**NZQA**

**Approved**

Achievement standard: 91062 Version 3

Standard title: Demonstrate understanding of basic concepts related to machines

Level: 1

Credits: 3

Resource title: Crane power

Resource reference: Construction and Mechanical Technologies VP-1.25 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-02-2015-91062-02-7333 |
| 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: 91062

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Vocational pathway: Manufacturing and Technology

Learner instructions

# Introduction

This assessment activity requires you to demonstrate your understanding basic concepts related to machines commonly found on a truck mounted crane.

You are going to be assessed on how comprehensively you demonstrate your understanding of basic concepts of machines commonly found on a truck mounted 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 if necessary to suit their learners.

# Task

Study one or more machines commonly found on a truck mounted crane. Find out their purpose, how they work, and why they are used. You will then produce a report or presentation which will demonstrate your comprehensive understanding of basic concepts related to machines.

As you work, gather evidence you could use in your report or presentation. You could include annotated photographs or drawings of a truck mounted crane, diagrams you have drawn, models you have made, notes from group discussions, and written explanations. You may explain or discuss other machines in order to clarify the concepts you refer to.

Decide on the format of your report or presentation. You might present your findings as a written report or a presentation accompanied by a model, display board, or slides, for example.

Create a report or presentation in which you do the following:

* Explain the purpose of levers, inclined planes and screws. For example, you could explain how the lever is used in the crane to increase strength.
* Explain the purpose of mechanical components. For example, you could explain the use of fixed and moving pivots and pulleys on the crane. See Resource A for a list of mechanical components you could discuss in your report or presentation.
* Explain the advantages and disadvantages of pneumatic and hydraulic systems. For example, you could explain the advantages of using hydraulics in the rams found on the crane and the disadvantages of using pneumatics to move the rams.
* Explain how a machine commonly found on a truck mounted crane provides mechanical advantage and motion and discuss why particular levers, inclined planes and screws, and mechanical components were selected to ensure the desired mechanical advantage and motion. For example, you could choose the mechanical arms and hydraulic rams of the crane to discuss why basic mechanical principles and components were selected to ensure the desired mechanical advantage and motion. You could also compare and contrast the advantages and disadvantages of a crane driven by winch and pulley mechanisms as opposed to hydraulic rams.

Make sure you acknowledge all your sources of information. You need to provide references to make it clear where your information has come from.

# Resource A

## Mechanical Components

The mechanical components you discuss in your presentation may include:

* bearings (plain, ball, roller, needle, thrust, etc.)
* cams (plate, eccentric, etc.) and followers (needle, roller, flat, offset, etc.)
* pivots (fixed, moving, etc.) and linkages (parallel, reverse, sliding crank motion, etc.)
* gear drives (spur, bevel, helical, rack and pinion, worm, idler, etc.)
* belt or chain and sprocket drives (v-belt, flat belt, duplex chain or double belt, tooth belt, etc.)
* shafts and bearings (solid shafts, hollow shafts, ball bearing, roller bearing, conical bearing, etc.).

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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 demonstrate their comprehensive understanding of machines commonly found on a truck mounted crane. Learners will produce a report or presentation explaining the basic concepts and discussing why particular components are used. They will be assessed on the comprehensiveness of the report or presentation.

# Conditions

This is an individual assessment activity.

# Resource requirements

Learners will require access to relevant information about truck mounted cranes. Provide access to a library or the internet, for example.

It is recommended that learners take and annotate photos to help demonstrate their understanding. Many learners will have phones they can use for this purpose, but it will be necessary to provide a camera learner use.

Useful websites include:

<http://www.technologystudent.com>

Hiab catalogues: <http://pdf.directindustry.com/pdf/hiab-17585.html>

Useful videos include:

Mechanical Toys, Video Education Australasia

<http://www.youtube.com/watch?v=aVEy5WDul7U>

# Additional information

None.

# Assessment schedule: Construction and Mechanical Technologies 91062 – Crane power

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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 basic concepts related to machines by:   * explaining the purpose of levers, inclined planes and screws   For example:  The learner explains how the lever is used in the crane to increase strength.   * explaining the purpose of mechanical components   For example:  The learner explains the use of fixed and moving pivots and the use of pulleys used in the crane.   * explaining the advantages and disadvantages of pneumatic and hydraulic systems   For example:  The learner explains advantages of using hydraulics in the rams found on the crane. The learner explains disadvantages of using pneumatics in the crane system.   * describing the mechanical advantage and motion of a machine   For example:  The learner describes a pulley assembly on the truck mounted crane that achieves mechanical advantage and motion.  *The above expected learner responses are indicative only and relate to just part of what is required.* | The learner demonstrates in-depth understanding of basic concepts related to machines by:   * explaining the purpose of levers, inclined planes and screws   For example:  The learner explains how the lever is used in the crane to increase strength.   * explaining the purpose of mechanical components   For example:  The learner explains the use of fixed and moving pivots and the use of pulleys used in the crane.   * explaining the advantages and disadvantages of pneumatic and hydraulic systems   For example:  The learner explains advantages of using hydraulics in the rams found on the crane. The learner explains disadvantages of using pneumatics in the crane system.   * explaining how a machine provides the desired mechanical advantage and motion   For example:  The learner explains how a pulley assembly on the truck mounted crane achieves the desired mechanical advantage and motion.  *The above expected learner responses are indicative only and relate to just part of what is required.* | The learner demonstrates comprehensive understanding of basic concepts related to machines by:   * explaining the purpose of levers, inclined planes and screws   For example:  The learner explains how the lever is used in the crane to increase strength.   * explaining the purpose of mechanical components   For example:  The learner explains the use of fixed and moving pivots and the use of pulleys used in the crane.   * explaining the advantages and disadvantages of pneumatic and hydraulic systems   For example:  The learner explains advantages of using hydraulics in the rams found on the crane. The learner explains disadvantages of using pneumatics in the crane system.   * explaining how a machine provides the desired mechanical advantage and motion   For example:  The learner explains how a pulley assembly on the truck mounted crane achieves the desired mechanical advantage and motion.   * discussing why particular levers, inclined planes and screws, and mechanical components were selected to ensure the desired mechanical advantage and motion of a machine   For example:  The learner chooses the arms and hydraulic rams of the crane to discuss why basic mechanical principles and components were selected to ensure the desired mechanical advantage and motion. The learner compares and contrasts the advantages and disadvantages of a crane driven by winch and pulley mechanisms as opposed to hydraulic rams.  *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.