# Textiles and Design

## Textiles to enhance performance

**Area of study**: properties and performance of textiles

## Overview

An in-class presentation for students (with teacher present) to look at innovations and technological advances in fibres, yarns and fabrics. The presentation will explore technological advances in production and decorative and finishing techniques as well as examine the effects of these technologies on the consumer, manufacturer, employees and the environment. This accompanying document is to be used as a follow up activity with additional resources and questions for students to answer.

## Content/activities

1. Complete the table below by providing a definition of the properties of fibres.

|  |  |  |
| --- | --- | --- |
| Classification | Property | Definition |
| aesthetic | lustre |  |
|  | drape |  |
| durability | abrasion resistance |  |
|  | strength |  |
| comfort | absorbency |  |
|  | elasticity |  |
|  | resistance |  |
|  | thermal properties |  |
|  | dimensional stability |  |
| care | effect of chemicals |  |
|  | sun resistance |  |
|  | colour fastness |  |
|  | shrink |  |

1. What is a microfibre?

|  |
| --- |

1. Draw a cross section of a microfibre in the space below.

|  |
| --- |

1. List some end uses of microfibres in the space below.

|  |
| --- |

1. In the table below, list advantages and disadvantages of microfibres to society.

|  |  |  |
| --- | --- | --- |
| Effect on: | Advantages | Disadvantages |
| Individuals |  |  |
| Manufacturers |  |  |
| Employees |  |  |
| Environment |  |  |

1. What is a bicomponent yarn?

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| --- |

1. How are bicomponent yarns produced?

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1. List some end uses of bicomponent yarns in the space below.

|  |
| --- |

1. In the table below, list advantages and disadvantages of bicomponent yarns to society.

|  |  |  |
| --- | --- | --- |
| Effect on: | Advantages | Disadvantages |
| Individuals |  |  |
| Manufacturers |  |  |
| Employees |  |  |
| Environment |  |  |

1. What is a washable web and how is it produced?

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1. How do washable webs enhance performance of textile items?

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1. List some end uses of washable webs.

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| --- |

1. In the table below, list advantages and disadvantages of washable webs to society.

|  |  |  |
| --- | --- | --- |
| Effect on: | Advantages | Disadvantages |
| Individuals |  |  |
| Manufacturers |  |  |
| Employees |  |  |
| Environment |  |  |

1. What is the difference between CAD and CAM?

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1. In the table below, outline the production technology and its advantages for the textiles industry.

|  |  |
| --- | --- |
| Technology | Outline and advantages |
| Pattern making systems |  |
| Grading and marking systems |  |
| Automatic cutting systems |  |
| Garment distribution on the sewing floor |  |
| Computerised sewing machines |  |
| 3D body scanning |  |
| Seamless technology |  |

1. Complete the table below by providing and overview of the decorative technique and suggesting and end use for the technique.

|  |  |  |
| --- | --- | --- |
| Decorative technique | Overview | Suggested end use |
| Digital image transfer  |  |  |
| Direct digital printing (DDP) |  |  |
| Sublimation |  |  |
| Other: |  |  |

1. There are many different finishing techniques that enhance fabric performance or allow the product to serve a special purpose, including crease resistant, soil/stain resistant, easy care, water repellent, flame retardant, and antimicrobial finishes. Choose two to research and complete the following tables.

|  |  |
| --- | --- |
| Research | Answer |
| Finishing technique |  |
| Overview |  |
| How it works |  |
| Advantages |  |
| Disadvantages |  |
| How it enhances the performance of textiles |  |

## Other innovations worth mentioning

Innovations in fibres

* Bamboo – [bamboovillage.com.au/about-bamboo/](https://bamboovillage.com.au/about-bamboo/)
* Innovations with wool – [woolmark.com/news/textile-innovation/](https://www.woolmark.com/news/textile-innovation/)

Innovations in yarns

* Vectran yarn [fiber-line.com/en/fibers/vectran](https://www.fiber-line.com/en/fibers/vectran)

Innovations in fabrics

* Goretex – [gore-tex.com.au/](https://www.gore-tex.com.au/)
* Cordura – [cordura.com/](https://www.cordura.com/)

## Past HSC exam questions

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[NESA Textiles and Design – support material – HSC exam papers](https://educationstandards.nsw.edu.au/wps/portal/nesa/11-12/stage-6-learning-areas/technologies/textiles-and-design-syllabus/major-textiles-project)

### Textiles and Design HSC Exam 2019

**Question 13 — Properties and Performance of Textiles (8 marks)**

* 1. What properties make bicomponent yarns suitable for school tights? (2 marks)

|  |
| --- |

* 1. Describe how **one** innovation in fibre technology has benefited the environment. (3 marks)

|  |
| --- |

* 1. Explain how a polyester plain weave fabric achieves the functional properties required for an overnight bag. (3 marks)

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**Question 15 — Properties and Performance of Textiles (8 marks)**

Justify the selection of a fibre, fabric structure and fabric finish for a textile fabric that can be used to cover the seats on public transport.

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Marker feedback for question 13

In better responses, students were able to:

* demonstrate their understanding of the properties of bicomponent yarns relevant to the specific end use listed in the question
* identify a relevant fibre innovation and demonstrate understanding of its impact on the environment
* demonstrate knowledge of how the fibre composition and the fabric structure contribute to the functional properties of the end use listed in the question.

Areas for students to improve include:

* demonstrate understanding of the link between bicomponent yarn properties and end use
* avoiding general comments and instead using a specific example
* demonstrate understanding of the functional properties of the end use listed in the question.

Marker feedback for question 15

In better responses, students were able to:

* identify an appropriate fibre, fabric structure and fabric finish
* demonstrate understanding of how each of these is appropriate to the end use listed in the question.

Areas for students to improve include:

* using appropriate textile terminology relating to the properties and performance of textiles for the end use specified in the question.

### Textiles and Design HSC Exam 2018

**Question 13 — Properties and Performance of Textiles (8 marks)**

* 1. Outline how a finishing technique can enhance a fabric’s performance? (2 marks)

|  |
| --- |

* 1. Explain why a nylon/elastomeric yarn is suitable for swimwear. (3 marks)

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* 1. Describe how **one** innovation in textile machinery has benefited the consumer. (3marks)

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| --- |

Marker feedback for question 13

In better responses, students were able to:

* demonstrate awareness of how a specific finish improves fabric performance (a)
* identify how the finish was applied and worked, and how this technique enhances the product (a)
* identify the properties of nylon/elastomeric yarn and relate these to the functions of swimwear (b)
* demonstrate understanding of a recent innovation in textile machinery and how it has directly benefited consumers in a number of ways (c).

Areas for students to improve include:

* addressing how a specific finish works and how it improves performance (a)
* relating the properties of nylon/elastomeric yarn to the main features of swimwear, such as fit, movement, comfort, low absorbency and chlorine resistance (b)
* relating recent innovations to benefits to the consumer

### Textiles and Design HSC Exam 2018

**Question 13 — Properties and Performance of Textiles (8 marks)**

* 1. What are bicomponent yarns? (2 marks)

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| --- |

* 1. Outline the advantages to the consumer of using washable webs. Use an example to support your answer. (3 marks)

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* 1. To what extent has the introduction of computer-aided manufacture (CAM) affected manufacturing in the textile industry? (3 marks)

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| --- |

**Question 15 — Properties and Performance of Textiles (8 marks)**

Name and justify a suitable fibre composition, yarn type and fabric structure for a school shirt. In your answer, refer to fibre, yarn and fabric properties.

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Marker feedback for question 13

In better responses, students were able to:

* clearly define bicomponent yarns using appropriate terminology
* state a relevant example of a washable web and directly link the example to advantages of their use for consumers
* clearly explain CAM and how it affects the textile industry.

Areas for students to improve include to:

* define textile terminology and provide appropriate examples of textile items
* understand the difference between CAM and CAD.

Marker feedback for question 15

In better responses, students were able to:

* correctly identify a suitable fibre, yarn and fabric structure appropriate for a school shirt
* justify the properties of a fibre, yarn and fabric structure that enhance the end use of the school shirt
* relate performance criteria of the school shirt to the properties and characteristics of the chosen fibre, yarn, and fabric structure.

## Additional resources

[ABC ‘Get into Textiles’ on iView](https://iview.abc.net.au/show/get-into-textiles)

Each video is rough 25 – 30 minutes long with relevant information for this area of study.

* Episode 3 – ICT In Textiles: Design, Practice And Process
* Episode 4 – CAD/CAM in Textile Manufacturing
* Episode 5 – Mass Production Systems and Techniques
* Episode 6 – Dyeing and Printing
* Episode 8 – Finishing Textiles
* Episode 11 – Textiles: Environmental Impacts

Some suggested questions to accompany the episodes include the following.

**Episode 3 – ICT In Textiles: Design, Practice And Process**

1. What is a mood board and how are they created? How are ICTs used in the development of the mood board?
2. Outline three advantages of using specialist software to sketch textile items.
3. How does ICT increase productivity and save time throughout the design and manufacturing process?
4. List a range of ICT technologies (scanners, for example) used in the design of textile items and outline how they speed up the design, manufacture, distribution and sale of textile items.
5. The episode showed how data is more accessible and easier to analyse using ICTs. Outline how modern designers use data to improve designing, marketing and testing throughout the design process. How has the use of data in the textiles industry improved the experience for consumers?

**Episode 4 – CAD/CAM in Textile Manufacturing**

1. Outline the difference between tradition screen/rotary printing and digital printing on fabrics.
2. List advantages and disadvantages of digital printing onto fabrics
3. For the process of direct digital printing, explain why different types of dyes are used.
4. How do manufacturers prepare the fabric for printing? Why is this step an important part of the process?
5. Why is important for designers to consider how many colours or stitches they use in each design?
6. What is the benefit of cutting fabrics by laser?

**Episode 5 – Mass Production Systems and Techniques**

1. The episode showed a computerised pattern design process. Outline the benefits of using CAD pattern design over traditional handmade methods.
2. The episode highlights the Quality control process. Outline the quality control system and identify where control points are identified.
3. The episode outlines several pieces of machinery used during the mass production of garments. Outline what each f the following machines does:
	1. Overlocker
	2. Twin needle machine
	3. Buttonhole machine
	4. Specialist machines
4. Robust machinery, highly skilled workers and effective management systems combine to make production incredibly efficient. Compare the two different garment assembly methods mentioned in the episode (batch production and job production).
5. How can consumer pressure improve working conditions in international factories?

**Episode 6 – Dyeing and Printing**

1. The episode explores the method of heat transfer printing. Outline the process of and advantages and limitations of sublimation printing
2. How do manufacturers match colours during the dyeing process? What data do they collect to inform their process?
3. The episode outlines the manufactures quality control checks. Name the quality control tests conducted and outline how they are performed.
4. The episode identifies the environmental challenges of dyeing and printing textiles. How are waste products (the dyed water) treated at the dye plant before being sent to the local sewage treatment facility? Why is it important that the manufacturer treats their own waste?

**Episode 8 – Finishing Textiles**

1. Outline the process of calendaring and explain how effects the textiles end use.
2. Outline the process of brushing and explain how effects the textiles end use.
3. What are fluorocarbons and how to they enhance the performance of textile items?

**Episode 11 – Textiles: Environmental Impacts**

1. This episode looks at the environmental impacts of manufacturing textile items and how manufacturers are trying to mitigate their impact on the environment. Outline how governments, manufactures and consumers can reduce the environmental impact of textile items.

## Useful images from presentation

### Microfibre cross section



### Bicomponent yarns cross section

  