

Lesson 5.3

Manufacturing Faults & Tolerances

This lesson focuses on manufacturing faults which occur during the production process. 'Fault' can mean anything that is not up to the required standard, in the context of the stitching industry this could mean:

- Faults in fabrics and material
- Faults caused by processing/manufacturing faults
- Faults caused by equipment

Serious product faults may not be correctable, leading to wastage of materials, money, time, and resources. Less serious faults still cost time to correct, and, in some cases, they may be too costly to correct, causing bottlenecks (hold ups and blockages).

Higher costs are not the only consequence of reoccurring faults, they can also have negatives effects and lead to-

- problems across the business, such as loss of customers and cancelled orders
- problems for employees /colleagues such as general dissatisfaction, low morale, low motivation, and staff leaving
- problems with production such as slow down, missed deadlines and unmet production targets

Managers will look for resolutions when a machinist is continually producing faults, usually after exhausting all avenues such as training, material and method review disciplinary action may be taken, leading to more unrest. Though many managers do shy away from disciplinary

measures, in some cases this can prove effective, especially if the problem affects other employees or production levels.

Given the cost and long-term consequence of faults, **prevention** is better than cure. Therefore, it is important that you check work against specifications, tolerances, and quality standards **before, during and after** carrying out the job. But what are you looking for? What are manufacturing faults?

Watch the 5.3 video tutorial in full at this point. Then refer to it as you work through each section. Reference points are provided in each section.



Module 5.3 Faults and Tolerances

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Manufacturing Faults

Manufacturing faults are defects in a product that occur during the production process. As we know quality is the responsibility of all staff, but this working production team are expected to recognise, report and deal with manufacturing faults as they work. Production sewing machinists, in particular need to keep a look out for faults such as open or gaping seams, poorly cut work, wrong or missed stitches, poor assembly, incorrect pocket/label/button positions, wrong labels, pressing faults and general quality issues.

You also need to be aware of trimming faults, (as covered in Course 6) and be able to recognise fabric faults. Bear in mind that if you work on fabric that has holes, rips or shading you are responsible for the faulty item, as you did not check before sewing, remember the golden rule.

THE GOLDEN RULE

Do not add quality to a faulty product
Do not add poor quality to a perfect product

If a faulty product is allowed to go through the production process, this incurs cost. If a faulty product gets through the process, past quality control and out to the customer this not only incurs cost but possible loss of business. Therefore, **all** staff must be alert to faults and report them immediately.

Watch the video tutorial 5.3 Faults & Tolerances. We recommend that you watch this video right through before starting the lesson. Then refer to it as you progress (reference points are highlighted in each section)

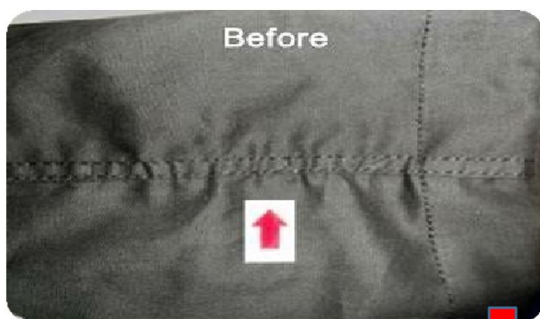
Watch the 5.3 Video tutorial, reference points 04.05 to 05.08

Your company may categorize faults into acceptable and non-acceptable or repairable and non-repairable. The category of the fault depends on the AQL within your company. Whether to repair a fault depends on the extent of the fault and the time/cost it will take to repair.



The faults to the left are often defined as repairable, however, the company needs to think if the product repairing process is worth it. They need to consider:

- the cost incurred when carrying out the job originally
- the cost of unpicking the fault
- the cost of re-doing the job
- the quality after the repair



Repairs can often mean the cost of the job is virtually tripled. In some company's repairs are seen as part of the job and time/cost allowances are in place. In other machinists are expected to make repairs in their own time.

Remember the selling price must remain the same regardless of extra time taken to make repairs. No business can survive extra costs incurred by reoccurring, continuous repairs – **that is one of the reasons why it is important to get it right first time.**

So, how can you as production machinist determine whether a fault is non-repairable or repairable? Depending on your company procedure you should leave the decision to your supervisor/manager. Your responsibility

would be to check the acceptable quality levels, measure the fault against them, come up with a possible solution, then report it. Do not attempt the repair before reporting it.

Critical Defects

In addition to repairable and non-repairable faults there are critical defects. These **are** faults that are likely to result in hazardous or unsafe conditions for an individual wearing or using the product. A critical defect in clothing may cause an accident to the wearer, for example:

Critical defects in relation to child's garment include:



Loose components: trims and fasteners not secured properly

Sharp edges: due to broken needles, damaged snap buttons, rivets, wire, and pins

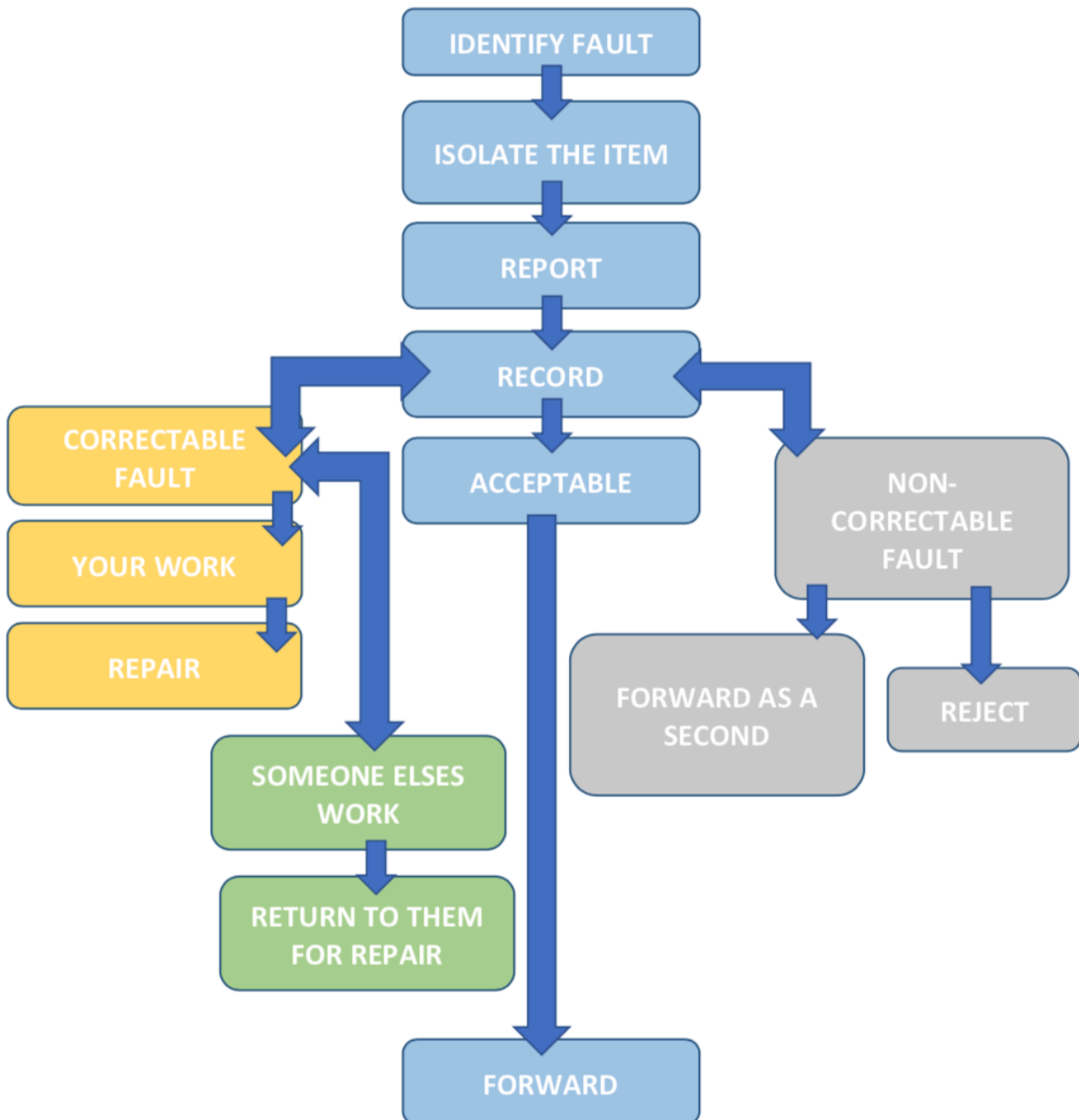
Trimmings: drawstrings at head or neck must be avoided in children's wear

Thread ends which are extensively long or loose

All the defects listed above must not be present in this product under any circumstances. If the company was audited and such defects were found in packed garments the audit would fail. All packed goods would have to be re-inspected; custom could be lost and there could be health and safety implications

How to deal with faults

Your responsibility in relation to fault repair will depend on the type of fault and your company policy. There may be a set procedure in place related to faults. The table below shows how a company may ask you to deal with faults.



Knowledge Challenge 5.10

1. When do you quality check your work?
 - Before I start the job
 - Before I pass the job on to the next operation
 - Before, during and on completion, and before I pass it on for the next operation
 - During the job
2. What would you do if a job/product came to you that contains faults?
 - Report the faults so the product can be returned and repaired by the person who made them
 - Ignore them – they are not your responsibility
 - Repair them yourself
3. There are three types of manufacturing faults. What Are they?
 - Repairable
 - Non repairable
 - Critical defects
4. What are 'tolerances. Tolerances are...
 - Acceptable faults
 - The amount of acceptable variation from a specified measurement
 - The number of rejected items allowed

5. Highlight two things that could occur if the stated tolerances are ignored.

- The product would be acceptable
- The product would not fit together properly
- The product would pass quality checks
- The product will not meet specifications
- The product would meet quality standards
- The product size would be incorrect

6. The consequence of recurring faults can be serious. They can have a negative effect on business, production, and colleagues. Highlight two effects that reoccurring faults could have on a business and sales:

- Cancelled orders
- Missed deadlines
- Low morale
- Unmet production targets
- Staff leaving
- Loss of customers

7. The consequence of recurring faults can be serious. They can have a negative effect on business, production, and colleagues.

From the list below, highlight two effects that reoccurring faults could have on **Employees/colleagues?**

- Staff leaving
- Loss of customers
- Missed deadlines
- Low morale
- Unmet production targets

- Cancelled orders

8. The consequence of recurring faults can be serious. They can affect business, production, and employees/colleagues.

From the list below, highlight two effects that reoccurring faults could have on **production**?

- Staff leaving
- Loss of customers
- Bottle necks and slow production
- Low morale
- Unmet Production Targets
- Cancelled orders



GROUNDWORK: Completing this groundwork is an option, but it is recommended. Completion will help you to better understand your role, your company, and internal processes and procedures. For those undertaking an apprenticeship these activities will help you gather information relevant to the End Point Assessment.

Note: For those learners, who are independent and not yet working as an employed production sewing machinist, alternative recommendations are included.

To complete the groundwork for this section, find out if your company use tolerances. If yes,

- Look at the product you are working on now
- List three of three key operations (i.e., Seam, hem, top stitch).
- Create a table like the example below by stating the tolerances for each operation.

Your table may look something like the table below:

PRODUCT: Blouse

OPERATION	TOLERANCE
OPERATION 1: Top stitch around collar	1mm +/- from edge
OPERATION 2.: Hem	2.5 cm hem +/- 2mm
OPERATION 3: Overlock side seams	+/- 3 mm trim

If your company does not use tolerances, create your own. Create a table, list three operations and identify acceptable tolerance for each operation



Types of Manufacturing Faults

Whether faults are repairable or not they incur cost.

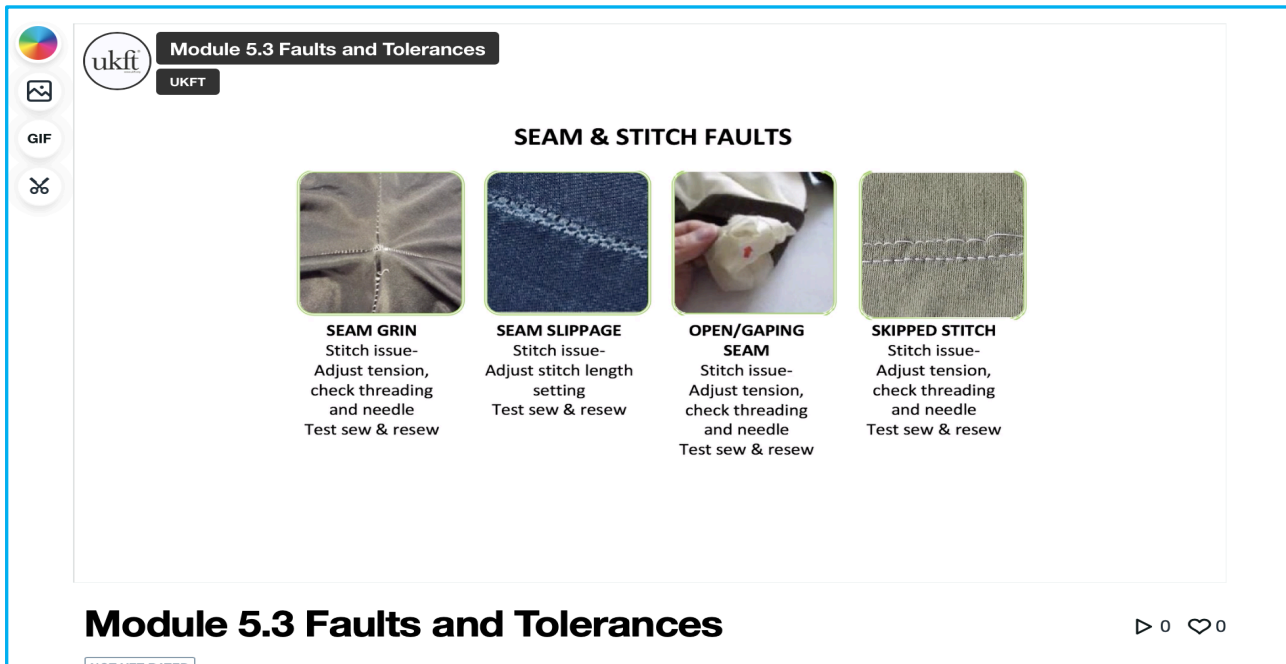
Faults mean the product does not meet the quality standard and would be either have to be reduced in price or scrapped. Therefore, given the company has paid for the raw material and paid the production costs, faults must be eliminated where possible.

As explained previously, some companies are more tolerant of manufacturing faults than others and what is deemed as an unacceptable fault in one company may be

acceptable in another. You need to ensure you know your own company's acceptable quality levels to help you determine a repairable or non-repairable fault.

Many manufacturing faults can be easily prevented, **and prevention is a hundred times better than cure**. With good training a sewing machinist will prevent the fault from happening in the first place. You need to be alert to potential faults, prevent further faults, spot existing faults and be able to act or repair faults correctly.

Watch the video from reference point 06.05 for an overview of faults plus product quality checks that identify the kind of faults to look for.



How to Identify faults

To help identify faults in stitched products, see the list of common faults and possible solutions below. This is by no means an exhaustive list, faults can come in hundreds of formats, but this list will help you recognise the key faults to look out for.


Stitch Faults

Stitch faults can be detected early. Always test sew before sewing a new product. The machine must be adjusted according to the fabric. (See Lesson 2) The thread and needle must also be checked (See Lesson 2)

The stitch is fundamental to the quality of the product being sewn, if the stitch is faulty and product is made up, the times and materials are wasted as the product will be rejected.

The most common stitch problems, their cause and solution are listed below.

- Skipped stitch
- Unbalance stitch
- Staggered stitch
- Variable stitch density

		Skipped Stitch	
Cause		Solution	
Fabric is flagging, not being pulled through the system properly		Adjust the pressure on the presser foot. See Lesson 2.4	
Timing problem, causing unsynchronised needle and bobbin thread so not forming the stitch		Timing setting problems should be examined by machine mechanic. See Lesson 2.4	
Tight or loose thread tension on the upper or lower loop		Adjust thread tension. See Lesson 2.4	

Incorrect needle, badly inserted needle or needle damage needle	Check Needle, change needle, insert needle correctly. See lessons 2.4 and 2.11
Thread is unbalanced	Ensure the same thread type is in the top and bottom spool. See Lesson 3.12



Unbalanced Stitch

Problem	Solution
The machine is threaded incorrectly ie missed thread guides etc	Ensure the thread is following the correct threading path. See Lesson 2.3
Poor quality thread	Ensure the thread is good quality and the same type of thread is in the top and bottom spool. See Lesson 3.12
Tight or loose thread tension on the upper or lower loop	Examine bottom and top thread tension and adjust to balance stitch. See Lesson 2.4

Thread tension is a common problem and must be identified and fixed before sewing. The images show lock stitch and overlocking when the tension is too tight and too loose.



IMAGES: FROM CRAFTSY.COM



Staggered Stitch

Cause	Solution
Incorrect needle, badly inserted needle or needle damage needle	Check Needle, change needle, insert needle correctly. See lessons 2.4 and 2.11
Loss of fabric control due to the pressure of the presser foot	Adjust the pressure on the presser foot. See Lesson 2.4
Incorrect thread types or thread is unbalanced	Ensure the thread type is correct for the fabric being sewn and the same type of thread is in the top and bottom spool. See Lesson 3.12
The feed dog is not pulling the fabric through properly	The feed dog settings should be examined by machine mechanic. See Lesson 2.4



Variable Stitch Density

Cause	Solution
Twisting of thread at the thread stand position	Ensure a circular foam pad is positioned underneath the thread cone and all thread guides are threaded correctly. See Lesson 2.3
Tight or loose thread tension on the upper or lower loop	Examine bottom and top thread tension and adjust to balance stitch. See Lesson 2.4

Broken tension spring	Check and replace spring. This may need to be done by a mechanic.
Fraying of thread in the needle	Check the hole and size of the needle. A finer thread may have to be used or a different size needle
Overheating of thread, needle, and mechanism	<p>This can happen when working at high-speed causing by melted fabric that block the mechanism. Sew slower if fabric is prone to melting.</p> <p>Ensure the mechanism is lubricated</p> <p>Use a needle cooler when working at high speed to avoid needle breakage and thread burn. The cooler delivers a continuous adjustable stream of cold air onto any sewing machine needle.</p>

Seam Faults

Seams can be faulty for different reasons. Seam faults are usually down to fabric handling and sewing skills. See common seam faults and solutions below:



Seam grin

Stitch issue:

- Adjust tension
- Check threading
- Check needle.
- Test sew & resew



Seam slippage

Stitch issue:

- Adjust stitch length setting
- Ensure appropriate seam allowance
- Test sew & resew



Open or Gaping Seam

Stitch issue:

- Adjust tension
- Check threading
- Check needle
- Test sew & resew

	<p>Twisted seam</p> <p>Handling issue:</p> <ul style="list-style-type: none"> • Check cut edge • Resew
	<p>Puckered seam</p> <p>Handling/sewing issue:</p> <ul style="list-style-type: none"> • Check tensions • Check needle is suitable for fabric • Resew – do not pull fabric when sewing
	<p>Mismatched seam</p> <p>Handling/sewing issue:</p> <ul style="list-style-type: none"> • Re-align seams and resew
	<p>Uneven top stitch</p> <p>Sewing issue:</p> <ul style="list-style-type: none"> • Unpick and resew straight/aligning stitch

	<p>Wavy hem</p> <p>Handling issue:</p> <ul style="list-style-type: none"> • unpick and resew without pulling fabric or use a cover stitch machine
	<p>Roped hem</p> <p>Handling issue:</p> <ul style="list-style-type: none"> • unpick and resew without pulling fabric

Cutting Faults

Cut pieces can be faulty. It is the sewing machinist's responsibility to identify and report these faults and request recuts. See common cutting faults and below:



Shaded cut pieces

Cutting issue:

- Do not sew
- Report issue
- Request recut



Missing components

Cutting issue:




- Request missing components






Badly cut components

This is usually a pattern cutting issue or the wrong size components have been bundled up. This issue often is not recognised until part sewn, as parts may not fit together properly

- Report issue
- Request recut

	<p>Incorrect or missed markings</p> <p>Marking up issue:</p> <p>This means wrongly positioned or missing notches, pockets positions etc</p> <ul style="list-style-type: none"> • Report issue • Request markings
<p>Trimming Faults</p> <p>Trimming and accessories can be faulty or incorrect. They are usually the fault of the distributor however it is the sewing machinist's responsibility to identify and report these faults and not to use faulty or incorrect trimmings. See common trimming faults below:</p>	
	<p>Label Faults</p> <p>Machinist or label distribution fault:</p> <ul style="list-style-type: none"> • Check labels against specifications. Do not sew incorrect labels in a product • Check label position. Sew labels in the correct position
	<p>Incorrect button/ buttonhole position</p> <p>Machinist /marker's / distributors fault:</p> <ul style="list-style-type: none"> • Ensure markings are correct before sewing • Check buttons against specifications • Check button size against buttonhole size before sewing • Remove button and re-applied correctly

	<ul style="list-style-type: none"> A cut buttonhole in the wrong place is unrepairable.
	<p>Faulty fastening</p> <p>Distributor, machinists' fault:</p> <ul style="list-style-type: none"> Check fastening against specifications Check the fastening works Report fault Do not insert faulty fastening
	<p>Colour runs</p> <p>Distributor's, machinists' fault:</p> <ul style="list-style-type: none"> Report any sign of colour transfer from fabrics and trimming immediately Do not sew
	<p>Incorrect thread</p> <p>Machinist fault:</p> <ul style="list-style-type: none"> Check specifications for thread type and colour before sewing. Resew work carried out using the incorrect thread



Trimming fault

Faults with braid, tape, lace, motifs, D-rings, buckles etc

- Report quality issues.
- Do not sew faulty trimmings onto work
- Report signs of low stock

Fabric Faults

Faults in fabric occur often. Ultimate responsibility lies with the cutter however It is the sewing machinist's responsibility to identify and report these faults and not to continue sewing unless instructed. See common fabric faults below:




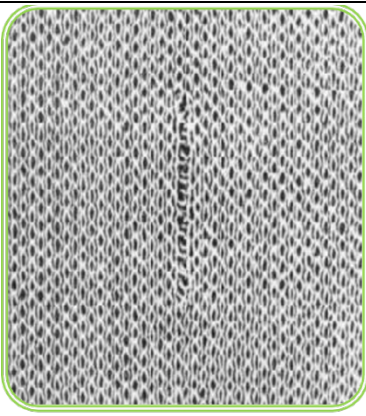
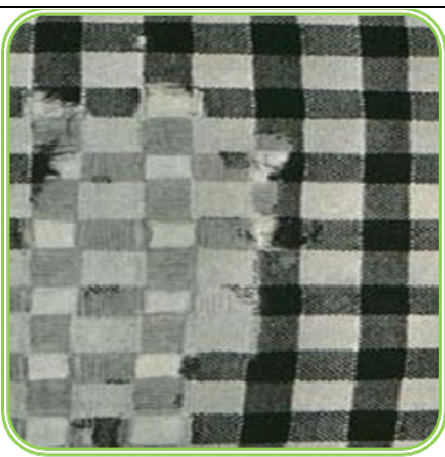
Shading or fading.

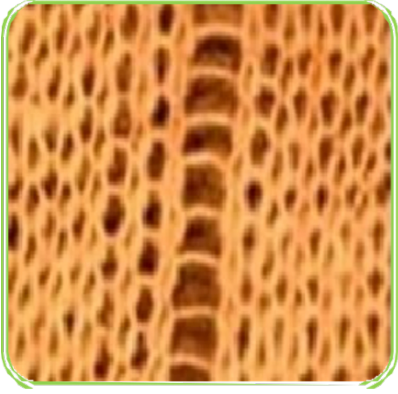
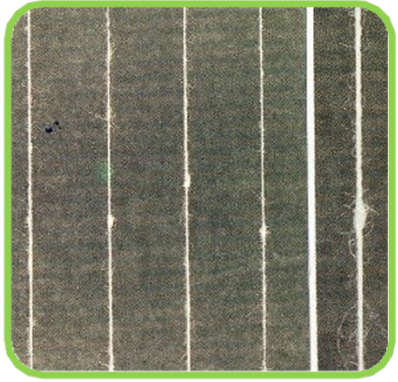

- Report immediately.
- Do not sew, unless discussed and permitted. The fault could be in a position where it is not seen on the finished product
- Request recut if required.



Marks and stains

- Report immediately.
- Do not sew, unless discussed and permitted. The fault could be in a position where it is not seen on the finished product
- Request recut if required.

	<p>Weave fault</p> <ul style="list-style-type: none"> • Report immediately. • Do not sew. unless discussed and permitted. The fault could be in a position where it is not seen on the finished product • Request recut if required.
	<p>Weave fault</p> <ul style="list-style-type: none"> • Report immediately. • Do not sew. unless discussed and permitted. The fault could be in a position where it is not seen on the finished product • Request recut if required.
	<p>Print fault</p> <ul style="list-style-type: none"> • Report immediately. • Do not sew. unless discussed and permitted. The fault could be in a position where it is not seen on the finished product • Request recut if required.

	<p>Knit fault</p> <p>Ladder or hole in knitted fabric.</p> <ul style="list-style-type: none"> • Report immediately. • Do not sew. unless discussed and permitted. The fault could be in a position where it is not seen on the finished product • Request recut if required.
	<p>Weave fault</p> <ul style="list-style-type: none"> • Report immediately. • Do not sew. unless discussed and permitted. The fault could be in a position where it is not seen on the finished product • Request recut if required.
	<p>Selvedge fault</p> <p>Raw selvedge on cut components.</p> <ul style="list-style-type: none"> • Report immediately. • Do not sew. unless discussed and permitted. The fault could be in a position where it is not seen on the finished product • Request recut if required.

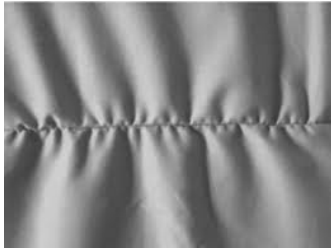
Knowledge Challenge 5.11

1. The pieces of a product you are making do not fit together properly, making the job difficult. Do you...
 - Persevere and make it fit by trimming bits off
 - Leave it and go onto the next job
 - Report the issue and request a re-cut

2. What is the best way to determine whether a fault is non-repairable or repairable? Select two answers from below.
 - Use your own judgement and repair the fault yourself if necessary
 - Report the fault and leave the decision to your supervisor/manager
 - Repair all faults found regardless of fault type or time required
 - Know the acceptable quality levels, measure the fault against them, come up with a possible solution and then report it before attempting the repair

3. Prevention is better than cure, so how can you help to prevent faults from happening. Select the correct action from below:
 - Check work against specifications, tolerances, and quality standards before, during and after carrying out the job
 - Check work against specifications, tolerances, and quality standards after carrying out the job

4. See images of faults below. Draw a line to match the fault image to the fault name



Skipped stitch



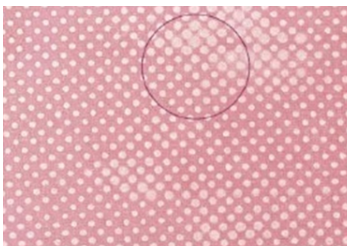
Puckered seam



Fabric Print fault



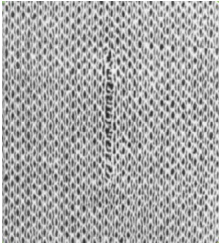




Split Seam



Uneven top stitching

5. Different faults are dealt with in different ways. Draw a line to match the action to the fault/issue

 <p>SKIPPED STITCHES</p>	<p>Cutting issue:</p> <ul style="list-style-type: none"> • Do not sew • Report issue • Request recut
 <p>BADLEY CUT COMPONENTS</p>	<p>Faulty fastening</p> <p>Distributor, machinists' fault:</p> <ul style="list-style-type: none"> • Check fastening against specifications • Check the fastening works • Report fault • Do not insert faulty fastening
	<p>Skipped stitch. Machinist fault:</p> <ul style="list-style-type: none"> • Check/adjust tension • Check/adjust needle • Check/adjust pressure • Check/adjust timing
	<p>Weave fault:</p> <ul style="list-style-type: none"> • Report immediately. • Do not sew. unless discusses and permitted. The fault could be in a position where it is not seen on the

	<p>finished product</p> <ul style="list-style-type: none"> • Request recut if required.
	<p>Roped hem</p> <p>Machinists Fault:</p> <p>Handling issue</p> <ul style="list-style-type: none"> • unpick and re sew without pulling fabric



GROUNDWORK: Completing this groundwork is an option, but it is recommended. Completion will help you to better understand your role, your company, and internal processes and procedures. For those undertaking an apprenticeship these activities will help you gather information relevant to the End Point Assessment.

Note: For those learners, who are independent and not yet working as an employed production sewing machinist, alternative recommendations are included.

To complete the groundwork for this section, start to build your own faults library. Grow the library as you progress in your work and come across different faults. Keep the library in your folder for reference.

Create a table like the one below on an A4 sheet. Create samples of the listed faults and attach them Note how to deal with the fault in the last column

FAULT TYPE	SAMPLE TYPE	SOLUTION
Skipped stitch	Attach example	Check/adjust tension, Check machine is threaded correctly Check needle is right size and inserted correctly Test sew Resew
Tight upper tension	Attach example	
Seam Grin	Attach example	
Burst seam	Attach example	

Now let's go onto the kind of work records and documentation used in the stitching industry.