Management	Level 5

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Creative Thinking	Intermediate
Decision Making	Intermediate
Leadership	Advanced
Lifelong Learning	Intermediate

Senior Equipment Engineer

JOB ROLE DESCRIPTION

The Senior Equipment Engineer is responsible for the day-to-day equipment operations, including maintaining uptime and operation of equipment systems to meet business needs. He/She, as the subject matter expert, is required to manage maintenance for all equipment and adopt new technologies to improve equipment capability indices. He is responsible for developing a management system to ensure that operations meet both internal and external parties' quality requirements.

He has to take the lead in managing cross-functional teams in continuous improvement projects and assist in implementing process improvement projects. He plays an important role in organisational development through development of on-the-job training and mentoring of team leaders.

The Senior Equipment Engineer possesses an analytical mind and leadership skills to steer the team to perform their best and achieve the desired organisational outcomes.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Equipment Engineering	• Maintain uptime and operations of equipment systems • Manage contractors for outsourced services to ensure fulfilment of contract terms and agreements • Coordinate with sub-contractors, vendors or local authorities for any new installation or equipment re-location • Resolve equipment maintenance issues
	Manage Equipment Capability	• Manage maintenance for all equipment • Improve equipment capability indices to meet organisation goals • Design data monitoring systems to aid data analytics • Adopt new technologies to improve equipment systems
	Conform to Management System Requirements	• Ensure operations meet both internal and external parties' quality requirements • Enhance safety procedures and ensure good housekeeping in the area of responsibilities
	Contribute to Continuous Improvement	• Lead cross-functional teams in continuous improvement projects • Collaborate with stakeholders in improvement activities to meet organisational goals
	Influence Organisational Development	• Develop on-the-job training programmes • Develop workplace learning plans • Develop team leaders through capability development and coaching • Lead team leaders in the development of business unit strategies and operational plans

Senior Equipment Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 5
Automated System Design	Level 5
Automation Process Control	Level 5
Automation Systems Maintenance	Level 5
Change Management	Level 3
Conflict Management	Level 4
Continuous Process Improvement	Level 5
Crisis Situations Management	Level 3
Data Analytics Systems Design	Level 5
Effectiveness Management	Level 5
Enterprise Risk Management	Level 4
Equipment Maintenance	Level 5
Factory Systems Management	Level 5
Failure Analysis	Level 5
Innovation Management	Level 4
Internet of Things (IoT) Management	Level 5
Learning and Development	Level 4
Operations Management	Level 5
Organisational Analysis	Level 4
Organisational Strategising	Level 4
People Capability Development	Level 4
Quality Systems Management	Level 5
Vision Management	Level 3
Workplace Safety and Health (WSH) Systems Management	Level 5

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Creative Thinking	Intermediate
Decision Making	Intermediate
Leadership	Advanced
Lifelong Learning	Intermediate

Senior Process Engineer

JOB ROLE DESCRIPTION

The Senior Process Engineer evaluates processes to optimise production capabilities and reviews the technical environment to meet business needs. He/She, as the subject matter expert, is required to analyse manufacturing process gaps to address product defect issues and improve process capability indices to meet product line targets. He is responsible for developing a management system to ensure operations meet both internal and external parties' quality requirements.

He has to take the lead in managing cross-functional teams in continuous improvement projects and assist in implementing process improvement projects. He plays an important role in organisational development through the development of on-the-job training and mentoring of team leaders.

The Senior Process Engineer possesses an analytical mind and leadership skills to steer the team to perform their best and achieve the desired organisational outcomes.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Process Engineering	• Ensure technical operations meet daily output yield targets • Analyse manufacturing process gaps to address product defect issues • Design data monitoring systems to aid data analytics
	Manage Process Capability	• Evaluate processes to optimise process capability • Improve process capability indices to meet organisation goals • Develop new process capability for new product lines
	Conform to Management System Requirements	• Develop quality systems to ensure operations meet both internal and external parties' quality requirements • Enhance safety procedures and ensure good housekeeping in the area of responsibilities
	Contribute to Continuous Improvement	• Formulate strategies for manufacturing process performance improvements • Lead cross-functional teams in continuous improvement projects • Collaborate with stakeholders in improvement activities to meet organisational goals
	Influence Organisational Development	• Develop on-the-job training programmes • Develop workplace learning plans • Develop team leaders through capability development and coaching • Lead team leaders in the development of business unit strategies and operational plans

Senior Process Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 5
Change Management	Level 3
Conflict Management	Level 4
Continuous Process Improvement	Level 5
Crisis Situations Management	Level 3
Data Analytics System Design	Level 5
Data Synthesis	Level 5
Effectiveness Management	Level 5
Enterprise Risk Management	Level 4
Factory Systems Management	Level 5
Failure Analysis	Level 5
Innovation Management	Level 4
Innovation Management	Level 5
Learning and Development	Level 4
Manufacturing Process Management	Level 5
Operations Management	Level 5
Organisational Analysis	Level 4
Organisational Strategising	Level 4
People Capability Development	Level 4
Quality System Management	Level 5
Vision Management	Level 3
Workplace Safety and Health (WSH) Systems Management	Level 5

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Creative Thinking	Intermediate
Decision Making	Intermediate
Leadership	Advanced
Lifelong Learning	Intermediate

> As quality engineers, we believe in doing the right thing even when no one is looking. We need to be responsible for the product we are producing and the safety of the product for our customers.

Senior Quality Engineer

Lim Chek Hoon

Systems on Silicon Manufacturing Company Pte Ltd

STRENGTHENING THE QUALITY MINDSET

Lim Chek Hoon has always enjoyed working in a chemical laboratory. She is also detailed and analytical by nature. So after a few years working in the hard disk drive industry, she found her true calling working as a quality engineer at Systems on Silicon Manufacturing Company, a joint venture between NXP Semiconductors and Taiwan Semiconductor Manufacturing Company.

Now, as Senior Engineer (Quality) 17 years later, she oversees the operations of the chemical laboratory that handles the quality assurance of the chemicals, ultra-pure water, wafers, air and incoming materials involved in semiconductor manufacturing. The role of her chemical laboratory is crucial in ensuring the final quality of the chips the company manufactures.

"In the manufacturing process, every step is important; and we have to ensure that the quality of all these monitoring parameters is within the base line," says Chek Hoon. "If there is any anomaly, we need to trigger the affected department to take action before it becomes an out-of-control case."

For the team of nine that she supervises, she stresses the importance of having a quality mindset and the passion to do the job well. Data has to be captured accurately and reported to the requesting departments on time to avoid delaying the manufacturing process.

"Every chip counts in our company," said Chek Hoon. "If we do not take action to deal with anomaly in a timely manner, we will affect the quality, performance and safety of our customers' products, such as cars, medical devices and mobility devices."

Describing the team as trouble-shooters and investigators, she adds, "The process of finding the root cause of a problem, especially out-of-control cases, is very interesting and challenging. And once we have identified the root cause, we need to stand firm, be almost stubborn about our findings, to make sure the problem is addressed. Quality must be ingrained into everyone's DNA."

According to Chek Hoon, working in the quality team requires an individual to be analytical and investigative. The Skills Framework for Electronics provides the guidance on the skills an individual needs to progress up the Quality specialisation in the Technical and Engineering track. The formal training complements the on-the-job training to equip the individual with skills to use the different tools and methodologies, such as 8D problem solving disciplines, failure mode effects analysis and statistical process control for trouble-shooting.

The formal training also outlines safety procedures for working with hazardous chemicals in the laboratory. In addition, she finds that productivity and automation courses on tools, such as Microsoft VBA and Excel, are important in helping her team members work more efficiently in data analysis.

As she progressed to a supervisory position, Chek Hoon also stepped up in acquiring soft skills such as how to manage people with empathy, how to communicate effectively and how to do performance appraisals. She plans to learn more about how to manage a laboratory well, through courses as well as benchmarking trips to the parent laboratory in Taiwan, to be able to bring improvements, best practices and new methodologies to Singapore.

Senior Quality Engineer

JOB ROLE DESCRIPTION

The Senior Quality Engineer evaluates and manages quality systems, tools and standards to meet business needs. He/She, as the subject matter expert, is required to identify risk areas, ensure the robustness of the risk control plans deployed for excursion free launch and conduct qualification and/or validation for new materials. He is responsible for developing a management system to ensure that operations meet both internal and external parties' quality requirements.

He has to take the lead in managing cross-functional teams in continuous improvement projects and assist in implementing process improvement projects. He plays an important role in organisational development through development of on-the-job training and mentoring of team leaders.

The Senior Quality Engineer possesses an analytical mind and leadership skills to steer the team to perform their best and achieve the desired organisational outcomes.

CRITICAL WORK FUNCTIONS AND KEY TASKS	CRITICAL WORK FUNCTIONS	KEY TASKS
	Administer Quality Engineering	• Evaluate calibration and measurement analysis systems for improvements • Conduct qualification and validation tests for new materials • Identify risk areas and ensure risk control plans are deployed for excursion free launch • Deploy control plans for smooth production flows • Manage quality systems certification
	Conform to Management System Requirements	• Develop, drive and communicate quality systems to ensure operations meet both internal and external parties' quality requirements • Enhance safety procedures and ensure good housekeeping in the area of responsibilities • Conduct audit validation and drive systemic solutions with team members • Manage quality planning to complement quality systems • Drive compliance in quality policies and procedures
	Contribute to Continuous Improvement	• Lead cross-functional teams in continuous improvement projects • Lead continuous improvement projects • Collaborate with stakeholders in improvement activities to meet organisational goals • Identify system gaps and enhancements in the quality management systems • Formulate and implement quality project plans in joint consultation with stakeholders
	Influence Organisational Development	• Develop on-the-job training programmes • Develop workplace learning plans • Develop team leaders through capability development and coaching • Lead team leaders in the development of business unit strategies and operational plans

Senior Quality Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 5
Change Management	Level 3
Conflict Management	Level 4
Continuous Process Improvement	Level 5
Crisis Situations Management	Level 3
Data Analytics System Design	Level 5
Data Synthesis	Level 5
Effectiveness Management	Level 5
Enterprise Risk Management	Level 4
Factory Systems Management	Level 5
Failure Analysis	Level 5
Innovation Management	Level 4
Internet of Things (IoT) Management	Level 5
Learning and Development	Level 4
Metrology Management	Level 5
Operations Management	Level 5
Organisational Analysis	Level 4
Organisational Strategising	Level 4
People Capability Development	Level 4
Product Testing	Level 5
Quality Control and Assurance	Level 5
Quality Process Control	Level 5
Quality Systems Management	Level 5
Vision Management	Level 3
Workplace Safety and Health (WSH) Systems Management	Level 5
Yield Analysis	Level 5

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Creative Thinking	Intermediate
Decision Making	Intermediate
Leadership	Advanced
Lifelong Learning	Intermediate

> I make it my personal mission to create developmental opportunities for my team members, to continue to grow and develop talents with deep skill sets. Training on new technology will allow them to reach their maximum potential and achieve higher levels of efficiency and effectiveness on the job.

Product Integration Engineering Director

Fu Wei
Micron Semiconductor Asia

RAMPING UP TO MEET FUTURE DEMANDS

Micron Technology, Inc. is a world leader in innovative memory solutions that transform how the world uses information. The group established its initial presence in Singapore nearly two decades ago and has a workforce of over 7,500 here today. In 2016, when Micron expanded its flash memory fabrication facility on North Coast Drive in Singapore, it expected to increase its 3D NAND flash memory production significantly to respond quickly to market conditions.

Working behind the scenes was Fu Wei, Product Integration Engineering Director at Micron, who was part of a multi-skilled team to improve the first 3D NAND production yield to maturity and beyond. With 18 years of experience managing various portfolios in the company, Fu Wei had an end-to-end view of how to integrate and optimise processes to improve both yield and quality.

Enhancements in yield and quality are crucial in supporting the larger objectives of capacity improvement and cost reduction in a manufacturing or fabrication facility. When the grand opening of the expanded 3D NAND flash memory fabrication facility went smoothly and successfully, Fu Wei looks back at the project as one of the proudest achievements of his career.

However, solving such complex yield and quality problems is all in a day's work for him. He has also successfully led the Micron 80series DRAM technology transfer project at Micron Technology Virginia, setting new benchmarks in yield and quality.

"Joining this role in Micron has allowed me to be continuously challenged to solve difficult problems as we aim to be at the forefront of advancement in technologies and innovation," says Fu Wei. "In my different portfolios – from managing starting materials silicon wafers and handling return materials from customers to product quality engineering and process integration — I have learnt new skills and knowledge. It is this excitement of taking on new challenges, and learning along the way, that motivates me."

Fu Wei advises young engineers joining the sector to have a passion for the job as well as an attitude for teamwork. He also places great importance on the ability to learn as product integration deals with new technology node changes every year, which bring new challenges and opportunities for technological breakthroughs. The Skills Framework for Electronics will guide his team members as they equip themselves with new skills to create better solutions for tomorrow's challenges.

As he moves up in seniority, he has had to acquire soft skills to complement his hard engineering skills. More recently, he completed the People Leadership – Supervisory Skills and Critical Thinking Skills programmes under the WSQ framework, to hone his skills in analytical thinking, leadership and people management. As he looks ahead, he plans to develop and empower his team of more than 100 engineers with new skills and knowledge to contribute to the company.

Senior Integration Engineer

JOB ROLE DESCRIPTION

The Senior Integration Engineer develops and converges new processes to meet business needs. His/Her work also includes assessing production processes and machines to identify possible limitations during technology development phases. He, as the subject matter expert, is required to qualify integrated processes to meet business and time-to-market requirements and also collaborate with external suppliers to explore possibilities of integrating their technology to future products. He is responsible for developing a management system to ensure that operations meet both internal and external parties' quality requirements.

He has to take the lead in managing cross-functional teams in continuous improvement projects and assist in implementing process improvement projects. He plays an important role in organisational development through development of on-the-job training and mentoring of team leaders.

The Senior Integration Engineer possesses an analytical mind and leadership skills to steer the team to perform their best and achieve the desired organisational outcomes.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Product and Process Engineering	• Develop and converge new processes • Manage devices and process developments to meet customers' requirements • Assess production processes and machines to identify possible limitations during technology development phases • Qualify integrated processes to meet business and time-to-market requirements • Collaborate with external suppliers and explore possibilities to integrate their technology to future products
	Control Maintenance Process and Manufacturing Issues	• Manage experiment design process margin for Standard Operating Procedures (SOPs) set-up and systems maintenance • Characterise new 'Bill of Materials' and their interactions between assembly processes during development phase • Prioritise key process weaknesses for baseline continuous improvements to yield and/or quality and/or production and costs
	Conform to Management System Requirements	• Develop quality systems to ensure operations meets both internal and external parties' quality requirements • Enhance safety procedures and ensure good housekeeping in the area of responsibilities
	Contribute to Continuous Improvement	• Lead cross-functional teams in continuous improvement projects • Lead continuous improvement projects • Collaborate with stakeholders in improvement activities to meet organisational goals
	Influence Organisational Development	• Develop on-the-job training programmes • Develop workplace learning plans • Develop team leaders through capability development and coaching • Lead team leaders in the development of business unit strategies and operational plans

Senior Integration Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 5
Change Management	Level 3
Conflict Management	Level 4
Continuous Process Improvement	Level 5
Crisis Situations Management	Level 3
Data Analytics Systems Design	Level 5
Data Synthesis	Level 5
Defect Density Monitoring	Level 5
Effectiveness Management	Level 5
Enterprise Risk Management	Level 4
Factory Systems Management	Level 5
Failure Analysis	Level 5
Innovation Management	Level 4
Internet of Things (IoT) Management	Level 5
Learning and Development	Level 4
Manufacturing Process Management	Level 5
New Product Introduction	Level 5
Operations Management	Level 5
Organisational Analysis	Level 4
Organisational Strategising	Level 4
Parametric Testing	Level 5
People Capability Development	Level 4
Process Integration	Level 5
Quality Systems Management	Level 5
Vision Management	Level 3
Workplace Safety and Health (WSH) Systems Management	Level 5

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Creative Thinking	Intermediate
Decision Making	Intermediate
Leadership	Advanced
Lifelong Learning	Intermediate

Senior Product Engineer

JOB ROLE DESCRIPTION

The Senior Product Engineer generates test set-up specifications and builds plans based on customers' test requirements for production to meet business needs. He/She, as the subject matter expert, is required to provide design solutions for products and establish product specifications to satisfy product requirements to meet organisational goals. He is responsible for formulating test programmes, hardware and major setup issues in mass production to ensure operations meet both internal and external parties' quality requirements.

He has to take the lead in managing cross-functional teams in continuous improvement projects and assist in implementing process improvement projects. He plays an important role in organisational development through the development of on-the-job training and mentoring of team leaders.

The Senior Product Engineer possesses an analytical mind and leadership skills to steer the team to perform their best and achieve the desired organisational outcomes.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Product Engineering	• Generate test set-up specifications based on customers' requirements • Provide design solutions for products • Conduct qualification and validation tests for new materials • Design data monitoring systems to aid data analytics • Adopt new technologies to improve systems automation
	Control Product Issues	• Formulate test programmes, hardware and major set-up issues in mass production • Improve production yield to meet organisational goals • Review manufacturing process change requests • Establish product specifications to satisfy product requirements
	Conform to Management System Requirements	• Develop quality systems to ensure operations meet both internal and external parties' quality requirements • Enhance safety procedures and ensure good housekeeping in the respective area of responsibilities
	Contribute to Continuous Improvement	• Lead cross-functional teams in continuous improvement projects • Lead continuous improvement projects • Collaborate with stakeholders in improvement activities to meet organisational goals
	Influence Organisational Development	• Develop on-the-job training programmes • Develop workplace learning plans • Develop team leaders through capability development and coaching • Lead team leaders in the development of business unit strategies and operational plans

Senior Product Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 5
Conflict Management	Level 4
Continuous Process Improvement	Level 5
Crisis Situations Management	Level 3
Data Analytics Systems Design	Level 5
Effectiveness Management	Level 5
Enterprise Risk Management	Level 4
Factory Systems Management	Level 5
Failure Analysis	Level 5
Innovation Management	Level 4
Learning and Development	Level 4
Manufacturing Process Design	Level 6
Materials Qualification	Level 5
Metrology Management	Level 5
New Product Introduction	Level 5
Operations Management	Level 5
Organisational Analysis	Level 4
Organisational Strategising	Level 4
People Capability Development	Level 4
Product Testing	Level 5
Production Resource Management	Level 5
Quality Systems Management	Level 5
Vision Management	Level 3
Workplace Safety and Health (WSH) Systems Management	Level 5
Yield Analysis	Level 5

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Creative Thinking	Intermediate
Decision Making	Intermediate
Leadership	Advanced
Lifelong Learning	Intermediate

> To stay relevant in this challenging industry, we have to remain flexible and to have inquisitive mindsets so that we can continually adapt to changes. Learning, to me, is never-ending but fulfilling when I challenge myself to gain new knowledge, skills and competencies.

Staff Engineer

Wong Chih Hsien
Seagate Singapore International Headquarters Pte Ltd

KEEPING PACE WITH PRODUCT ADVANCEMENTS

Wong Chih Hsien is at the forefront of the data storage sector's rapid pace of advancement. As Staff Engineer at Seagate Singapore International Headquarters Pte Ltd, he focuses on the technical aspects of process optimisation to enhance quality and output of new product designs.

His job requires him to stay on top of new product transfers, which happens at the rate of once every few months, where each product could have different specifications and technical requirements. To ensure the success of these product transfers, he orchestrates a high level of coordination among many functional teams through daily conference calls.

While being a team player and having initiative are important, Chih Hsien says that the main skills needed for his area of work revolve around data analytics. Acquiring skills in the JMP statistical analysis software, he says, has been very useful for him to identify trends and distribution when analysing large data sets. He has also attended Six Sigma training that improved his competency in analysing process data trends and identifying key factors in improving process control optimisation.

"It is really important to be comfortable in handling huge amounts of data collected daily through monitoring processes to implement process control or to troubleshoot," he says. "It is also important to think critically so that from the data set, we can understand the root cause of problems and formulate plans to drive improvements."

He recalls a challenging project when his team had to handle a new media cleaning tool for the start-up of Seagate's third recording media facility in Singapore. With no experience in configuring the new tool and little knowledge of its performance, the team had to learn the functionality of the tool to be able to optimise the process capability in a short span of a few months.

Not surprisingly, Chih Hsien finds himself still learning continuously and improving his technical proficiencies after 12 years at Seagate. This is where the Skills Framework for Electronics can support engineers in learning new skills to improve productivity. Being skilled in software automation, for instance, has helped him spend less time on performing routine tasks, freeing up time to work on more demanding and challenging projects.

He also participates in the in-house technical development and training programme to improve his technical proficiency and gain knowledge on technical know-how from his colleagues. This programme provides a broad spectrum of knowledge on disk drive operations covering engineering innovations, manufacturing operational efficiencies and financial aspects.

Chih Hsien still feels that there is much more to learn and understand. To take his career further, he plans to sign up for courses that will help him excel in the technical aspects of work, supplemented with courses on effective communication to improve his ability to collaborate with cross-functional teams.

Staff Engineer/Senior Staff Engineer

JOB ROLE DESCRIPTION

The Staff Engineer/Senior Staff Engineer leads the adoption of technical practices to achieve sustainable and efficient technical results. He/She evaluates the manufacturing and assembly plans of new product designs and develops new process capabilities to meet the organisation's product design requirements. He establishes maintenance strategies and systems and integrates quality principles and methodologies to enhance engineering performance within the organisation.

He must be analytical and work in a consultative manner with other department heads, and function as an advisor who recommends technical solutions and influence technical decisions.

The Staff Engineer/Senior Staff Engineer is expected to have good leadership qualities and is expected to lead change management in the organisation.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Administer Engineering Support	• Direct technical teams and be accountable for the technical results • Adapt technical practices to achieve sustainable and efficient technical results • Evaluate manufacturing and assembly plans of new product designs • Develop new process capabilities to meet product design requirements • Evaluate new methodologies to improve work processes • Direct research on application of new and unique manufacturing approaches
	Control Maintenance Process and Manufacturing Issues	• Establish maintenance strategies and systems • Resolve maintenance and manufacturing issues
	Conform to Management System Requirements	• Integrate quality principles and methodology to enhance engineering performance • Evaluate Workplace Safety and Health management systems for compliance and improvements
	Contribute to Continuous Improvement	• Evaluate the organisation's approach towards a lean enterprise • Review innovation practices to enhance business competitiveness • Analyse data for business insights identification
	Influence Organisational Development	• Develop on-the-job training programmes • Develop workplace learning plans • Lead change management in the organisation • Manage conflict grievances and disputes between employees • Conduct interviews and make hiring decisions • Mentor technical and engineering teams

Staff Engineer/Senior Staff Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Automation Process Control	Level 6
Business Planning	Level 4
Change Management	Level 4
Conflict Management	Level 4
Crisis Situations Management	Level 4
Data Synthesis	Level 6
Effectiveness Management	Level 5
Enterprise Risk Management	Level 6
Innovation Management	Level 5
Learning and Development	Level 5
Manufacturing Process Design	Level 5
Organisational Analysis	Level 4
Organisational Strategising	Level 4
People Capability Development	Level 4
Quality Systems Management	Level 6
Risk Appetite and Goals Setting	Level 5
Vision Management	Level 4
Workplace Safety and Health (WSH) Systems Management	Level 5

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Creative Thinking	Advanced
Decision Making	Advanced
Lifelong Learning	Advanced
Transdisciplinary Thinking	Intermediate

Principal Engineer

JOB ROLE DESCRIPTION

The Principal Engineer is responsible for developing, enhancing, and influencing the organisation's technical roadmap. He/She drives sustainable manufacturing strategies by managing the integration of all module processes for lean manufacturing in accordance with organisation's requirements. He establishes organisation engineering quality management systems and evaluates quality engineering processes to satisfy business and legislative requirements.

In partnership with the other departments, he is responsible to create business opportunities through innovation and recommend changes to current technical practices.

The Principal Engineer is expected have an analytical mind to provide technical guidance and mentorship to the technical department with a large degree of autonomy.

CRITICAL WORK FUNCTIONS AND KEY TASKS	CRITICAL WORK FUNCTIONS	KEY TASKS
	Conduct Research and Development	• Influence the future technology roadmaps • Develop organisational leading technologies
	Drive Sustainable Manufacturing Strategies	• Manage integration of all module processes for lean manufacturing • Establish manufacturing strategies for sustainability
	Conform to Management System Requirements	• Establish organisation engineering quality management systems • Evaluate quality engineering processes to satisfy business and legislative requirements • Strategise the organisation's Workplace Safety and Health programmes
	Contribute to Continuous Improvement	• Innovate and change current industry practices to create business opportunities • Establish lean manufacturing systems for the organisation • Develop big data analytics plans
	Influence Organisational Development	• Conduct interviews and make hiring decisions • Act as technical guru to mentor engineers • Build high-performance teams that work collaboratively • Formulate framework to manage conflict grievances and disputes between employees • Lead collective bargaining processes between employees • Align human resources with business needs

Principal Engineer

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Business Continuity Planning	Level 4
Business Planning	Level 5
Change Management	Level 5
Conflict Management	Level 5
Crisis Situations Management	Level 5
Effectiveness Management	Level 5
Enterprise Risk Management	Level 6
Innovation Management	Level 6
Learning and Development	Level 6
Manufacturing Process Design	Level 6
Organisational Analysis	Level 5
Organisational Strategising	Level 5
People Capability Development	Level 5
Research and Development	Level 5
Risk Appetite and Goals Setting	Level 5
Technology Roadmapping	Level 5
Vision Management	Level 5
Workplace Safety and Health (WSH) Systems Management	Level 6

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Decision Making	Advanced
Global Mindset	Intermediate
Lifelong Learning	Advanced
Transdisciplinary Thinking	Advanced

Fellow/Senior Fellow

JOB ROLE DESCRIPTION

The Fellow/Senior Fellow is responsible for building an international network to further the interests of the organisation. He/She drives organisational growth through endorsement of business continuity frameworks, strategies, policies and plans. He provides leadership to several divisions and functions in the organisation and recommends frameworks that guide the organisation in maintaining and improving its competitive position.

The Fellow/Senior Fellow drives strategy development and implementation of core competencies training of the technical workforce based on his/her deep industry understanding.

He displays a high level of social network at an executive level within the industry. He takes a leadership role in championing an organisational environment that encourages innovation to enhance the competitiveness of the organisation. Being an analytical person, the Fellow/Senior Fellow consistently makes informed decisions using detailed analysis of available information and data.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Build Business Networks	• Build international networks to promote the organisation • Maintain a large network at the executive level within industry
	Drive Organisational Growth	• Endorse business continuity frameworks, strategies, policies and plans • Contribute substantially to business value with impact on several divisions and/or functions • Drive strategy development and implementation of core competence to the workforce • Set direction on roadmaps and/or standards definition with industry partners • Exploit the organisation's strengths to enhance business competitiveness • Drive value, alignment and sustainability
	Contribute to Continuous Improvement	• Challenge new ideas while actively balancing risks and opportunities • Create an environment that encourages innovation • Champion the adoption of lean manufacturing • Encourage inter-departmental continuous improvement projects to enhance cost efficiency and sustain business competitiveness • Lead in continuous improvement activities to achieve quality and productivity goals
	Influence Organisational Development	• Lead organisational succession planning, capability development and employee engagement • Develop and strengthen executive management relations • Act as mentor to develop talent

Fellow/Senior Fellow

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Business Continuity Planning	Level 5
Business Networking	Level 5
Business Planning	Level 6
Change Management	Level 6
Conflict Management	Level 6
Crisis Situations Management	Level 6
Innovation Management	Level 6
Learning and Development	Level 6
Manufacturing Process Design	Level 6
Organisational Analysis	Level 6
Organisational Strategising	Level 6
People Capability Development	Level 6
Research and Development	Level 6
Risk Appetite and Goals Setting	Level 6
Technology Roadmapping	Level 6
Vision Management	Level 6

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Decision Making	Advanced
Global Mindset	Advanced
Lifelong Learning	Advanced
Transdisciplinary Thinking	Advanced

Notes

Management

Production Supervisor

JOB ROLE DESCRIPTION

The Production Supervisor manages production operations to ensure optimal efficiency within the organisation. He/She performs troubleshooting on production line issues and highlights maintenance issues to the engineering team. He maximises assets utilisation through the coordination of day-to-day operations across the production processes to ensure the availability of resources in order to fulfil shipment and cycle times.

As an analytical person, the Production Supervisor contributes to the productivity improvement in an organisation through data collection analysis and implementation of improvement projects.

He is expected to have good leadership and communication skills to lead teams to provide focus and direction to achieve organisational goals.

CRITICAL WORK FUNCTIONS AND KEY TASKS	CRITICAL WORK FUNCTIONS	KEY TASKS
	Manage Production Operations	• Supervise production operations • Maintain good housekeeping in production areas • Interpret information from the networks and/or dashboard for production monitoring • Highlight issues that affect output and operations • Apply system indices to manage production process flows
	Maximise Assets Utilisation	• Interpret information from the networks and/or dashboard to maximise the use of assets • Ensure availability of resources to fulfil shipment and cycle times
	Conform to Management System Requirements	• Enforce good safety culture and good manufacturing practices • Ensure adherence to processes and procedures • Ensure the robustness of processes with the use of process control tools • Supervise compliance to Workplace Safety and Health requirements
	Contribute to Continuous Improvement	• Assist in the implementation of improvement projects • Identify opportunities for continuous improvement projects • Collect data for analysis
	Influence Organisational Development	• Develop and implement training plans for production staff • Perform training and assessment

Production Supervisor

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Audit Management	Level 4
Continuous Process Improvement	Level 3
Data Analytics Systems Design	Level 3
Data Synthesis	Level 3
Emergency Management	Level 3
Enterprise Risk Management	Level 3
Factory Systems Management	Level 4
Good Manufacturing Practices Implementation	Level 3
Hazards and Risk Control, and Policy Management	Level 3
Innovation Management	Level 3
Internet of Things (IoT) Management	Level 3
Learning and Development	Level 2
Operations Management	Level 4
Production Performance Management	Level 3
Production Planning	Level 4
Production Resource Management	Level 3
Production Shut-down and Re-start	Level 3
Quality Control and Assurance	Level 3
Quality Systems Management	Level 3
Report Writing	Level 3
Solutioning	Level 4
Technical Presentations	Level 4
Workplace Safety and Health (WSH) Practices Implementation	Level 3

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Basic
Decision Making	Basic
Leadership	Basic
Lifelong Learning	Basic
Teamwork	Basic

Superintendent

JOB ROLE DESCRIPTION

The Superintendent manages the production operations to ensure the efficiency and smooth flow of production processes. He/She applies technical approaches to formulate solutions for production or operation issues in accordance with organisation requirements. He is expected to maximise assets utilisation by forecasting the utilisation and demand of resources. He monitors and ensures adherence to quality standards in accordance with product specifications and executes benchmarked reliability test plans for quality assurance.

In addition, the Superintendent contributes to productivity improvement in the organisation by leading teams in continuous improvement projects. He is required to conduct core training for staff.

The Superintendent is expected to be a good team leader and have good communication skills to lead production teams to provide focus and direction to achieve organisational goals.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Manage Production Operations	• Inspect business approaches to resolve work issues • Coordinate production, including production schedules and milestones • Apply technical approaches to formulate solutions for production or operation issues • Ensure that scheduled and unscheduled maintenance work are carried out • Ensure that good work discipline is practised in production lines • Compile production yield reports • Drive the team to meet production goals
	Maximise Assets Utilisation	• Forecast demand for materials • Monitor utilisation of materials
	Conform to Management System Requirements	• Enforce compliance to safety and good manufacturing practices and processes in production areas • Monitor and ensure adherence to quality standards in accordance with product specifications • Maintain quality assurance systems • Monitor process performance data to establish good control parameters • Execute benchmarked reliability test plans • Provide reliability presentations for audit and management reporting • Investigate root causes of product and process failures
	Contribute to Continuous Improvement	• Lead continuous improvement projects • Lead working level community to explore opportunities for improvement projects
	Influence Organisational Development	• Provide guidance to production staff • Develop training plans for production staff

Superintendent

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Continuous Process Improvement	Level 4
Data Analytics Systems Design	Level 4
Data Synthesis	Level 4
Effectiveness Management	Level 4
Emergency Management	Level 4
Enterprise Risk Management	Level 4
Factory Systems Management	Level 5
Good Manufacturing Practices Implementation	Level 3
Hazards and Risk Control, and Policy Management	Level 4
Innovation Management	Level 4
Internet of Things (IoT) Management	Level 4
Learning and Development	Level 3
Operations Management	Level 5
Production Performance Management	Level 4
Production Planning	Level 5
Production Resource Management	Level 4
Production Shut-down and Re-start	Level 4
Quality Systems Management	Level 4
Report Writing	Level 4
Solutioning	Level 4
Technical Presentations	Level 5
Workplace Safety and Health (WSH) Practices Implementation	Level 4
Workplace Safety and Health (WSH) Systems Management	Level 4

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Intermediate
Decision Making	Intermediate
Leadership	Intermediate
Lifelong Learning	Intermediate
Teamwork	Intermediate

Senior Superintendent

JOB ROLE DESCRIPTION

The Senior Superintendent manages the day-to-day production operations. He/She participates in the design of new product manufacturing processes and generates technical solutions to resolve yields and quality-related issues within the organisation. He maximises assets utilisation through the development of resource plans for production. He is expected to develop quality systems to ensure that operations meet both internal and external parties' quality requirements. He is responsible for defining cost reduction and/or productivity programmes relating to product engineering and for driving execution of these programmes.

The Senior Superintendent adds values to the organisation by working closely with customers to satisfy their needs and requirements by reviewing alternative approaches in resource and support needs. He drives new product implementation and qualifies products for production launch.

The Senior Superintendent must be a team leader who works together with Engineers to support organisational goals. In addition, he needs to have leadership qualities to influence organisational development through on-the-job training programmes and mentorship programmes.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Manage Production Operations	• Establish systems and specifications for control, foolproof, streamline, automation and standardisation • Establish product engineering competencies and value-add services • Manage production works and account for manufacturing processes • Drive new product offloads from customers and qualify products for production launch • Collate data for budget and management reports • Analyse operations data to identify patterns and correlations among various data points
	Maximise Assets Utilisation	• Develop resource plans for production • Monitor the utilisation and efficiency of the production machines
	Conform to Management System Requirements	• Develop quality systems to ensure operations meets both internal and external parties' quality requirements • Enhance safety procedures and good housekeeping in the respective area of responsibilities
	Contribute to Continuous Improvement	• Lead cross-functional teams in continuous improvement projects • Follow-up on project team • Assist in implementation of process improvement projects • Define cost reduction and/or productivity programmes relating to product engineering and drive execution
	Influence Organisational Development	• Develop on-the-job training programmes • Develop workplace learning plans • Develop team leaders through capability development and coaching • Lead team leaders in the development of business unit strategies and operational plans

Senior Superintendent

SKILLS AND COMPETENCIES	TECHNICAL SKILLS AND COMPETENCIES		GENERIC SKILLS AND COMPETENCIES (TOP 5)	
	Audit Management	Level 5	Communication	Intermediate
	Change Management	Level 3	Creative Thinking	Intermediate
	Continuous Process Improvement	Level 5	Decision Making	Intermediate
	Crisis Situations Management	Level 3	Leadership	Advanced
	Data Analytics Systems Design	Level 5	Lifelong Learning	Intermediate
	Data Synthesis	Level 5		
	Effectiveness Management	Level 4		
	Enterprise Risk Management	Level 5		
	Hazards and Risk Control, and Policy Management	Level 4		
	Innovation Management	Level 5		
	Internet of Things (IoT) Management	Level 5		
	Learning and Development	Level 4		
	Production Performance Management	Level 5		
	Production Resource Management	Level 5		
	Quality Control and Assurance	Level 5		
	Quality Systems Management	Level 5		
	Solutioning	Level 5		
	Vision Management	Level 3		
	Workplace Safety and Health (WSH) Systems Management	Level 4		

Manager / Senior Manager

JOB ROLE DESCRIPTION

The Manager/Senior Manager uses data analytics and determines new strategies to make production processes more efficient to meet organisational goals. He/She establishes, implements and manages projects to meet operational objectives. He manages his team's resources and balances between production requirements and manpower resources to ensure the organisation's sustainability. He integrates quality principles and methodologies to enhance engineering performance within the organisation.

In addition, the Manager/Senior Manager evaluates the organisation's approach towards a lean enterprise and uses data analytics for business insights identification. He drives innovation practices in the organisation and reviews manufacturing processes to reduce working capital and optimise inventory levels.

As a people manager, the Manager/Senior Manager oversees manpower, finance, training, and resource planning and deployment within the organisation. He displays a high level of organisational awareness and leadership skills by working in a consultative manner with other departments and/or sections within the organisation.

	CRITICAL WORK FUNCTIONS	KEY TASKS
CRITICAL WORK FUNCTIONS AND KEY TASKS	Manage Operations	• Determine priorities dynamically and set planning assumptions for work-in-progress levels by products, cycle times and yields • Manage manufacturing key metrics including loading, performance to commitments, on-time delivery and bottlenecks • Evaluate the sustainability of manufacturing processes by preparing rough-cut capacity plans • Improve operation planning through use of big data and advanced analytics modelling • Analyse production efficiencies
	Maximise Asset Utilisation	• Manage material requirements planning taking into account the sales forecasts, production plans and production capacities • Manage a balance between production requirements and manpower resources
	Conform to Management System Requirements	• Integrate quality principles and methodologies to enhance engineering performance • Evaluate Workplace Safety and Health management systems for compliance and improvements
	Contribute to Continuous Improvement	• Evaluate the organisation's approach towards a lean enterprise • Manage innovation practices in organisation • Analyse data for business insights identification • Review manufacturing processes to reduce working capital and optimise inventory levels
	Influence Organisational Development	• Develop on-the-job training programmes • Develop workplace learning plans • Lead change management in the organisation • Conduct interviews and make hiring decisions • Resolve workplace grievances and disputes

Manager / Senior Manager

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Business Continuity Planning	Level 4
Business Planning	Level 4
Change Management	Level 4
Conflict Management	Level 4
Crisis Situations Management	Level 4
Data Synthesis	Level 6
Effectiveness Management	Level 5
Enterprise Risk Management	Level 6
Innovation Management	Level 5
Learning and Development	Level 5
Organisational Analysis	Level 4
Organisational Strategising	Level 4
People Capability Development	Level 4
Production Resource Management	Level 6
Quality Systems Management	Level 6
Risk Appetite and Goals Setting	Level 5
Vision Management	Level 4
Workplace Safety and Health (WSH) Systems Management	Level 5

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Creative Thinking	Advanced
Decision Making	Advanced
Lifelong Learning	Advanced
Transdisciplinary Thinking	Intermediate

Head of Department

JOB ROLE DESCRIPTION

The Head of Department provides leadership to all manufacturing and engineering activities and ensures that all manufacturing objectives are achieved in a timely and cost-effective manner. He/She designs business structures to support solutions by identifying, developing and implementing new manufacturing processes.

In addition, the Head of Department champions the organisational vision and mission and is accountable for the overall organisational excellence. As a problem solver, he creates business solutions by formulating and recommending manufacturing policies and programmes to guide the organisation in maintaining and improving its competitive position and profitability.

The Head of Department manages all aspects of the employees of the department and is responsible for performance management. As a team leader, he builds a high-performance team that works collaboratively through an organisation, and has the ability to develop and execute functional strategies, as well as act as a change leader.

CRITICAL WORK FUNCTIONS AND KEY TASKS

CRITICAL WORK FUNCTIONS	KEY TASKS
Lead Business Excellence	• Create business solutions by formulating and recommending manufacturing policies and programmes • Guide the organisation in maintaining and improving its competitive position and profitability • Design business structures to support solutions
Conform to Management System Requirements	• Establish the organisation's engineering quality management systems • Evaluate quality engineering processes to satisfy business and legislative requirements • Strategise the organisation's Workplace Safety and Health programmes
Contribute to Continuous Improvement	• Champion innovation in the organisation • Develop big data analytics plans • Lead all manufacturing and engineering activities • Ensure manufacturing objectives are achieved in a timely and cost-effective manner
Influence Organisational Development	• Conduct interviews and make hiring decisions • Mentor and lead managers • Build high-performance teams that work collaboratively • Formulate framework to manage conflict grievances and disputes between employees • Lead collective bargaining processes between employees • Align human resources with business needs

Head of Department

SKILLS AND COMPETENCIES

TECHNICAL SKILLS AND COMPETENCIES	
Business Continuity Planning	Level 5
Business Planning	Level 5
Change Management	Level 5
Conflict Management	Level 5
Crisis Situations Management	Level 5
Effectiveness Management	Level 5
Enterprise Risk Management	Level 6
Innovation Management	Level 6
Learning and Development	Level 6
Organisational Analysis	Level 5
Organisational Strategising	Level 5
People Capability Development	Level 5
Production Resource Management	Level 6
Risk Appetite and Goals Setting	Level 5
Vision Management	Level 5
Workplace Safety and Health (WSH) System Management	Level 6

GENERIC SKILLS AND COMPETENCIES (TOP 5)	
Communication	Advanced
Decision Making	Advanced
Global Mindset	Intermediate
Lifelong Learning	Advanced
Transdisciplinary Thinking	Advanced

> **Continual skills upgrading will shape our workforce to be ready for the Industry 4.0 'Smart Factory'. As we replace traditional ways of operation with new functions, the Skills Framework enables our people to keep pace with the evolution of the electronics manufacturing sector and achieve personal career growth.**

Vice President and General Manager

Tan Yew Kong

GLOBALFOUNDRIES Singapore Pte Ltd

LEADING PEOPLE TOWARDS INDUSTRY TRANSFORMATION

As technology advancements continue to revolutionise manufacturing processes, GLOBALFOUNDRIES is one semiconductor foundry that is future-proofing its workforce and operations in Singapore ahead of time.

Charting its future direction is Tan Yew Kong, Vice President and General Manager, who helms the company's 200mm F2/3/5 and Silicon Manufacturing Partners operations in the country. In his management position, he directs the operations to improve fabrication indices for quality, yield, cost and delivery as well as customer satisfaction. He also provides leadership to the 1,800-strong team to support business objectives in an environment where automation and data exchange are transforming electronics manufacturing.

"We have been seeing more sophisticated system integration with cyber-physical systems, the internet-of-things, cloud computing, artificial intelligence and robotic manufacturing appearing in the industry," he says. "New functions require the workforce to adopt new skills to maintain manufacturing performance, operate automated robots and system and apply network interfaces to manage Big Data."

Responding to these challenges, Yew Kong inculcates a culture of skills mastery and lifelong learning in his team to ensure continual skills development. In addition to on-the-job training, GLOBALFOUNDRIES provides employees with opportunities to attend in-house courses, forums, webinars and external executive and professional courses to support their career growth.

In his 22 years with the industry, he has benefitted by participating in such training programmes as well as local and overseas seminars, honing his skills continuously as he advanced to the management level. In the learning journey, he advises individuals to acquire the operational, technical and project management skill sets to lay the foundation from the start. At this stage, communication and presentation skills and the ability to work in a team would also help them develop their professions.

As they progress to junior management, they should complement these skills by taking up people management/engagement and financial courses. At higher management, individuals should look at acquiring skills in mass communication, business acumen, market dynamics management and strategic thinking to be effective on the job.

A firm advocate of lifelong learning, Yew Kong represents GLOBALFOUNDRIES as a member in the Electronics Skills Framework Workgroup, which spearheads the development of the Skills Framework for Electronics in Singapore. One of the functions of the workgroup is to identify the future skills needed to prepare the local workforce to be ready for the changing dynamics of the electronics manufacturing sector.

"The Skills Framework helps our electronics manufacturing sector in Singapore stay globally competitive by providing continuous learning progression framework for companies to develop their workforce to support their businesses," he explains. "The updated learning and skills will also enable employees and students to keep pace with technological advancements to enhance their career growth and employment opportunities."

Managing Director / General Manager / Vice-President

JOB ROLE DESCRIPTION

The Managing Director/General Manager/Vice-President has the responsibility to steer the organisation to achieve excellence in a globalised environment and ensure organisational succession planning. He/She develops business and professional networks to foster an atmosphere of inclusiveness with diverse external stakeholders and the global business community.

In addition, the Managing Director/General Manager/Vice-President directs plant operations and provides leadership to departmental managers to ensure that the organisational objectives are accomplished in a timely and cost effective manner.

The Managing Director/General Manager/Vice-President also formulates and recommends ideas and directions to drive changes in an organisation while maintaining a culture of innovativeness to sustain value creation in meeting the competitive position and long-term objectives of the organisation. With a nurturing mind set, he also mentors and develop talent as future leaders.

CRITICAL WORK FUNCTIONS AND KEY TASKS

CRITICAL WORK FUNCTIONS	KEY TASKS
Build Business Networks	• Develop business and professional networks • Foster an atmosphere of inclusiveness with diverse external stakeholders and the global business community
Drive Organisational Growth	• Steer the organisation to achieve excellence in a globalised environment • Drive value-creation and meet the long-term objectives of the organisation • Formulate business ideas and directions to drive change in the organisation
Contribute to Continuous Improvement	• Challenge new ideas while actively balancing risks and opportunities • Innovate and create an environment that encourages innovation • Maintain a culture of innovative thinking and practices • Champion the adoption of lean manufacturing for the organisation
Influence Organisational Development	• Lead organisational succession planning, capability development and employee engagement • Develop and strengthen relations with executive management • Act as a mentor to develop talent

Managing Director / General Manager / Vice-President

SKILLS AND COMPETENCIES	TECHNICAL SKILLS AND COMPETENCIES		GENERIC SKILLS AND COMPETENCIES (TOP 5)	
	Business Continuity Planning	Level 6	Communication	Advanced
	Business Networking	Level 6	Decision Making	Advanced
	Business Planning	Level 6	Global Mindset	Advanced
	Change Management	Level 6	Lifelong Learning	Advanced
	Conflict Management	Level 6	Transdisciplinary Thinking	Advanced
	Crisis Situations Management	Level 6		
	Innovation Management	Level 6		
	Learning and Development	Level 6		
	Organisational Analysis	Level 6		
	Organisational Strategising	Level 6		
	People Capability Development	Level 6		
	Risk Appetite and Goals Setting	Level 6		
	Vision Management	Level 6		

Overview of Technical Skills and Competencies

Technical Skills and Competencies (TSCs)

TSC Category	TSC Title	TSC Description	Proficiency Levels					
			1	2	3	4	5	6
Automation Management	Automated Operation Monitoring	Ensure smooth automation operations by maintaining and monitoring the automated systems and manufacturing process flows	●	●	●	●		
	Automated System Design	Design and commission automated systems as well as evaluate the system design specification against functional requirements				●	●	
	Automation Process Control	Apply automation process control to monitor performance metrics and quality of manufacturing outputs to determine the optimal settings as well as productivity improvement strategies			●	●	●	●
	Automation System Maintenance	Maintain automation systems to meet operation requirements as well as propose strategies for the automation systems performance improvement	●	●	●	●	●	
Big Data Analytics	Data Analytics System Design	Integrate the use of data analytics in the production environment for the identification of bottlenecks and system improvements			●	●	●	●
	Data Synthesis	Analyse factory automation and manufacturing data to monitor the manufacturing processes for operations and product or process flow optimisation			●	●	●	●
Business Continuity Management	Business Continuity Planning	Execute business impact analysis, risk analysis, testing and exercising to ensure the currency of the organisation's business continuity plans				●	●	●
	Crisis Situations Management	Identify crisis response and recovery activities as well as implement the recovery and business continuity strategies to minimise the impact of disruptive events to the organisation			●	●	●	●
Maintenance	Equipment Maintenance	Maintain tools and equipment to meet operation requirements as well as propose strategies for tools and equipment performance improvement		●	●	●	●	
	Facilities Maintenance	Manage facility systems maintenance as well as propose strategies for performance enhancement		●	●	●	●	
Manufacturing and Operations	Defect Density Monitoring	Monitor the manufacturing process defect density metrics and manage deviations as well as analyse defect density issues and recommend corrective actions			●	●	●	
	Electrostatic Discharge Control	Implement precautionary measures required to avoid damage to sensitive electronic components as well as adopt proper components handling techniques and the use of appropriate personal grounding device			●	●		

Overview of Technical Skills and Competencies

Technical Skills and Competencies (TSCs)

TSC Category	TSC Title	TSC Description	Proficiency Levels					
			1	2	3	4	5	6
	Factory System Management	Manage different factory system applications to ensure optimum manufacturing operations performance as well as measure equipment effectiveness and track production lot material				●	●	
	Good Manufacturing Practices Implementation	Implement good manufacturing practices to ensure that works are carried out based on industry practices and protocols		●	●			
	Manufacturing Process Management	Perform process engineering and ensure the stability of the manufacturing process as well as troubleshoot process deviations and propose strategies for process performance improvement		●	●	●	●	
	Metrology Management	Manage metrology techniques for process performance measurement as well as develop metrology recipes for process optimisation			●	●	●	
	Operation Management	Manage the manufacturing operations' Standard Operating Procedures (SOPs) to ensure consistent results of each manufacturing process as well as define and standardise the exact steps to perform specific tasks				●	●	
	Production Shut-down and Re-start	Manage shutdown and restarting of production process to minimise loss and/or damage of assets as well as ensure the safety of personnel during shut down and restarting			●	●		
Networking Building	Business Networking	Establish mutually beneficial relationship with other business stakeholders and potential clients and/or customers					●	●
Network Technology Management	Internet of Things (IoT) Management	Interrelate computing devices, equipment and machines' data in a networked environment to provide specific solutions		●	●	●	●	
Organisational Development	Change Management	Implement organisational change smoothly as well as manage reactions to ensure seamless transition during change			●	●	●	●
	Conflict Management	Perform conflict management within the organisation to assist members in resolving grievances and disputes				●	●	●
	Learning and Development	Plan employees' learning and development activities to maximise employee contribution as well as building a skilled workforce		●	●	●	●	●
	Vision Management	Motivate and lead team to understand and believe in the organisation's vision and values to achieve strategic objectives			●	●	●	●

TSC Category	TSC Title	TSC Description	Proficiency Levels					
			1	2	3	4	5	6
People Management	Effectiveness Management	Set goals with team and evaluate team's effectiveness in achieving the defined goals and objectives				●	●	
	People Capability Development	Develop individual or team to achieve current business goals, meet future challenges and build capacity for change				●	●	●
	Report Writing	Present specific information and evidence in a clear and structured format			●	●		
	Technical Presentations	Deliver effective and engaging presentations to a variety of audiences				●	●	
Production Management	Production Performance Management	Plan and manage resources to optimise production performance as well as manage production constraint and improve manufacturing efficiency			●	●	●	
	Production Planning	Establish and execute the production plan to meet production targets and cycle time indices				●	●	
	Production Resource Management	Plan and control capacity and quality issues to meet organisational needs as well as schedule resources to synchronise production processes			●	●	●	●
Product Development and Testing	Manufacturing Process Design	Analyse the design of the product to identify potential manufacturing risks and problems for the reduction of manufacturing costs				●	●	●
	New Product Introduction	Support new production by validating build plan to achieve cost-effective production and assembly as well as meeting design specifications			●	●	●	
	Product Testing	Formulate test programme structure based on product specifications as well as develop a systematic approach in resolving test issues			●	●	●	
	Research and Development	Optimising manufacturing processes, material developments and development of new product line					●	●
Productivity and Innovation	Continuous Process Improvement	Apply continuous improvement processes to improve products, services or processes seeking incremental improvement over time or breakthrough improvement all at once	●	●	●	●	●	
	Innovation Management	Respond to external or internal opportunities and apply creativity to introduce new ideas, processes or products			●	●	●	●
	Solutioning	Generate solutions by systematic analysis of the problem, proposing preventive and/or corrective measures and evaluating the effectiveness of the measures from different perspectives				●	●	

Overview of Technical Skills and Competencies

Technical Skills and Competencies (TSCs)

TSC Category	TSC Title	TSC Description	Proficiency Levels					
			1	2	3	4	5	6
Quality Management	Audit Management	Assess organisational objectives, policies, procedures, structure, control and system for the verification of efficient management of the organisation's activities				●	●	
	Failure Analysis	Examine the electrical and physical defects evidence to verify the causes of failure as well as identify the failure modes			●	●	●	
	Material Qualification	Manage quality of materials to ensure material specifications conform to product requirements				●	●	
	Parametric Testing	Implement parametric tests and parametric data analysis to drive process and yield improvements			●	●	●	
	Quality Control and Assurance	Implement checks and testing processes for the measurement and assurance of product quality and services to meet consumer expectations	●	●	●	●	●	
	Quality Process Control	Implement quality process controls to improve and stabilise production in order to avoid or minimise issues leading to defects			●	●	●	
	Quality System Management	Coordinate and direct the organisation's activities to meet customer and regulatory requirements as well as identify opportunities for improvement		●	●	●	●	●
	Yield Analysis	Apply yield analysis techniques to drive process and yield performance improvements			●	●	●	
Risk Management	Enterprise Risk Management	Develop and implement risk management strategies to support business operations			●	●	●	●
	Risk Appetite and Goals Setting	Manage productive practices to allow for effective and efficient management of work by making changes for continuous improvements in the organisation					●	●
Strategy Planning and Implementation	Business Planning	Develop business plans by reviewing existing resources to identify growth opportunities to achieve sustainable competitive advantage leading to a high exit valuation				●	●	●
	Organisational Analysis	Evaluate factors that can affect the organisation's performance as well as strategically assessing the organisation's own resources and potential for improvement				●	●	●
	Organisational Strategising	Provide an overall strategic direction to the organisation to support achievement of strategic needs of the organisation				●	●	●

TSC Category	TSC Title	TSC Description	Proficiency Levels					
			1	2	3	4	5	6
System Integration	Embedded System Integration	Implement control systems to perform pre-defined tasks and also real-time monitoring for the real world				●	●	
	Process Integration	Integrate process loops and/or architecture to optimise process interactions between and within process modules as well as formulate strategies for yield performance improvements			●	●	●	
Technology Road Mapping	Technology Road Mapping	Plan short-term and long-term goals with specific technology solutions to help meet those goals in order to make capital out of future market needs					●	●
Workplace Safety and Health Management	Emergency Management	Implement emergency management to ensure the readiness of the stakeholders in addressing emergencies that may arise in the workplace			●	●		
	Hazards and Risk Control, and Policy Management	Ensure a systematic and objective approach for hazards identification and risk assessment to effectively manage the hazards that may occur within the workplace		●	●	●		
	Workplace Safety and Health Practices Implementation	Implement Workplace Safety and Health practices in accordance with legislative requirements to ensure safe work practices			●	●		
	Workplace Safety and Health System Management	Ensure systematic process in the managing of Workplace Safety and Health related activities in the workplace				●	●	●

Overview of Technical Skills and Competencies

General Descriptors for Technical Skills and Competencies (TSCs)

Level	Responsibility (Degree of supervision and accountability)	Autonomy (Degree of decision-making)	Complexity (Degree of difficulty of situations and tasks)	Knowledge and Abilities (Required to support work as described under Responsibility, Autonomy and Complexity)
6	Accountable for significant area of work, strategy or overall direction	Empowered to chart direction and practices within and outside of work (including professional field/ community), to achieve/ exceed work results	Complex	• Synthesise knowledge issues in a field of work and the interface between different fields, and create new forms of knowledge • Employ advanced skills, to solve critical problems and formulate new structures, and/or to redefine existing knowledge or professional practice • Demonstrate exemplary ability to innovate, and formulate ideas and structures
5	Accountable for achieving assigned objectives, decisions made by self and others	Provide leadership to achieve desired work results; Manage resources, set milestones and drive work	Complex	• Evaluate factual and advanced conceptual knowledge within a field of work, involving critical understanding of theories and principles • Select and apply an advanced range of cognitive and technical skills, demonstrating mastery and innovation, to devise solutions to solve complex and unpredictable problems in a specialised field of work • Manage and drive complex work activities
4	Work under broad direction Hold accountability for performance of self and others	Exercise judgment; Adapt and influence to achieve work performance	Less routine	• Evaluate and develop factual and conceptual knowledge within a field of work • Select and apply a range of cognitive and technical skills to solve non-routine/abstract problems • Manage work activities which may be unpredictable • Facilitate the implementation of innovation
3	Work under broad direction May hold some accountability for performance of others, in addition to self	Use discretion in identifying and responding to issues, work with others and contribute to work performance	Less routine	• Apply relevant procedural and conceptual knowledge and skills to perform differentiated work activities and manage changes • Able to collaborate with others to identify value-adding opportunities
2	Work with some supervision Accountable for a broader set of tasks assigned	Use limited discretion in resolving issues or enquiries; Work without frequently looking to others for guidance	Routine	• Understand and apply factual and procedural knowledge in a field of work • Apply basic cognitive and technical skills to carry out defined tasks and to solve routine problems using simple procedures and tools • Present ideas and improve work
1	Work under direct supervision Accountable for tasks assigned	Minimal discretion required; Expected to seek guidance	Routine	• Recall factual and procedural knowledge • Apply basic skills to carry out defined tasks • Identify opportunities for minor adjustments to work tasks

Overview of Generic Skills and Competencies

Generic Skills and Competencies (GSCs)

GSC	GSC Description	Proficiency Levels		
		Basic	Intermediate	Advanced
Communication	Convey and exchange thoughts, ideas and information effectively through various mediums and approaches	Communicate information with others to respond to general inquiries and to obtain specific information	Articulate and discuss ideas and persuade others to achieve common outcomes	Negotiate with others to address issues and achieve mutual consensus
Computational Thinking	Develop and use computational models, tools and techniques to interpret and understand data, solve problems and guide decision-making	Use computational models, tools and techniques to identify patterns in a problem and develop a solution	Modify existing computational models, tools and techniques to develop different solutions	Develop and create computational models, tools and techniques to implement new solutions and apply to other problems
Creative Thinking	Adopt a fresh perspective to combine ideas or information in new ways and make connections between seemingly unrelated fields to create new ideas and applications	Connect ideas or information from related fields or applications to address an immediate issue	Connect or combine ideas or information from unrelated fields or applications to generate multiple ideas to bring about a specific outcome	Create original applications or ideas to reveal new possibilities and reshape goals through high level of innovativeness
Decision Making	Choose a course of action from various alternatives using a reasoned process to achieve intended goals	Make decisions of simple or routine nature to achieve intended goals using given information and guidelines	Make decisions in a complex setting to achieve intended goals using a structured process and multiple sources of available information	Make decisions in a volatile and ambiguous setting using a structured process and limited sources of available information to achieve intended goals
Developing People	Help others to learn and develop their capabilities to enhance their performance and achieve personal or professional goals	Use demonstration and explanation to teach a familiar task to inexperienced co-workers	Provide coaching to others to develop their skills and knowledge on their jobs to enhance performance	Provide mentorship to help others in their professional and personal development to improve performance and further their careers
Digital Literacy	Use ICT tools, equipment and software to create, evaluate and share information digitally with others	Perform basic functions using software programmes pertaining to computer operating systems and file management, and search online information	Use available software features to create and edit documents, customise templates and reports and evaluate online information	Use available software features to enhance documents, analyse and manipulate data, and use ICT to organise, share and communicate information clearly and coherently
Global Mindset	Awareness of diversity across global cultures and markets; Seek opportunities to adopt successful practices and ideas	Demonstrate understanding of global challenges and opportunities and how to transfer best practices across cultures; Respect cultural differences and needs of a diverse workforce	Develop global networks and manage virtual relationships while balancing both local and global perspectives; Adopt a local and global perspective when making decisions	Build the organisation's capabilities to compete in a global environment; Manage tension between corporate requirements, global and cultural differences

Overview of Generic Skills and Competencies

Generic Skills and Competencies (GSCs)

GSC	GSC Description	Proficiency Levels		
		Basic	Intermediate	Advanced
Interpersonal Skills	Manage relationships efficiently and communicate with others effectively to achieve mutual consensus and outcomes	Recognise own internal feelings and emotional states to manage interpersonal relationships in social situations	Detect and decipher emotions of others to manage interpersonal relationships in social situations	Influence, guide and handle others' emotions to build instrumental relationships and manage conflicts and disagreements
Leadership	Lead others to achieve objectives in the most effective way; Provide an inclusive workplace that cultivates workplace relationships and teamwork, and foster the development of others	Demonstrate professionalism to set a good example at peer level; Support others through own initiative and enthuse others through own positive and energetic approach.	Lead by example at team level; Encourage and guide others to adopt a point of view, make changes or take action; Provide a team environment that facilitates relationship building, teamwork and the development of others	Lead by example at organisational level; Inspire, motivate and guide others to adopt a point of view, make changes or take action; Cultivate an open, cooperative and collaborative learning culture for the organisation
Lifelong Learning	Seek out opportunities to enhance one's knowledge and skills; Access and acquire new knowledge and skills actively for continual learning	Organise and manage own learning by setting learning targets; Identify learning approaches to achieve work or career goals	Engage in collaborative learning by discussing one's learning with others and soliciting feedback to continually improve oneself	Conduct self-reflective practices to review one's learning to facilitate continual growth in one's career or profession
Managing Diversity	Work well with people from different ethnic, social, cultural and educational backgrounds and understand the concerns and interests of diverse work groups	Demonstrate sensitivity to the cultural characteristics, values, beliefs, and behaviours of another ethnic or cultural group	Build relationships with different ethnic or cultural groups by engaging in cross-cultural cooperative projects	Manage conflicts arising from different ethnic or cultural groups and work effectively in cross-cultural settings
Problem Solving	Generate feasible and efficient solutions to solve problems and capitalise on new opportunities	Identify easily perceivable problems and follow given guidelines and procedures to solve the problems	Identify less perceivable problems and use problem solving tools and techniques to solve the problems	Anticipate potential problems beyond the current scope and apply higher order problem solving tools and techniques to turn problems into opportunities
Resource Management	Efficient and effective deployment and allocation of resources when and where they are needed; Include planning, allocating and scheduling of resources to tasks, which typically include manpower, machines, money and materials	Use resources to ensure optimum and efficient use of resources	Deepen insights into the planning, allocation and deployment of resources to anticipate needs; Plan the allocation and deployment of resources efficiently and effectively	Establish strategies for the allocation and deployment of resources efficiently and effectively

GSC	GSC Description	Proficiency Levels		
		Basic	Intermediate	Advanced
Sense Making	Organise and analyse data and information accurately to identify relationships and detect patterns and trends to gain insights for decision-making	Identify relationships and linkages within different components of data	Interpret data to uncover patterns and trends between various sources of data	Analyse data relationships, patterns and trends to gain important insights and make informed decisions
Service Orientation	Commit to exceeding both internal and external customers' needs; Proactively identify customer needs and sustain a culture of service excellence within the organisation	Exceed customer needs and expectations and handle service challenges with a positive mindset. Demonstrate an understanding of the organisation's service vision, mission and values	Anticipate customers' needs and expectations and elicit feedback from customers to improve service; Build relationships with customers to create and sustain customer loyalty	Model, lead, train and motivate staff with a focus on sustaining a culture that encourages commitment to service excellence and high performance
Teamwork	Work collaboratively and effectively with others to contribute to group efforts to achieve identified objectives	Contribute to a positive and cooperative working environment by fulfilling own responsibilities and providing support to co-workers to achieve team goals	Facilitate work team activities, provide assistance and support needed by team members and promote ownership and commitment among team members to work goals to improve team performance.	Establish teams, design and assess tasks to continually improve team effectiveness and cultivate a sense of organisational ownership and a co-operative working environment
Transdisciplinary Thinking	Understanding of concepts across multiple disciplines, with the capacity to synthesise the knowledge and insights to guide decisions and foster cooperation	Research and adapt concepts from outside one's field of expertise to supplement one's core knowledge and proficiency	Co-relate material from diverse knowledge bases to guide decisions and policy making; Participate in reflective and transdisciplinary communities within and outside the organisation	Synthesise knowledge and insights across disciplinary boundaries to aid strategic decisions and foster cooperation within and outside of the organisation
Virtual Collaboration	Use online collaborative communication tools to work as teams to accomplish tasks or projects	Participate and contribute in a virtual team. Set up appropriate online collaborative tools and supporting equipment	Use interactive collaborative tools to foster cohesion and commitment among virtual team members to achieve goals; Keep up-to-date with innovative online collaborative tools and applications to enhance one's proficiency in engaging in virtual collaboration	Leverage diverse team talent, latest online collaborative technologies and virtual platforms to produce collaborative behaviour and achieve technological savviness in virtual collaboration

Supporting Organisations and Acknowledgements

We would like to thank the following organisations and partners for their support and contributions in the development and validation of the Skills Framework for Electronics:

Applied Materials, Inc
ASE Singapore Pte Ltd
Epson Singapore Pte Ltd
GLOBALFOUNDRIES Singapore Pte Ltd
Infineon Technologies Asia Pacific Pte Ltd
KLA-Tencor
Micron Semiconductor Asia Pte Ltd
Seagate Singapore International Headquarters Pte Ltd
Singapore Epson Industrial Pte Ltd
STATS ChipPAC Pte Ltd
STMicroelectronics
Systems on Silicon Manufacturing Company Pte Ltd (SSMC)
UMC Singapore Branch
United Test and Assembly Center Ltd
UTAC Manufacturing Services Singapore Pte Ltd

In addition, we would like to express our gratitude to the following stakeholders and partners for their contribution to the development of the Skills Framework for Electronics:

- Organisations that have provided the necessary information and assisted in the validation
- Individuals who have agreed to share their personal career stories
- The Unions who have provided their views and support on behalf of their members
- The Industry Association and Professional Bodies for sharing their business and members' perspectives
- Various Government and Government-Linked Agencies for their assistance
- Education and Training Providers for the inputs on skills and competencies development

Photo Credits:
Micron Technology, Inc.: Page 2, 4, 26

Notes

Notes

Notes

Wage Information

MONTHLY GROSS WAGES OF SELECTED OCCUPATIONS IN MANUFACTURING, JUNE 2016

OCCUPATION	GROSS WAGE	
	25th Percentile ($)	75th Percentile ($)
Chief Operating Officer/General Manager	8,357	18,810
Managing Director/Chief Executive Officer	5,000	15,000
Manufacturing Plant/Production Manager	5,477	10,100
Premises and Facilities Maintenance Manager (Including Building Security Manager)	5,721	10,232
Quality Assurance Manager	5,850	10,900
Research and Development Manager	6,915	11,815
Electrical Engineer	3,987	6,156
Electronics Engineer	4,477	6,850
Industrial and Production Engineer	4,200	6,350
Mechanical Engineer	4,070	6,068
Assistant Electronics Engineer	3,280	5,258
Assistant Manufacturing Engineer	3,306	5,351
Assistant Mechanical Engineer	2,807	4,338
Electrical Engineering Technician	2,878	5,000
Electronics Engineering Technician	2,750	4,338
Manufacturing Engineering Technician	2,859	4,320
Mechanical Engineering Technician	3,001	4,425
Electrical Mechanic and Fitter	2,314	4,003
Industrial/Office Machinery Mechanic	2,246	3,175
Supervisor/General Foreman (Electrical and Electronic Trades)	3,288	4,774
Electrical and Electronic Equipment Assembler	1,394	2,209
Stationary Plant and Machine Supervisor/General Foreman	2,900	4,265

Source: Occupational Wage Survey, Manpower Research and Statistics Department, Ministry of Manpower

Notes:
1) Data pertain to full-time resident employees in the private sector establishments each with at least 25 employees.
2) Monthly Gross Wage refers to the sum of the basic wage, overtime payments, commissions, allowances, and other regular cash payments. It is before deduction of employee CPF contributions and personal income tax and excludes employer CPF contributions, bonuses, stock options, other lump sum payments and payments-in-kind.
3) 25th Percentile Wage refers to the wage level which divides the bottom 25% of wage earners from the rest.
4) 75th Percentile Wage refers to the wage level which divides the top 25% of wage earners from the rest.

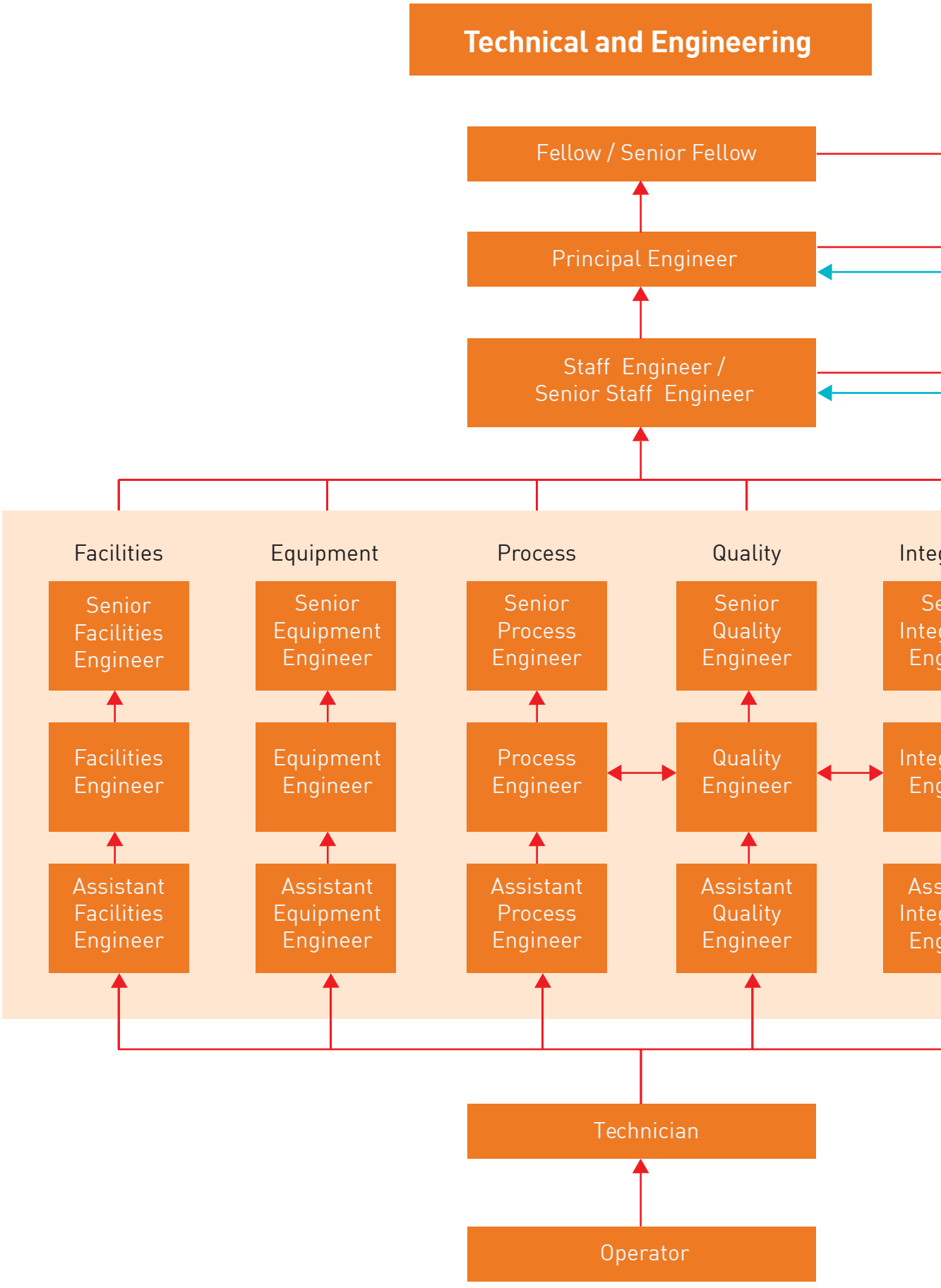
SKILLS FRAMEWORK FOR ELECTRONICS

Career Pathways

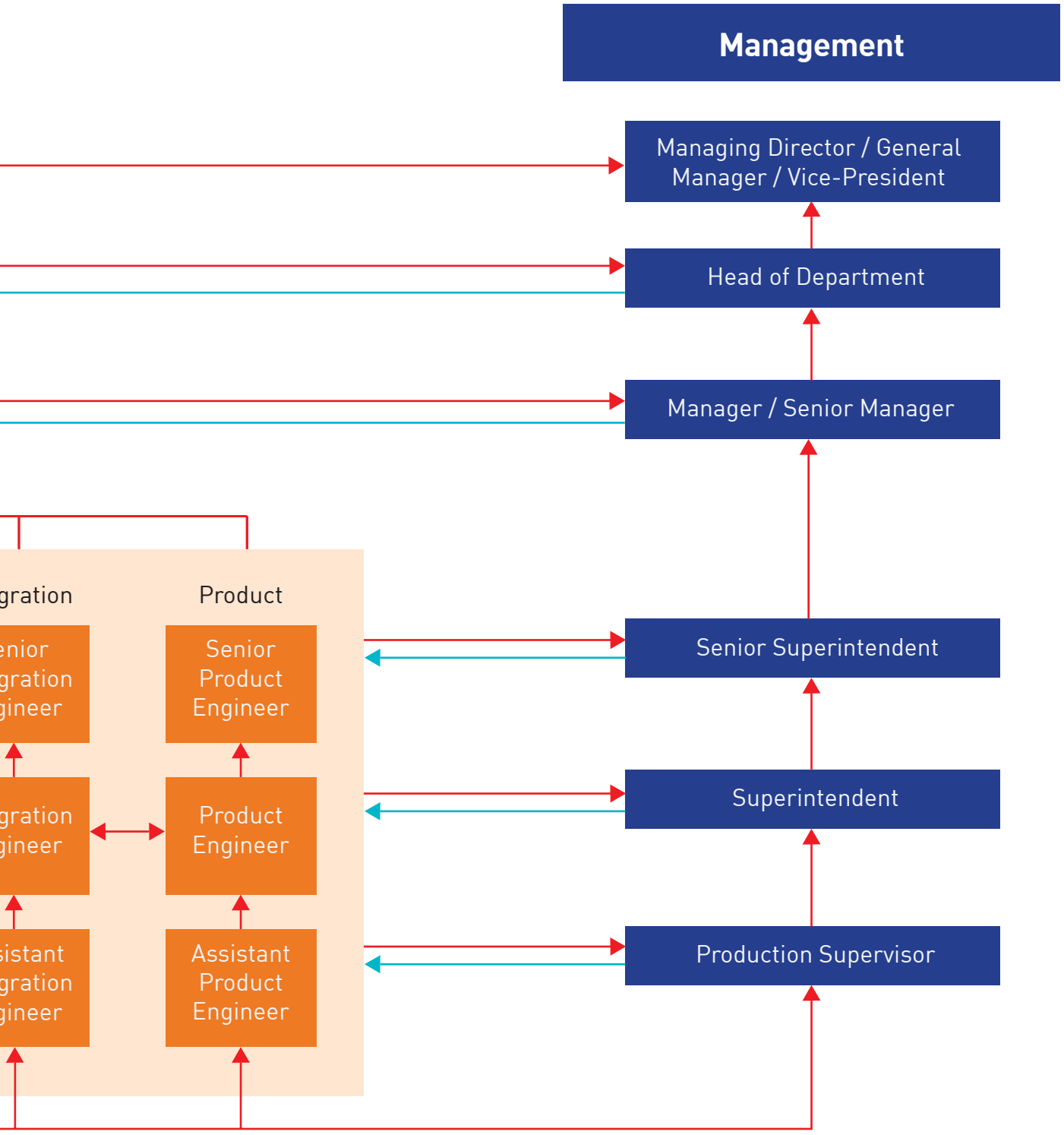
For more information,
please visit www.skillsfuture.sg

SKILLS FRAMEWORK

Career



K FOR ELECTRONICS
Pathways



Technical & Engineering

Management

Direct Lateral Movement

Depending on Skills and Experience

PUBLISHED IN SEPTEMBER 2017