

QUALIFICATIONS PACK - OCCUPATIONAL STANDARDS FOR ELECTRONICS INDUSTRY

What are Occupational Standards(OS)?

- OS describe what individuals need to do, know and understand in order to carry out a particular job role or function
- OS are performance standards that individuals must achieve when carrying out functions in the workplace, together with specifications of the underpinning knowledge and understanding

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Contents

1. Introduction and Contacts.....P1
2. Qualifications Pack.....P2
3. Glossary of Key TermsP3
4. OS Units.....P5

Introduction

Qualifications Pack-Circuit Imaging Operator

SECTOR: ELECTRONICS

SUB-SECTOR: Printed Circuit board Manufacturing

OCCUPATION: Circuit Imaging

REFERENCE ID: ELE / Q 2101

Circuit Imaging Operator: Circuit Imaging Operator imprints the requisite circuit with the help of UV rays through machine on to the laminated board

Brief Job Description: A circuit imaging operator captures the requisite circuit on the laminated panel. A positive UV translucent film is placed on the photo sensitised board. The film is required to be opaque in regions where the circuit trace is necessary and is clear elsewhere. On exposure to UV, the photo resist under the clear portions of the film get cured without affecting the area under opaque portions of the film.

Personal Attributes: Attributes that a circuit imaging operator is expected to have are attention to detail, accuracy and ability to work in a process driven team. The individual is also required to pay keen attention to alignment, since lack of focus could lead to wastage.

Job Details	Qualifications Pack Code	ELE / Q 2101		
	Job Role	Circuit Imaging Operator		
	Credits(NVEQF/NVQF/NSQF) [OPTIONAL]	TBD	Version number	1.0
	Sector	Electronics	Drafted on	19/07/2013
	Sub-sector	PCB Manufacturing	Last reviewed on	07/08/2013
	Occupation	Circuit Imaging	Next review date	07/02/2014

Job Role	Circuit Imaging Operator
Role Description	Places the laminated board on the circuit imaging machine taking due care in alignment of the holes drilled on the board, places the UV translucent film on the laminated board, operates the machine in order to expose the photo resist to UV light; recognises basic faults in the circuit imaging machine and corrects them, does maintenance of the circuit imaging machine from time to time
NVEQF/NVQF level	2
Minimum Educational Qualifications*	10 th /12 th pass (in Science stream)
Maximum Educational Qualifications*	Diploma (Electronics)
Training (Suggested but not mandatory)	
Experience	Nil
Applicable National Occupational Standards (NOS)	<p>Compulsory:</p> <ol style="list-style-type: none"> ELE / N 2101- Operate circuit imaging machine ELE / N 0001- Coordinate with others <p>Optional: Not applicable</p>
Performance Criteria	As described in the relevant OS units

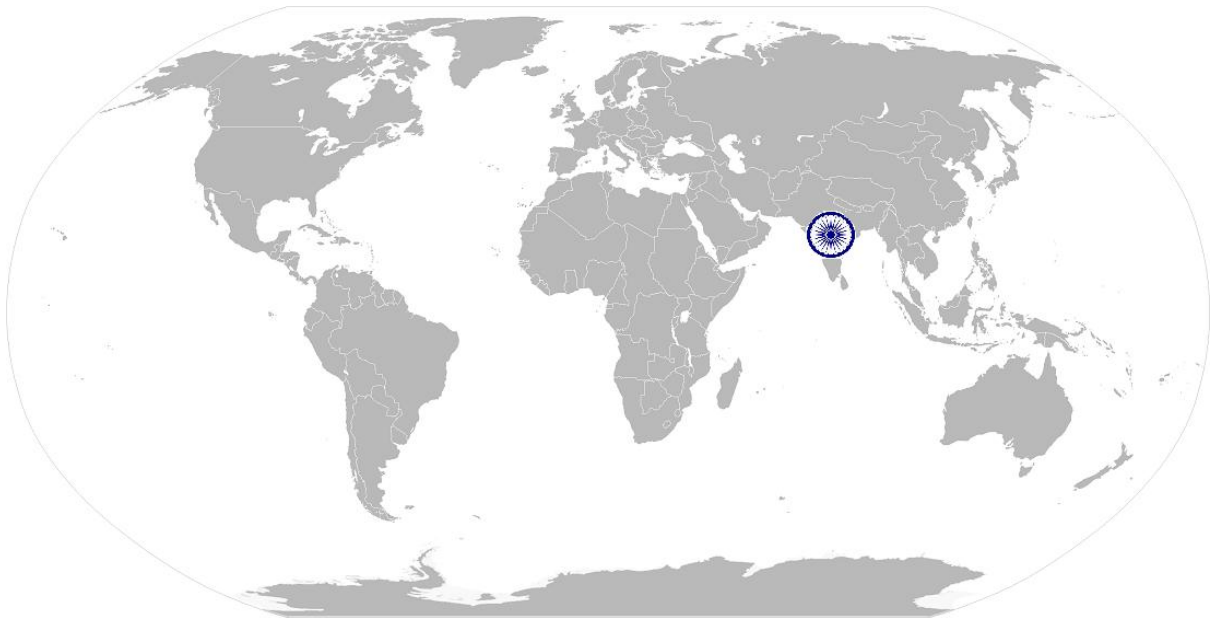
Definitions

Keywords /Terms	Description
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.
Function	Function is an activity necessary for achieving the key purpose of the sector, occupation, or an area of work, which can be carried out by a person or a group of persons. Functions are identified through functional analysis and form the basis of OS.
Sub-function	Sub-functions are sub-activities essential to fulfil the achieving the objectives of the function.
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 they need to meet that standard consistently. Occupational Standards are applicable both in the Indian and global contexts.
Performance Criteria	Performance criteria are statements that together specify the standard of performance required when carrying out a task.
National Occupational Standards (OS)	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.
Knowledge and Understanding	Knowledge and understanding 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	Core skills or generic skills are a group of skills that are the key to learning

Acronyms

Skills	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.
Keywords /Terms	Description
NOS	National Occupational Standard(s)
NVQF	National Vocational Qualifications Framework
NSQF	National Qualifications Framework
NVEQF	National Vocational Education Qualifications Framework
QP	Qualifications Pack

National Occupational Standard



Overview

This unit is about imaging the requisite electronic circuit on to the Laminated Board in the process of printed circuit board fabrication

ELE / N 2101

Operate circuit imaging machine

National Occupational Standard

Unit Code	ELE / N 2101
Unit Title (Task)	Operate circuit imaging machine
Description	This OS unit is about imaging the requisite electronic circuit on to the laminated board in the process of printed circuit board fabrication
Scope	<p>This unit/ task covers the following:</p> <ul style="list-style-type: none"> • Collect the laminated boards and UV translucent film from respective departments • Set up the circuit imaging machine ensuring appropriate pressure and intensity settings • Expose the board and the film to Ultraviolet radiation
Performance Criteria(PC) w.r.t. the Scope	
Element	Performance Criteria
Quality of output	<p>To be competent, the user/ individual must be able to:</p> <p>PC1. Check for errors in input material through visual inspection before performing the imaging process</p> <p>PC2. Ensure countdown timer, vacuum pressure and intensity settings are appropriate</p> <p>PC3. Ensure high throughput (number of panels per day)</p> <p>PC4. Efficiently capture the circuit image onto the allotted number of boards</p> <p>PC5. Avoid alignment errors between the board and the film</p> <p>PC6. Handle the board with care in order to avoid scratches</p> <p>PC7. Ensure that inputs received have undergone necessary cleaning procedures, clean the circuit imaging machine on a regular basis</p> <p>PC8. Ensure general maintenance such as replacement of bulbs , chiller maintenance (water cooling based machine), removal of dust from glass with help of sticky pads, etc.</p>
Maintenance	<p>PC9. Ensure No shut down of machine due to improper maintenance</p> <p>PC10. Perform regular cleaning process and methodology as prescribed by manufacturer of the machine</p>
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its processes)	<p>The individual on the job needs to understand:</p> <p>KA1. Company's policies on: incentives, delivery standards, and personnel management</p> <p>KA2. PCB fabrication process carried out by the organization</p> <p>KA3. Organizational capabilities with respect to input materials/processes</p> <p>KA4. Importance of the individual's role in the workflow</p> <p>KA5. Reporting structure</p>
B. Technical Knowledge	<p>KB1. Thorough knowledge of the circuit imaging machine functioning</p> <p>KB2. Knowledge about UV, Photo resist, Intensity, Vacuum, Alignment and their importance in the Circuit Imaging process</p> <p>KB3. Basic Knowledge of operation and maintenance of machines such as Laminator, Imaging and Developing machines</p>

ELE / N 2101

Operate circuit imaging machine

	<p>KB4.Knowledge of photo tools (whether they are negatives or positives of the circuit pattern), development of the UV cured circuit, understanding of development parameters, knowledge of chemicals used for developing etc.</p> <p>KB5.Knowledge & Understanding of common defects and remedies with causes.</p> <p>KB6.Knowledge of the complete process of circuit imaging room including surface preparation of laminate, lamination of the board and cooling , circuit exposure and cooling and developing the exposed board</p> <p>KB7.Knowledge of manual and automated exposure machines and standard process built around these.</p> <p>KB8.Knowledge of DFR Lamination & DFR developer operations (DFR: Dry Film Resist) including process parameters, chemicals, calibration of exposure etc.</p> <p>KB9. Knowledge of various methods of Imaging</p> <p>KB10. Knowledge of defects in product and photo</p> <p>KB11.Knowledge of environmental norms</p> <p>KB12.Knowledge of acceptability criteria – IPC –A-610 Rev H Class II and III, developed by IPC</p>
Skills (S) [Optional]	
<p>A. Core Skills/ Generic Skills</p>	<p>Basic reading skills</p>
	<p>SA1. To be able to understand machine operating manual in order to identify and fix minor faults that occur</p>
	<p>Teamwork</p> <p>SA2. To maintain pace of the imaging process in order not to lag behind in the overall assembly line</p> <p>SA3. To co ordinate with other team members in order to collect inputs and deliver outputs to respective teams</p>
	<p>Basic Writing Skills</p>
	<p>SA4. To be able to write reports/log books</p>
<p>B. Professional Skills</p>	<p>Using tools and machines</p>
	<p>SB1. To operate Circuit Imaging Machine to be able to meet everyday's demand</p>
	<p>Quality Control</p>
	<p>SB2. To identify errors both in the input material and in the printed board output</p>
	<p>Critical thinking</p>
	<p>SB3. To spot process disruptions and delays</p>
	<p>Reflective thinking</p>
<p>SB4. To improve work processes</p> <p>SB5. To reduce errors</p>	

ELE / N 2101

Operate circuit imaging machine

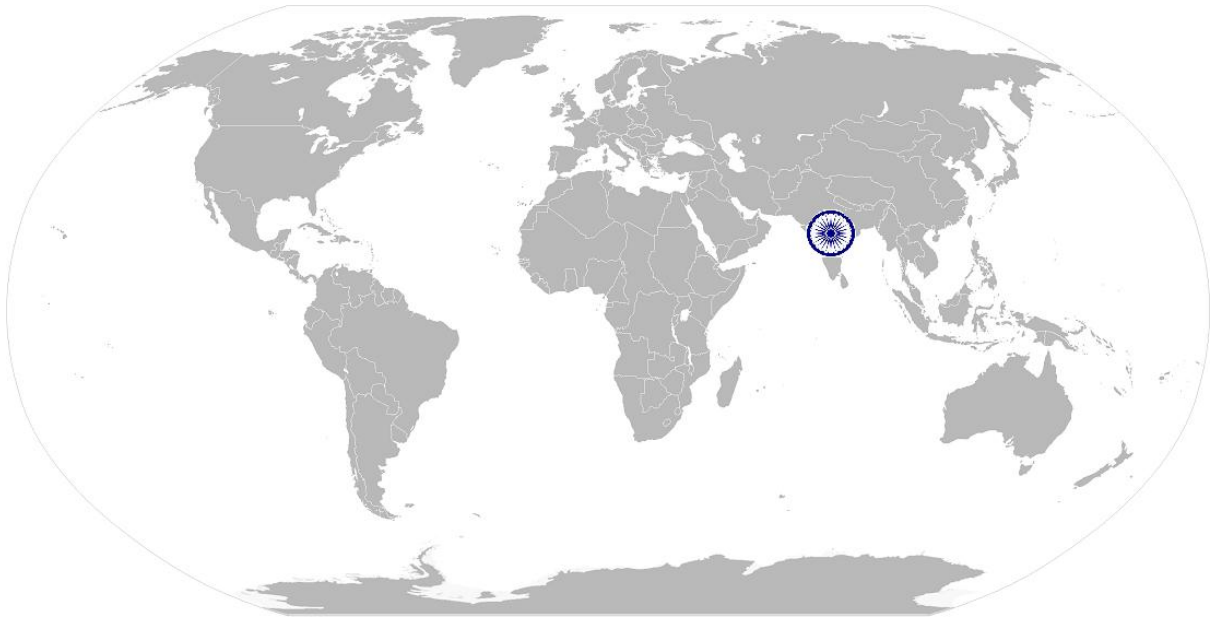
NOS Version Control

NOS Code	ELE/ N 2101		
Credits(NVEQF/NVQF/NSQF) [OPTIONAL]	TBD	Version number	1.0
Industry	Electronics	Drafted on	19/07/2013
Industry Sub-sector	PCB Manufacturing	Last reviewed on	07/08/2013
		Next review date	07/02/2014

ELE / N 0001

Coordinate with others

National Occupational Standard



Overview

This unit is about the Operators's level of communication with colleagues and other departments and sections within the organisation. It determines his ability to work as a team member to achieve the required deliverables on schedule.

Unit Code	ELE/N0001
Unit Title (Task)	Coordinate with others
Description	This OS unit is about communicating with colleagues and seniors in order to maintain smooth work flow
Scope	<p>This unit/ task covers the following:</p> <ul style="list-style-type: none"> • Interacting with supervisor to understand the requirements and work accordingly • Coordinating with colleagues within and outside the department to carry out the work • Receiving feedback on the work done • Communicating any potential hazards or expected process disruption
Performance Criteria(PC) w.r.t. the Scope	
Element	Performance Criteria
Interaction with supervisor	<p>To be competent, the user/ individual must be able to:</p> <p>PC1. Understand the work output requirements</p> <p>PC2. Comply with company policy and rules</p> <p>PC3. Deliver quality work on time as required by reporting any anticipated reasons for delays</p> <p>PC4. Report about product defects, repairs and maintenance of machine required</p>
Interactions with colleagues and other departments	<p>PC5. Put team over individual goals</p> <p>PC6. Carry out conflicts resolution and multi-tasking</p>
Receive feedback	<p>PC7. Complete rework on time</p> <p>PC8. Apply the feedback received and avoid the mistakes in future</p>
Knowledge and Understanding (K)	
A. Organizational Context (Knowledge of the company / organization and its processes)	<p>The individual on the job needs to know and understand:</p> <p>KA1. Company's policies on: incentives, delivery standards, and personnel management</p> <p>KA2. Work flow involved in company's assembly process</p> <p>KA3. Importance of the individual's role in the workflow</p> <p>KA4. Reporting structure</p>
B. Technical Knowledge	<p>The individual on the job needs to know and understand:</p> <p>KB1. How to communicate effectively</p> <p>KB2. How to build team coordination</p>
Skills (S) [Optional]	
A. Core Skills/ Generic Skills	Teamwork and some multitasking
	<p>The individual on the job needs to know and understand how:</p> <p>SA1. To deliver product to next work process on time</p>

Coordinate with others

B. Professional Skills	Decision making
	The individual on the job needs to know and understand: SB1. How to report potential areas of disruptions to work process SB2. When to report to supervisor and when to deal with a colleague depending on the type of concern
	Reflective thinking
	The individual on the job needs to know and understand: SB3. How to improve work process
	Critical thinking
	The individual on the job needs to know and understand: SB4. How to spot process disruptions and delays

NOS Version Control

NOS Code	ELE / N 0001		
Credits(NVEQF/NVQF/NSQF) [OPTIONAL]	TBD	Version number	1.0
Industry	Electronics	Drafted on	19/07/2013
Industry Sub-sector	Assembly	Last reviewed on	07/08/2013
		Next review date	07/02/2014