

Title	Control printed circuit board manufacturing processes		
Level	3	Credits	30

Purpose	<p>This unit standard covers the setup, operation, and operational maintenance of equipment and materials for specified printed circuit board (PCB) manufacturing processes. This includes etching, plating, tinning, and deposition of conductive films.</p> <p>People credited with this unit standard are able to:</p> <ul style="list-style-type: none"> –set up printed circuit board manufacturing processes; –maintain the material properties of printed circuit board manufacturing processes; and –ensure the performance of printed circuit board manufacturing processes.
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Classification	Electronic Engineering > Electronic Manufacturing
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Available grade	Achieved
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Guidance Information

- 1 Definition
PCB manufacturing processes refers to printed circuit board etching, plating, tinning, and deposition of conductive films.
- 2 For *PCB fabrication operations*, covering cutting, scoring, drilling, routing, and press operations, refer to Unit 12582, *Control printed circuit board fabrication operations*. For *PCB screenprinting processes*, covering circuit printing, solder masking, and component layout masking, refer to Unit 12584, *Control printed circuit board screenprinting processes*.
 For *preparation of screenprinting stencils*, covering track layouts, component layout, screening layout, conductive layout, and solder masking, refer to Unit 12585, *Prepare screenprinting stencils for printed circuit board processes*.
- 3 Candidates are expected to be familiar with the following:
 - a the process parameters required for the specified processes and their related quality standards;
 - b the health and safety standards required for the handling and use of the materials used in the PCB manufacturing processes;
 - c where required, the operation of relevant process software packages.

- 4 Range
- a PCB manufacturing processes – two or more of – etching, plating, tinning, deposition of conductive films;
 - b types of printed circuit boards – one or more of – single sided, double sided, plated through-hole boards.
- 5 References
- Hazardous Substances and New Organisms Act 1996;
Health and Safety in Employment Act 1992;
IPC-A-610D, *Acceptability of Electronic Assemblies*, 2005, published by IPC – Association Connecting Electronics Industries.
- 6 The following apply to all outcomes of this unit standard:
- a all activities are to be completed and reported within agreed timeframes;
 - b all work practices must meet worksite's documented quality management requirements;
 - c all activities must comply with policies, procedures and requirements of the involved; and any relevant legislative and/or regulatory requirements, which include, but are not limited to, the Health and Safety in Employment Act 1992 and the Hazardous Substances and New Organisms Act 1996.

Outcomes and performance criteria

Outcome 1

Set up printed circuit board manufacturing processes.

Performance criteria

- 1.1 Loading and setting operations comply with job instructions and do not compromise the operational integrity of the process.
- Range software controls, process material properties, process and equipment settings.
- 1.2 The equipment and process operation conform to enterprise safety requirements and presents no uncontrolled hazards to any person.
- 1.3 Process tests provide results that comply with job instructions, and meet industry standards.
- Range IPC standards, or equivalent, for specified PCB characteristics.

Outcome 2

Maintain the material properties of printed circuit board manufacturing processes.

Performance criteria

- 2.1 Process measurements provide valid data on material properties.
- Range valid data may include but is not limited to – material sample selection, measurement accuracy, measurement timing, measurement frequency.
- 2.2 Adjustment of material properties complies with a given procedure.
- Range procedures include enterprise, process, health and safety material supplier procedures, or their combination. Evidence is required for two procedures.
- 2.3 All materials are handled and stored in accordance with a given procedure.
- Range procedures include enterprise, health and safety, material supplier procedures, or their combination. Evidence is required for one procedure.
- 2.4 The material properties are maintained within the range specified for the process.
- Range concentration, purity, other specified process characteristics.

Outcome 3

Ensure the performance of printed circuit board manufacturing processes.

Performance criteria

- 3.1 Completed boards comply with manufacturing process quality standards.
- Range registration accuracy, material deposition characteristics, other specified standards.
- 3.2 Operational checks confirm the continuing integrity of the process.
- Range checks may include but are not limited to – PCB inspection, process settings, equipment settings, process warnings.
- 3.3 The adjustment of equipment and process settings reflects a valid interpretation of process measurements or PCB quality characteristics.
- Range valid interpretation may include but are not limited to – use of fault finding trees, cause and effect analysis, scientific analysis, or their combination.

- 3.4 Enterprise procedures are followed to solve operational problems.
- Range valid methods may include but are not limited to – use of equipment and process guides, technical assistance, fault finding trees, cause and effect analysis, process analysis.
- 3.5 Procedures for dealing with process and equipment emergencies are known.
- Range examples of emergencies could include equipment or process failure and occurrences of known process or material hazards.

This unit standard is expiring. Assessment against the standard must take place by the last date for assessment set out below.

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	24 February 1998	31 December 2021
Review	2	28 June 1999	31 December 2021
Revision	3	3 April 2001	31 December 2021
Review	4	23 November 2003	31 December 2021
Rollover and Revision	5	19 March 2010	31 December 2021
Review	6	26 July 2018	31 December 2021

Consent and Moderation Requirements (CMR) reference

0003

This CMR can be accessed at <http://www.nzqa.govt.nz/framework/search/index.do>.