



Competenz

Skills for industry



Mechanical engineering learner guide

World class skills for New Zealand industry

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Welcome

Congratulations on starting your training with Competenz

With your apprenticeship, you're kick-starting a career in an exciting industry. As workplaces continue to change and adapt to new technologies and practices, it will be your skills and ideas that will shape how we operate in the future.

Your training programme ensures you have access to all the assistance you need. Our job is to help you learn and succeed.

This guide provides useful tips on how and where to access the right information to support you through your qualification. Please read it carefully before you begin completing your assessments.

Welcome on board. We wish you well in your studies and encourage you to make the most of your opportunities.

From the team at Competenz.

Who are Competenz

Competenz is one of New Zealand's industry training organisations (ITOs). Each year, we work with more than 3,500 companies and 20,000 learners in 37 industries around New Zealand to build skills, careers and businesses. Most learning takes place on-the-job.

We partner with employers, apprentices, schools, training providers and assessors across the country.

Mechanical engineering and fabrication contribute \$2.4 billion to the New Zealand economy per year, and the sector employs more than 43,000 people nationwide.

3,500+ Companies

Competenz works with more than 3,500 companies throughout New Zealand

20,000+ Learners

Competenz works with more than 20,000 learners throughout New Zealand

What you can expect as an apprentice

Most of the learning is done on-the-job, so you will learn from the people you work with

You'll experience learning in your workplace from the skilled tradespeople you work with, theory learning through Canvas eLearning, and develop your practical skills at a block course alongside experienced tutors.

Each year you will go on a two-week block course at a polytech, or similar, to complete projects and gain new skills. Throughout the year, you will need to set aside time regularly to achieve online unit standards. If you need to ask any questions there's plenty of help available via phone support, study groups, your employer or your Competenz training advisor. Keep reading to learn more.

You will be assigned a Competenz training advisor who will visit you four times a year to structure your training into manageable chunks, set deadlines to complete assessments, mark assessments, schedule block courses and help you successfully complete your apprenticeship.

Getting qualified

Your training plan has been put together by you, your Competenz training advisor and employer. It's the roadmap for your apprenticeship and is designed using a blended learning model – this means there's a variety of learning resources and assessment methods.

Your training plan is broken up into a series of steps, which are made up of a group of unit standards – each with an assessment you need to pass.

The order you do your learning in is essential as it ensures you learn the right things at the right time. You'll need to make sure you understand the basics well before attempting the more advanced assessments. This way you will also have the relevant health and safety knowledge before completing the practical units.

Your Competenz training advisor has put everything in the right order for you: just follow your training plan to ensure you stay on track. If you're ever unsure about what assessments you need to complete and by when, please check with your training advisor.

Apprenticeships are a three-way partnership

Roles and obligations:

The apprentice

- » This is your apprenticeship
- » You do the work
- » You do the learning
- » You get the qualification

Your role is to stay up to date with your learning material and assessments, ensuring you complete what's required.

The employer

- » Your employer will support you with completing and verifying on-the-job assessments in your workplace
- » Your manager will be familiar with your training programme and targets and provide you with opportunities to develop and practice the required skills for your apprenticeship.

The training advisor

Your training advisor will guide you through your training, monitoring your progress and completion of on-the-job assessments.

Your training advisor will:

- » Visit you in your workplace four times a year
- » Mark on-the-job assessments
- » Set deadlines to complete your assessments
- » Co-ordinate access to Canvas eLearning and delivery of additional training material
- » Assist you to finish your training programme successfully.

The apprenticeship

An apprenticeship is a pathway to a lifelong career. You learn on-the-job, get paid and get qualified as a tradie.

Most of the learning is practical work completed on-the-job. Apprentices are also required to complete eLearning via our online learning platform Canvas, and attend block courses for two to three weeks each year.

The average time to complete an apprenticeship is between three to four years (a minimum of 6,000 hours). But that depends on how quickly you can learn on your job with your employer and your overall commitment.

On-the-job and off-the-job learning make up the qualification

Some learning is theory-based, while some is delivered at work. The skills your employer teaches you as part of your normal duties at work is called on-the-job learning. Please note your learning may differ from other apprentices at your workplace: if you're ever unsure, please check with your training advisor.

Other learning happens at a block course. Your block course is run by a polytech with the machinery and equipment required to complete your apprenticeship. Block courses are two weeks long and is based around building a project. This is called off-job learning.

Graduate outcomes

The New Zealand Certificate in Mechanical Engineering (Trade) with strands in Fitting and Machining, General Engineering, Machining, Maintenance Engineering and Toolmaking, Level 4

This qualification has been developed by leading New Zealand mechanical engineers to equip graduates with the skills and knowledge to work productively and safely.

With technology and automation rapidly driving advancements in the engineering sector, this qualification is designed with the future in mind so you can respond and adapt to change.

Graduates of this qualification will be able to:

- » Understand relevant health and safety legislation and workplace safety culture
- » Interpret drawings and specifications and use the appropriate materials, processes, tools and equipment for the task
- » Apply knowledge of relevant engineering principles and practices, and problem-solving skills, to perform engineering tasks to industry standards
- » Use effective and efficient processes, principles and quality systems to produce components and provide services in a commercial mechanical engineering environment
- » Communicate effectively within a team and the wider workplace
- » Recognise the limits of their own ability and the importance of working with integrity and maintaining currency in the mechanical engineering field.

Graduates of the General Engineering strand will also be able to:

Build, maintain and repair a broad range of machinery and equipment using fitting, machining, fabrication, hydraulics, pneumatics and welding skills and knowledge.

Graduates of the Machining strand will also be able to:

Plan, sequence and machine complex engineering components to a high degree of tolerance and finish, using current and relevant machining technologies and techniques.

Graduates of the Fitting and Machining strand will also be able to:

Build and install complex machines where precision fitting and machining skills are required.

Graduates of the Maintenance Engineering strand will also be able to:

Apply knowledge of maintenance engineering strategies and practices to monitor, inspect, maintain and repair facilities or plant and equipment.

Graduates of the Toolmaking strand will also be able to:

Apply knowledge of tool design and function to manufacture tooling for relevant industrial processes, using current and relevant manufacturing technologies and techniques.





Time management and study skills

Planning is the key to success in your apprenticeship

To finish your qualification on time, aim to complete approximately seven credits per month. To make this possible, commit to regular weekly study times and designate a 'study zone' – somewhere where you won't be disturbed or distracted.

When focusing on your eLearning, close all other tabs in your internet browser and work on one subject. Be sure to take your time, write notes, ask questions and carry out research to fill in any knowledge gaps.



The training plan

Roadmap overview

Unit standards are grouped into steps that form the roadmap, from the beginning to the end, of your apprenticeship. Sometimes, you can't progress to the next step until you finish all units in the one before. This is important as it ensures you've learnt the required skills and knowledge and are well prepared for what comes next.

To make progressing as simple as possible, your Competenz training advisor will release units to your Canvas dashboard when it's time for you to complete them. They'll also allocate units to you and set goals at their quarterly visit.

Looking at the roadmap diagram, you'll see that the unit standards have been categorised into three areas; eLearning, on-the-job and off-the-job. Your eLearning units will be completed online via Canvas, on-the-job units in your workplace and off-the-job units at your block course. You need to show you are ready to attend the course by completing the pre-block course step on your plan.

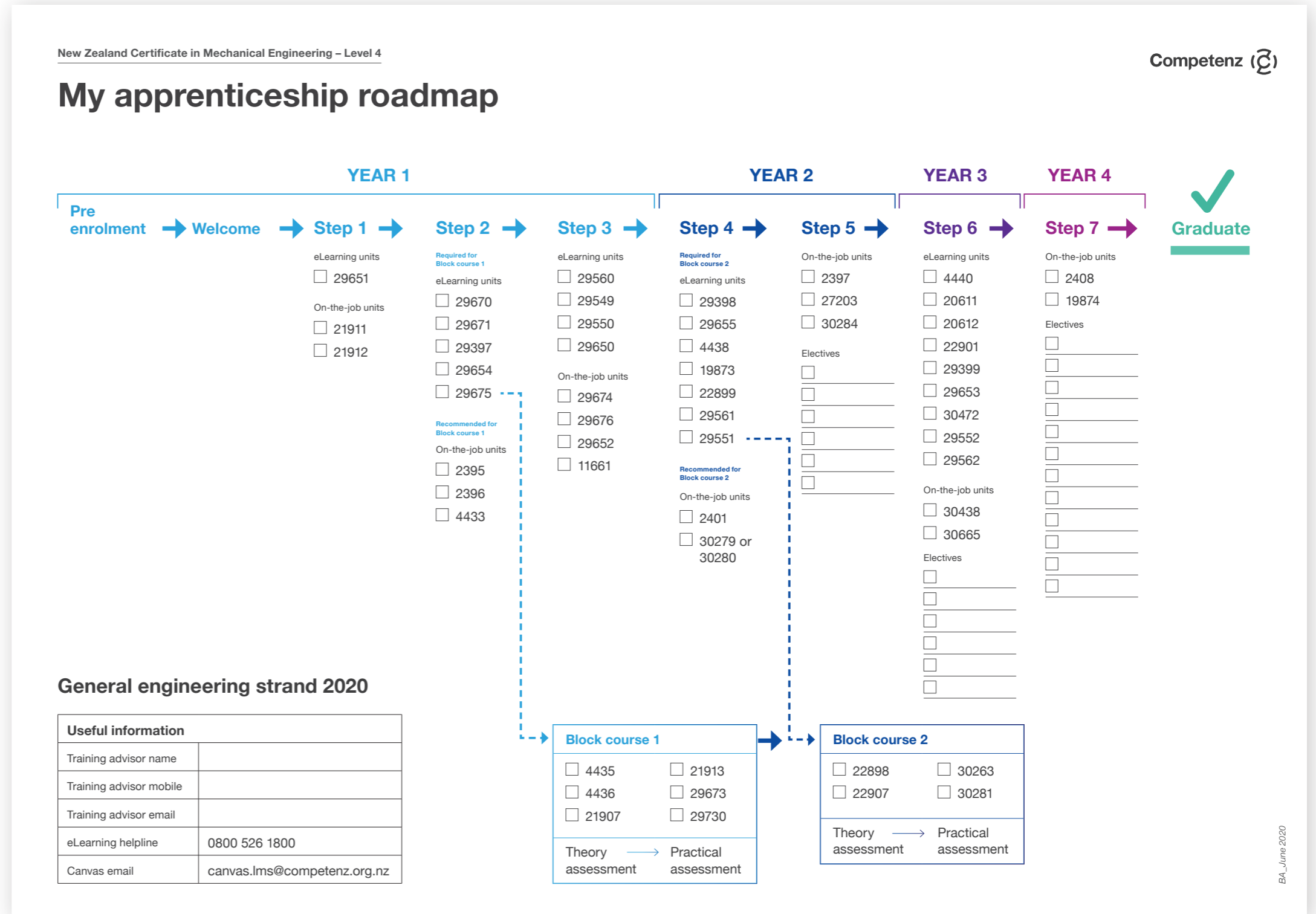
Block course pre-requisites

Before you can attend a block course, a block course theory assessment must be completed in Canvas. Completion of this shows that you're ready and prepared for your block course. The combination of theory learning, the online assessment and the practical block course results in the achievement of all unit standards for that block course.

The block course component in Canvas is made up of:

- » Theory/learning material
- » Pre-requisite units
- » Quizzes to validate what you've learnt
- » Project and practical assessments for your block course
- » A theory assessment.

Once the theory assessment is achieved, and all pre-requisite units completed, you're ready for your block course! Your training advisor will be able to inform you of the next course available in your area.



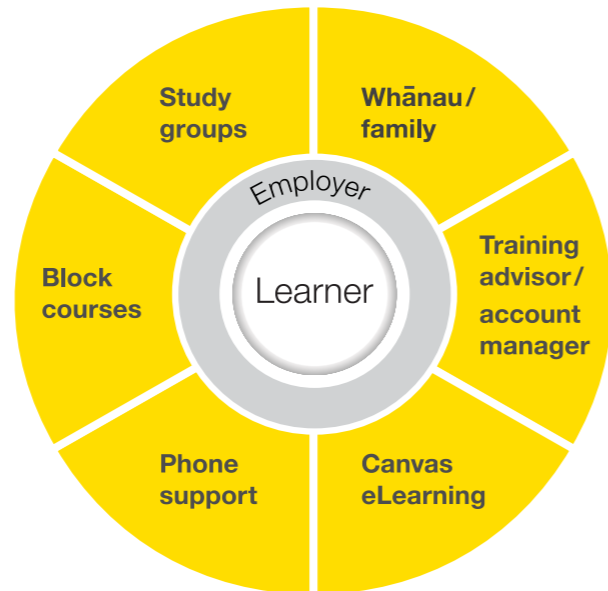
Support and contacts

Support model

Everyone learns differently, and there is no right or wrong way. You're only starting, so you're not expected to know everything! What is important, however, is that you know where to go for help when it's required.

Competenz has a range of support options in place to help you.

Learners are supported through a variety of touchpoints.



Training advisor quarterly visits

Your training advisor will guide you through your training, monitoring your progress and completion of on-the-job assessments.

At your quarterly visit, your training advisor will:

- » Review your goals and achievements since the last visit
- » Set new goals for the next quarter
- » Answer any questions you have
- » Provide any necessary information or updates – eg. block course details.

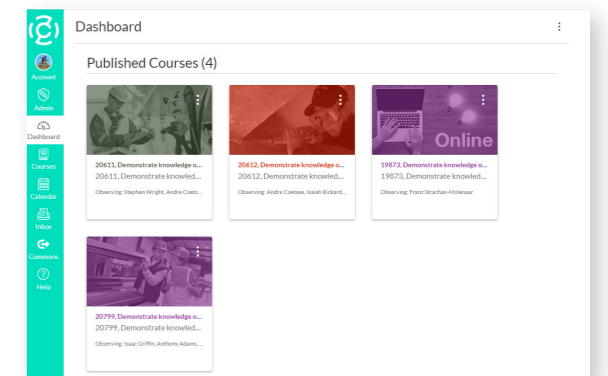
Your training advisor will visit you four times a year, but they're always available via phone or email to answer any questions or provide guidance. Don't hesitate to reach out!



Canvas

Access to all assessments is via our eLearning platform, Canvas. Units from your training plans are grouped into 'steps'. As you progress through your qualification, each step will be released on your Canvas dashboard. Once the unit is achieved, it will be archived. This means it's still there when you need it, but it won't get in the way of your outstanding units.

If you have any questions relating to Canvas, please email support@competenz.org.nz or call our Customer Services Team on 0800 526 1800.



eAssessors

Competenz has a team of eAssessors who are responsible for marking your eLearning assessments in Canvas.

They will leave helpful feedback on your assessment attempts and can be contacted for help via the Competenz phone support system.

Study groups

Dedicated fortnightly study groups are an excellent opportunity to receive support from experienced tutors and meet other engineering apprentices. You can take along any questions you have about your assessments. Study groups are available online and in-person at locations around New Zealand.

Talk to your Competenz training advisor to find out about study groups in your area and how to enrol.

Block course

This is a training course run by a local polytech that has the machinery and equipment you're required to operate to complete your apprenticeship. At a block course, you'll work on projects and learn how to do things safely. As you work through the projects and the complete tasks required for assessment, the tutor will mark you off. The tutors are experienced engineers and are there to help you. Be sure to check-in with them regularly to ensure you're on-track and they've seen you do everything that is required.

Language, literacy and numeracy support

- » Are you new to the workforce and finding it hard to keep up with your peers?
- » Do you struggle with reading and writing, or have learning challenges such as dyslexia?
- » Do you find counting and basic mathematics difficult?

If you have trouble with any of the above at home, work or in your on-the-job training, we can help. There is also a range of online tools and support available. Talk to your training advisor to find out more.

Digital literacy support

Digital skills are essential to participate fully in 21st century life – whether it be in the community, at work or in personal life.

There are useful resources and short courses available that can help bring you up to speed. Check them out below:

- » The Open Polytech – Digital study skills (free online course)
- » Stepping Up NZ – free community based digital literacy classes

Financial literacy support

Financial capability is about feeling confident to make wise judgements about how to use and manage money in ways that benefit us now and in the future. It enables us to reach our goals, provide for our family and, ultimately reach retirement in good financial shape.

The Commission for Financial Capability provides access to online tools and resources to support this.

Phone support

Call 0800 526 1800 (and press 4 for learner support) between 5pm and 8pm on Tuesdays, Wednesdays and Thursdays.

Our dedicated team can help you to log in to Canvas to complete your eLearning. If you have a question about the learning content, we'll put you through to a Canvas assessor who will be able to answer your questions and get you on the right track.

If the line is busy, please don't hang up! Leave us a voicemail message, and we'll call you back before 9pm the same day.

Key contacts – where to go for help

- » Manager/supervisor
- » Competenz training advisor
- » Competenz online learning support – canvas.lms@competenz.org.nz
- » Competenz phone support – 0800 526 1800 (choose option 4 for learner support)

Resources to support

Assessment guides and learning content

All assessment guides are available on Canvas. Your training advisor will let you know which assessments you need to complete and by when. These on-the-job assessments are downloaded, printed and completed by you, and observed and verified by your on-the-job supervisor. Once completed, your Competenz training advisor will carry out the marking and assessment.

Each assessment guide provides you with the information you need to complete each assessment, so you must read it carefully.

Assessment Requirements

This Assessment Guide is designed to help you provide evidence of your skills and knowledge required by this unit standard.

Before you begin

Read through the assessment requirements yourself. Talk with your Assessor if there is anything you don't understand.

Meet with your Assessor to plan your assessment. Your Assessor will:

- » Talk you through this Guide, and discuss when and how you will be assessed.
- » Check you are ready to begin this assessment.

What you need to do

1. Complete the following assessment tasks:

Questions	Answer questions about:
	<ul style="list-style-type: none">» The principles of pneumatic power systems.» Pneumatic power systems and applications.» Hazards associated with pneumatic power systems.

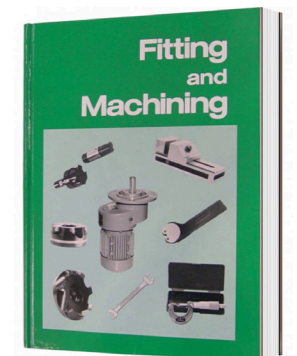
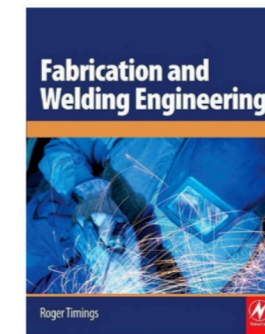
Note: Your Assessor may choose someone to verify your work. This person must have expertise in knowledge of pneumatics and pneumatic power systems and could be someone you report to, your trainer, or a supervisor or manager who works with you regularly.

2. When you have completed all the assessment tasks, complete the Candidate Evidence Check at the end of this Guide.
3. When you are sure you have completed and/or attached everything, contact your Assessor or Account Manager to arrange the next steps.

An example of an assessment requirement found on Canvas

Textbooks

Two textbooks have been introduced to programmes that we offer for the New Zealand Certificate in Mechanical Engineering, Mechanical Building Services and Engineering Fabrication, to support on-the-job theory and practical components.



Assessments

Some assessments check your knowledge through a series of questions, much like a quiz. Others require you to complete or be observed doing a task. Sometimes they're a combination of **both of these**. To find out what you need to do, read your assessment instructions and questions carefully.

If you're required to complete a task or be observed doing practical work, it will need to be checked by someone in your workplace who has the authority to confirm you've finished it according to the assessment instructions. This is called verification. These assessments have clear instructions about what you need to do and the evidence that must be recorded to prove you have passed successfully. There is also a form that must be signed too.

If the learning is theory-based, your assessment will be online. Once you've submitted your assessment, it is sent to an eAssessor for marking. If you don't get it right the first time, they'll provide guidance about the extra information required or redirect you to the learning material to review the key points again.

Workplace assessor vs verifier

The workplace **assessor** makes the call on whether a learner meets the competency requirements of the on-the-job unit standards.

The **verifier** attests the learner's evidence is authentic and meets the performance requirements of the workplace.

The eAssessor

The eAssessor marks completed work against the unit standard requirements and will provide an assessment of 'competent' or 'not yet competent'. They will;

- » Provide feedback on any incorrect questions
- » Provide guidance if you find a question difficult to understand.

eAssessors are also available after-hours to assist if you are having difficulty understanding a question. See phone support to find out how to access this service.

Online learning and assessment fundamentals

Your eLearning assessments are all open book. Lots of the information required to complete these assessments is available in the learning material: however, extra research is also needed.

In Canvas, you'll find that there are two types of online assessments. These are machine-marked (multi-choice questions), and assessor marked. Machine marked questions give you instant feedback with a score.

Before you attempt an assessment, ensure you have thoroughly read and understood all the learning material and opened the links. The links will direct you to videos and more information to help with your assessment.

Make sure you read all questions carefully before answering and follow the instructions. Pay attention to how many examples you are required to give and look for how many decimal places you need to round to.

Example of a quality answers

To keep safe when working with compressed gas cylinders, explain how you can prevent the items below from becoming a hazard.

Valves and gauges

At times valves and gauges can be sensitive and cause harm if faulty. To prevent valves from becoming a hazard one can refrain from leaving gas cylinders in the way of moving objects. One can also attach valve protection caps to the valve to lock it in place. Ensure that fittings are dry and not lubricated with oil or grease. If fittings are lubricated with oil or grease they are highly likely of causing an explosion as oils are explosive liquids and if exposed to gas an explosion will occur.

Cylinder keys

Cylinder keys allow and disallow the flow of gas. When storing a cylinder, ensure they are secured from toppling over. Failure to do so can lead to a cylinder falling, turning a cylinder key to release gas and possibly causing a gas leak. Ensure keys are kept away from the gas plant while in use.

Flash back arrestors

Flashback arrestors assist with keep flames out of the cylinder by cooling or extinguishing the flame. If damaged, a flame may enter a gas cylinder and cause a explosion. Arrestors should be tested and replace if needed by a competent person.

Hoses

The hoses on transport gas out of the cylinder. If damaged, they can cause gas leaks. To prevent damage, hoses must be treated carefully and regularly checked for signs of inconsistency.

Leaks

Leaks can cause serious harm to the body if inhaled by a person. To prevent the hazard, gas cylinders should be checked regularly for any rust, leakage or signs of deterioration.

It's important to 'use your own words'

a. Describe what to look for when inspecting chain wear

If the chain is run in one direction only, wear patterns affect the sprocket on only one side, leaving a hook shape to the sprocket's teeth.

Chain systems can be severely affected by dirt or foreign debris, which can slowly wear down a chain or sprocket and lead to chain breakage if it is forced through the sprocket.

Abrasion in chains and sprockets will show as roughly sanded areas around the edges. Poor lubrication or misalignment can lead to shiny wear patterns reoccurring on either chain or sprocket. Excessive noise can also be an indication of chain wear.

b. Describe how to estimate chain wear

To estimate the chain wear, you can compare it with a new chain – check the length and side flexing. Alternatively, wrap it around a sprocket and check it for fit.

Example of good answers:

- a. You look for the oil/lubrication condition. If the chain runs one way you look for a hook shape on the sprocket, indicating wear. Look for dirt/debris build up as it can wear down a chain/sprocket. You can also look for abrasions on chains and sprockets which will show as roughly sanded areas.
 - b. You can estimate chain wear by comparing it with a new chain. Check the side flexing and length or wrap it around a sprocket and check the fit.
- a. If there is wear on the chain, the same wear can also be occurring on the sprocket and chain parts as well. Abrasion in chains and sprockets will show as roughly sanded areas around the edges. Poor lubrication or misalignment can lead to shiny wear patterns reoccurring on either the chain or sprocket. Excessive noise can be an indication of a worn chain.
 - b. To estimate chain wear, you can compare it with a new chain – check the length and side flexing. Alternatively, wrap it around a sprocket and check for fit.

Submitting an online assessment

Before you submit an assessment, make sure you've attempted to answer all the questions. If you're unsure of an answer, make an attempt as this allows the assessor to provide you with feedback.

You are given three attempts to answer machine-marked questions correctly. Don't panic if it's still incorrect, as you will be given an additional three attempts. If you exhaust these second attempts and are again locked out, you will be directed to contact an eAssessor for further assistance.

Where a unit standard is made up of both machine and assessor marked questions you will receive your computer-scored responses first. Please do not re-submit the assessment until the assessor has marked the remaining questions. Assessments will be marked within ten working days.

All questions must be answered correctly before you are marked 'competent' and therefore pass that unit standard.

Assessor feedback and re-submission

The assessor will clearly state which questions were not answered correctly, will provide feedback and guidance and direct you about where to go for more information.

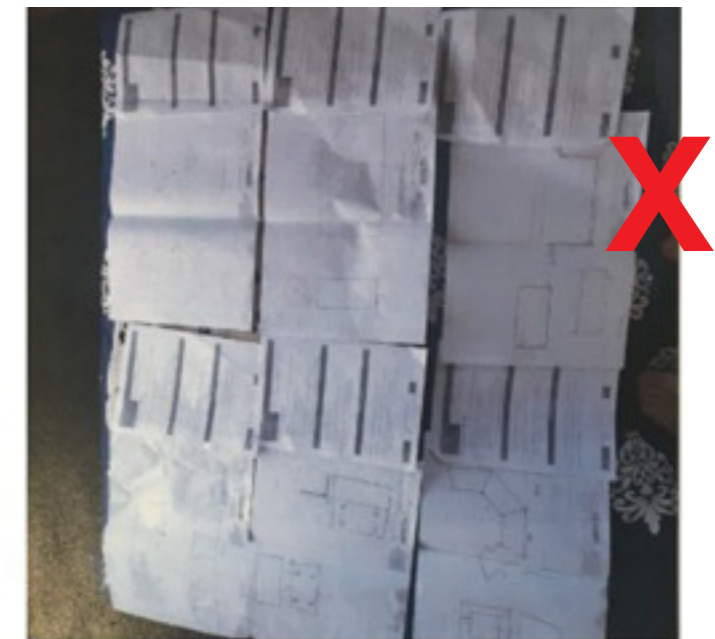
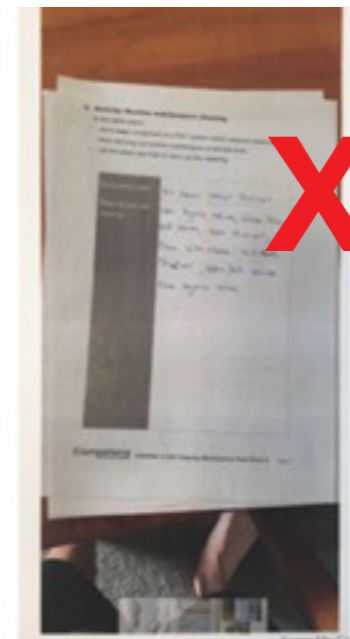
Please read all feedback carefully and only resubmit those questions indicated by the assessor. **You do not need to re-answer the entire assessment.**

Scenario	Submission	Feedback
Evident the learning material has not been read		You will be requested to read your learning material
Answer is incorrect	1st submission	You will be asked to refer to your learning material
	2nd submission	You will receive specific direction
	3rd submission	You will be asked to ring the learning support line
Part of an answer is correct and part is incorrect	1st submission	You will receive clear direction as to which part of the answer is correct and which is incorrect
	2nd submission	You will be asked to ring the learning support line
Compound questions (math question when you get one thing incorrect and it flows through)	1st submission	You will receive clear direction as to which part of the answer is correct and which is incorrect
	2nd submission	You will be asked to ring the learning support line
Only answered 'some' of the questions	ALL	It will be stated which questions need to be re-answered

Uploading files for marking

Please note you can only upload one file per question – i.e. one task sheet per question. If you need to upload multiple files, you can do so in the comments section.

Ensure all photos are clear and easy to read (especially if it's a drawing) before uploading. You can scan documents into a single file or combine files.



Learning pathways

General engineering

Entry level jobs	Advancing jobs	Senior jobs
Apprenticeship	Higher learning	Higher learning
General engineer	Specialist engineer Engineering supervisor Leading hand Workshop supervisor Welding supervisor	Foreman Site supervisor Business manager Business owner

Machining

Entry level jobs	Advancing jobs	Senior jobs
Apprenticeship	Higher learning	Higher learning
Machining engineer Fitting and assembly work Machine shop Fitter and turner CNC programmer/operator Manufacturing engineer	Specialist engineer Engineering supervisor Leading hand Workshop supervisor Welding supervisor	Foreman Site supervisor Business manager Business owner

Fitting and machining

Entry level jobs	Advancing jobs	Senior jobs
Apprenticeship	Higher learning	Higher learning
Fitting and machining engineer Fitter and turner CNC programmer/operator Manufacturing engineer	Specialist engineer Workshop supervisor Welding supervisor Engineering supervisor Leading hand	Foreman Business owner Business manager Site supervisor

Maintenance engineering

Entry level jobs	Advancing jobs	Senior jobs
Apprenticeship	Higher learning	Higher learning
Maintenance engineer Machine building and installation engineer Fluid power technician	Specialist fabricator Supervisor Welding supervisor Workshop supervisor Leading hand	Foreman Business owner Business manager Site supervisor

Toolmaking

Entry level jobs	Advancing jobs	Senior jobs
Apprenticeship	Higher learning	Higher learning
Toolmaker Machine shop CNC programmer/operator Research and development manufacturing	Specialist toolmaker Supervisor	Foreman Business owner Business manager Site supervisor

Year one: on-the-job assessments

On-the-job assessment resource toolbox, year one

Unit standard	Assessment title/subject	Textbook resources pages	Other resources (Add to this list as you go)
4433	Select, use, and care for simple measuring devices used in engineering	Culley (ed) 167 - 171 Timings 162 - 165	
2395	Demonstrate and apply knowledge of the selection, use, and care of engineering hand tools	Culley (ed) 125 - 141 Timings 214 - 224	
2396	Demonstrate and apply knowledge of the selection, use, and care of portable hand held engineering power tools	Culley (ed) 607 - 611 Timings 249 - 253	
29672	Assemble fabricated components using mechanical connections	Timings 386 - 427	
29674	Demonstrate knowledge of mechanical fasteners used in mechanical engineering	Culley (ed) 114 - 124 Timings 386 - 418	
11661	Perform engineering drilling operations using a pedestal type drilling machine	Culley (ed) 224 - 227 Timings 226 - 237	
29676	Demonstrate and apply knowledge of good work practices when servicing simple components under supervision		Company Instructions and Operating Procedures Manufacturer's Technical and Service Manuals

Year two: on-the-job assessments

On-the-job assessment resource toolbox, year two

(Year two only, unless specified)

Unit standard	Assessment title/subject	Textbook resources	Other resources (Add to this list as you go)
30279	Cut steel using the manual gas cutting process	Culley (ed) 553 - 554	
30280	Cut metals using the manual plasma cutting process		Company Instructions and Operating Procedures Manufacturer's Operator Manuals
2397	Carry out routine servicing of engineering machinery	Culley (ed) 613 - 614	Company Instructions and Operating Procedures Manufacturer's Technical and Service Manuals
30284	Demonstrate and apply knowledge of the construction, function and application of seals in mechanical engineering	Culley (ed) 489 - 493	Manufacturer's Technical and Service Manuals
30666	Demonstrate and apply knowledge of keys and pins	Culley (ed) 499 - 501	
30273	Set up and operate a CNC engineering lathe or machining centre	Culley (ed) 597 - 606	Company Instructions and Operating Procedures Manufacturer's Operator Manuals
30665 Year 2 and 3	Demonstrate and apply knowledge of workplace communication in mechanical engineering trades	Timings 58 - 65	
30438 Year 2 and 3	Dismantle, inspect and assemble component parts within assemblies	Culley (ed) 482 - 536	Manufacturer's Technical and Service Manuals
2714 Year 2 and 3	Produce components by performing engineering turning operations	Culley (ed) 228 - 308	Manufacturer's Operator Manuals
2715 Year 2 to 4	Produce components by performing engineering milling operations	Culley (ed) 328 - 374	Manufacturer's Operator Manuals
22910 Year 2 and 3	Produce a part program for a CNC engineering lathe or machining centre	Culley (ed) 597 - 606	Manufacturer's Operator Manuals

Year three and four: on-the-job assessments

On-the-job assessment resource toolbox, year three and/or four (Years specified)

Unit standard	Assessment title/subject	Textbook resources	Other resources (Add to this list as you go)
2407 Year 3	Monitor the condition of mechanical machinery		Manufacturer's Technical and Service Manuals
22905 Year 3	Perform planned maintenance work on mechanical equipment	Culley (ed) 613 - 619	Manufacturer's Technical and Service Manuals
30285 Year 3	Demonstrate knowledge of, and replace and test dynamic seals in machinery	Culley (ed) 489 - 491	Manufacturer's Technical and Service Manuals
4441 Year 3	Calibrate engineering measuring devices and equipment	Culley (ed) 175 - 179	Manufacturer's Technical and Service Manuals
18544 Year 3	Select and use advanced material cutting tools in engineering machining		Manufacturer's Operator Manuals
29676 Year 3	Demonstrate and apply knowledge of good work practices when servicing simple components under supervision		Company Instructions and Operating Procedures Manufacturer's Technical and Service Manuals
30274 Year 3 and 4	Cut fabrication materials using hand held power tools	Culley (ed) 607 - 611 Timings 249 - 253	Manufacturer's Technical and Service Manuals
30440 Year 3 and 4	Mark out fabrication components using geometrical methods	Timings 172 - 206	
25699 Year 3 and 4	Form heavy fabrication materials	Timings 278 - 344	
25698 Year 3 and 4	Form light fabrication materials	Timings 278 - 344	
25700 Year 3 and 4	Assemble and join light fabrication materials	Timings 386 - 465	

cont.

Unit standard	Assessment title/subject	Textbook resources	Other resources (Add to this list as you go)
19874 Year 3 and 4	Service and replace bearings in mechanical machinery	Culley (ed) 502 - 527	Manufacturer's Operator Manuals Manufacturer's Technical and Service Manuals
30439 Year 3 and 4	Assessable, fit and test precision components	Culley (ed) 482 - 536	Manufacturer's Operator Manuals Manufacturer's Technical and Service Manuals
30272 Year 3 and 4	Cut fabrication materials using machines	Timings 225 - 276	Manufacturer's Operator Manuals
2408 Year 4	Align mechanical machinery	Culley (ed) 494 - 497	Manufacturer's Operator Manuals
30286 Year 4	Demonstrate knowledge of, and replace and test static seals in machinery	Culley 489 - 494	Manufacturer's Technical and Service Manuals
18616 Year 4	Program a 3-axis CNC machining centre	Culley (ed) 596 - 606	Manufacturer's Operator Manuals
18617 Year 4	Program a 2-axis CNC turning centre	Culley (ed) 596 - 606	Manufacturer's Operator Manuals
2702 Year 4	Set and operate a CNC machining centre	Culley (ed) 596 - 606	Manufacturer's Operator Manuals
2703 Year 4	Set and operate a CNC lathe	Culley (ed) 596 - 606	Manufacturer's Operator Manuals
18543 Year 4	Manufacture multi-stage tooling for industry		Manufacturer's Operator Manuals



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