**NZQA**

**Approved**

Achievement standard: 91355 Version 3

Standard title: Select and use planning tools to manage the development of an outcome

Level: 2

Credits: 4

Resource title: Planning a hydraulics prototype

Resource reference: Generic Technology VP-2.2 v2

Vocational pathway: Manufacturing and Technology

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| Date version published | February 2015 Version 2  To support internal assessment from 2015 |
| Quality assurance status | These materials have been quality assured by NZQA.  NZQA Approved number A-A-02-2015-91355-02-8247 |
| 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

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Learner instructions

# Introduction

This assessment activity requires you to select and use planning tools to manage the development of a working hydraulic prototype device to clasp, lift and move a small load from an assessor/educator approved brief.

You will be assessed on how efficiently you optimise time and material use to manage the development and ensure the completion of a hydraulics prototype using selected planning tools.

The following instructions provide you with a way to structure your work to 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

You are to use planning tools to manage the design and development of a working hydraulics prototype and present evidence supporting how efficiently you have managed this process.

You require an assessor/educator approved brief that contains a conceptual statement which describes what is to be done and why, and measurable specifications. The outcome can be a conceptual design for an outcome and/or the technological outcome itself (prototype).

## Selecting planning tools

Explore existing planning tools and how industry mentors and/or practicing technologists (for example electronic, engineering and hydraulics specialists) use them.

Research other planning tools, which could include brainstorms, Gantt charts, PMI charts (plus-minus-interesting), reflective diaries/journals, plans of action, mind-maps, flow diagrams, graphic organisers, wire frames, test plans, spreadsheets, and databases.

Analyse how they may help you manage the development of your hydraulics prototype by recording the following information:

* identify each planning tool used
* at what stage of your project would this planning tool be relevant
* how does it help you:
  + plan the actions required
  + effectively prioritise and manage resources
  + make key planning decisions that will ensure the completion of the outcome (conceptual and/or prototype).

Select the best planning tools to use from the information you have collected and explain how they are best suited to help you manage the development of your hydraulics prototype.

## Using planning tools

Use your planning tools to:

* set achievable goals
* establish required resources (for example, time, materials, tools and equipment)
* research information such as community and work-based specialist knowledge and skills (engineers, hydraulic and/or electrical specialists)
* determine critical review points (i.e. those that ensure the hydraulic prototype device will be completed safely and on time) at key stages of your practice, such as:
  + on the completion of research, and/or
  + having gained feedback of your design ideas/working drawings
* provide evidence of how you are reviewing your progress and any revisions you are making to your planning to ensure you complete the outcome.

## Reviewing planning tools

During the development of your hydraulics prototype you will need to ensure you have provided evidence of how you:

* revised and/or confirmed your goals and the resources and planning tools you are using in order to complete your outcome (conceptual and/or prototype)
* optimised your use of time and materials.

## Submitting your evidence

You will need to provide evidence showing how effectively and efficiently you have managed your development process to ensure the completion of the hydraulics prototype (for example, you could organise and present this evidence through a visual diary, or other web based applications).

You will need to submit evidence of:

* your completed outcome (hydraulics prototype)
* your selection and use of planning tools to manage the development process (i.e. how you arrived at the final outcome).

# Resources

In selecting suitable planning tools, you may:

* find examples of planning tools on the web and in books:
  + [www.mindtools.com](http://www.mindtools.com)
  + <http://softwareforlearning.tki.org.nz>
* look at other technology projects you and other learners may have completed
* study learner projects published by <http://technology.tki.org.nz> (Learner Showcase and Classroom Practice Case Studies).

Useful books include:

Stensel, P 2007, *Design & Technology – Design For Life*, Pearson Education South Asia, Singapore

Reith, C 2008, *Technology Made Easy: NCEA Level 1*, Pearson Education, New Zealand.

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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 select and use planning tools to efficiently manage the development of a hydraulics prototype from an assessor/educator approved brief.

Learners will be assessed on how efficiently they manage its development, through ongoing reflection of goals, resources and planning tools, to optimise time and material use to ensure the completion of a hydraulics prototype.

This may be a conceptual design for an outcome and/or the technological outcome itself (prototype).

# Conditions

Provide learners with opportunities to critically evaluate planning tools that they and others have used.

Schedule at least one progress checkpoint during this activity.

# Resource requirements

Learners will require:

* internet and library access
* access to examples of planning tools.

# Additional information

Visits to industry or from practicing technologists may also be helpful.

# Assessment schedule: Generic Technology 91355 – Planning a hydraulics prototype

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| Evidence/Judgements for Achievement | Evidence/Judgements for Achievement with Merit | Evidence/Judgements for Achievement with Excellence |
| The learner selects and uses planning tools to manage the development of a hydraulics prototype by:   * selecting planning tools informed by a review of existing planning tools * using the selected planning tools to set achievable goals, establish resources required and determine critical review points * managing the development and reviewing progress as planned to ensure the completion of the hydraulics prototype   For example:  The learner looks at planning practices during an engineering firm visit that resulted in a successful working prototype (a single cylinder engine). As part of the firm’s planning process, a Gantt chart was successfully used to keep track of all deadlines and the resources (materials, equipment) required to construct the engine; the learner decided to use a similar planning tool.  The learner had access to a tablet and using a free application created a Gantt chart; similar to what was seen on the visit, allowing key stages, dates and required resources to be easily tracked. Critical review points were plotted on the Gantt chart and a reminder set on the tablet to ensure deadlines were met. Resources such as time for specialist visits were factored in; if changes were required after these consultations then adjustments were made quickly on the tablet. After looking online at examples, it was decided to use a flow chart to help manage the prototype’s construction, as the learner found the visual process easy to follow.  The learner decides to use the application Google docs to manage all their evidence (i.e. all documents such as spreadsheets, working drawings), as a hydraulics specialist, who the learner had consulted, had suggested this as a quick way to communicate information, as technical feedback was critical for a successful working prototype. For example, at a critical review point the learner requires feedback about the technical feasibility of a working drawing from the hydraulics specialist. The learner was able to download the working drawing using Google docs for the specialist to review. This resulted in the learner quickly realising more time would be needed, to incorporate the changes suggested by the hydraulics specialist into the working drawing, ensuring a successful working hydraulics prototype is to be completed on time.  *The above expected learner responses are indicative only and relate to just part of what is required.* | The learner selects and uses planning tools to effectively manage the development of a hydraulics prototype by:   * selecting planning tools informed by an analysis of existing planning tools * using the selected planning tools to set achievable goals, establish resources required and determine critical review points * reviewing progress at critical review points to revise and/or confirm goals, resources, and planning tools to ensure the completion of the hydraulics prototype   For example:  The learner looks at the planning practices during an engineering firm visit that resulted in a successful working prototype (a single cylinder engine). A Gantt chart was successfully used by the office manager to keep track of all deadlines and resources (materials, equipment) required by the engineers to construct the engine; however as this was created using a business program that the learner did not have access to, it was decided that a suitable available alternative would be found.  The learner had access to a tablet and using a free application created a Gantt chart; similar to what was seen on the visit, allowing key stages, dates and required resources to be easily tracked.  The learner uses reminders set on the tablet to confirm goals and review planning tools (Gantt chart, flow diagram) at pre-determined points ensuring deadlines were met. After a suggestion from a hydraulics specialist, who the learner had consulted, it was decided to use the application Google docs to manage all their evidence (i.e. all documents such as spreadsheets, working drawings) as information could be communicated quickly, critical for gaining the technical feedback needed for a successful working prototype.  At a critical review point the learner requires feedback about the technical feasibility of a working drawing from the hydraulics specialist. The learner was able to download the working drawing using Google docs for the specialist to review. When reviewing the working drawing, the specialist notes that the fluid properties engineered into the design were incorrect; thus more time would be needed to incorporate the changes suggested by the hydraulics specialist, into the working drawing. The introduction of a flow chart ensured that the use of specialised equipment, ordering of materials, and time for practising new techniques was planned in advance. Planning was reviewed and time allowed for any changes to be researched and completed to ensure the hydraulics prototype is to be completed on time.  *The above expected learner responses are indicative only and relate to just part of what is required.* | The learner selects and uses planning tools to efficiently manage the development of a hydraulics prototype by:   * selecting planning tools informed by an analysis of existing planning tools * using the selected planning tools to set achievable goals, establish resources required and determine critical review points * ongoing reflection on goals, resources, and planning tools to optimise time and material use to ensure the completion of the hydraulics prototype   For example:  The learner looks at the planning practices during an engineering firm visit that resulted in a successful working prototype (a single cylinder engine). A Gantt chart was successfully used by the office manager to keep track of all deadlines and resources (materials, equipment) required by the engineers to construct the engine; however as this was created using a business program that the learner did not have access to, it was decided that a suitable and available alternative would be found.  The learner had access to a tablet and using a free application created a Gantt chart; similar to what was seen on the visit, allowing key stages, dates and required resources to be easily tracked.  The learner constantly uses and reviews planning tools (Gantt chart, flow diagram), goals and resources on the tablet to keep on track so the hydraulic prototype is completed on time. After a suggestion from a hydraulics specialist, who the learner had consulted, it was decided to use the application Google docs to manage all their evidence (i.e. all documents such as spreadsheets, working drawings) as information could be communicated quickly, critical for gaining the technical feedback needed for a successful working prototype. Critical review points are used to ensure the developing prototype has specialist feedback before any essential developments are carried out (for example, checking the technical feasibility of the hydraulics mechanical properties). If this results in changes the learner optimises the remaining time by planning in extra technical checkpoints. This allows any technical changes to be checked by the specialist before any work commences on the prototype saving resources. For example, initial design ideas considered incorporating two different hydraulic components into the prototype, however the learner realised that this combination resulted in a complex drawing that would be better viewed in 3D to understand all components. The learner adjusted planning to allow time to create a computer generated 3D model for the specialist to easily check at a technical point, saving time and material wastage.  The learner optimises the remaining time and resources available by such things as; using the tablet to revise and confirm goals on the Gantt chart, listing tasks and reviewing ongoing progress each week on a spreadsheet to allow time for such things as computer access to CAD (computer aided design); a flow chart to ensure the use of all specialised equipment (i.e. computer time), ordering of materials, and time for practising new techniques was well planned in advance. If the learner is behind then more time is organised in the workshop or computer room at break time to ensure the hydraulics prototype is to be completed on time.  *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.