

Programme of Industry Training Details

NZQA has approved the programme of industry training in line with NZA requirements			
Provider name	Apprentice Training New Zealand 2010 Trust		MoE number 7741
Programme of Industry Training Title	New Zealand Apprenticeship in Mechanical Engineering (Trade) (Level 4) - Metal Forming strand		Programme ID 127681
Level	4	Credits	280
NZSCED code and classification			
030701	Engineering and Related Technologies > Mechanical and Industrial Engineering and Technology > Mechanical Engineering		
Qualification to which the programme leads			
New Zealand Certificate in Mechanical Engineering (Trade) (Level 4) with strands in Fitting and Machining, General Engineering, Machining, Maintenance Engineering, Metal Forming, and Toolmaking [Ref: 2714-1]			
Aim of Programme of Industry Training			
<p>The purpose of this programme of industry training is to provide the mechanical engineering industry with skilled tradespeople who are able to safely and independently perform engineering tasks within metal forming, to industry standards.</p> <p>This programme is designed for people working in the industry and will typically be achieved in a workplace environment whilst completing a New Zealand Apprenticeship.</p>			
Entry Requirements			
<p>It is recommended that people enrolling in this programme hold the National Certificate in Education Achievement (NCEA) Level 2 [Ref: 0973] or equivalent.</p> <p>People enrolling in this programme must hold a relevant position in a Metal Forming organisation and have signed an apprenticeship training agreement.</p>			

Learning outcomes and programme outline

This programme of industry training has been developed to meet the qualification graduate outcomes. The learning outcomes will develop on the job, in response to the learner journey.

This programme will enable apprentices to gain broad knowledge and skills relevant to the metal forming strand in the mechanical engineering (trade) discipline.

The unit standard content of the programme reflects all the conditions specified in the qualification in terms of health and safety, application in a commercial environment, and specific topics covered for each graduate outcome. Employers are encouraged to support the apprentice to complete the unit standards in the sequence identified, however it is recognised that this may vary as operational requirements of the employer may result in the apprentice acquiring skills and knowledge in a different order. The variation to assessment is limited by critical health and safety prerequisites as identified on unit standards.

It is expected that fundamental health and safety awareness will be a focus at the start of the programme through the completion of the health and safety unit standard and further embedded in all on-job and off-job learning throughout the duration of the programme.

It is also expected that employers comply with all relevant employment, health and safety, privacy and human rights legislation. This is generally achieved through provision of an adequate induction into the job, appropriate supervision and a safe working environment for the apprentice.

This programme is typically delivered over four years, and during that period the training will prepare apprentices for the achievement of all outcomes at Level 4. Apprentices undertake lower level unit standards towards the start of their training as the foundation of their apprenticeship. These standards contain the underpinning knowledge and skills that are fundamental to their development, and support the later achievement of the more specialised technical skills and knowledge.

Apprentice Training New Zealand recognise that higher level learning may be involved and will support any apprentice to reach this level without being disadvantaged. By the time the apprentice has completed their apprenticeship they will be applying these skills and this knowledge to satisfactorily perform all of the competencies required at the level of the qualification.

Assessment standards aligned with qualification outcomes

Some unit standards in this programme apply to more than one graduate outcome. These unit standards will provide partial credit to each applicable graduate outcome, totalling the value of the unit standard. The credit value is **not** counted in full against each graduate outcome it applies to.

A unit standard and its credits can only be counted once towards the programme. Unit standards with partial credits are denoted in both the Assessment standards number and Credit columns in the table below.

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Core Outcomes	Assessment standards		Level	Credit
<p>Outcome 1</p> <p>Apply an understanding of the relevant Health and Safety legislation and workplace safety culture in order to work safely and meet responsibilities in a commercial mechanical engineering environment.</p> <p>Credits 15</p>	21911	Demonstrate knowledge of safety on engineering worksites	2	2
	21912	Apply safe working practices on an engineering worksite	2	2
	29650	Demonstrate knowledge of the safe use of powered equipment in a mechanical engineering or fabrication workshop	2	2
	29652	Demonstrate knowledge of safety, health, risk assessment, and hazard ID and control on an engineering worksite	3	3
	29675 (also in Outcome 3)	Demonstrate knowledge of safety when lifting loads in engineering installation, maintenance, and fabrication work	2	2 (partial credit of 1)
	29651	Demonstrate knowledge of health and safety when welding and thermal cutting	2	3
	31908	Describe safety practices while working with hot and molten metals	3	3
<p>Outcome 2</p> <p>Interpret drawings and/or specifications and select and use the appropriate materials, processes, tools and equipment for the mechanical engineering task being</p>	2395 (also in Outcome 3)	Demonstrate and apply knowledge of the selection, use, and care of engineering hand tools	2	4 (partial credit of 2)
	2396 (also in Outcome 3)	Demonstrate and apply knowledge of the selection, use and care of portable hand held engineering power tools	2	4 (partial credit of 2)

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undertaken. Credits 65	4433 (also in Outcome 3)	Select, use, and care for simple measuring devices used in engineering	1	2 (partial credit of 1)
	4436 (also in Outcome 3)	Select, use, and care for engineering marking-out equipment	2	3 (partial credit of 1)
	4801	Demonstrate knowledge of heat treatment for engineering non-ferrous metals	4	4
	29397	Demonstrate knowledge of basic trade calculations and units of measure for mechanical engineering trades	2	4
	29399	Demonstrate and apply knowledge of trade calculations to solve problems for mechanical engineering trades	3	4
	29549	Demonstrate basic knowledge of the mechanical properties and selection of engineering materials	2	3
	29550	Demonstrate basic knowledge of common engineering metals	2	3
	29551	Demonstrate knowledge of the strength, mechanical properties, and treatment of engineering metals	3	3
	29654	Demonstrate knowledge of and interpret mechanical engineering drawings and geometric tolerancing	2	3
	29655	Manually produce engineering sketches	2	3
29674	Demonstrate knowledge of mechanical fasteners used in mechanical	2	3	

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		engineering		
	30472 (also in Outcome 4)	Demonstrate knowledge of engineering job planning and costing	3	3 (partial credit of 2)
	31197 (also in Strand Outcome)	Demonstrate knowledge of additive manufacturing technology	3	5 (partial credit of 3)
	30429 (also in Strand Outcome)	Demonstrate knowledge of dimensional limitations and accuracy of metal forming processes	2	5 (partial credit of 2)
	31909 (also in Strand Outcome)	Describe metal forming and foundry processes	4	15 (partial credit of 10)
Outcome 3	2395 (also in Outcome 2)	Demonstrate and apply knowledge of the selection, use, and care of engineering hand tools	2	4 (partial credit of 2)
Apply knowledge of relevant engineering principles and practices, and problem solving skills, to perform engineering tasks to industry standards.	2396 (also in Outcome 2)	Demonstrate and apply knowledge of the selection, use and care of portable hand held engineering power tools	2	4 (partial credit of 2)
Credits 80	2401 (also in Outcome 5)	Shut down, isolate and start up machines and equipment	3	3 (partial credit of 2)
	4433 (also in Outcome 2)	Select, use, and care for simple measuring devices used in engineering	1	2 (partial credit of 1)
	4436 (also in Outcome 2)	Select, use, and care for engineering marking-out equipment	2	3 (partial credit of 2)
	21913	Lift loads in engineering installation, maintenance, and fabrication work	2	2
	29398	Apply knowledge of basic trade calculations for mechanical engineering trades	2	4

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	29560 (also in Outcomes 4 & 5)	Demonstrate knowledge of efficient and effective workplace procedures in mechanical engineering or fabrication	2	3 (partial credit of 1)
	29561 (also in Outcomes 4)	Demonstrate knowledge of efficient and effective processes in mechanical engineering or fabrication	3	3 (partial credit of 1)
	29562 (also in Outcome 4)	Demonstrate and apply knowledge of process or task improvements in mechanical engineering or fabrication	4	3 (partial credit of 1)
	29675 (also in Outcome 1)	Demonstrate knowledge of safety when lifting loads in engineering installation, maintenance, and fabrication work	2	2 (partial credit of 1)
	29676 (also in Strand Outcome)	Demonstrate and apply knowledge of good work practices when servicing simple components under supervision	2	3 (partial credit of 2)
	29552	Demonstrate knowledge of heat treatment of engineering metals	4	3
	4441	Calibrate engineering measuring devices and equipment	4	4
	19741 (also in Strand Outcome)	Demonstrate and apply knowledge of common metal forming defects and quality control	3	5 (partial credit of 2)
	2380 (also in Strand Outcome)	Inspect and test metal formed products	3	10 (partial credit of 2)
	2381 (also in Strand)	Inspect and repair refractory linings and	3	15 (partial credit of 10)

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	Outcome)	crucibles used in metal forming processes		
<p>Outcome 4</p> <p>Apply an understanding of effective and efficient processes and principles, and quality systems, to the production of components and/or provision of services in a commercial mechanical engineering environment.</p> <p>Credits 10</p>	29560 (also in Outcomes 3 & 5)	Demonstrate knowledge of efficient and effective workplace procedures in mechanical engineering or fabrication	2	3 (partial credit of 1)
	29561 (also in Outcome 3)	Demonstrate knowledge of efficient and effective processes in mechanical engineering or fabrication	3	3 (partial credit of 2)
	29562 (also in Outcome 3)	Demonstrate and apply knowledge of process or task improvements in mechanical engineering or fabrication	4	3 (partial credit of 2)
	30472 (also in Outcome 2)	Demonstrate knowledge of engineering job planning and costing	3	3 (partial credit of 1)
<p>Outcome 5</p> <p>Practice effective communication within a mechanical engineering team and the wider workplace.</p> <p>Credits 10</p>	29560 (also in Outcomes 3 & 4)	Demonstrate knowledge of efficient and effective workplace procedures in mechanical engineering or fabrication	2	3 (partial credit of 1)
	30665	Demonstrate and apply knowledge of workplace communication in mechanical engineering trades	3	2
	2401 (also in Outcome 3)	Shut down, isolate and start up machines and equipment	3	3 (partial credit of 1)
	<p>The achievement of this outcome is also met across multiple workplace unit standards that have already been given credit in other outcomes.</p> <p>The following unit standards have been identified as contributing to this outcome:</p> <p>Compulsory unit standards</p>			

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	2395, 2396, 21913, 29560, 29675, 29676, 30430, 2380, 2381, 4799, 19741, 4441.			
	The relevant evidence requirements or performance criteria set against the specific condition are noted in the programme matrix.			
Outcome 6 Recognise the limits of own ability and the importance of working with integrity and maintaining currency in the mechanical engineering field. Credits 5	<p>There are no specific unit standards aligned to this graduate profile outcome, however the following unit standards have been identified as contributing to this outcome:</p> <p>Compulsory unit standards 30472, 29561, 29560, 4441, 21911, 29650, 29652, 30472, 2380, 4799, 19741.</p> <p>The relevant evidence requirements or performance criteria set against the specific condition are noted in the programme matrix.</p>			
Strand – Metal Forming				
Apply knowledge of metallurgy and appropriate current forming technologies and techniques to produce quality cast and hot formed products from metal. Credits 95	30430	Transfer and pour molten metal in an industrial situation	3	15
	2380 (also in Outcome 3)	Inspect and test metal formed products	3	10 (partial credit of 8)
	4799	Test the physical properties of engineering metals	4	4
	31909 (also in Outcome 2)	Describe metal forming and foundry processes	4	15 (partial credit of 5)
	2379	Finish metal castings	2	15
	2381 (also in Outcome 3)	Inspect and repair refractory linings and crucibles used in metal forming processes	3	15 (partial credit of 5)
	29676 (also in Outcome 3)	Demonstrate and apply knowledge of good work practices when servicing simple components under supervision	2	3 (partial credit of 1)
	30429 (also in Outcome 2)	Demonstrate knowledge of dimensional limitations and accuracy of metal forming processes	2	5 (partial credit of 3)

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	31197 (also in Outcome 2)	Demonstrate knowledge of additive manufacturing technology	3	5 (partial credit of 2)
	19741 (also in Outcome 3)	Demonstrate and apply knowledge of common metal forming defects and quality control	3	5 (partial credit of 1)
To achieve 280 credits for the programme, the learner must choose a minimum of 32 credits at Level 4 or above, a minimum of 23 credits at Level 3, and the remaining credits at any level, from the following unit standards.				
	2371	Produce metal castings using gravity die casting machine	2	5
	2376	Produce moulds and cores using machines for metal casting processes	2	10
	2382	Produce expendable wax patterns for lost wax casting method	2	5
	2383	Carry out heat treatment of metal parts under supervision	2	2
	2433	Produce engineering component drawings using CAD software	2	6
	2386	Produce ceramic shell moulds for use in the investment casting process in metal casting	3	15
	2397	Carry out routine servicing of engineering machinery	3	4
	2436	Create three-dimensional engineering models using CAD software under supervision	3	5
	2374	Prepare and mix sand for metal casting processes	3	20
	2377	Produce molten metal using metal melting furnace	3	20

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	30274	Cut fabrication materials using hand held power tools	3	5
	30279	Cut steel using the manual gas cutting process	3	2
	30280	Cut metals using the manual plasma cutting process	3	2
	31910	Inspect and repair patterns in the metal forming industry	3	10
	31911	Inspect, service, and repair tooling used in the metal forming industry	3	10
	2375	Produce moulds and cores by hand for metal casting processes	4	25
	2692	Repair non-ferrous metal components using welding processes	4	10
	2693	Repair ferrous metal components using welding processes	4	10
	4802	Complete heat treatment of engineering metals in a furnace	4	10
	29635	Make patterns and/or tooling for use in industry	4	20
	30272	Cut fabrication materials using machines (Pre-req 29650)	4	10
	27206	Use non-destructive testing (NDT) methods to test metal surfaces for defects	4	5
	19449	Prepare for and perform chemical analysis using optical emission spectrometry equipment	4	5
	15130	Provide solutions for casting defects	5	15
	15131	Determine the inclusion content of	5	10

		steel		
<p>Training arrangements and support</p>				
<p>This programme is recognised as a New Zealand Apprenticeship, and as such Apprentice Training New Zealand carries out an assessment of the company and apprentice to ensure the right skills and knowledge are learnt in a supportive environment by a motivated apprentice.</p> <p>Apprentice compatibility and requirements:</p> <ul style="list-style-type: none"> - An Apprentice Training New Zealand Account Manager will engage in a conversation with the apprentice to ensure s/he understands his/her responsibilities, where to go for help and the importance of progressing at a steady rate to complete within the timeframe required. - The apprentice will be required to complete a 15 - 20 minute test with an Apprentice Training New Zealand Account Manager which assesses the apprentices reading, writing and comprehension ability. This test includes mechanical aptitude, reasoning and number skills. It identifies areas of weaknesses so that extra support can be offered where it is required. Extra support may include advising the employee and employer of Literacy and Numeracy providers that can offer specialist support. <p>Company compatibility and requirements:</p> <ul style="list-style-type: none"> - The company that the apprentice is employed with will need to have the right types of equipment so that learning and assessment can take place on-job. If the employer does not have the right equipment in some areas, there needs to be an agreement put in place so that the apprentice can go elsewhere to complete the unit standards. - The apprentice will need to have access to eLearning via use of a mobile device, personal computer or laptop within their workplace or their home environment. - Employers are required to support their apprentices throughout the training programme. Initially this is achieved through workplace tasks and on-job training by a designated trainer. This is followed by completion of tasks under close supervision in the workplace. The level of supervision will be adjusted as apprentices develop their skills, knowledge and confidence through the programme. This programme requires the apprentice to operate under broad supervision prior to any assessment. Employers have access to real-time data on their apprentice's progress through the programme via an Employer Portal. <p>Apprentice Training New Zealand supports the apprentice and employer by:</p> <ul style="list-style-type: none"> - Organising block courses and online learning. - Apprentice Training New Zealand Account Managers actively manage the progress of apprentices. This is supported by visits to the workplace to ensure that apprentices are steadily progressing through the programme to meet the training plan milestones. The training plan is developed in collaboration with industry. The frequency of visits is dependent on the apprentice's capability and the employer's ability to support their apprentice's progression, and is adjusted as appropriate throughout the apprenticeship. 				

- Providing assessment material for all on-job components
- Providing an eLearning platform with study guide resources and assessment functions.

Learning and Assessment Methods

Learning Methods

Learning will take place on-job by completing day to day tasks under supervision, by attending off-job training with a training provider, the use of eLearning workbooks or a combination of all three methods.

- On-job training enables apprentices to develop job-related skills by watching colleagues, emulating their behaviours and practicing under supervision. It also involves mentoring from supervisors, workplace trainers, or other personnel delegated by the employer.
- Block courses with structured and approved courses gives apprentices the opportunity to develop new skills they can take back into the workplace. Courses provide all apprentices with the same skill set regardless of their workplace experience and ensure all apprentices have relevant and transferable skills. Courses may be a combination of classroom tuition and workshop practice with the emphasis on development of technical skills and the embedding of learning.

Assessment Methods

Assessment of unit standards can be achieved by:

- Completing theory questions, providing evidence (such as job cards, photographs, designs, videos, etc.), the apprentice being observed by an assessor or verifier completing a task(s) or a combination of these.
- Assessment evidence can be captured through assessment guides, via an on-line portal, through eLearning, and block courses.

Transition Arrangements

The following exemptions are available for those who need to transfer to the qualification to which this programme leads. The table includes exemptions arising from earlier replacement of unit standards, or recommended alternative for expiring unit standards.

Credit For	Exempt From
21905, 21908	29397
16955, 16956	29399, 29398
20917	29549

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20799	29550
4797	29551
21910	29654
2430	29655
21909	29674
2683	30279, 30280
4800	29552
Consistency of Graduate Outcomes	
<p>Apprentice Training New Zealand will monitor the performance of graduates in the real world to demonstrate the consistency of graduate outcomes by:</p> <ul style="list-style-type: none"> - ensuring programmes continue to meet current industry needs through ongoing consultation at the Sector and Technical Advisory group levels. - utilising Industry Subject Matter Experts in our product development and review processes - operating systematic and robust quality assured assessment practices - collecting workplace evidence including both graduate and employer feedback, through the use of surveys demonstrating that graduates meet the graduate profile outcomes - any other relevant evidence as appropriate. 	
Indicative duration of Programme of Industry Training	
Number of months	48
Total learning hours	2800