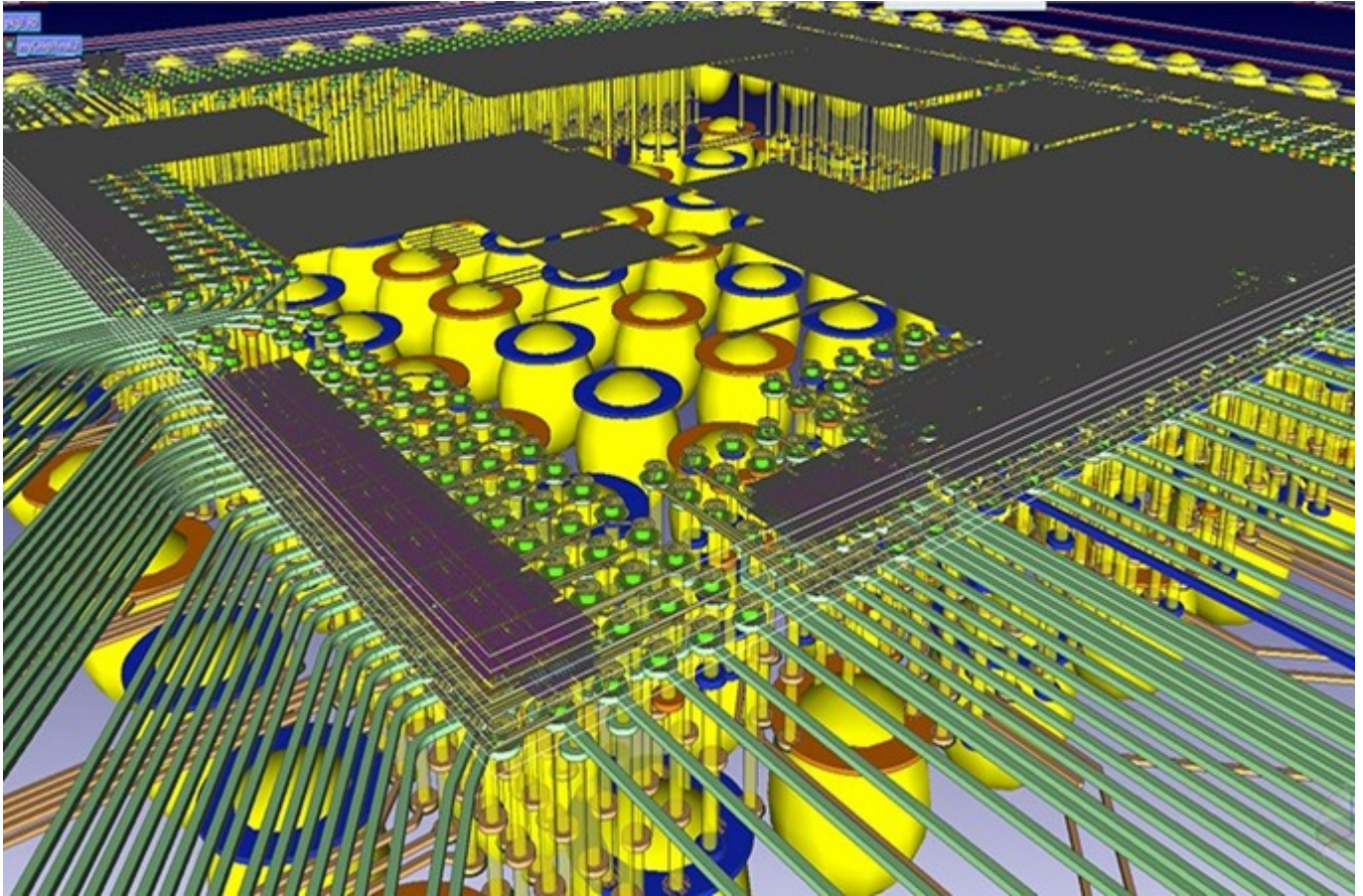


Qualification Pack



IC Package Engineer

QP Code: ELE/Q0124

Version: 3.0

NSQF Level: 5

Electronics Sector Skills Council of India || 155, 2nd Floor, ESC House Okhla Industrial Area-Phase 3
New Delhi- 110020 || email: anu@essc-india.org



Qualification Pack

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Qualification Pack

ELE/Q0124: IC Package Engineer

Brief Job Description

An IC Package Engineer is responsible to design complete package & check Package feasibility & Characterization and validate, He works in coordination with Production as well as Research and Development (R&D) for sample building & Approvals on both types Electronics as well as Mechanical. He is also responsible for development of New Products & Launching for the same to mass production.

Personal Attributes

The individual must have an aptitude for details along with analytical and problem-solving skills. The person should be able to work in co-ordination with others. The individual should be able to communicate appropriately, both verbally and in writing.

Applicable National Occupational Standards (NOS)

Compulsory NOS:

1. [ELE/N0133: Defining the IC package characteristics and feasibility](#)
2. [ELE/N0134: Building a mechanical and customer sample](#)
3. [ELE/N0135: Building Quality & Transferring to Mass Production](#)
4. [ELE/N0136: Research and development of new products](#)
5. [DGT/VSQ/N0102: Employability Skills \(60 Hours\)](#)

Qualification Pack (QP) Parameters

Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Production-S&C
Country	India
NSQF Level	5
Credits	19
Aligned to NCO/ISCO/ISIC Code	NCO-2015/3118.0302

Qualification Pack

Minimum Educational Qualification & Experience	<p>Completed 2nd year of UG (UG Diploma) (Physics/ Electronics/Electrical/Mechanical) with 1.5 years of experience Relevant Experience in Semiconductor & Components</p> <p>OR</p> <p>Completed 3 year diploma after 10th (Electronics/Electrical/Mechanical) with 3 Years of experience Relevant Experience in Semiconductor & Components.</p> <p>OR</p> <p>Previous relevant Qualification of NSQF Level (4.5) with 1.5 years of experience Relevant Experience in Semiconductor & Components</p>
Minimum Level of Education for Training in School	10th Class
Pre-Requisite License or Training	NA
Minimum Job Entry Age	18 Years
Last Reviewed On	NA
Next Review Date	08/11/2025
NSQC Approval Date	08/05/2025
Version	3.0
Reference code on NQR	QG-05-EH-03991-2025-V3-ESSCI
NQR Version	3.0

Remarks:

NA

Qualification Pack

ELE/N0133: Defining the IC package characteristics and feasibility

Description

This NOS is about design, simulate, and define parameters for electronic package development, including electrical, thermal, mechanical, process, and equipment aspects using industry-standard tools and methodologies

Scope

The scope covers the following :

- Design and Simulation Process
- Define Process Parameters
- Define Machine Parameters

Elements and Performance Criteria

Design and Simulation Process

To be competent, the user/individual on the job must be able to:

- PC1.** identify the package design as per customer requirements
- PC2.** verify the files and convert them into design files using design tools
- PC3.** analyze electrical parameters for simulation
- PC4.** analyze mechanical parameters for simulation
- PC5.** analyze thermal parameters for simulation
- PC6.** verify all simulation and internal design parameters
- PC7.** verify substrate design with the substrate manufacturer
- PC8.** manage all documents related to parameters
- PC9.** package structures need to be understood well
- PC10.** identify the design & Simulation Software skills like (CADENCE, SEIMENS ETC)
- PC11.** understand electrical, thermal & mechanical requirements

Define Process Parameters

To be competent, the user/individual on the job must be able to:

- PC12.** analyze the structure of the strips and their dimensions
- PC13.** identify the package outline drawing and strip drawing (PIN Holes, Fiducial Marks, and Orientation)
- PC14.** verify process parameter for each step with risk factor
- PC15.** identify risk factors and discuss them with process engineers
- PC16.** identify productivity and discuss with process engineers
- PC17.** check estimated cost and discuss with process engineers
- PC18.** review the specifications for each failure mode
- PC19.** create and save the recipe with the best-optimized parameters
- PC20.** identify major parameters of both traveling card and Standard operating procedure (SOP)

Qualification Pack

PC21. define all raw material parameters, requirements, etc

PC22. check the highlight to see if any special requirements are required

Define Machine Parameters

To be competent, the user/individual on the job must be able to:

PC23. identify process & quality equipment

PC24. check equipment buy off procedure and documentation

PC25. verify the spare parts material information

PC26. identify the equipment setup

PC27. define equipment spec definition

PC28. analyze advanced technology to decide advance tools

PC29. Check all equipment related parameters clearly

PC30. ensure that the program at each process equipment is correct

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. how to identify the die dimensions and back grinding processes

KU2. the importance of analyzing the die attach film/material properties and thickness requirements

KU3. how to evaluate the curing and attaching conditions of die-attach film/material

KU4. how to recognize the structure of stacking (die thickness and substrate thickness with die attach film/material thickness)

KU5. how to specify the bonding force, pick & place location, curing parameters inside the oven, etc.

KU6. the procedure of setting up all process parameters, such as bonding force, placements, attaching speed, adhesive thickness, wafer and substrate location moving speed, etc.

KU7. how to set to run dummy samples

KU8. the importance of taking measurements to ensure all dimensions are within specification

KU9. the importance of repeating the criteria until the specified criteria are met

KU10. how to turn major input parameters into Standard Operating Procedure (SOP)

KU11. the importance of preparing full SOP and releasing it to production, and considering the special requirements, if required

KU12. the importance of identifying the parameters for the new product verification process

KU13. how to prepare a copy of the old recipe to perform a similar program

KU14. the importance of identifying and making changes as per the product specification requirements

KU15. how to run dummy measurements, Calculate Process Capability (CPK), Process Performance (PPK), and other quality parameters

KU16. the importance and process of verifying the real product using various quality and reliability checks

KU17. the importance of preparing for mass production after all QCs are passed

Qualification Pack

- KU18.** how to use Automatic Computer-Aided Design (AUTO-CAD) software
- KU19.** the procedure of preparing process flow with clear specifications, such as temperature, speed, water flow, vacuumed, etc.
- KU20.** the importance of preparing the SOP with pictures, visuals, data charts to ensure it is more understandable to operators
- KU21.** the importance of identifying the training needs of operators on SOP flow
- KU22.** the process of preparing the travelling card with the defined process or program name/ code
- KU23.** the importance of ensuring the quality of all the travelling cards released to production
- KU24.** the importance of performing regular inspection of programs
- KU25.** the importance of performing regular inspection of data, such as yield, failure, etc.
- KU26.** the importance of preparing for emergencies

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** maintain work-related notes and records
- GS2.** read the relevant literature to get the latest updates about the field of work
- GS3.** listen attentively to understand the information/ instructions being shared
- GS4.** communicate politely and professionally
- GS5.** plan and prioritize tasks to ensure timely completion
- GS6.** co-ordinate with the co-workers to achieve the work objectives
- GS7.** evaluate all possible solutions to a problem to select the best one
- GS8.** take quick decisions to deal with workplace emergencies/ accidents

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Design and Simulation Process</i>	18	20	-	4
PC1. identify the package design as per customer requirements	-	-	-	-
PC2. verify the files and convert them into design files using design tools	-	-	-	-
PC3. analyze electrical parameters for simulation	-	-	-	-
PC4. analyze mechanical parameters for simulation	-	-	-	-
PC5. analyze thermal parameters for simulation	-	-	-	-
PC6. verify all simulation and internal design parameters	-	-	-	-
PC7. verify substrate design with the substrate manufacturer	-	-	-	-
PC8. manage all documents related to parameters	-	-	-	-
PC9. package structures need to be understood well	-	-	-	-
PC10. identify the design & Simulation Software skills like (CADENCE, SEIMENS ETC)	-	-	-	-
PC11. understand electrical, thermal & mechanical requirements	-	-	-	-
<i>Define Process Parameters</i>	12	18	-	3
PC12. analyze the structure of the strips and their dimensions	-	-	-	-
PC13. identify the package outline drawing and strip drawing (PIN Holes, Fiducial Marks, and Orientation)	-	-	-	-
PC14. verify process parameter for each step with risk factor	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC15. identify risk factors and discuss them with process engineers	-	-	-	-
PC16. identify productivity and discuss with process engineers	-	-	-	-
PC17. check estimated cost and discuss with process engineers	-	-	-	-
PC18. review the specifications for each failure mode	-	-	-	-
PC19. create and save the recipe with the best-optimized parameters	-	-	-	-
PC20. identify major parameters of both traveling card and Standard operating procedure (SOP)	-	-	-	-
PC21. define all raw material parameters, requirements, etc	-	-	-	-
PC22. check the highlight to see if any special requirements are required	-	-	-	-
<i>Define Machine Parameters</i>	10	12	-	3
PC23. identify process & quality equipment	-	-	-	-
PC24. check equipment buy off procedure and documentation	-	-	-	-
PC25. verify the spare parts material information	-	-	-	-
PC26. identify the equipment setup	-	-	-	-
PC27. define equipment spec definition	-	-	-	-
PC28. analyze advanced technology to decide advance tools	-	-	-	-
PC29. Check all equipment related parameters clearly	-	-	-	-
PC30. ensure that the program at each process equipment is correct	-	-	-	-



Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
NOS Total	40	50	-	10

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N0133
NOS Name	Defining the IC package characteristics and feasibility
Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Production-S&C
NSQF Level	5
Credits	5
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	08/11/2025
NSQC Clearance Date	08/05/2025

Qualification Pack

ELE/N0134: Building a mechanical and customer sample

Description

This NOS is about building mechanical and functional design sample as per the requirements

Scope

The scope covers the following :

- Build Mechanical Design
- Build Functional Design
- Data Collection & Yield Monitoring

Elements and Performance Criteria

Build Mechanical Design

To be competent, the user/individual on the job must be able to:

- PC1.** analyze raw material
- PC2.** analyze process and run dummy samples
- PC3.** verify all process parameters
- PC4.** verify all machine parameters
- PC5.** verify risk factors for each process parameter
- PC6.** identify a mitigation plan for any abnormal issue
- PC7.** check and collect data at each process step for internal as well as customer
- PC8.** identify process and equipment with high accuracy
- PC9.** check all the steps with more tight tolerances
- PC10.** analyze ship samples to customers to check all outline dimensions
- PC11.** ensure that everything is documented

Build Functional Design

To be competent, the user/individual on the job must be able to:

- PC12.** analyze raw material
- PC13.** analyze process and run dummy samples
- PC14.** review all process parameters
- PC15.** review all machine parameters
- PC16.** verify risk factors for each process parameter
- PC17.** identify a mitigation plan for any abnormal issue
- PC18.** check and collect data at each process step for internal as well as customer
- PC19.** identify process and equipment with high accuracy
- PC20.** perform all functional tests and figure out all early-stage failure
- PC21.** check all the steps with more tight tolerances
- PC22.** analyze ship samples to customers to check all outline dimensions

Qualification Pack

PC23. verify everything and get customer approval

Data Collection & Yield Monitoring

To be competent, the user/individual on the job must be able to:

PC24. verify and collect data at each process step

PC25. analyze data using statistical software

PC26. identify defects of each step and record

PC27. perform failure analysis for failures and find out the root cause

PC28. execute the doe to resolve any issues that arise at any stage of the process.

PC29. monitor yield of all phases (mechanical, functional, etc.

PC30. analyze yield

PC31. check lot requirements to run mechanical and functional samples

PC32. define warranty or guarantee parameters

PC33. identify consumer parameters

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. the importance of defining all die dimensions, stacking combination, and wire bonding parameters

KU2. how to define sample size for each lot to measure all dimensions

KU3. the importance of preparing the measurement techniques in the SOP for operators

KU4. the importance of analyzing the collected data and performing statistical analysis to determine if it is within the specification before releasing the lot to the next step

KU5. how to identify the consumables pack specifications

KU6. the importance of regularly inspecting for each consumable

KU7. how to identify any failure at die attach

KU8. the importance of ensuring wire bond passes through failure analysis

KU9. the importance of checking the root cause of each failure

KU10. the importance of defining the short term and long-term actions or failures to reduce the failure rate

KU11. how to prepare an 8D report

KU12. the importance of preparing the yield data collection for each product

KU13. how to analyze the yield

KU14. the importance of analyzing data using statistical methods

KU15. the importance of recording all failures along with actions to avoid future failure

KU16. the importance of performing Research and Development (R&D) and preparing strategies for further improvements

KU17. the working principle of machines to improve UPH

KU18. how to develop the design of experiments (DOE) expertise

KU19. the process of running statistical tools, such as the Joint Manpower Program (JMP)

KU20. the importance of regularly interacting with customers, suppliers, and internal teams

Qualification Pack

KU21. the process generating designs using Auto-CAD

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** write work-related notes and maintain relevant records
- GS2.** read the relevant literature to get the latest updates about the field of work
- GS3.** listen attentively to understand the information/ instructions being shared by the speaker
- GS4.** communicate politely and professionally
- GS5.** plan and prioritize tasks to ensure timely completion
- GS6.** evaluate all possible solutions to a problem to select the best one
- GS7.** co-ordinate with the co-workers to achieve work objectives
- GS8.** identify possible disruptions to work and take appropriate preventive measures
- GS9.** take quick decisions to deal with workplace emergencies/ accidents

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Build Mechanical Design</i>	12	18	-	4
PC1. analyze raw material	-	-	-	-
PC2. analyze process and run dummy samples	-	-	-	-
PC3. verify all process parameters	-	-	-	-
PC4. verify all machine parameters	-	-	-	-
PC5. verify risk factors for each process parameter	-	-	-	-
PC6. identify a mitigation plan for any abnormal issue	-	-	-	-
PC7. check and collect data at each process step for internal as well as customer	-	-	-	-
PC8. identify process and equipment with high accuracy	-	-	-	-
PC9. check all the steps with more tight tolerances	-	-	-	-
PC10. analyze ship samples to customers to check all outline dimensions	-	-	-	-
PC11. ensure that everything is documented	-	-	-	-
<i>Build Functional Design</i>	18	20	-	3
PC12. analyze raw material	-	-	-	-
PC13. analyze process and run dummy samples	-	-	-	-
PC14. review all process parameters	-	-	-	-
PC15. review all machine parameters	-	-	-	-
PC16. verify risk factors for each process parameter	-	-	-	-
PC17. identify a mitigation plan for any abnormal issue	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC18. check and collect data at each process step for internal as well as customer	-	-	-	-
PC19. identify process and equipment with high accuracy	-	-	-	-
PC20. perform all functional tests and figure out all early-stage failure	-	-	-	-
PC21. check all the steps with more tight tolerances	-	-	-	-
PC22. analyze ship samples to customers to check all outline dimensions	-	-	-	-
PC23. verify everything and get customer approval	-	-	-	-
<i>Data Collection & Yield Monitoring</i>	10	12	-	3
PC24. verify and collect data at each process step	-	-	-	-
PC25. analyze data using statistical software	-	-	-	-
PC26. identify defects of each step and record	-	-	-	-
PC27. perform failure analysis for failures and find out the root cause	-	-	-	-
PC28. execute the doe to resolve any issues that arise at any stage of the process.	-	-	-	-
PC29. monitor yield of all phases (mechanical, functional, etc.	-	-	-	-
PC30. analyze yield	-	-	-	-
PC31. check lot requirements to run mechanical and functional samples	-	-	-	-
PC32. define warranty or guarantee parameters	-	-	-	-
PC33. identify consumer parameters	-	-	-	-
NOS Total	40	50	-	10

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N0134
NOS Name	Building a mechanical and customer sample
Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Production-S&C
NSQF Level	5
Credits	4
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	08/11/2025
NSQC Clearance Date	08/05/2025

Qualification Pack

ELE/N0135: Building Quality & Transferring to Mass Production

Description

This NOS unit is about verifying functionality, physical dimensions, robustness etc. of the package.

Scope

The scope covers the following :

- Verification of Functionality and Physical Dimensions
- Robustness of Package
- Low volume Mass Production

Elements and Performance Criteria

Verification of Functionality and Physical Dimensions

To be competent, the user/individual on the job must be able to:

- PC1.** check and release three qualification builds (Lot)
- PC2.** collect all data at each process step
- PC3.** identify sample size for data collection and build mass production
- PC4.** identify all process parameters and specifications
- PC5.** analyze the data using a statistical tool
- PC6.** review the functionality during the test
- PC7.** analyze all testing and measuring tool
- PC8.** identify internal qualification procedure
- PC9.** prepare a document and basic SOPs

Robustness of Package

To be competent, the user/individual on the job must be able to:

- PC10.** identify reliability and qualification conditions
- PC11.** analyze JEDAC Standard
- PC12.** collect data on each reliability testing
- PC13.** analyze the data and compare it with standards
- PC14.** determining whether a weather package is robust or not
- PC15.** identify reliability testing equipment
- PC16.** identify quality and reliability failure defects
- PC17.** respond to customer returns
- PC18.** review all data to management for final approval
- PC19.** check the list to show that everything is clear

Low volume Mass Production

To be competent, the user/individual on the job must be able to:

- PC20.** check and transfer all documents to the production team

Qualification Pack

- PC21.** release one small volume lot with the production engineer
- PC22.** train production engineers for process engineering
- PC23.** train production engineer for any equipment related change
- PC24.** manage teamwork during small volumes for a smooth transition
- PC25.** identify issues during small volumes and fixed if any
- PC26.** ensure that production transfer is successful full
- PC27.** review data and get final approval

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

- KU1.** the use of Auto CAD and other equivalent design tools
- KU2.** the wafer structure and processing, and wire material properties
- KU3.** the importance of determining the customer requirements and collecting data from competitors' specs
- KU4.** how to perform reverse analysis to get the die to attach and wire bonding specifications
- KU5.** the importance of identifying the critical and normal dimension requirements as per the customer requirements
- KU6.** the importance and process of defining the dimension specifications to meet the customer requirements
- KU7.** the Joint Electron Device Engineering Council (JEDEC) standard
- KU8.** the customer bonding diagram
- KU9.** the importance of specifying the wire bonding material that fulfils the bonding drawing and electrical, mechanical, and thermal specifications
- KU10.** how to perform drawing activities bonding drawing
- KU11.** how to verify the die-attach staking structure
- KU12.** how to verify rubber tip for die attach and capillary for wire bonding drawing
- KU13.** how to identify magazine drawing and cassette drawing

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** write work-related notes and maintain relevant records
- GS2.** read the relevant literature to get the latest updates about the field of work
- GS3.** listen attentively to understand the information/ instructions being shared by the speaker
- GS4.** communicate politely and professionally
- GS5.** plan and prioritize tasks to ensure timely completion
- GS6.** evaluate all possible solutions to a problem to select the best one
- GS7.** co-ordinate with the co-workers to achieve work objectives
- GS8.** identify possible disruptions to work and take appropriate preventive measures



Qualification Pack

GS9. take quick decisions to deal with workplace emergencies/ accidents

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Verification of Functionality and Physical Dimensions</i>	12	16	-	4
PC1. check and release three qualification builds (Lot)	-	-	-	-
PC2. collect all data at each process step	-	-	-	-
PC3. identify sample size for data collection and build mass production	-	-	-	-
PC4. identify all process parameters and specifications	-	-	-	-
PC5. analyze the data using a statistical tool	-	-	-	-
PC6. review the functionality during the test	-	-	-	-
PC7. analyze all testing and measuring tool	-	-	-	-
PC8. identify internal qualification procedure	-	-	-	-
PC9. prepare a document and basic SOPs	-	-	-	-
<i>Robustness of Package</i>	16	20	-	4
PC10. identify reliability and qualification conditions	-	-	-	-
PC11. analyze JEDAC Standard	-	-	-	-
PC12. collect data on each reliability testing	-	-	-	-
PC13. analyze the data and compare it with standards	-	-	-	-
PC14. determining whether a weather package is robust or not	-	-	-	-
PC15. identify reliability testing equipment	-	-	-	-
PC16. identify quality and reliability failure defects	-	-	-	-
PC17. respond to customer returns	-	-	-	-

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Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC18. review all data to management for final approval	-	-	-	-
PC19. check the list to show that everything is clear	-	-	-	-
<i>Low volume Mass Production</i>	12	14	-	2
PC20. check and transfer all documents to the production team	-	-	-	-
PC21. release one small volume lot with the production engineer	-	-	-	-
PC22. train production engineers for process engineering	-	-	-	-
PC23. train production engineer for any equipment related change	-	-	-	-
PC24. manage teamwork during small volumes for a smooth transition	-	-	-	-
PC25. identify issues during small volumes and fixed if any	-	-	-	-
PC26. ensure that production transfer is successful full	-	-	-	-
PC27. review data and get final approval	-	-	-	-
NOS Total	40	50	-	10



Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N0135
NOS Name	Building Quality & Transferring to Mass Production
Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Production-S&C
NSQF Level	5
Credits	4
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	08/11/2025
NSQC Clearance Date	08/05/2025

Qualification Pack

ELE/N0136: Research and development of new products

Description

This NOS is about performing research and development of new products

Scope

The scope covers the following :

- New Product Introduction
- New Material Introduction
- Improve Productivity
- Cost Reduction

Elements and Performance Criteria

New Product Introduction

To be competent, the user/individual on the job must be able to:

- PC1.** ensure that thorough market analysis has been performed
- PC2.** ensure that thorough product analysis has been performed
- PC3.** identify IP's
- PC4.** identify new packaging structures
- PC5.** analyze design, feasibility, characterization for this new structure
- PC6.** analyse market and product

New Material Introduction

To be competent, the user/individual on the job must be able to:

- PC7.** identify package structure
- PC8.** identify material properties of each layer
- PC9.** analyze the impact of each material on performance is essential
- PC10.** identify new material based on concept
- PC11.** review the cost & reliability impact of new material and calculate before trial
- PC12.** verify the design of experiments (DOE) method on this material
- PC13.** analysis each parameter
- PC14.** identify new material chemistry
- PC15.** identify material characterization equipment
- PC16.** identify material characterization technique

Improve Productivity

To be competent, the user/individual on the job must be able to:

- PC17.** identify the process
- PC18.** analyze the process of equipment
- PC19.** analyze the production line and suggest some ways to improve it
- PC20.** ensure that the idea may be planned related, equipment related and material related etc

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PC21. test the idea by running the DOE

PC22. approved for implementation if ok

Cost Reduction

To be competent, the user/individual on the job must be able to:

PC23. identify the process

PC24. analyze the process of equipment

PC25. analyze the production line and suggest some ways to improve it

PC26. ensure that the idea may be planned related, equipment related and material related etc

PC27. test the idea by running the DOE

PC28. approved for implementation if ok

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. how to prepare the File Allocation Table (FAT) report

KU2. how to identify all specifications as per the organizational standards

KU3. the importance of ensuring the functioning of the main controller and the main panel as per the requirements given to the manufacturer

KU4. the importance of ensuring all equipment consumable specifications, dimensions and other parameters are clearly defined by the process and equipment engineer

KU5. the importance and process of preparing the equipment and process parameters

KU6. the importance of defining and preparing sample size required to buy off machines as per the specifications and CPK Requirements

KU7. the importance of preparing a comprehensive report to avoid any future issues

KU8. the importance of recording all approvals in the appropriate formats as per the organizational standards

KU9. the importance of ensuring the functioning of the main controller and the main panel as per requirements given to the manufacturer

KU10. the importance of preparing the equipment consumables according to the specifications, dimensions and other parameters defined by the process and equipment engineer

KU11. how to prepare the sample size required to buy off machines and the importance of ensuring it is defined clearly according to the specifications and CPK requirements

KU12. the importance of using low cost and highly reliable raw material and consumables

KU13. how to verify new material to design DOE

KU14. the process of collecting the quality and reliability data for each characterization, feasibility, and building the qualification

KU15. how to generate the Process Change Notification (PCN)

KU16. the process of transitioning from low volume mass production to high volume mass production

KU17. the characterization phase, feasibility phase, customer sampling phase, and qualification phase is required



Qualification Pack

Generic Skills (GS)

User/individual on the job needs to know how to:

- GS1.** write work-related notes and maintain relevant records
- GS2.** read the relevant literature to get the latest updates about the field of work
- GS3.** listen attentively to understand the information/ instructions being shared by the speaker
- GS4.** communicate politely and professionally
- GS5.** plan and prioritize tasks to ensure timely completion
- GS6.** evaluate all possible solutions to a problem to select the best one
- GS7.** co-ordinate with the co-workers to achieve work objectives
- GS8.** identify possible disruptions to work and take appropriate preventive measures
- GS9.** take quick decisions to deal with workplace emergencies/ accidents

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>New Product Introduction</i>	12	16	-	4
PC1. ensure that thorough market analysis has been performed	-	-	-	-
PC2. ensure that thorough product analysis has been performed	-	-	-	-
PC3. identify IP's	-	-	-	-
PC4. identify new packaging structures	-	-	-	-
PC5. analyze design, feasibility, characterization for this new structure	-	-	-	-
PC6. analyse market and product	-	-	-	-
<i>New Material Introduction</i>	16	18	-	2
PC7. identify package structure	-	-	-	-
PC8. identify material properties of each layer	-	-	-	-
PC9. analyze the impact of each material on performance is essential	-	-	-	-
PC10. identify new material based on concept	-	-	-	-
PC11. review the cost & realibility impact of new material and calculate before trail	-	-	-	-
PC12. verify the design of experiments (DOE) method on this material	-	-	-	-
PC13. analysis each parameter	-	-	-	-
PC14. identify new material chemistry	-	-	-	-
PC15. identify material characterization equipment	-	-	-	-
PC16. identify material characterization technique	-	-	-	-
<i>Improve Productivity</i>	6	8	-	2

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC17. identify the process	-	-	-	-
PC18. analyze the process of equipment	-	-	-	-
PC19. analyze the production line and suggest some ways to improve it	-	-	-	-
PC20. ensure that the idea may be planned related, equipment related and material related etc	-	-	-	-
PC21. test the idea by running the DOE	-	-	-	-
PC22. approved for implementation if ok	-	-	-	-
<i>Cost Reduction</i>	6	8	-	2
PC23. identify the process	-	-	-	-
PC24. analyze the process of equipment	-	-	-	-
PC25. analyze the production line and suggest some ways to improve it	-	-	-	-
PC26. ensure that the idea may be planned related, equipment related and material related etc	-	-	-	-
PC27. test the idea by running the DOE	-	-	-	-
PC28. approved for implementation if ok	-	-	-	-
NOS Total	40	50	-	10

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	ELE/N0136
NOS Name	Research and development of new products
Sector	Electronics
Sub-Sector	Semiconductor & Components
Occupation	Production-S&C
NSQF Level	5
Credits	4
Version	2.0
Last Reviewed Date	08/05/2025
Next Review Date	08/11/2025
NSQC Clearance Date	08/05/2025

Qualification Pack

DGT/VSQ/N0102: Employability Skills (60 Hours)

Description

This unit is about employability skills, Constitutional values, becoming a professional in the 21st Century, digital, financial, and legal literacy, diversity and Inclusion, English and communication skills, customer service, entrepreneurship, and apprenticeship, getting ready for jobs and career development.

Scope

The scope covers the following :

- Introduction to Employability Skills
- Constitutional values - Citizenship
- Becoming a Professional in the 21st Century
- Basic English Skills
- Career Development & Goal Setting
- Communication Skills
- Diversity & Inclusion
- Financial and Legal Literacy
- Essential Digital Skills
- Entrepreneurship
- Customer Service
- Getting ready for Apprenticeship & Jobs

Elements and Performance Criteria

Introduction to Employability Skills

To be competent, the user/individual on the job must be able to:

- PC1.** identify employability skills required for jobs in various industries
- PC2.** identify and explore learning and employability portals

Constitutional values – Citizenship

To be competent, the user/individual on the job must be able to:

- PC3.** recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.
- PC4.** follow environmentally sustainable practices

Becoming a Professional in the 21st Century

To be competent, the user/individual on the job must be able to:

- PC5.** recognize the significance of 21st Century Skills for employment
- PC6.** practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life

Basic English Skills

To be competent, the user/individual on the job must be able to:

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- PC7.** use basic English for everyday conversation in different contexts, in person and over the telephone
- PC8.** read and understand routine information, notes, instructions, mails, letters etc. written in English
- PC9.** write short messages, notes, letters, e-mails etc. in English

Career Development & Goal Setting

To be competent, the user/individual on the job must be able to:

- PC10.** understand the difference between job and career
- PC11.** prepare a career development plan with short- and long-term goals, based on aptitude

Communication Skills

To be competent, the user/individual on the job must be able to:

- PC12.** follow verbal and non-verbal communication etiquette and active listening techniques in various settings
- PC13.** work collaboratively with others in a team

Diversity & Inclusion

To be competent, the user/individual on the job must be able to:

- PC14.** communicate and behave appropriately with all genders and PwD
- PC15.** escalate any issues related to sexual harassment at workplace according to POSH Act

Financial and Legal Literacy

To be competent, the user/individual on the job must be able to:

- PC16.** select financial institutions, products and services as per requirement
- PC17.** carry out offline and online financial transactions, safely and securely
- PC18.** identify common components of salary and compute income, expenses, taxes, investments etc
- PC19.** identify relevant rights and laws and use legal aids to fight against legal exploitation

Essential Digital Skills

To be competent, the user/individual on the job must be able to:

- PC20.** operate digital devices and carry out basic internet operations securely and safely
- PC21.** use e- mail and social media platforms and virtual collaboration tools to work effectively
- PC22.** use basic features of word processor, spreadsheets, and presentations

Entrepreneurship

To be competent, the user/individual on the job must be able to:

- PC23.** identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research
- PC24.** develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion
- PC25.** identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity

Customer Service

To be competent, the user/individual on the job must be able to:

- PC26.** identify different types of customers
- PC27.** identify and respond to customer requests and needs in a professional manner.

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PC28. follow appropriate hygiene and grooming standards

Getting ready for apprenticeship & Jobs

To be competent, the user/individual on the job must be able to:

PC29. create a professional Curriculum vitae (Résumé)

PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively

PC31. apply to identified job openings using offline /online methods as per requirement

PC32. answer questions politely, with clarity and confidence, during recruitment and selection

PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements

Knowledge and Understanding (KU)

The individual on the job needs to know and understand:

KU1. need for employability skills and different learning and employability related portals

KU2. various constitutional and personal values

KU3. different environmentally sustainable practices and their importance

KU4. Twenty first (21st) century skills and their importance

KU5. how to use English language for effective verbal (face to face and telephonic) and written communication in formal and informal set up

KU6. importance of career development and setting long- and short-term goals

KU7. about effective communication

KU8. POSH Act

KU9. Gender sensitivity and inclusivity

KU10. different types of financial institutes, products, and services

KU11. how to compute income and expenditure

KU12. importance of maintaining safety and security in offline and online financial transactions

KU13. different legal rights and laws

KU14. different types of digital devices and the procedure to operate them safely and securely

KU15. how to create and operate an e- mail account and use applications such as word processors, spreadsheets etc.

KU16. how to identify business opportunities

KU17. types and needs of customers

KU18. how to apply for a job and prepare for an interview

KU19. apprenticeship scheme and the process of registering on apprenticeship portal

Generic Skills (GS)

User/individual on the job needs to know how to:

GS1. read and write different types of documents/instructions/correspondence

GS2. communicate effectively using appropriate language in formal and informal settings



Qualification Pack

- GS3.** behave politely and appropriately with all
- GS4.** how to work in a virtual mode
- GS5.** perform calculations efficiently
- GS6.** solve problems effectively
- GS7.** pay attention to details
- GS8.** manage time efficiently
- GS9.** maintain hygiene and sanitization to avoid infection

Qualification Pack

Assessment Criteria

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Introduction to Employability Skills</i>	1	1	-	-
PC1. identify employability skills required for jobs in various industries	-	-	-	-
PC2. identify and explore learning and employability portals	-	-	-	-
<i>Constitutional values – Citizenship</i>	1	1	-	-
PC3. recognize the significance of constitutional values, including civic rights and duties, citizenship, responsibility towards society etc. and personal values and ethics such as honesty, integrity, caring and respecting others, etc.	-	-	-	-
PC4. follow environmentally sustainable practices	-	-	-	-
<i>Becoming a Professional in the 21st Century</i>	2	4	-	-
PC5. recognize the significance of 21st Century Skills for employment	-	-	-	-
PC6. practice the 21st Century Skills such as Self-Awareness, Behaviour Skills, time management, critical and adaptive thinking, problem-solving, creative thinking, social and cultural awareness, emotional awareness, learning to learn for continuous learning etc. in personal and professional life	-	-	-	-
<i>Basic English Skills</i>	2	3	-	-
PC7. use basic English for everyday conversation in different contexts, in person and over the telephone	-	-	-	-
PC8. read and understand routine information, notes, instructions, mails, letters etc. written in English	-	-	-	-
PC9. write short messages, notes, letters, e-mails etc. in English	-	-	-	-
<i>Career Development & Goal Setting</i>	1	2	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
PC10. understand the difference between job and career	-	-	-	-
PC11. prepare a career development plan with short- and long-term goals, based on aptitude	-	-	-	-
<i>Communication Skills</i>	2	2	-	-
PC12. follow verbal and non-verbal communication etiquette and active listening techniques in various settings	-	-	-	-
PC13. work collaboratively with others in a team	-	-	-	-
<i>Diversity & Inclusion</i>	1	2	-	-
PC14. communicate and behave appropriately with all genders and PwD	-	-	-	-
PC15. escalate any issues related to sexual harassment at workplace according to POSH Act	-	-	-	-
<i>Financial and Legal Literacy</i>	2	3	-	-
PC16. select financial institutions, products and services as per requirement	-	-	-	-
PC17. carry out offline and online financial transactions, safely and securely	-	-	-	-
PC18. identify common components of salary and compute income, expenses, taxes, investments etc	-	-	-	-
PC19. identify relevant rights and laws and use legal aids to fight against legal exploitation	-	-	-	-
<i>Essential Digital Skills</i>	3	4	-	-
PC20. operate digital devices and carry out basic internet operations securely and safely	-	-	-	-
PC21. use e- mail and social media platforms and virtual collaboration tools to work effectively	-	-	-	-
PC22. use basic features of word processor, spreadsheets, and presentations	-	-	-	-

Qualification Pack

Assessment Criteria for Outcomes	Theory Marks	Practical Marks	Project Marks	Viva Marks
<i>Entrepreneurship</i>	2	3	-	-
PC23. identify different types of Entrepreneurship and Enterprises and assess opportunities for potential business through research	-	-	-	-
PC24. develop a business plan and a work model, considering the 4Ps of Marketing Product, Price, Place and Promotion	-	-	-	-
PC25. identify sources of funding, anticipate, and mitigate any financial/ legal hurdles for the potential business opportunity	-	-	-	-
<i>Customer Service</i>	1	2	-	-
PC26. identify different types of customers	-	-	-	-
PC27. identify and respond to customer requests and needs in a professional manner.	-	-	-	-
PC28. follow appropriate hygiene and grooming standards	-	-	-	-
<i>Getting ready for apprenticeship & Jobs</i>	2	3	-	-
PC29. create a professional Curriculum vitae (Résumé)	-	-	-	-
PC30. search for suitable jobs using reliable offline and online sources such as Employment exchange, recruitment agencies, newspapers etc. and job portals, respectively	-	-	-	-
PC31. apply to identified job openings using offline /online methods as per requirement	-	-	-	-
PC32. answer questions politely, with clarity and confidence, during recruitment and selection	-	-	-	-
PC33. identify apprenticeship opportunities and register for it as per guidelines and requirements	-	-	-	-
NOS Total	20	30	-	-

Qualification Pack

National Occupational Standards (NOS) Parameters

NOS Code	DGT/VSQ/N0102
NOS Name	Employability Skills (60 Hours)
Sector	Cross Sectoral
Sub-Sector	Professional Skills
Occupation	Employability
NSQF Level	4
Credits	2
Version	1.0
Last Reviewed Date	08/05/2025
Next Review Date	31/10/2025
NSQC Clearance Date	08/05/2025

Assessment Guidelines and Assessment Weightage

Assessment Guidelines

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below.)
4. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on these criteria.
5. To pass the Qualification Pack, every trainee should score a minimum of 70% in every NOS.
6. In case of successfully passing only certain number of NOS's, the trainee is eligible to take subsequent assessment on the balance NOS's to pass the Qualification Pack

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Minimum Aggregate Passing % at QP Level : 70

(Please note: Every Trainee should score a minimum aggregate passing percentage as specified above, to successfully clear the Qualification Pack assessment.)

Assessment Weightage

Compulsory NOS

National Occupational Standards	Theory Marks	Practical Marks	Project Marks	Viva Marks	Total Marks	Weightage
ELE/N0133.Defining the IC package characteristics and feasibility	40	50	-	10	100	20
ELE/N0134.Building a mechanical and customer sample	40	50	-	10	100	20
ELE/N0135.Building Quality & Transferring to Mass Production	40	50	-	10	100	20
ELE/N0136.Research and development of new products	40	50	-	10	100	20
DGT/VSQ/N0102.Employability Skills (60 Hours)	20	30	-	-	50	20
Total	180	230	-	40	450	100

Qualification Pack

Acronyms

NOS	National Occupational Standard(s)
NSQF	National Skills Qualifications Framework
QP	Qualifications Pack
TVET	Technical and Vocational Education and Training

Qualification Pack

Glossary

Sector	Sector is a conglomeration of different business operations having similar business and interests. It may also be defined as a distinct subset of the economy whose components share similar characteristics and interests.
Sub-sector	Sub-sector is derived from a further breakdown based on the characteristics and interests of its components.
Occupation	Occupation is a set of job roles, which perform similar/ related set of functions in an industry.
Job role	Job role defines a unique set of functions that together form a unique employment opportunity in an organisation.
Occupational Standards (OS)	OS specify the standards of performance an individual must achieve when carrying out a function in the workplace, together with the Knowledge and Understanding (KU) they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria (PC)	Performance Criteria (PC) are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (NOS)	NOS are occupational standards which apply uniquely in the Indian context.
Qualifications Pack (QP)	QP comprises the set of OS, together with the educational, training and other criteria required to perform a job role. A QP is assigned a unique qualifications pack code.
Unit Code	Unit code is a unique identifier for an Occupational Standard, which is denoted by an 'N'
Unit Title	Unit title gives a clear overall statement about what the incumbent should be able to do.
Description	Description gives a short summary of the unit content. This would be helpful to anyone searching on a database to verify that this is the appropriate OS they are looking for.
Scope	Scope is a set of statements specifying the range of variables that an individual may have to deal with in carrying out the function which have a critical impact on quality of performance required.

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Knowledge and Understanding (KU)	Knowledge and Understanding (KU) are statements which together specify the technical, generic, professional and organisational specific knowledge that an individual needs in order to perform to the required standard.
Organisational Context	Organisational context includes the way the organisation is structured and how it operates, including the extent of operative knowledge managers have of their relevant areas of responsibility.
Technical Knowledge	Technical knowledge is the specific knowledge needed to accomplish specific designated responsibilities.
Core Skills/ Generic Skills (GS)	Core skills or Generic Skills (GS) are a group of skills that are the key to learning and working in today's world. These skills are typically needed in any work environment in today's world. These skills are typically needed in any work environment. In the context of the OS, these include communication related skills that are applicable to most job roles.
Electives	Electives are NOS/set of NOS that are identified by the sector as contributive to specialization in a job role. There may be multiple electives within a QP for each specialized job role. Trainees must select at least one elective for the successful completion of a QP with Electives.
Options	Options are NOS/set of NOS that are identified by the sector as additional skills. There may be multiple options within a QP. It is not mandatory to select any of the options to complete a QP with Options.