



NEW ZEALAND QUALIFICATIONS AUTHORITY
MANA TOHU MĀTAURANGA O AOTEAROA

Final date for issue of award is 31 December 2008

NEW ZEALAND CERTIFICATE IN ENGINEERING - PLASTICS

WORK EXPERIENCE GUIDELINES

Introduction

Work experience opportunities for this certificate are practically confined to private enterprise.

The minimum requirements are either:

- three years' work experience in the plastics industry according to these Guidelines or
- two years' work experience in the plastics industry according to these Guidelines and one year's work experience according to the Work Experience Guidelines for NZCE (Mechanical) appended.

Work Experience Credit for Related Qualifications

Between six months and eighteen months work experience may be credited from a completed apprenticeship, a Trade Certificate, an Advanced Trade Certificate or a National Certificate at level 3 or above in any of the following:

- plastics engineering
- engineering trades such as toolmaking, fitting and turning, fabrication, maintenance and diagnostics.

The time credited will be determined according to the details recorded in the Work Experience Record Book. Candidates should submit a certified copy of the certificate of completion of apprenticeship, Trade Certificate, Advanced Trade Certificate or National Certificate (a certified copy is one which is signed by a person such as a justice of the peace, a solicitor, or a notary public as an authentic copy of the original).

It may be possible that time can be credited from qualifications other than those above. Advice should be sought from the Qualifications Authority.

Suitable Work Experience

Experience should be gained under **each** of the five headings listed below. For the category under each heading, appropriate activities from which relevant experience might be gained are given. The process of approving Work

Experience Record Books will be assisted by cross-referencing activities entered in the book to these activities.

1 Design for Plastics Manufacturing

This category includes activities related to the design and draughting of products, tooling and equipment for plastics manufacturing.

- 1.1 Preparing sketch designs for proposed products, bearing in mind the multiple constraints imposed.
- 1.2 Draughting and completing full design details and specifications for products from any of the following manufacturing processes:
 - sheet, pipe or profile extrusion
 - extrusion, injection or injection-stretch blow moulding
 - blown, cast or laminated film or film converting processes
 - vacuum or pressure thermoforming
 - compression moulding
 - injection moulding
 - rotational moulding.
- 1.3 Draughting and completing full design details for tooling associated with products from any of the following manufacturing processes:
 - sheet, pipe or profile extrusion
 - extrusion, injection or injection-stretch blow moulding
 - blown, cast or laminated film or film converting processes
 - vacuum or pressure thermoforming
 - compression moulding
 - injection moulding
 - rotational moulding.
- 1.4 Draughting and completing full design details for machining components and special equipment for the production of products from any of the following manufacturing processes:
 - sheet, pipe or profile extrusion
 - extrusion, injection or injection-stretch blow moulding
 - blown, cast or laminated film or film converting processes
 - vacuum or pressure thermoforming
 - compression moulding
 - injection moulding
 - rotational moulding.

2 Engineering and Maintenance Activities for Plastics Manufacturing

This category includes general workshop practice encompassing a wide range of “hands-on” activities that provide experience with the use and maintenance of mechanical devices in the plastics industry.

- 2.1 Reading engineering drawings.
- 2.2 Marking out and setting up workshop equipment.

- 2.3 Undertaking turning, milling, grinding and drilling operations.
- 2.4 Carrying out assembly, fitting and finishing of tooling associated with products from any of the following manufacturing processes:
 - sheet, pipe or profile extrusion
 - extrusion, injection or injection-stretch blow moulding
 - blown, cast or laminated film or film converting processes
 - vacuum or pressure thermoforming
 - compression moulding
 - injection moulding
 - rotational moulding.
- 2.5 Carrying out heat treatment processes.
- 2.6 Carrying out assembly, fitting and finishing of machine components or special equipment for the production of products from any of the following manufacturing processes:
 - sheet, pipe or profile extrusion
 - extrusion, injection or injection-stretch blow moulding
 - blown, cast or laminated film or film converting processes
 - vacuum or pressure thermoforming
 - compression moulding
 - injection moulding
 - rotational moulding.
- 2.7 Planning and carrying out machine and plant maintenance procedures, including lubrication, fault detection, repairs, rebuilds and preventative maintenance.

3 Plastics Manufacturing Operations

This category includes activities related the production of plastic products.

- 3.1 Operating production machinery for any of the following manufacturing processes:
 - sheet, pipe or profile extrusion
 - extrusion, injection or injection-stretch blow moulding
 - blown, cast or laminated film or film converting processes
 - vacuum or pressure thermoforming
 - compression moulding
 - injection moulding
 - rotational moulding.
- 3.2 Setting up production machinery, services and ancillary plant for any of the following manufacturing processes:
 - sheet, pipe or profile extrusion
 - extrusion, injection or injection-stretch blow moulding
 - blown, cast or laminated film or film converting processes
 - vacuum or pressure thermoforming
 - compression moulding

- injection moulding
 - rotational moulding.
- 3.3 Controlling and optimising production for any of the following manufacturing processes:
- sheet, pipe or profile extrusion
 - extrusion, injection or injection-stretch blow moulding
 - blown, cast or laminated film or film converting processes
 - vacuum or pressure thermoforming
 - compression moulding
 - injection moulding
 - rotational moulding.
- 3.4 Diagnosing and correcting production faults for any of the following manufacturing processes:
- sheet, pipe or profile extrusion
 - extrusion, injection or injection-stretch blow moulding
 - blown, cast or laminated film or film converting processes
 - vacuum or pressure thermoforming
 - compression moulding
 - injection moulding
 - rotational moulding.
- 3.5 Carrying out product trials and evaluations for any of the following manufacturing processes:
- sheet, pipe or profile extrusion
 - extrusion, injection or injection-stretch blow moulding
 - blown, cast or laminated film or film converting processes
 - vacuum or pressure thermoforming
 - compression moulding
 - injection moulding
 - rotational moulding.
- 3.6 Setting up and maintaining systems for the handling, distribution and storage of raw materials and products.
- 3.7 Establishing and carrying out quality assurance procedures and processes.

4 Materials for Plastics Manufacturing

This category includes activities related to the handling of materials associated with the production of plastic products.

- 4.1 Establishing and making up raw material formulations, blends and mixtures.
- 4.2 Selecting and advising on polymer types and grades to meet specific product performance, manufacturing and commercial requirements.
- 4.3 Identifying polymer types from unknown sample products.

4.4 Advising on safety procedures for the handling and storage of raw materials.

5 Management

This category includes activities related to marketing and efficient production of plastic products.

- 5.1 Participating in market exploration and identification of new product opportunities.
- 5.2 Establishing and participating in product development processes.
- 5.3 Participating in production planning and raw material ordering processes.
- 5.4 Participating in production performance monitoring and control.
- 5.5 Participating in production efficiency improvement and waste production programmes.
- 5.6 Analysing and identifying product costing.
- 5.7 Participating in machine and plant acquisition programmes.
- 5.8 Developing and maintaining plant safety programmes.
- 5.9 Supervising and training staff.
- 5.10 Undertaking project engineering activities.

APPENDIX: Relevant Section of Mechanical Engineering Work Experience Guidelines

NZCE Work Experience Relevant to Mechanical Engineering

1 Mechanical Engineering Practice

- 1.1 Selecting materials and applying properties of common workshop materials.
- 1.2 Machining various tool insert profiles to the correct specifications.
- 1.3 Heat-treating metals.
- 1.4 Using all types of metal fasteners.
- 1.5 Using lathes, boring bars, surface grinders, cam grinders (automotive only), milling machines, valve and seat refacing equipment.
- 1.6 Detecting and repairing cracks.
- 1.7 Undertaking static and dynamic balancing.
- 1.8 Soldering, brazing, oxy-acetylene welding using electric, MIG and TIG welding techniques.
- 1.9 Moulding, casting and fabricating components. Identifying limitations and factors governing choice of process.
- 1.10 Maintaining, repairing or modifying hydraulics, cylinders and/or motors in automotive heavy vehicles, equipment or machinery such as tractors, trucks, heavy motor vehicles and equipment.
- 1.11 Using engineering instruments, vernier, micrometer, telescopic gauges etc.
- 1.12 Maintaining and overhauling plant, equipment and controls for all types of applications, such as power production and manufacturing machinery, and building services for industrial and commercial buildings. This includes an understanding of bearings and seals and their applications to differing duties, their correct fitting and adjustment.
- 1.13 Applying principles of preventative maintenance, condition based monitoring and other modern maintenance methods.
- 1.14 Working with services generation and reticulation, eg steam, water and compressed air.

2 Design, Research and Development

This category includes the process of developing mechanical devices and systems from a concept through sketching, producing working drawings, testing prototypes, to implementation, and includes costing and client liaison. Candidates must demonstrate an understanding of the design process.

- 2.1 Producing sketches and designs (including calculations) for pilot situations or adaptation of engines to operate machinery for industry and/or for use in a specific or general way.
- 2.2 Reading information from drawings which could be for mechanisms, plant design to suit manufacturing or other industrial applications.
- 2.3 Designing mechanical engineering components, devices or equipment (including calculations, draughting to current New Zealand standards, drawing up specifications and making cost estimates).
- 2.4 Carrying out non-destructive tests or tests-to-failure on materials or machine components.
- 2.5 Evaluating mechanical products and testing them against design objectives.
- 2.6 Developing and constructing specialised machinery.
- 2.7 Developing mechanical instruments and apparatus for research and scientific purposes.
- 2.8 Consulting with clients and colleagues on matters relevant to design, production and implementation.
- 2.9 Designing a commissioning programme for a new or recently installed plant, including staff training

Additional Relevant Activities

Involvement in the following activities also provides relevant work experience.

- Total Quality Management, including problem solving techniques.
- Total Productive Maintenance.
- Techniques for cost benefit analysis of expenditure.
- Team work related skills, e.g. conflict resolution, running meetings etc.
- Project management.
- Budgeting, reporting, and classification of expenditure, i.e. difference between R& M and capital expenditure and cost benefit analysis.
- Working with specific legislation affecting the work place such as:
 - Health and Safety in Employment Act, 1992
 - The Resource Management Act, 1991

- The Building Act, 1991.