**NZQA**

**Approved**

Achievement standard: 91051 Version 3

Standard title: Demonstrate understanding of how different disciplines influence a technological development

Level: 1

Credits: 4

Resource title: A combination of efforts

Resource reference: Generic Technology VP-1.8 v2

Vocational pathway: Manufacturing and Technology

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| Quality assurance status | These materials have been quality assured by NZQA. NZQA Approved number A-A-02-2015-91051-02-7361 |
| Authenticity of evidence | Assessors/educators must manage authenticity for any assessment from a public source, because learners may have access to the assessment schedule or exemplar material.Using this assessment resource without modification may mean that learners’ work is not authentic. Assessors/ educators may need to change figures, measurements or data sources or set a different context or topic to be investigated or a different text to read or perform. |

Vocational Pathway Assessment Resource

Achievement standard: 91051

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Learner instructions

# Introduction

This assessment activity requires you to demonstrate your understanding of how different disciplines influence the development of a crane.

You are going to be assessed on how comprehensively you demonstrate your understanding of how knowledge, practices and collaborations from a range of disciplines (i.e. mechanical, engineering, structural design, physics) influence the development of a crane.

The following instructions provide you with a way to structure your work so you can demonstrate what you have learnt and achieve success in this standard.

Assessor/educator note: It is expected that the assessor/educator will read the learner instructions and modify them as necessary to suit their learners

# Task

Cranes are widely used in the Manufacturing and Technology sector. You have been asked to prepare a report about the development of a crane and how experts contributed towards this.

You will be expected to discuss how different disciplines have impacted on the quality of the design and functionality of a crane’s development.

Begin by looking at a specific type of crane and identify:

* The knowledge and practices drawn from two or more disciplines that have influenced the crane’s development. This could include:
	+ mechanical engineering (e.g. how the crane turns, drum cables, all the moving parts, maintenance requirements, safety inspections for wear and tear)
	+ construction (e.g. selection of materials to build the crane – considering cost and performance of materials)
	+ physics (e.g. force and stress – ability to lift required weight safely)
	+ structural design (e.g. conditions the crane operates in − extreme heat or cold, tropical hurricanes or salt spray by a harbour)
	+ aesthetic design (e.g. the operator’s cabin – visibility of operation, enclosed to stay out of weather, air-conditioning)
	+ market research (e.g. what crane buyers want)
	+ legal experts (e.g. codes of practice and law regarding safety standards).
* How individuals from these disciplines collaborated during the development of the crane, for example how the design engineer (gearing and physics, aerodynamics), the materials engineer, and the production team collaborated during the development.

## Report

Complete your report. This could be written or presented in the first person as a consultant or as an account in the third person.

Your report needs to:

* identify the knowledge and practices drawn from two or more disciplines that influenced the development of a crane
* consider the role of the individuals associated with these different disciplines
* identify how the collaboration of these people interact during the development of the crane, for example how these people bring together different knowledge bases and practices
* discuss the impact this knowledge, practices and collaboration has on the development of a crane.

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Assessor/Educator guidelines

# Introduction

The following guidelines are supplied to enable assessors/educators to carry out valid and consistent assessment using this internal assessment resource.

As with all assessment resources, education providers will need to follow their own quality control processes. Assessors/educators must manage authenticity for any assessment from a public source, because learners may have access to the assessment schedule or exemplar material. Using this assessment resource without modification may mean that learners' work is not authentic. The assessor/educator may need to change figures, measurements or data sources or set a different context or topic. Assessors/educators need to consider the local context in which learning is taking place and its relevance for learners.

Assessors/educators need to be very familiar with the outcome being assessed by the achievement standard. The achievement criteria and the explanatory notes contain information, definitions, and requirements that are crucial when interpreting the standard and assessing learners against it.

# Context/setting

This activity requires learners to present a report that demonstrates comprehensive understanding of how different disciplines, knowledge and practices, influence the development of the crane.

# Conditions

Learners could work individually or in groups to gather and analyse their evidence. The final work will be individually assessed. Decide on the format of the final presentation, for example a written report, computer slide show, brochure or video. You may wish to take learner preferences into account in deciding on the format.

# Resource requirements

Learners require access to the internet for research.

Visits to industry or from practicing specialists involved with operating, designing and maintaining cranes may also be helpful.

# Additional information

Presenting the report as a Prezi presentation: [http//prezi.com](http://www.prezi.com)

A Technology Online report may be helpful:

<http://technology.tki.org.nz/>

<http://technology.tki.org.nz/Case-Studies/Technologists-Practice-case-studies-Introduction/Hard-Materials/A-new-Carter>

Code of practice on operating, designing and maintaining cranes:

<http://www.osh.govt.nz/order/catalogue/10.shtml>

## Other possible contexts for this vocational pathway

A presentation on the development of BMX bikes, skateboards, helmets for a track cyclist.

# Assessment schedule: Generic Technology 91051 – A combination of efforts

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| --- | --- | --- |
| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The learner demonstrates understanding of how different disciplines influence the development of a crane by:* identifying the knowledge and practices drawn from the disciplines

For example:The learner’s report identifies engineers and designers as key people involved with ensuring a crane’s design meets all criteria and constraints.* identifying how individuals from the disciplines collaborated during the development of a crane

For example:The learner describes how crane engineers need a strong understanding of mathematics, and are able to work with designers using computer-aided engineering (CAE) to stimulate and study a crane’s design.* describing the impact of knowledge, practices and collaboration on the development of a crane’s design

For example:The learner describes how all the people involved in the development of the crane design have different expertise or knowledge bases:*Crane engineers begin by creating a preliminary computer-aided design (CAD) according to the client’s specifications and technical data that allows them to stimulate and study how the design will behave.**Designers carry out further testing to verify the design’s overall structural strength and compliance (i.e. structural and integrity analysis).**The above expected learner responses are indicative only and relate to just part of what is required.* | The learner demonstrates in-depth understanding of how different disciplines influenced the development of a crane by:* identifying the knowledge and practices drawn from the disciplines

For example:The learner’s report identifies engineers and designers as key people involved with ensuring a crane’s design meets all criteria and constraints.* identifying how individuals from the disciplines collaborated during the development of a crane

For example:The learner describes how crane engineers need a strong understanding of mathematics, and are able to work with designers using computer-aided engineering (CAE) to stimulate and study a crane’s design.* explaining how knowledge, practices and collaboration impacted the development of a crane’s design

For example:The learner explains how all the people involved in the development of the crane design have different expertise or knowledge bases:*Crane engineers begin by creating a preliminary computer-aided design (CAD) according to the client’s specifications and technical data that allows them to stimulate and study how the design will behave.**Designers carry out testing to ensure the crane’s design meets all criteria and constraints and the design’s overall structural strength and compliance (i.e. structural and integrity analysis) is verified*.*The above expected learner responses are indicative only and relate to just part of what is required.* | The learner demonstrates comprehensive understanding of how different disciplines influenced the development of a crane by:* identifying the knowledge and practices drawn from the disciplines

For example:The learner’s report identifies engineers and designers as key people involved with ensuring a crane’s design meets all criteria and constraints.* identifying how individuals from the disciplines collaborated during the development of a crane

For example:The learner describes how crane engineers need a strong understanding of mathematics, and are able to work with designers using computer-aided engineering (CAE) to stimulate and study a crane’s design.* discussing how knowledge, practices and collaboration interacted to impact on the development of a crane’s design

For example:The learner discusses all the people involved in designing a crane and how their different expertise or knowledge bases interact, for example the learner discusses crane engineers’ knowledge of mechanisms and movement, and how properties of materials contribute towards the design that is created specifically for the client’s specifications and technical data. The learner discusses how designers use computer-aided engineering (CAE) technology to analyse the engineer’s computer aided designs (CAD), allowing them to simulate and study how the crane’s design will behave.*Designers and engineers need a strong mathematical understanding as testing of the crane design includes checking for appropriate structural, kinematic and dynamic strength against the applied mechanical, hydraulic loading and external wind load*.The learner discusses how this close collaboration between the different disciplines of engineering and design allowed both parties to solve any problems arising within the design process quickly and at an earlier stage.*The above expected learner responses are indicative only and relate to just part of what is required.* |

Final grades will be decided using professional judgement based on an examination of the evidence provided against the criteria in the Achievement Standard. Judgements should be holistic, rather than based on a checklist approach.