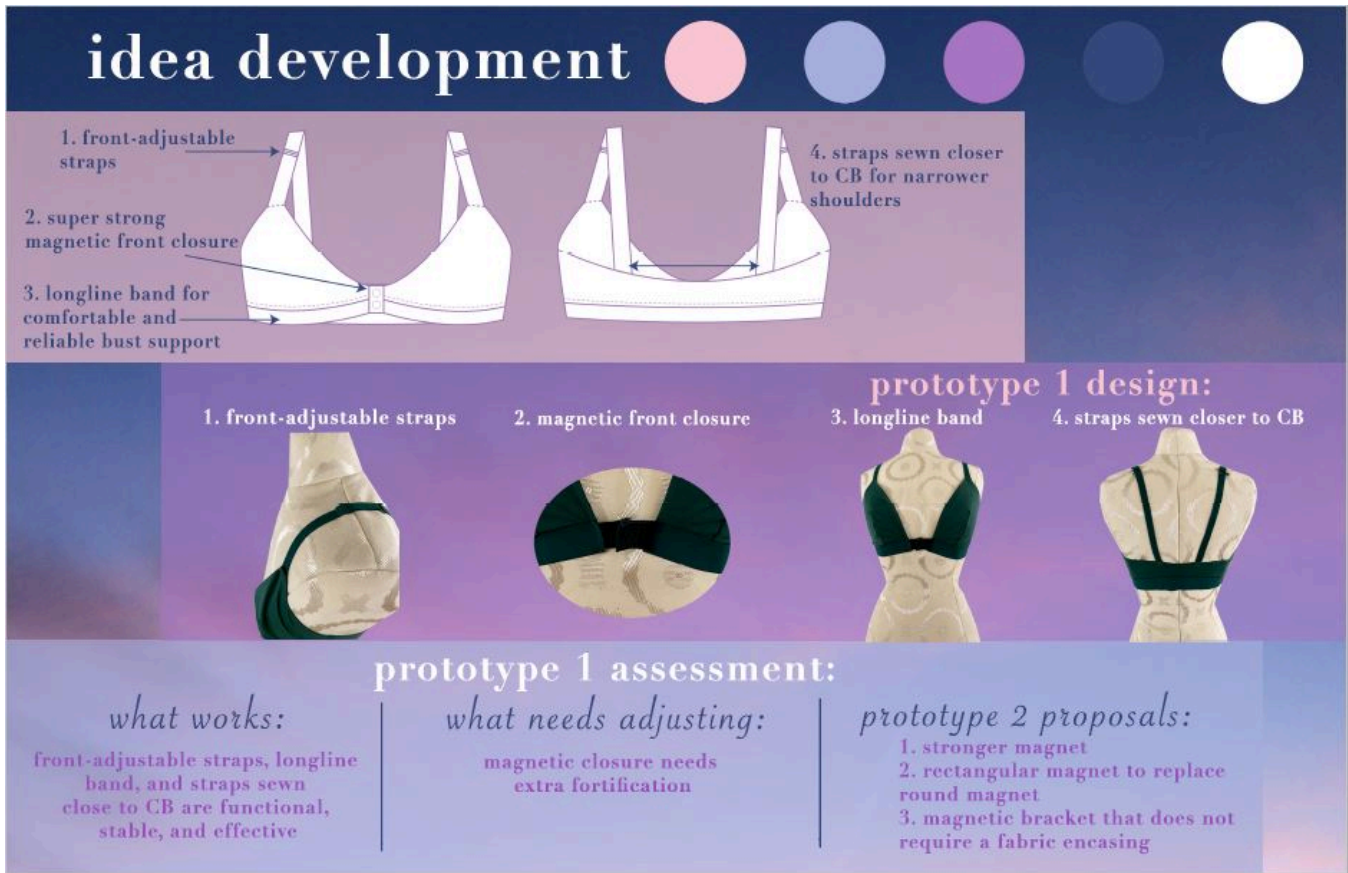


Idea Pitch board with summary of product problem and proposed solution; inclusion of guiding design framework; list of features that address user needs.

You can access a long image description for the visual above in the footnotes of this page.<sup>1</sup>

1. An infographic with the title: "Idea pitch." Four major sections are presented: Problem and solution, product and function, fea design framework, and product uniqueness and consumer benefits. Problem and solution section: Women with low range of shoulder and arm motion find it difficult, painful, and even impossible to put on bras that are currently on the market. This can lead to issues with self-esteem and confidence, as well as overall discomfort. To combat these problems, a front-closing, highly adjustable bra has been developed. This bra presents and alternative to traditional hook and eye closures on the back of the bra. It includes a super strong magnetic front closure for easy-on, one-handed donning. Product and function section: Fiber content: 92% recycled polyester, 8% elastane. Comfort: no underwire and soft, stretchy fabric. Flexibility: elastane allows for movement and breathability. Odor resistance: treated to resist bacteria that creates odor. FEA design framework section: Functional: mobility, protection, donning/doffing, and comfort. Expressive: roles, status, self-esteem, and value. Aesthetic: design principles, body/garment relationship, and art elements. Product uniqueness and consumer elements section: Front closure for easy donning/doffing; magnetic closure requires less dexterity; free of underwire to give consistent support without the discomfort; front strap adjusters allow the wearer to change the tightness of the bra by pulling/releasing from the front; shoulder straps are sewn closer together on the back of the bra for individuals with narrower shoulders.



Idea Development Board with technical flat of proposed adaptive apparel design with callouts that address functional needs of user; images of fabricated sample; assessment for future design iterations.

You can access a long image description for the visual above in the footnotes of this page.<sup>2</sup>

2. An infographic with the title: "Idea development." Three major sections are presented: a technical flat of the proposed design, photos of the prototype design, and an assessment of the prototype. The technical flat design has 4 callouts: 1. front-adjustable straps, 2. super strong magnetic front closure, 3. longline band for comfortable and reliable support, 4. straps sewn closer to CB for narrower shoulders. The prototype design section showcases photos of the mockup, a simple black bra containing the elements mentioned in the first section. The prototype assessment section reviews what works, what needs adjusting, and proposals for a second prototype. What works: front-adjustable straps, longline band, and straps sewn close to CB are functional, stable, and effective. What needs adjusting: magnetic closure needs extra fortification. Prototype 2 proposals: a stronger magnet, a rectangular magnet to replace the round magnet, and a magnetic bracket that does not require a fabric encasing.

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# Chapter 2. The Adaptive Apparel Designer's Guide to Sketching

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Chapter 2 focuses on sketching to develop potential concepts in apparel design. The chapter overviews how to use the resources provided in chapter 1 when sketching. Additionally, fashion illustration templates of bodies with disabilities are provided to aid in sketching. Croquis include seated bodies, amputee/protheses-user bodies, bodies using mobility aids, and bodies with spinal disabilities.

## Sketching as a Method for Developing Concepts in Apparel Design

Sketching is the process of drawing a rough idea of how an apparel design may take shape. Sketching is a step in the apparel design process in which numerous design ideas are developed for further refinement and detail at a later point. The purpose of sketching is to produce a plethora of ideas for assessment before moving forward in the design process.

### Importance of idea development through sketching

Sketching is an important stage in the apparel design process as this is when research is translated into visual solutions for apparel. Oftentimes, designers are encouraged to produce numerous design ideas through sketching using pencil and paper, but as technology advances, software and other digital tools have replaced traditional tools for this important idea development stage. But no matter what tools the designer chooses to use, documenting ideas are an integral part of the ideation phase to new apparel design, particularly when aiming to address adaptive users' functional needs.

Some designers find it helpful to use additional tools to sketch, including croquis and tracing paper.

### How to develop ideas through sketching

#### Croquis

In apparel design, croquis are minimalist shapes taking on the form of a human body which serve as a blank canvas for which clothing idea can be drawn on top. Using a croquis allows for the designer to focus on apparel design ideas while keeping proportions of the human body form. Croquis can be used alongside traditional tools or more advanced technology digital sketching tools to keep body proportions of the user/wearer while generating numerous design ideas.

## Tracing paper

Tracing paper is another tool that can be used alongside croquis and traditional tools for generating apparel design ideas in the sketching phase. Some designers may choose to use a layer of semi-transparent or opaque paper (i.e., tracing paper) on top of a croquis to speed up the ideation stage where apparel design ideas are only drawn (not including the body shape). Using tracing paper in conjunction with a croquis supports sketching in proportion with a body while also generating numerous apparel design options.

## Fashion Illustration Templates of Bodies with Disabilities

In this section of the chapter figures of different bodies with disabilities have been prepared to aid the designer in generating design ideas. To support inclusivity in the design sketching phase, fashion illustration templates have been prepared in black and white croquis-style format for male, female, and child bodies. These figures are organized into the following sub-sections: a) seated bodies, amputee/protheses-user bodies, and bodies using mobility aids. While these croquis provide designers an alternative version of the traditional 9 heads fashion figure, these could also be adapted to 8 heads technical design croquis, truer to human proportions. Further, additional croquis could be developed to include a greater range of body shape and stature differences such as, but not limited to, dwarfism, Down's, progeria, and cerebral palsy.

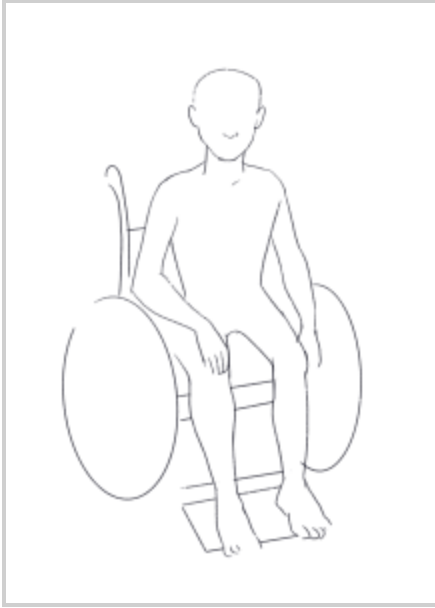
### Seated bodies



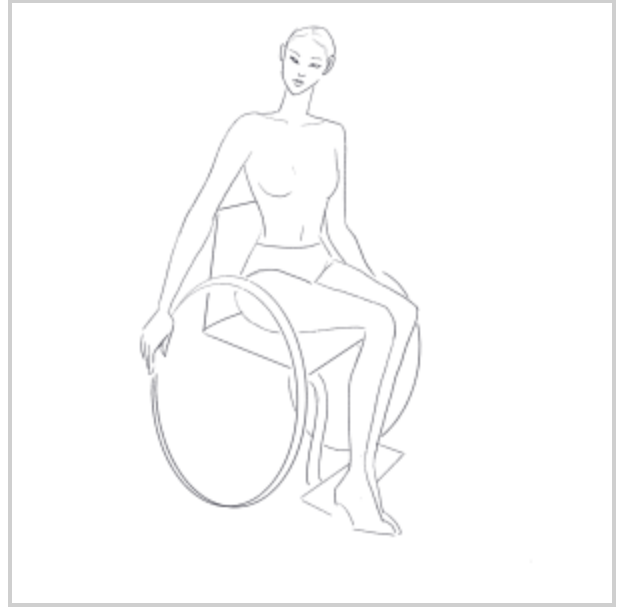
Female with a wheelchair, side view



Male with a wheelchair, in  $\frac{3}{4}$  view.



Child with a wheelchair,  $\frac{3}{4}$  view



Female with a wheelchair, in  $\frac{3}{4}$  view

## Amputee/Protheses-user bodies

### Lower extremity



Female with a prosthetic leg,  $\frac{3}{4}$  view

### Upper extremity



Male with a prosthetic arm, a back view

## Bodies using mobility aids (e.g., crutches, walkers, canes)



Female with a lower limb amputation, using a crutch, a front view

**How to use Chapter 1's [Market Analysis of Adaptive Apparel Brands and Products](#) while sketching adaptive apparel:**

- Consider the research you collected in your market analysis research process using Chapter 1's Market Analysis of Adaptive Apparel Brands and Products. What are the gaps in the market you are

trying to address? What functional needs are you trying to meet? Review your research of existing products and how you would like to adapt or improve upon them. Use your research of various design adaptations. Use the sketching process to create multiple ideas around how these goals can be achieved. It is best to come up with as many ideas as possible. Sketches do not have to be of an entire garment. They may just be of a garment part—such as coming up with multiple ideas of how to close a cuff. Initial sketches can be rough or include as much detail as you need. The goal is to get the idea on paper! Doing so helps you keep track of your ideas and can serve as a communication tool with potential users of the product.

**How to use Chapter 1's [Disabilities' Impact on Dressing and Clothing Needs](#) while sketching adaptive apparel:**

- Use the consumer research you gathered using Chapter 1's [Disabilities' Impact on Dressing and Clothing Needs](#) to guide your sketching process. Through your consumer research you have developed understanding of the potential product users' needs. As discussed above, use the sketching process to create multiple ideas around how these needs can be met. It is best to come up with as many ideas as possible.

**How to use Chapter 1's [Illustrated Glossary of Clothing Adaptations](#) while sketching adaptive apparel:**

- Use the Illustrated Glossary in your sketching process as a jumping-off point. The illustrations can be referenced or even traced to start your original design sketches using the closure or design element, for example. Consider printing the illustrations out to use with tracing paper, or importing them into the digital drawing software of your choice.

### Feedback Survey

We welcome your feedback as a user of this OER or potential collaborator on Adaptive Apparel Design work. Please [click on this survey link](#) or use your personal device to scan the QR code that will then link you to the online survey.



# Chapter 3. The Adaptive Apparel Designer's Guide to Creating a Sample Notebook

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Developing samples of potential patternmaking and construction techniques and potential materials is a key part of any apparel design or soft goods product development process. Chapter three overviews how to use resources provided in chapter 1 in the sample development process. Additionally, the chapter includes a sourcing guide to help users buy notions and materials for adaptive clothing.

## Brief overview of using the sample notebook in apparel design

The sample-making process is an integral part of the apparel design process, especially for adaptive apparel design. This is because patternmaking and construction techniques used for garment assembly for people without disabilities may not apply for certain functional needs of people with disabilities. To ensure a good first sample and final product, it is wise for a designer to complete samples of the patternmaking and construction technique to feel confident that the proposed solution will work as planned. The sample-making phase also allows for practice of the technique so that when advancing onto a first sample, and eventually final product, the result will take shape and function as planned.

In the apparel design process, samples are often organized and assembled into a notebook for record keeping of the evolution of patterns or construction techniques. The notebook can be shared with others on a design team to build on the knowledge learned by one designer so that other team members can efficiently advance new patterns/techniques for future products. (Example of sample notebook structure below.)

While some may view the sampling phase as one that is time consuming and unnecessary, it is very beneficial stage to ensure a strong final product that functions as ideated in the sketching phase in addition to keeping record of the process.

## Sample notebooks

Your sample notebook should include sections for the name of the technique used, date of completion, materials used, and process.

Download a [sample design notebook \[DOC\]](#) for your own use.

**How to use Chapter 1's [Disabilities' Impact on Dressing and Clothing Needs](#) to develop adaptive apparel samples for your notebook:**

- Review your collected design research for potential solutions. Create a list of construction techniques, materials, and notions you would like to experiment with. Create samples of multiple potential ways to construct the product so you can select the one that best meets your needs. Samples can include patternmaking and construction experiments. Often, half-scale samples can allow you to test the concept while saving time, space, and money. Samples may also be of a garment part. For example, you may sample different ways to close a sleeve cuff.

**How to use Chapter 1's [Illustrated Glossary of Clothing Adaptations](#) to develop adaptive apparel samples for your notebook:**

- Use the Illustrated Glossary of Clothing Adaptations to give you ideas and inspiration of how you might use the design features or specialized notions in your design. Consider including these illustrations as well as any related research within your sample notebook for easy future reference.

**How to use Chapter 1's [Textiles \(Selection and Rationale\)](#) to develop adaptive apparel samples for your notebook:**

- Review your collected design research to identify textile types appropriate for your intended target. Research potential construction methods that meet the design needs identified and that work with the planned fabrication. Construct multiple samples with various stitches and seams. Evaluate the samples with your client as well as through objective textile testing methods when appropriate. For example, is a particularly strong seam needed? Perhaps tensile testing is in order. Use your sample notebook to record all the details of your sample, including any client feedback or testing results.

## Sourcing Guide

Once you have identified materials and notions you would like to sample for adaptive clothing, use this sourcing guide to find some resources for purchasing them. Please note that this sourcing guide is not exhaustive for notions that could be useful in your adaptive apparel design, but provides a starting point for sourcing. New materials and sources of materials are always being developed, so it is good to conduct your own sourcing research as well.

## Where to buy notions for adaptive clothing

### Magnetic zipper



One-handed zipper using magnets for individuals with dexterity issues. **Brand:** MagZip ([Link to magnetic zipper on Amazon](#))

### Snaps



Snaps (plastic pictured). Snaps are available in plastic and metal. Plastic may be preferred if magnets are used in other areas of the garment. Metal snaps may be more durable. **Brand:** Dritz ([Link to snaps on Amazon](#))

### Magnetic buttons



Buttons using magnets for individuals with dexterity issues. **Brand:** SEMINI ([Link to magnetic buttons on Amazon](#))

### Snap tape



Snap Tape for easier opening. **Brand:** Dritz ([Link to snap tape at JoAnn](#))

## Velcro



Two strips of thin plastic sheet, one covered with tiny loops and the other with tiny flexible hooks, which adhere when pressed together and can be separated when pulled apart deliberately. **Brand:** Velcro ([Link to velcro at JoAnn](#))

## Double-fold binding



Double fold bias strip to make customized buttonholes for tubes or bound seams for sensory comfort. **Brand:** Wrights ([Link to binding at JoAnn](#))

## Where to buy materials for adaptive clothing

Features of adaptive apparel fabrics	Suggested Fabric	Links
Highly adaptive breathability	Merino Wool: Breathes well, wicks moisture and is available in lightweight, summer-worthy styles. Doesn't retain odors like synthetic fabrics do.	<a href="https://naturesfabrics.com/collections/wool-fabric">naturesfabrics.com/collections/wool-fabric</a>
Temperature management	Polartec's Windbloc: Good wind protection (ventilation rate of 50cc/cm <sup>2</sup> /sec or less)	<a href="https://polartec.com/fabrics/weather-protection/windbloc">polartec.com/fabrics/weather-protection/windbloc</a>
Sensory comfort	Fleece: Soft texture and attractive appearance	<a href="https://yourfleece.com">yourfleece.com</a>
Sensory comfort	Tagless labeled garments and fabrics through heat transfer printing, pad printing, or screen printing	<a href="https://aspeite.com/blog/the-essential-guide-to-tagless-labels-on-garments">aspeite.com/blog/the-essential-guide-to-tagless-labels-on-garments</a>

### **Feedback Survey**

We welcome your feedback as a user of this OER or potential collaborator on Adaptive Apparel Design work. Please [click on this survey link](#) or use your personal device to scan the QR code that will then link you to the online survey.



# Chapter 4. The Adaptive Apparel Designer's Guide to Creating a Mood or Inspiration Board

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Chapter 4 covers development of mood or inspiration board for adaptive apparel projects. The chapter overviews how to use the resources provided in earlier chapters to create a visual reference point for the design process of selected concepts generated in the prior steps.

## Brief overview of using the Mood or Inspiration Board in apparel design

A mood board, or inspiration board, is a visual that helps to inform and guide apparel design and sketch refinement before shifting into pattern work. The mood or inspiration board (or set of boards) are a visual culmination of the research and experimentation conducted in prior stages of the apparel design process. Some items included in a mood/inspiration board may include inspiration images, textile swatches and trims, color direction, typography, and any other images or objects that help visually communicate the essence of the design or collection. The mood/inspiration board(s) provide continual reminder for the designer of the design direction and help to keep the designer focused when refining their design ideas.

Mood/inspiration board can be crafted physically through finding images and adhering them onto a board, such as a foam core board, mat board, trifold, or wall-mounted cork board, depending on your resources, space available, and long-term needs of the boards, using a 'collage' approach. These boards can also be created digitally using software and digital images and other digital resources. Lastly, these boards can be created using a mix of tools, both digital and physical in a mixed-medium approach. No matter what approach a designer uses to create a mood/inspiration board, the end purpose is the same – to provide visual direction for their design(s).

## Examples of a mood boards

Mood/inspiration boards can take on different shapes and include select information from the research stage of the apparel design process. Below are three examples of different mood/inspiration boards and how research can be communicated visually through imagery and text.

## Childrenswear mood board



This example mood board primarily uses images to communicate the target consumer group, color palette, and textiles.

## Swimwear mood board



This example mood board uses images and text to communicate target consumer, color palette, textiles and fabrication direction, and season for a targeted brand/label.

## Magnet Bra mood board



This example mood/inspiration board uses images and text to communicate research conducted on target market and design opportunity in addition to color palette. See longer image description below.

You can access a long image description for the moodboard above in the footnotes of this page.<sup>1</sup>

1. A moodboard with the title: "Adaptive intimates for women with injuries and disabilities: research and development." Two major sections are presented: target market and market opportunity. Target market: women with low range of shoulder and arm motion, making it difficult and often painful to put on a bra. Many different conditions can lead to weakness and low function in the arms, shoulder, and hands, including: injury, amputation, cerebral palsy, general aging, autism, multiple sclerosis, and more. A table labeled "Market Opportunity" with the caption "Traditional bras have back closures with intricate hook and eyes, as well as uncomfortable underwire and sub-par aesthetics." The table lists two problems and solutions. Problems: Difficulty donning and securing; Discomfort. Design solutions: Front super strong magnetic closure; Daily wearability, no underwire. A quote from a potential client is presented to the side: "It can be incredibly difficult on my self-esteem to ask for help when I need to put on a bra. It's such a vulnerable experience." Quote is attributed to Sal, 21, who suffered a rotator cuff injury.

## Using your Research to Create your Mood Boards

Information gathered in the prior stages of the apparel design process is narrowed down and assembled into the mood or inspiration board (or set of boards). Chapter 1 provides resources for market research, consumer research, and materials research. All this information can be used to develop your board(s).

**How to use Chapter 1's [Market Analysis of Adaptive Apparel Brands and Products](#) to develop adaptive apparel mood or inspiration boards:**

- Use information you gathered from Chapter 1's Market Analysis of Adaptive Apparel Brands and Products to understand what products exist for the adaptive need your product addresses, consumers' views of these products, and market gaps to be filled. This information will help you focus down your collected research and decide what to include on your mood/inspiration board.

**How to use Chapter 1's [Disabilities' Impact on Dressing and Clothing Needs](#) to develop adaptive apparel mood or inspiration boards:**

- Use information you gathered from Chapter 1's Disabilities' Impact on Dressing and Clothing Needs to identify functional adaptive apparel needs for your market.

**How to use Chapter 1's [Illustrated Glossary of Clothing Adaptations](#) to develop adaptive apparel mood or inspiration boards:**

- Consider using illustrations from Chapter 1's Illustrated Glossary of Clothing Adaptations Organized by Wearer's Needs, which meet the identified functional adaptive apparel needs for your market, on your mood/inspiration board.

**How to use Chapter 1's [Textiles \(Selection and Rationale\)](#) to develop adaptive apparel mood or inspiration boards:**

- Use images or physical swatches of textiles selected in your research process using Chapter 1's Textiles (Selection and Rationale) on your mood/inspiration board. If the images of the selected textiles don't match your selected color palette, consider recoloring them digitally.

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# Chapter 5. The Adaptive Apparel Designer's Guide to Patternwork

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Chapter 5 focuses on pattern work for adaptive apparel. It covers patternmaking techniques useful for adaptive apparel and includes guidance for obtaining body measurements of persons experiencing a disability, including digital options. The chapter also overviews how to use resources provided in chapter 1—descriptions of disabilities and their impact on dressing and clothing needs and illustrated glossary of clothing adaptations organized by wearer's needs—to create adaptive apparel patterns.

## Brief overview of using patterns in apparel design

In the patternmaking steps, designers and product developers develop patterns for the garments they will produce. Patterns are used as a guide in cutting out the fabric pieces to be sewn into the garments or soft goods products. Thus, they are an essential communication tool, and their accuracy is paramount. Patterns may be developed through a variety of processes, most commonly flat pattern or draping. Many books cover these techniques.

## Guidance for Obtaining Body Measurements of Persons Experiencing a Disability, Including Digital Options

Taking accurate body measurements is one of the keys to provide great fit and comfort for wearers. Body measurements should be taken how garments are used, especially it is very critical for those who spend lots of time during the day in a seated position.

## Tips for taking measurements of the seated body:

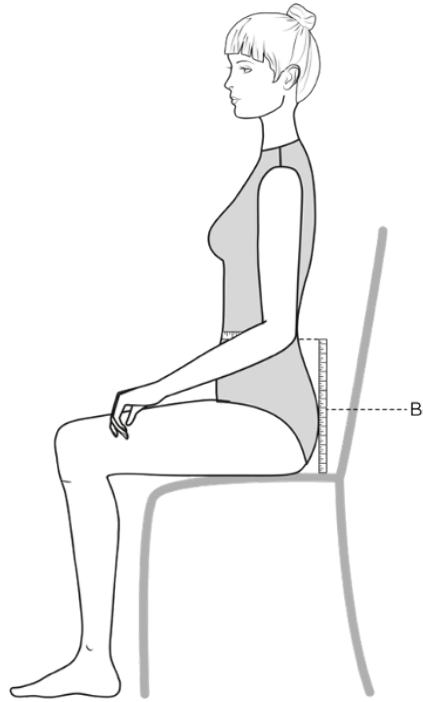


Illustration of taking a rise measurement while the individual is seated.  
Image Source: [Mueller & Sohn](#). Used here for illustrative purposes under fair use.

- **All Measurements:** If possible, ask a caregiver for assistance in taking measurements, to make the client feel more comfortable.
- **Lower Body Rise or Crotch Depth:** Sit the client being measured on a flat surface, such as a hard chair, stool, or wheelchair, and measure along the side from the lower edge of the waist measure tape vertically downward to the seat of the chair. It may be easier to use a ruler for this measurement.
- **Hip:** Measure the hips at the fullest part
- **Inseam:** Measure the inseam along the inner thigh and calf, from just below the crotch to the knee and ankle with a seated position
- **Outseam:** Measure along the outer thigh and calf, from the waist to the knee and ankle with a seated position

### Additional online resources for obtaining body measurement

- [Taking Measurements \(Mueller & Sohn\)](#)
- [ClothingPatterns101.com](#)
- [Girth Measurement of the Human Body \(TextileLearner.net\)](#)

### 3D scanning:

3D body scanning can provide effective technical solutions for the body measuring processes. Body scanning can be faster than hand-measuring processes as all measurements can be taken simultaneously. It offers the additional advantage of creating a permanent 3D record of the person's body, which the designer can reference later, without the client having to be present. Here are some tips to consider when 3D scanning an individual with a disability:

- To capture 3D body scan data, consider if the target customer can enter the limited space of a stationary full body scanning booth. Handheld scanners may be more appropriate.
- The customer needs to stand with arms and legs extended and hold the position for a short time (e.g., 5 seconds). The process might present barriers for customers with disabilities.
- To obtain a seated position of the customer (if the position is important for the apparel design), an assisting tool (e.g., a chair) is needed to avoid the data loss on the top and undersides of the legs.

Additional online resources regarding 3D body scanning can be found at [The 3D Body Scanner \(Cornell\)](#)

### Expert Advice On Working with People in The Disabled Community for Measuring for Patternmaking and for Fittings

*This content was provided by Morgan Tweed, CPACC. Morgan is an Accessibility Specialist in Architecture and Landscape Architecture. Morgan has participated as a client in apparel design class projects focusing on adaptive apparel.*

Anytime you must touch their person, ask first. Autonomy is something that people tend to keep from disabled people. This is an important step in respecting your client.

There are many different adaptations to the measuring and fitting that may help depending on the situation.

Below are some of the major adaptations that should be considered. Keep in mind that this is not an exhaustive list by any means, and everyone may have different needs.

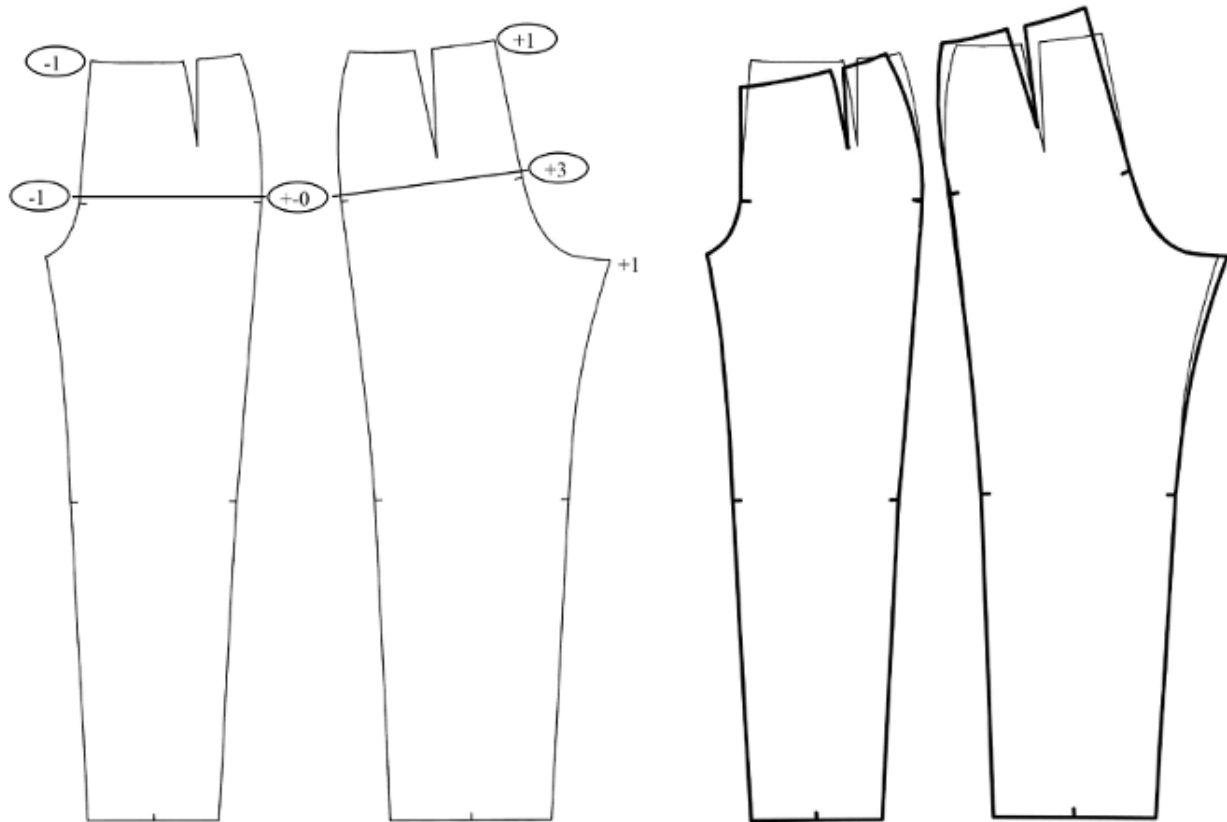
Disability	Advice for measuring for patternmaking
Deafness and Hard of Hearing	<ul style="list-style-type: none"> <li>Show them that you are going to touch them before doing so.</li> </ul>
Sensitive skin and skin conditions	<ul style="list-style-type: none"> <li>Ask if any area hurts before measuring.</li> </ul>
Neurodivergent	<ul style="list-style-type: none"> <li>You may need to do measurements over clothing or instruct someone else to do the measurements.</li> </ul>
Wheelchair users	<ul style="list-style-type: none"> <li>When you are measuring, make sure to get the line of the lower back/butt/legs in the seated position. This will make a big difference to comfort.</li> <li>Measure the back of the shoulders with the arms extended forward. Most people have their arms down often. Manual wheelchair users are constantly reaching forward.</li> </ul>
Other mobility aids and mobility needs	<ul style="list-style-type: none"> <li>Ask them what their most usual postures are, and measure based on those. For example, if they use forearm crutches: The shoulder measurements are likely to be wider from an arched position.</li> </ul>
For weight differences	<ul style="list-style-type: none"> <li>Ask where they wear their waistline most often. Over or under the belly.</li> </ul>
For unique shapes	<ul style="list-style-type: none"> <li>If there is a unique shape, measure all the aspects you can to ensure comfort. If they are ok with it, take pictures.</li> <li>Not all unique shapes are obvious. Measure everything!</li> <li>Don't avoid measuring stumps, missing limbs, and unusual areas.</li> <li>If they wear them prosthetics the time, measure with it on. If they take it off and on, make sure it is accessible.</li> </ul>
For swelling	<ul style="list-style-type: none"> <li>Measure areas prone to swelling.</li> <li>Don't pull things tight to measure over swollen areas, it can really hurt.</li> </ul>

## Patternmaking techniques useful for adaptive apparel

The goal of this section is to identify changes from typical patternmaking techniques that can make clothing function better for individuals with disabilities. The table below identifies types of garment

adaptations, patternmaking techniques that can be used to achieve these adaptations, as well as how these techniques can help people with disabilities. The designer may wish to research additional specific patternmaking adjustments such as clients with shorter statures and spinal differences.

<b>Types of adaptations</b>	<b>Patternmaking principles and techniques for adaptive apparel</b>	<b>Relevant clothing needs of people with disabilities</b>
Increase garment rise	Modify the pant pattern for a seated position. Extend the length of the crotch on the center back and reduce the length of crotch on the center front. Also, the total crotch length is extended. (See the figure below.)	To provide enhanced comfort and fit in a seated position (for wheelchair users)
Easier opening	Apply Velcro and magnetic snaps for the fly front zipper of a pair of pants	To make the donning and doffing process easier
Easier opening	Extend the fastener (e.g., zippers or snaps) longer on the side seam or the entire length of side seam	To make the donning and doffing process easier
Easier opening	Add extra openings through dart manipulation and/or style lines to allow the garment to easily open	To make the donning and doffing process easier
Sensory comfort	Use or modify as flat-locked seams or inside-out seams	To provide enhanced sensory comfort and avoid sensory sensitivity
Sensory comfort	Remove tags	To provide enhanced sensory comfort and avoid sensory sensitivity
Sensory comfort	Modify patterns to minimize or remove seams at pressure points (by combining pattern pieces or moving seams to different locations)	To provide enhanced sensory comfort and avoid sensory sensitivity
Sensory comfort	Remove back pockets of pants	To provide enhanced sensory comfort and avoid sensory sensitivity
Storage	Create additional pockets which can hold medical items on existing seams or side seams	To provide additional storage for users with diverse needs
Storage	Attach pockets on the thighs or knees of pants	To provide additional storage for wheelchair users
Easier manipulation	Replace existing closures with adaptive closures (e.g., Velcro, magnetic snaps, magnetic zippers, snaps)	To provide easier manipulation of closures
Self Dressing	Add loops to waistbands.	To assist with holding the pants while pulling them up.
Garment comfort	Create an adjustable slit (e.g., zippers at the pant hem)	To provide comfort and mobility (for wheelchair users)



An example of patternmaking to increase garment rise.

**How to use Chapter 1's [Disabilities' Impact on Dressing and Clothing Needs](#) to create adaptive apparel patterns:**

- Review this section of chapter 1 with your user or target market's needs in mind. Note all their dressing challenges and design considerations that can alleviate these challenges. Make of note of how you will adapt your patternmaking method to implement each desired design consideration. Jot down where you can look for information on completing that pattern alteration. This may be a printed book, web resource, or even an individual with expertise. After planning all your pattern-making steps, carefully consider if there might be any conflicts between the planned alterations. If you identify any, consider alternatives. You may to create and evaluate physical samples of various techniques to choose the best option for your project.

Client's Name:		Date:	Notes:	
	Dressing Challenge	Design Consideration	Patternmaking Method	Source of Information on Patternmaking
1				
2				
3				
<i>(Add rows as needed)</i>				
Potential interactions:				

Download a [Tracking Client Dressing Challenges template \[DOC\]](#) for your own use.

**How to use Chapter 1's [Illustrated Glossary of Clothing Adaptations](#) to create adaptive apparel patterns:**

- After deciding on your which design considerations are needed to address the identified dressing challenges, use these illustrations to help you visualize the patternmaking changes that will be needed. For example: "I can see that this specialty closure requires a different attachment method. Will my typical seam allowance work with this specialty closure?"

## References and Resources

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### **Feedback Survey**

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# Chapter 6. The Adaptive Apparel Designer's Guide to Creating a First Sample

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First sample development is a key part of any apparel design or soft goods product development process. This chapter provides construction techniques useful for adaptive apparel and helpful hints for fitting adaptive apparel. Additionally, the chapter overviews how to use resources provided in chapters 1, 3, and 5 to develop first samples of adaptive apparel.

## Brief overview of using first samples in apparel design

First samples are garment prototypes, typically made of muslin or another low-cost fabric that is representative of the intended final garment fabric. First samples provide the product developer the important opportunity to evaluate the interaction of the planned pattern, construction techniques, fabrics, and notions in a prototype product or garment.

## Creating a First Sample: Design & materials useful for adaptive apparel

**How to use Chapter 1's [Disabilities' Impact on Dressing and Clothing Needs](#) to develop the first samples of adaptive apparel:**

- Consider the specific dressing challenges related to your client's disability and identify design considerations for your design. If not already addressed in the patternmaking process, make sure that appropriate design elements, seam types, and construction techniques are included in your first sample.

**How to use Chapter 1's [Textiles \(Selection and Rationale\)](#) to develop first samples of adaptive apparel:**

- Review the descriptions of textile properties—thermal protection, comfort, easy care, and breathability—and decide which factors are most important when selecting fabrics for your garments or soft-goods products. Note key fabric selection criteria and potential fabric types appropriate for the first sample of your design.

**How to use Chapter 3's [Sourcing Guide \(Where to Buy Notions and Materials for Adaptive Clothing\)](#) to develop first samples of adaptive apparel:**

After identifying notions and fabric types appropriate to meet the needs of your client or target market, use Chapter 3's sourcing guide to source these materials to test in your first sample. Be sure to keep track of important sourcing information, so you can easily re-order if you decide to implement these materials in your final product. This might include:

- Fabric or notion name
- Source
- Garments used in/yards per piece
- Total yards
- Price per yard
- Shipping cost
- Total cost
- Delivery time
- Construction
- Fiber content
- Width

For your own projects, review: [Materials Selection Chart \[Spreadsheet download\]](#)

## Creating a First Sample: Construction Techniques useful for adaptive apparel

Construction techniques useful for adaptive apparel can certainly vary with the specific needs of the intended target market. Considerations may include low-profile and non-irritating seam types for users with sensitive skin or seated body types. Other considerations may include seams with exceptional durability, such as a lapped seam. For example, this may be necessary for seams receiving extra strain due to the way the garment is pulled during donning or use. Coats provides a guide to seam types and their uses: [Seam Types \(Coats.com\)](#)

Seam type should be considered as part of the patternmaking process (Chapter 5), as different seams require different amounts of seam allowances to be incorporated into the pattern. Planned seam types can be tested in the sample notebook phase, as well as part of the complete product or garment as a first sample.

**How to use Chapter 1's [Illustrated Glossary of Clothing Adaptations](#) to develop first samples of adaptive apparel:**

- Use the illustrations of clothing adaptation to guide your construction of your first sample. For example, flat seams may be used to provide sensory comfort, or an elastic band may be used at the waist to allow the garment to open extra-wide. These illustrations may be incorporated into construction guides or specification packages.

## Fitting a First Sample: Helpful hints for fitting adaptive apparel

A key part of the first sampling step is to fit garments on the client and correct the patterns as needed. The fit session may also uncover a need to use a different fabric, notion, or construction technique. This section covers fit sessions, what good fit is, and how to evaluate fit.

### Fit Sessions

Fit refers to the relationship between the human form and the garment form. When fitting the garment on the model or client, fitters need to confirm that the initial design is appropriate for the design intent and fabric choice of the specific style. Through a fit session, the integrity of the design needs to be evaluated, based on the functionality or mobility of the garment. Here are what should be considered for a successful fitting session with clients with disabilities.

- **Space:** Make sure you have a separate area for privacy. Make sure the temperature is controlled. It is important to keep the fitting area well-organized and accessible for people with disabilities as they are our clients. The space for fitting should be adequate, for example, all tools be put away when not in use. Entering the space should be also easy and accessible.
- **Time:** The duration of a fitting session should be short, as client more easily get tired because of their physical disabilities.
- **Fitting Assistant:** Two fitters are better than one –position one in front and one in back–, each measuring, checking, and evaluating.
- **Hearing Assistance:** For those who are hearing impaired or offer audio translation, closed captioning services, etc. Make sure an ASL translator is available if necessary.

### Fit

To achieve a good fit, a garment should be comfortable to wear and allows freedom of movement. Clothing should lie smooth, without wrinkling, pulling, or sagging unless it is intended. It should be easy to

wear and use, look proportional, and follow the design intent. Clients also can identify certain issues, such as whether the garment is hard to get on or off, if something feels off about the garment, or if it is itchy. Make sure to consider how the garment interacts with medical equipment or devices. This can include garment opening placement for tubes or cords from medical devices.

## Fit Evaluation

Every body is unique. Especially when a client has a physical disability, it is important to note the client's body posture and shape. Here are the steps for evaluating a garment fit:

- Evaluate the proportional relationship of each area, front and back and side to side, to the previous area and to the whole of the body.
- Identify figure areas that may be larger or longer, smaller, or shorter than the average or ideal—body length, arm length, hip width, bust, and buttocks, and so on.
- Observe body conformation. You can determine the degree of angularity or curvature by the comparative amount and distribution of body weight.
- Identify specific variations that may influence overall garment appearance—angular hip bones, protruding abdomen, shallow chest, and so on. If you observe a variation in one area, examine other areas of the figure for a corresponding or related variation. For example, rounded upper back, resulting shallow chest or recessed collarbone, prominent shoulder blade.

## Fitting Guidelines

- Side seams should be perpendicular to the floor (straight up and down), not swinging to the front or back, or twisting.
- The neckline should not pull to the front or back of the garment.
- Sleeves should be proportional to the length of the garment, and the design intent.
- Sleeve openings should not be too wide or too narrow.
- Garments should not have “whiskers” or “drag lines.”
- The crotch of the garment should not cut into the body or hang too low below the body (unless this is the design intent).
- Sleeves should not bind when arms move.
- Pants should not gape at the back waist when sitting.
- Pants should be comfortable to sit in, move in.
- Jackets should not be tight across the back when arms are crossed in front of the chest.
- Hems should hang parallel to the floor (unless it is an asymmetrical hem).
- Busts should fit comfortably in the garment: no drag lines between the apex of each breast, squishing of the breast tissue, etc.
- Bust darts should point to the apex of the breasts and should end roughly 1-1 ½” away from the apex of the bust.
- Waist darts should be parallel to the CF/CB of the garment.

- Shirt collars should roll nicely, rather than fighting to stand up or flay out flat.
- Buttons and zippers should be easy to use.
- Pockets should be proportional, functional, and easy to get into and out of.
- Hoods should not pull the garment up and away from the body.
- Hoods should have a nice shape, not pointy (unless that is the design intent).
- Do the design lines look proportional and intentional?

## Fitting and Pattern Alteration Examples:

[Sewn Adaptive](#) is an education platform for tailors and sewers to learn alteration techniques to adaptive garments to make it more accessible to people with disabilities. Their video clips provide demonstrations of how to conduct fit sessions with clients with disabilities and how to adapt the existing garments.

- [Alterations to achieve a good pant fit for a wheelchair user](#)
- [Alterations to remove shirt wrinkles for a wheelchair user](#)
- [Alterations to shortening a jacket sleeve for an individual using a crutch](#)
- [Alterations to shortening sleeves for upper limb difference](#)

## References

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# Chapter 7. The Adaptive Apparel Designer's Guide to Creating the Completed Ensemble

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Chapter 7 covers the last step of the design process—the completed ensemble, with specific attention to how designers can conduct it for the adaptive apparel market. Resources from chapters 1 and 3 are brought together to help the adaptive apparel designer sew the garments in the intended fabric, test effectiveness of planned materials, test effectiveness of planned construction techniques, and receive user feedback through interview, survey, and/or through wear testing.

## Brief overview of completed ensembles in apparel design

In this step of the apparel design process, the garments are sewn in the intended fabric. Creating the completed ensemble is important as it allows the designer or product developer to test effectiveness of planned materials and construction techniques; and receive user feedback. This feedback may lead the designer to circle back to one of the earlier steps to improve the design.

## Creating the completed ensemble

The tips provided below show how to use resources from chapters 1 and 3 to develop the completed adaptive apparel or soft goods products. These include finalizing the design, including materials and construction techniques.

### **How to use Chapter 1's [Disabilities' Impact on Dressing and Clothing Needs](#) to develop completed ensembles of adaptive apparel**

- Consider the specific dressing challenges related to your client's disability and identify design considerations for your design. If not already addressed in the patternmaking and first sample processes, make sure that appropriate design elements, seam types, and construction techniques are included in your completed ensemble.

### **How to use Chapter 1's [Illustrated Glossary of Clothing Adaptations](#) to develop completed ensembles of adaptive apparel**

- Use the illustrations of clothing adaptation to guide your construction of your completed ensemble.

For example, flat seams may be used to provide sensory comfort, or an elastic band may be used at the waist to allow the garment to open extra-wide for ease of donning and doffing. These illustrations may be incorporated into construction guides or technical specification packages.

**How to use Chapter 1's [Textiles \(Selection and Rationale\)](#) to develop completed ensembles of adaptive apparel**

- If not already completed in the first sample process, review the descriptions of textile properties—thermal protection, comfort, easy care, and breathability—and decide which factors are most important when selecting fabrics for your garments or soft-goods products. Note key fabric selection criteria and potential fabric types appropriate for the completed ensemble of your design.

**How to use Chapter 3's [Sourcing Guide \(Where to Buy Notions and Materials for Adaptive Clothing\)](#) to develop completed ensembles of adaptive apparel**

- After identifying notions and fabric types appropriate to meet the needs of your client or target market, use Chapter 3's sourcing guide to source these materials to evaluate in your completed ensemble. Be sure to keep track of important sourcing information, so you can easily re-order if you decide to implement these materials in your final product.

## Gathering User Feedback

User feedback may be gathered in a variety of ways. The first step is to list the intended functions of the product and decide how to collect data to gather feedback on that function. It can be helpful to write out questions that you seek to have answered regarding your adaptive apparel design. This, in turn can inform what and how data should be collected. Pros, cons, and best practices for various user feedback techniques are discussed below.

## Wear Testing

Wear testing can be useful in understanding the effectiveness of the design in meeting the user's needs as intended. User(s) can wear or use the product in its intended setting for a time that allows understanding of how it would work/function. This is more than just trying it on. Before the wear test, the user and designer should collaboratively produce a list of specific functions that the garment would serve and activities the user will engage in to evaluate those functions. For example, let's say a corset with magnetic closures was designed. The user and designer should consider what type of activities will be engaged in and for how long. Will they be sitting at a formal dinner? Getting in and out of a car? Dancing? This thoughtful preparation can optimize the wear test to give the most useful information about the design

as intended to use used. It is also good to plan ahead how the user's evaluation of the product will be collected. Interviews or surveys, discussed below, can be used, but other methods—such as user diaries are possible.

## Interview, Surveys, and Focus Groups

If wear testing is not possible, potential users can still be asked to evaluate the product—either firsthand or digitally – through focus groups, interviews, or surveys. The designer should ensure that the wording is at the appropriate reading level for the target audience. Make sure not to use jargon that may be unfamiliar to people outside of the apparel industry. If necessary to use such terms, be sure to define them. The designer should also consider the usability aspects of interfaces. For example, this may include functionality with screen readers, translations, etc. See <https://www.w3.org/WAI/standards-guidelines/wcag/glance/> for further information.

Surveys offer the advantage of being able to reach a larger audience of potential users. However, if the survey is digital, rather than in person, it may not be possible for the user to evaluate the product 'hands-on'. Nonetheless, the product may be presented through photographs, 3D images, virtual reality, technical drawings, and written specifications. Interviews and focus groups can provide more depth in the users' evaluation as the interviewee can ask follow-up questions, based on the individuals' responses. Interviews and focus groups may be in person or digital (via remote video meeting platforms such as Microsoft Teams, Zoom, or WebEx), with the same product presentation factors as mentioned with surveys.

Gathered feedback may lead the designer to circle back to one of the earlier steps to improve the design.

### Feedback Survey

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# Review Statement

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*Adaptive Apparel Design* was produced with support from the Iowa State University Miller Open Education Mini-Grant Program. In addition to production support from the university's Open Education lead, Abbey K. Elder, this book also underwent a peer review process with input from subject matter experts.

The review for this book was structured around considerations related to the text's usefulness as a teaching resource based on a rubric, rating the text on various aspects of its organization and content. The rubric was adapted from the [Open Textbook Library's Review Rubric](#). Following the peer review process, changes suggested by the reviewers were incorporated by the lead author and contributors.