

ASSEMBLY AND TEST WSQ COMPETENCY MAP & QUALIFICATION TITLES



INDUSTRY KEY PURPOSE	SECTOR KEY PURPOSE
To provide high quality innovative product design, development, manufacturing, assembly, test and supply chain services of electrical and electronics products and components in the Electronics industry; covering sectors such as Semiconductor, Data Storage, Computer Peripherals, Infocomms & Consumer Electronics and Other Electronics Modules & Components.	To provide reliable, cost-effective and quality assembly & test services to support the Semiconductor sector.

ALTERNATE PATHWAY

PROFESSIONAL DEGREE/ WORKPLACE CROSS-TRAINING

TECHNICAL DIPLOMA/ HIGHER NITEC/ WORKPLACE CROSS-TRAINING

NITEC/ O' LEVELS - EQV OR BELOW/ WORKPLACE CROSS-TRAINING



OCCUPATIONAL LEVEL	QUALIFICATION S	COMPETENCY UNITS	COMPETENCY CATEGORY								QUALIFICATION MATRIX		
			Equipment Engineering	Quality Engineering	Product Test Engineering	Process Engineering	Manufacturing Engineering	Package Development Engineering	Industrial Engineering	Facility Engineering			
PROFESSIONAL	WSQ Diploma in Assembly & Test	Core (Mandatory)	Apply Good Manufacturing Practices Apply Factory Systems Manage Problems and Make Decisions In A Technical Environment								3 Core CUs + Min 2 SE CU + Min 1 Specialisation Electives from the same track Total = 6 CUs Total Recommended Learning Hours: > 200 hrs		
		Sector Elective	Apply Technical Presentation Skills Apply Technical Writing Techniques Apply Basic DMAIC Problem Solving Techniques Apply 8 Disciplines Problem Solving Approach Perform Assembly Operations Manage Design and Execution of Experiments Manage Failure Mode and Effect Analysis Manage Statistical Processes and Data Analysis In A Technical Environment Manage Technical Projects Manage Measurement Systems Analysis In A Technical Environment Perform Assembly Die Preparation Operations Perform Assembly Die Attached Operations Perform Module Assembly Operations Perform Assembly Molding (Encapsulation) Operations Perform Assembly Post-Molding Operations Perform Burn-In Operations Perform Final Test Operations Perform Post Test Operations Perform Wafer Sort Operations Perform Wire Bond Operations Manage Electro-Static Discharge										
			Specialisation Elective	Refer to Annex A	Refer to Annex A	Refer to Annex A	Refer to Annex A	Refer to Annex A	Refer to Annex A	Refer to Annex A		Refer to Annex A	
			Core (Mandatory)	Implement Good Manufacturing Practices Supervise Quality Procedures and Process Supervise Teams in Manufacturing Environment Write Technical Report Supervise Work Improvement and Productivity Processes								3 Core CUs + min 1 SE CU + min 2 Specialisation Electives from the same track Total = 6 CUs Total Recommended Learning Hours: > 150 hrs	
			Specialisation Elective	Refer to Annex B	Refer to Annex B	Refer to Annex B	Refer to Annex B	Refer to Annex B	Refer to Annex B	Refer to Annex B			Refer to Annex B
			Core (Mandatory)	Carry Out Basic Manufacturing Practices Apply Teamwork in the Manufacturing Environment Apply 5S Techniques (16 hrs T + 1.75 hrs A) MF-COM-101C-2 Apply Quality Systems (16 hrs T + 1.5 hrs A) MF-COM-102C-1									3 Core CUs + min 1 SE CU + min 2 Specialisation Electives from the same track Total = 6 CUs Total Recommended Learning Hours: > 100 hrs
			Specialisation Elective					Refer to Annex C					
			Core (Mandatory)	Equipment Engineering consists of all activities relating to equipment engineering, which include benchmarking and qualifying of new equipment and advanced-level troubleshooting for existing equipment.									
				Quality Engineering consists of all activities relating to quality engineering in control and assurance, which include qualifying of new products, handling of internal & external audits, ensuring proper document controls, and executing corrective actions to meet customers' requirements, regulatory policies and industry standards.									
				Product Test Engineering consists of all activities relating to product engineering, which include evaluating of new product functionalities and specifications. It also consists of activities relating to test engineering, which include coding of test script, changing of test parameters and algorithm, executing of test and evaluating test results.									
				Process Engineering consists of all activities relating to process engineering, such as integrating processes seamlessly based on in-depth knowledge on respective manufacturing processes and flows.									
			Manufacturing Engineering consists of all activities relating to manufacturing engineering which include maintaining, monitoring and optimising of daily manufacturing operation, reporting of abnormalities and applying good documentation practices.										
	Package Development Engineering consists of all activities relating to package development engineering, which include designing and developing of new products, customising existing product, and fabricating substrate interposer that are of high quality and reliability yet able to fall within specifications and meet customers' requirement.												
	Industrial Engineering consists of all activities relating to industrial engineering, which include planning and management of plant activities, ensuring efficient process flow, equipment layouts and optimising space utilisation, and maximising equipment utilisation and workforce effectiveness.												
	Facility Engineering consists of all activities relating to facility engineering, which includes maintaining the plant, machinery and associated building facilities, maximising of space use, and providing line and administration support to production during equipment installations and other set-up in production floor.												

TYPICAL OCCUPATIONAL TITLES

- PROFESSIONAL**
- Product Test Engineer
 - Equipment Engineer
 - Quality Assurance Engineer
 - Facility Engineer
 - Process Engineer
 - Total Productivity Maintenance Engineer
 - Line Sustaining Engineer
 - Package Development Engineer
 - Failure Analysis Engineer
 - Reliability Engineer
 - Manufacturing Engineer
 - Production Engineer
 - Manufacturing Supervisor
 - Assembly Product Engineer
 - Test Engineer
 - Product Engineer
 - Industrial Engineer
 - Manufacturing System Engineer
 - Package Yield Enhancement Engineer
 - Capacity Analyst
 - Material Planner

- TECHNICAL / SUPERVISORY**
- Technical Specialist
 - Engineering Assistant
 - Engineering Specialist
 - Capacity Assistant

- OPERATIONAL**
- Associate Technician
 - Manufacturing Specialist
 - Engineering Operator
 - Manufacturing Trainer

* 'Red' font represents that CS had been developed.
 * 'Blue' font represents that units are imported.
 * 'Black' font represents that units are to-be developed.

WSQ DIPLOMA IN ASSEMBLY & TEST LIST OF SPECIALISATION ELECTIVES COMPETENCY CATEGORY							
Equipment Engineering	Quality Engineering	Product Test Engineering	Process Engineering	Manufacturing Engineering	Package Development Engineering	Industrial Engineering	Facility Engineering
Manage Test Handler Maintenance	Apply Failure Analysis Techniques	Apply Test Methodologies	Manage Automated Storage Retrieval System Processes	Manage Daily Manufacturing Operations	Manage DRAM Packaging Design	Analyse Statistical Data from Factory System	Manage Plant Aircon System
Manage Wafer Sort Prober Maintenance	Manage Quality Management System	Implement Test Programming	Manage Automated Test Equipment Processes	Apply Supervisory Skills in a Manufacturing Environment	Manage Memory Packaging Technology Development on Processes	Conduct Material planning (Supply Chain Analysis)	Manage Pure Water System
Manage Automated Test Equipment Maintenance	Manage Reliability Statistics	Perform Test Data Extraction and Analysis	Manage Bake Oven Processes (UTAC)	Manage Manufacturing Key Performance Indicators	Manage Memory Packaging Technology Development on Material Selection	Manage Asset Utilization	Manage Plant Fire Alarm and Security System
Identify Hardware in Assembly & Test industry	Manage Return Material Authorisation (RMA)	Apply Product Knowledge	Manage Ball Attached Processes (Micron)	Manage Manufacturing Workforce Performance	Manage NAND Packaging Design	Manage Total Productive Maintenance in Autonomous Maintenance	Manage Plant Compressed Dry Air System
Manage Assembly Wafer Sort Equipment Maintenance		Identify Assembly and Test Business Processes	Manage Burn In Oven Processes	Manage Production Output	Manage Substrate Interposer Fabrication	Manage Total Productive Maintenance in Planned Maintenance	Manage Plant Electrical System
Manage Automated Storage Retrieval System Hardware Maintenance		Identify Semiconductor Processes	Manage Detaper Processes		Manage Substrate Interposer Quality System	Manage Total Productive Maintenance in Quality Maintenance	
Manage Automated Test Equipment Calibration		Manage Internal Audit	Manage Die Attach Processes (Micron)			Manage Workforce Productivity	
Manage Oven Maintenance		Identify Wafer Fabrication Processes	Manage Die Sorter Processes			Perform Advanced Equipment Connectivity	
Manage Ball Attached Equipment Maintenance		Implement New Product Introduction (NPI)	Manage Flip Chip Processes			Perform Basic Equipment Connectivity	
Manage Burn In Loader/Unloader Maintenance		Implement Test Time Reduction Methodologies	Manage Grinder Processes			Perform Capacity Analysis	
Manage Burn In Oven Maintenance		Manage Non Conformance	Manage IC Defects				
Manage Detaper Maintenance		Perform Yield Management	Manage Marking Processes (EOL)				
Manage Die Attach Maintenance			Manage Molding (Encapsulation) Processes				
Manage Die Sorter Maintenance			Manage Packaging Processes				
Manage Grinder Maintenance			Manage Plating Processes				
Manage Marking Equipment Maintenance			Manage Reflow Oven Processes				
Manage Molding Equipment Maintenance			Manage Singulation Processes				
Manage Packaging Equipment Maintenance			Manage Stencil Printer Processes				
Manage Plating Equipment Maintenance			Manage Strip Laser Processes				
Manage Reflow Oven Maintenance			Manage Tape and Reel Processes				
Manage Singulation Equipment Maintenance			Manage Taper Processes				
Manage Stencil Printer Maintenance			Manage Test Handlers Processes				
Manage Strip Laser Maintenance			Manage Underfill dispensers Processes				
Manage Tape and Reel Equipment Maintenance			Manage UV Cure Processes				
Manage Taper Maintenance			Manage Visual Mechanical (VM) Scanner Processes				
Manage Underfill Dispensers Maintenance			Manage Wafer Box Loader Processes				
Manage UV Cure Equipment Maintenance			Manage Wafer Level Bumping Processes				
Manage Visual Mechanical (VM) Scanner Maintenance			Manage Wafer Saw Processes				
Manage Wafer Box Loader Maintenance			Manage Wafer Sort Processes				
Manage Wafer Saw Maintenance			Manage Wafer Transfer Processes				
Manage Wafer Transfer Equipment Maintenance			Manage Wire Bonding Processes				
Manage Wire Bonder Maintenance							

WSQ ADVANCED CERTIFICATE IN ASSEMBLY & TEST LIST OF SPECIALISATION ELECTIVES							
COMPETENCY CATEGORY							
Equipment Engineering	Quality Engineering	Product Test Engineering	Process Engineering	Manufacturing Engineering	Package Development Engineering	Industrial Engineering	Facility Engineering
Install Hardware in Assembly & Test Industry	Prepare Internal Audits	Implement Product Knowledge	Implement Automated Storage Retrieval System Processes	Supervise Daily Manufacturing Operations	Test DRAM Packaging Design	Compile Statistical Data from Factory System	Maintain Plant Aircon System
Implement Assembly Wafer Sort Equipment Maintenance	Diagnose Product Failure Analysis	Implement New Product Introduction (NPI)	Implement Automated Test Equipment Processes	Monitor Manufacturing Key Performance Indicators	Test NAND Packaging Design	Implement Advanced Equipment Connectivity	Maintain Plant Deionised Water System
Implement Automated Storage Retrieval System Hardware Maintenance	Audit Reliability Statistics	Implement Test Programming	Implement Bake Oven Processes		Monitor Substrate Interposer Fabrication & Quality System	Implement Basic Equipment Connectivity	Maintain Plant Fire Alarm and Security System
Maintain Automated Test Equipment Calibration	Diagnose Return Material Authorisation (RMA)	Implement Test Time Reduction Methodologies	Implement Ball Attached Processes				Maintain Plant Compressed Dry Air System
Implement Automated Test Equipment Maintenance		Implement Data Extraction & Analysis	Implement Burn In Oven Processes				Maintain Plant Electrical System
Implement Bake Oven Maintenance		Diagnose Non Conformance	Implement Detaper Processes				
Implement Ball Attached Equipment Maintenance		Implement Yield Management	Implement Die Attach Processes				
Implement Burn In Loader/Unloader Maintenance			Implement Die Sorter Processes				
Implement Burn In Oven Maintenance			Implement Flip Chip Processes				
Implement Detaper Maintenance			Implement Grinder Processes				
Implement Die Attached Equipment Maintenance			Investigate IC Defects				
Implement Die Sorter Maintenance			Implement Marking Processes (EOL)				
Implement Grinder Maintenance			Implement Molding (Encapsulation) Processes				
Implement Marking Equipment Maintenance			Implement Packaging Processes				
Implement Molding Equipment Maintenance			Implement Plating Processes				
Implement Packaging Equipment Maintenance			Implement Reflow Oven Processes				
Implement Plating Equipment Maintenance			Implement Singulation Processes				
Implement Reflow Oven Maintenance			Implement Stencil Printer Processes				
Implement Singulation Equipment Maintenance			Implement Strip Laser Processes				
Implement Stencil Printer Maintenance			Implement Tape and Reel Processes				
Implement Strip Laser Maintenance			Implement Taper Processes				
Implement Tape and Reel Equipment Maintenance			Implement Test Handlers Processes				
Implement Taper Maintenance			Implement Underfill dispensers Processes				
Implement Test Handlers Maintenance			Implement UV Cure Processes				
Implement Underfill Dispensers Maintenance			Implement Visual Mechanical (VM) Scanner Processes				
Implement UV Cure Equipment Maintenance			Implement Wafer Box Loader Processes				
Implement Visual Mechanical (VM) Scanner Maintenance			Implement Wafer Level Bumping Processes				
Implement Wafer Box Loader Maintenance			Implement Wafer Saw Processes				
Implement Wafer Saw Maintenance			Implement Wafer Sort Processes				
Implement Wafer Sort Prober Maintenance			Implement Wafer Transfer Processes				
Implement Wafer Transfer Equipment Maintenance			Implement Wire Bonding Processes				
Implement Wire Bonder Maintenance							

WSQ CERTIFICATE IN ASSEMBLY & TEST							
LIST OF SPECIALISATION ELECTIVES							
COMPETENCY CATEGORY							
Equipment Engineering	Quality Engineering	Product Test Engineering	Process Engineering	Manufacturing Engineering	Package Development Engineering	Industrial Engineering	Facility Engineering
				Carry Out Basic Final Test Processes			
				Carry Out Basic Wafer Sort Processes			
				Operate Hardware in Assembly & Test Industry			
				Operate Assembly Wafer Sort Equipment			
				Operate Automated Storage Retrieval System Hardware			
				Operate Automated Test Equipment Calibration			
				Operate Automated Test Equipment			
				Operate Bake Oven			
				Operate Ball Attached Equipment			
				Operate Burn In Loader/Unloader			
				Operate Burn In Oven			
				Operate Detaper			
				Operate Die Attached Equipment			
				Operate Die Sorter			
				Operate Grinder			
				Operate Marking Equipment			
				Operate Molding Equipment			
				Operate Packaging Equipment			
				Operate Plating Equipment			
				Operate Reflow Oven			
				Operate Singulation Equipment			
				Operate Stencil Printer			
				Operate Strip Laser			
				Operate Tape and Reel Equipment			
				Operate Taper			
				Operate Test Handlers			
				Operate Underfill Dispensers			
				Operate UV Cure Equipment			
				Operate Visual Mechanical (VM) Scanner			
				Operate Wafer Box Loader			
				Operate Wafer Saw			
				Operate Wafer Sort Prober			
				Operate Wafer Transfer Equipment			
				Operate Wire Bonder			
				Perform Quality Control (QC) Operations			