**NZQA**

**Approved**

Achievement standard: 91060 Version 3

Standard title: Demonstrate understanding of basic concepts used to make products from textile materials

Level: 1

Credits: 4

Resource title: Understanding aerodynamic sails

Resource reference: Construction and Mechanical Technologies VP-1.23 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-02-2015-91060-02-7326 |
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Vocational Pathway Assessment Resource

Achievement standard: 91060

Standard title: Demonstrate understanding of basic concepts used to make products from textile materials

Level: 1

Credits: 4

Resource title: Understanding aerodynamic sails

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Vocational pathway: Manufacturing and Technology

Learner instructions

# Introduction

This assessment activity requires you to demonstrate understanding of basic concepts used to make aerodynamic sails from textile materials.

You are going to be assessed on how comprehensively you demonstrate your understanding of basic concepts used to make aerodynamic sails from textile materials.

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

Create a report that demonstrates your understanding of the characteristics of textile materials, the techniques used to manage these characteristics, and why specific combinations of techniques and textile materials would be suitable in specific situations, for example sails used on wind powered machines such as yachts, hang-gliders, windsurf sails, and land sailing vehicles.

Consider a range of textile materials that could be used for making aerodynamic sails.

Report on your understandings by:

* describing characteristics of these materials. Characteristics of textile materials include variables that require managing in different ways during construction. These variable characteristics include:
  + strength, for example canvas is a much stronger fabric than cotton
  + thickness, for example denim, canvas, duck, and polar fleece are comparatively thick fabrics while georgette, organza, and t-shirting are comparatively thin fabrics
  + stretch, for example considerable stretch is found in stretch knits, and in fabrics cut on the bias, while other fabrics such as linens have relatively little stretch
  + nap or pile, for example fabrics with nap are velvet, velour, corduroy
  + stability, for example in terms of tendency to fray
  + the shine, for example satin is very shiny
  + stickiness, for example some PVC material will stick to itself.
* explaining techniques used when making aerodynamic sails. At least one technique must be explained from each of the following categories:
  + measuring, for example adjusting for body size, positioning grainline, measuring hems; or marking out, for example transfer of pattern markings, marking hemlines
  + sizing, for example working out pattern size, proportions; shaping, for example using darts, gathers, princess seams; or forming, for example fitting
  + joining or assembling, for example creating seams, adding zips
  + finishing or detailing, for example pressing, top stitching, applying designs.
* explaining how the characteristics of these materials influence the selection of techniques. Managing textile materials includes:
  + using techniques that accommodate the characteristics of textile materials, for example using a walking foot when seaming fabrics that are shiny and slippery
  + using techniques that make the most of, or take advantage of the characteristics of textile materials.
* discussing why different materials are used for aerodynamic sails, and how they require (or benefit from) different techniques for their handling and use
* explaining which combination of techniques and materials would be suitable for a situation, for example a sail on a traditional sailing yacht
* considering two situations, for example a mainsail from a yacht and/or hang-glider’s sailcloth, windsurfer sail, land yacht sail, and:
  + comparing the materials and techniques used
  + discussing the suitability of the materials and techniques used for these different situations (i.e. how do the techniques and materials used relate to the purpose of the sails?).

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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 create a report that demonstrates comprehensive understanding of basic concepts used when making aerodynamic sails from textile materials.

# Conditions

Learners need to create their presentation independently, and will be assessed individually.

Designing and making a sail is not a necessary part of this assessment activity.

Evidence would be expected to be gathered from activities to be completed by individual learners over a specified period of time.

Decide on the format of the final report. The material presented could include annotated photographs, flow diagrams, written text, drawings, website links, and functional modelling. You may wish to take learners’ preferences into account when deciding on the format.

# Resource requirements

The assessor/educator will provide learners with:

* a selection of textile materials used for sail making
* faulty and well-made products made from textile materials to analyse and discuss
* examples of sails such as a yacht’s mainsail and a windsurfer sail (or alternative products that will enable learners to discover how techniques and textile materials are combined in differing ways, for different situations).

Learners will require access to the internet for research.

# Additional information

Useful resources include:

* Choosing fabric: weight versus drape

<http://www.colettepatterns.com/blog/fabric-haberdashery/choosing-fabric-weight-vs-drape>

* Tips for sewing on thick fabric

<http://sewing.craftgossip.com/tips-for-sewing-on-thick-fabric/2009/03/31/>

* Sewing through thick layers of fabric

<http://keyka.typepad.com/my_weblog/2008/12/sewing-through-thick-layers-of-fabric.html>

* Betzina, S 2004, *More Fabric Savvy: A Quick Resource Guide to Selecting and Sewing Fabric*, Taunton Press, United States. Available from <http://www.fishpond.co.nz/q/Sandra+Betzina?rid=550973696>
* Copies of *Threads magazine* (or *2010 Threads Archive* DVD-ROM): [http://www.tauntonstore.com](http://www.tauntonstore.com/)
* Sewing machine manuals.

# Assessment schedule: Construction and Mechanical Technologies 91060 – Understanding aerodynamic sails

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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 used to make aerodynamic sails from textile materials by:   * describing characteristics of textile materials used in aerodynamic sails   For example, the learner describes:   * + how strength, thickness, stretch, and drape vary in sail materials   + how canvas (traditional sail fabric) has a tendency to stretch and distort with wind pressure, while newer synthetic materials (e.g. dacron, nylon) have improved stretch and lower weight capabilities. * explaining techniques that are used. The learner explains techniques from four different categories   For example, the learner explains:   * + measuring/marking out: *Laying out woven polyester flat and wrinkle free on a clean dry surface is very important*, *techniques to ensure this happens include weighting the corners to keep tension on the sail material*   + sizing/shaping/forming: *Techniques to use when forming the woven polyester sails include using CAD (computer aided design) to decide on the shape and weight of the panels (i.e. placing heavier material where there is more stress)*   + joining/assembling - the variety of seams that can be used on woven polyester fabrics: The learner completes samples on nylon with annotated notes showing needle, stitch and machine types (e.g. triple-stitch method used on sails)   + finishing/detailing: how the woven polyester panels can be laminated to increase strength and UV tolerance. * describing which combinations of techniques and textile materials would be suitable for a situation   For example, the learner describes:   * + techniques that are suitable for using in combination with a specific material and situation e.g. woven polyester to create the mainsail for a yacht   + how sails are manufactured with a combination of broad-seaming and non-stretch fabrics. When constructing a sail for a yacht, the panels that make up the sections of a sail are cut with curves on the connecting seams, which add a 3D shape to an otherwise flat triangular piece of fabric.   *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 used to make aerodynamic sails from textile materials by:   * describing characteristics of textile materials used in aerodynamic sails   For example, the learner describes:   * + how strength, thickness, stretch, and drape vary in sail materials   + how canvas (traditional sail fabric) has a tendency to stretch and distort with wind pressure, while newer synthetic materials (e.g. dacron, nylon) have improved stretch and lower weight capabilities. * explaining techniques that are used. The learner explains techniques from four different categories   For example, the learner explains:   * + measuring/marking out: *Laying out woven polyester flat and wrinkle free on a clean dry surface is very important*, *techniques to ensure this happens include weighting the corners to keep tension on the sail material*   + sizing/shaping/forming: *Techniques to use when forming the woven polyester sails include using CAD (computer aided design) to decide on the shape and weight of the panels (i.e. placing heavier material where there is more stress)*   + joining/assembling: the variety of seams that can be used on woven polyester fabrics: The learner completes samples on nylon with annotated notes showing needle, stitch and machine types (e.g. triple-stitch method used on sails)   + finishing/detailing: how the woven polyester panels can be laminated to increase strength and UV tolerance. * explaining how the characteristics of textile materials influence technique selection   For example, the learner explains*:*   * + how techniques are chosen: *To manage characteristics of woven polyester, which is slippery, weights are used to keep it flat.*   + how to take advantage of the diagonal stretch in woven fabrics: *Panels need to be laid out to ensure the warp and weft of the sailcloth is orientated parallel to luff and foot of the sail*   + how canvas and woven polyesters could be cut: the explanation includes the advantages of a rotary cutter over scissors. * explaining which combinations of techniques and textile materials would be suitable for a situation   For example, the learner explains:   * + techniques that would be suitable for using in combination with e.g. woven polyester to create the mainsail for a yacht   + how sails are manufactured with a combination of broad-seaming and non-stretch fabrics; when constructing a sail for a yacht, the panels that make up the sections of a sail are cut with curves on the connecting seams, which add a 3D shape to an otherwise flat triangular piece of fabric.   *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 used to make aerodynamic sails from textile materials by:   * describing characteristics of textile materials used in aerodynamic sails   For example, the learner describes:   * + how strength, thickness, stretch, and drape vary in sail materials   + how canvas (traditional sail fabric) has a tendency to stretch and distort with wind pressure, while newer synthetic materials (e.g. dacron, nylon) have improved stretch and lower weight capabilities. * explaining techniques that are used. The learner explains techniques from four different categories   For example, the learner explains:   * + measuring/marking out: *Laying out woven polyester flat and wrinkle free on a clean dry surface is very important*, *techniques to ensure this happens include weighting the corners to keep tension on the sail material*   + sizing/shaping/forming: *Techniques to use when forming the woven polyester sails include using CAD (computer aided design) to decide on the shape and weight of the panels (i.e. placing heavier material where there is more stress)*   + joining/assembling - the variety of seams that can be used on woven polyester fabrics: The learner completes samples on nylon with annotated notes showing needle, stitch and machine types (e.g. triple-stitch method used on sails)   + finishing/detailing: how the woven polyester panels can be laminated to increase strength and UV tolerance. * discussing why textile materials require particular techniques for their handling and use   For example, the learner discusses:   * + measuring/marking out: how the laying out of woven polyester is different from canvas, and techniques used to ensure this is carried out correctly and safely (e.g. adequate cutting area, weighting the fabric, etc.)   + sizing/shaping/forming:compares panel shapes and fabric weights, and discusses which would best suit the woven polyester, discussion includes using CAD (computer aided design) compared to traditional plotting of the shape and weight of the panels (i.e. placing heavier material where there is more stress)   + joining/assembling: the importance of choosing the right type of application for joining, sewing and/or adhesive; annotated pictures are included showing how sail panels can be joined (e.g. adhesive is used on the panel seams which are then joined using overcast stitch)   + finishing/detailing: how sails are often equipped with horizontal strips and strands sewn into sails to assist with judging airflow. To ensure these are securely attached the learner discusses the best stitch to use and compares results of different stitch techniques. * discussing why techniques and textile materials are combined in different ways across two or more situations   For example, the learner:   * + discusses and compares techniques that would be suitable for using with woven polyester (dacron, nylon) to create sails for different purposes (e.g. yacht’s main sail, windsurf sail, etc.)   + discusses how sails need to have high life expectancy, be lightweight and withstand tough treatment   + compares such things as which sailcloth material would be best suited for the intended design (e.g. width, weight and quality of possible fabrics); which cutting technique ensures cut pieces meet quality and design standards (e.g. panels are cut on correct weft and/or warp alignment with symmetry checked); which seam construction offers the best seam strength and accuracy for the intended sail design (e.g. bonded or sewn joins); which joining methods ensure minimal errors, correct alignment and integrity of sails panels (e.g. cover-stitch or triple stitch method)   + produces samples of such things as bonded and sewn panels, with annotations explaining which seams, stitches and/or adhesives obtained the best results   + completes a canvas sample to test traditional sail methods against modern alternatives.   *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.