International Labour Organization

Cut inspection

Cutting room operations

Factory Improvement Toolset

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Factory Improvement Toolset

The Factory Improvement Toolset (FIT) is an innovative self-facilitated, activity-based learning approach designed by the International Labour Organization (ILO) to create more decent and sustainable employment. FIT supports manufacturers in global supply chains to improve productivity, competitiveness and working conditions by upgrading production systems and factory practices.

FIT has been developed to be a sustainable, time- and cost-efficient option for supporting factories to enhance productivity through improved business practices and working conditions. FIT focuses on areas of production improvement and actions to be taken specific to each participating factory. It can be utilized as stand-alone learning tools or to complement other training programmes.

With each module lasting no more than 2.5 hours, FIT enables factories to train personnel, whilst minimizing interference with production realities. The easy-to-use methodology makes it possible to rapidly scale the implementation to reach a large cohort of trainees across multiple production facilities.

Working in small groups, participants review real-life situations and engage in discussions to determine improvements to be made in factory without an external trainer or specialist. This self-facilitated, activity-based and highly participatory learning approach positions participants as both student and teacher and makes the toolset self-tailored to the needs and interests of each group.

About this module

This FIT module on Cut inspection is a training for garment manufacturers to improve cutting room operations. Participants will work on inspecting cut panels and bundles systematically. This module takes about 2.5 hours to complete.

Upon completion of the training, participants should have:

- Understood the cut inspection process and its importance for garment quality.
- Learnt how to carry out cut parts, panels and bundle inspections, and how to make a pass or fail decision regarding the cut.
- Learnt how to record inspection results using a cutting inspection report.

The **Factory Improvement Toolset** of the **International Labour Organization (ILO)** are developed and provided by the ILO's **Enterprises Department**.

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Guidelines for successfully using the training tool

Read out-loud

The FIT tool is designed for participants to take turns reading the instructions in the modules out loud to the group. At least one member of the group should be selected in the beginning of the session to take this responsibility.

Work as a group

Always work in groups of 5-7 during a FIT session. The programme will not be successful if participants work independently or do not collaborate with each other.

Be active

Encourage everyone in the group to actively contribute to the discussion. Ensure that no group member dominates the discussion or does not participate at all.

Monitor the time

Select one member of the group to monitor the time for each activity and remind the group when it is time to move to the next exercise.

Complete the action plan

Complete the action plan at the end of the session. This will help ensure that FIT results in improvements in the factory. Review the plan a while after the session to make sure that actions in the plan has been completed accordingly.

Icons

A set of icons is used throughout the modules to provide easy to recognize reference points for different tasks within each session and activity.

Read out loud

One member of the group should read out loud to the rest of group.

Knowledge link

Knowledge and skills are linked to other FIT learning resources and support.

Time allotted

Indicates how much time each sessions and activity should take.

Supplies needed

Indicates that supplies may be necessary to complete the session.

Begin step-by-step instructions

Indicates that the step-by-step instructions for an activity are beginning.

Think about it

Indicates additional information for the participants to think about.

Measuring your performance

Measuring operational efficiency is a key aspect of running a productive factory. The box(es) below guides you in understanding which measurement indicator(s) can be used to measure and evaluate the performance of your factory in relation to the topics covered by the FIT cutting room series.

Indicator 1	**Re-cuts (%)**
Definition	The proportion of fabric used for re-cuts for each order (the amount of fabric used for re-cuts compared to the total amount of fabric used for the order).
Purpose	To understand how much of the fabric was used for re-cuts, to better assess quality and begin to identify how to improve quality in the cutting room.
Calculation	(# meters of fabric used for re-cuts / total # meters of fabric used for this order including re-cuts) x 100% This should also be calculated separately for re-cuts due to cutting defects and re-cuts due to other defects.
Frequency	Calculate for each cut order, then do a monthly average of all cut orders.
Responsible	Cutting room manager / Quality inspector

Indicator 2	**Fabric utilization (%)**
Definition	The proportion of total spread fabric that is actually used for garments. It is calculated for each cut (for each marker). The higher the most efficient.
Purpose	To understand how efficient your marker planning and cutting operations are, how much fabric gets wasted, and to begin to identify how to improve marker efficiency and reduce fabric waste.
Calculation	(Marker area used for garments in *sqm* / total fabric area in *sqm*) x 100% Marker area used for garments = Fabric (in sqm) actually used for garments Total fabric area = The total amount of fabric spread on the cutting table for a cut = Fabric length (mts) x Fabric width (mts)
Frequency	Calculate for each marker, then do a monthly average of all markers.
Responsible	Cutting room manager / Senior marker maker

Session 1

Business case study

Goals

Preparing you for the type of discussions you will have with other group members throughout the learning module and understanding the benefits of being exposed to different perspectives.

Understanding better why carrying out a thorough cut inspection is important in the factory.

Session 1

Overview

One member should read the full session out loud to the rest of group

15 minutes

Learning manual, pens, markers and poster paper

A business case study presents a real-life situation for learners to reflect on and discuss with other group members. By discussing the case, students learn from others' ideas and perspectives, and develop an understanding of the topic at hand within the workplace.

One group member reads the case study out loud

The whole group discusses the case study

Everyone develops a deeper understanding of the topic

Activities

Activity

1

15 minutes

Case study review and respond

The case study below presents a situation that could happen in real life.

Instructions:

1) As a group, listen to one member read the case study below while following along in your learning module.

Ritthy is a new cutting room manager at the HS garment factory. During his first week at the factory, he notices that the cutting room checkers inspect cut parts randomly and have no system for recording the defects before and after they have been cut and assembled into bundles. Because of this, the sewing lines sometimes reject bundles because defects are found by sewing operators. When this happens, parts need to be re-cut and re-issued to the sewing lines. This delays order shipment, makes the cutting room and the sewing lines lose time, and makes it hard for both departments to plan their operations.

Ritthy decides to make some changes. He teaches cutting room checkers how to carry out a cut inspection by checking all cut parts for cutting defects before numbering. Then, he creates a form which checkers can use to record the results of their inspection.

Thanks to these changes, cutting defects are identified before bundles are issued to the sewing lines. Missing parts can be re-cut faster, which helps avoid delays. Inspection records can be used to identify the most common issues or defects, and measures can be taken to avoid them.

2) Together, discuss Ritthy's situation by answering the three questions in table 1 on the next page.

Table 1. Questions about Ritthy's situation
1. What problems has Ritthy identified? What impact do these problems have on the factory and its workers?
2. What does Ritthy do or change in order to solve these problems?
3. What are the results of Ritthy's solutions for the factory and its workers?

This page has been intentionally left blank and can be used for note taking.

Session 2

Learning about the topic

Goals

Discussing the cut inspection process and its importance for ensuring quality.

Learning how to carry out cut parts and panels inspections, then bundle inspections, and how to make a pass / fail decision.

Understanding how to record inspection results using a cut inspection report.

Session 2

Overview

One member should read the full session out loud to the rest of group

95 minutes

Learning manual, pens, and markers

This training module aims to help you improve the way your cutting room operates by focusing on cut inspection. Once fabric has been cut, QCs inspect cut parts and panels. These are then numbered and assembled into bundles. Then, a number of bundles are inspected before they can be issued to the sewing lines. These steps are very important for avoiding sewing mistakes and ensuring garment quality later on. Throughout this module, you will work on the three steps below.

Inspecting **cut parts & panels**

Inspecting **bundles**

Recording inspection results

First, you will discuss your inspection practices and learn about the different steps of the cut inspection process. Then, you will learn more about good practices for cut parts, panels and bundle inspection. Finally, you will practice recording the results of your cut inspection using a cut inspection record.

Activities

Activity
2a

20 minutes

Inspecting for quality

Cut inspections needs to be carried out to ensure **good quality** before sewing. There are two parts in cut inspection: (1) cut parts and panels inspection (after cutting), and (2) bundle inspection (after numbering and bundling). In this activity, you will discuss why it is important to perform a cut inspection.

Instructions:

1) Together, discuss the two questions in table 2 below.

2) Together, discuss: In your cutting room…

- Do you carry out cut inspections? When, and how?
- Do you record the results of the inspection? How?

3) Together, look at the inspection steps in table 3, then put them in the correct order by writing a number from 1 to 10 on the right. Solutions are provided at the bottom of the next page.

Table 2. Cut inspection & quality
1. What could happen (e.g. in the sewing line) if there are defects in the cut parts and panels (cutting or fabric defects)?
2. What could happen (e.g. in the sewing line) if there are mistakes in the way bundles were assembled (e.g. sizes, shades, etc.)?

Table 3. Cut inspection from A to Z	
Steps	**#**
Cut parts inspection: Check 100% of cut parts and panels for cutting defects (top, middle and bottom layer of every cut block).	
Receive a batch of bundles from the bundling workers.	
Hand in the cut audit report to the cutting manager and finally to be seen by the quality manager.	
Random bundle inspection: Inspect a selected number of bundles (e.g. 10%).	
Record the results of the cut parts inspection on the cut inspection report.	
Record the results of the panels inspection on the cut inspection report.	
Based on the compiled reports, problems are identified and solutions applied.	
Cut parts are numbered and bundled, then tagged.	
Panel inspection: Check 100% of panels for fabric defects (10% is enough for woven fabric).	
Record the results of the bundle inspection on the bundle inspection report.	

Solutions: 1, 6, 9, 7, 2, 4, 10, 5, 3, 8.

Activity

2b

25 minutes

Inspecting cut parts

The first part of a cut inspection is the **cut parts and panels inspection,** in which 100% of cut parts and panels are inspected for cutting defects, then for fabric defects. It is carried out after cutting, before numbering. In this activity, you will learn how to inspect cut parts and panels and what to pay attention to during the inspection.

Instructions:

1) Together, discuss:

- Do you inspect cut parts after cutting in your factory?
- Do you have criteria for passing or failing the inspection?

2) Together, look at table 4 showing the four types of cutting defects. For each defect, select the inspection method which you think is best suited, and write down the method # in the column on the right. Solutions are at the bottom of next page.

3) Together, discuss:

- After inspecting cut parts blocks for cutting defects, do you also inspect panels for fabric defects? Why or why not?
- What do you do if there are defects on the panels?

4) Have a participant read aloud the information in table 5. Make sure everyone understands, then, complete the exercise in table 6. Solutions are provided at the bottom of the page.

Cut parts inspection should be carried out on **100%** of cut parts blocks for knit and woven garments. Panel inspection should be carried out on 100% of knit garments, but 10% of woven garments panel check will suffice, unless the fabric is at high risk of fabric defects (signaled during the fabric inspection). If so, do a 100% inspection.

If there are **defects** on the panels, these can be re-cut from the end bits of the same roll (or dye lot #). To learn more about how to inspect panels for fabric defects, ask for the “Inspecting fabric” and “Inspecting garments” modules.

Table 4. Cutting defects

Inspection methods	
1. Check the top, middle and bottom plies against the relevant pattern to check for cutting accuracy.	
2. Check the notch location by placing the pattern board or paper marker over the top ply.	
3. Place the pattern board or paper marker over the cut part to see whether the shape is correct.	
4. Inspect edges visually and compare with buyer requirements.	
Cutting defects	**#**
Miscut: The cutting operator fails to split the line (to cut exactly on it).	
Non-matching plies: The top ply and the bottom ply in the cut are not exactly the same (in size, shape, etc.) because the cut is not accurate.	
Ragged cutting: The edge of the cut parts is not completely smooth and even due to excessive pressure or bad knife handling.	
Missing / misplaced notches: Notches have not been cut, or have been cut in the wrong place.	

Table 5. The 10% rule

During inspections, there must be **a rule** to help you decide if the cut passed or failed the inspection. This rule tells you the maximum number of defects that you accept for a certain number of cut parts inspected. A recommended rule of thumb is 10%.

For example, if your acceptable defect rate is 10%, it means that you accept up to 10 defects out of 100 parts inspected. Imagine that you inspect 100 parts,

- If there is less than 10 defects, the cut has passed the inspection.
- If there is more than 10 defects, the cut has failed the inspection. Reasons must be identified, and the system may need revision.

If you use the AQL system rather than a rule of thumb (general practice) of 10%, it is best to use AQL level 4.0.

Solutions: 3, 1, 4, 2.

Table 6. Pass or Fail?

Scenario: QC Nang is inspecting cut #65798, which contains 200 stacks of cut parts. She inspects 100%, and finds a total of 12 cutting defects.

1. Calculate the defect rate for this cut using the following formula:

   Defect rate = (# of defects / # of blocks inspected) x 100

   = (___ / ___) x 100 = ____ %

2. Nang's factory uses the 10% rule of thumb. Will cut #65798 pass or fail the inspection? Circle the correct answer.

   Pass / Fail

Solutions: 1. Defect rate = (12 / 200) x 100 = 6%; 2. It will pass, because 6% < 10%.

Activity

2c

20 minutes

Inspecting bundles

After cut parts have been numbered and bundled, QCs should carry out a random **bundle inspection**, to ensure that cut parts have been correctly bundled. In this activity, you will learn how to carry out a bundle inspection.

Instructions:

1) Together, discuss:

- Do you carry out bundle inspections? Why or why not?
- Do you inspect all bundles in each cut? If not, what percentage do you inspect?

2) Together, go through table 7 and decide what information should always be checked when inspecting bundles by putting a ✓ in the right column. Solutions are provided at the bottom of the page.

3) Have a participant read aloud the scenario in table 8. Then, together, use the information in the scenario to discuss the two practice questions. Solutions are provided at the bottom of the page.

Table 7. Bundle Inspection

Information	Check?
1. Number of bundles in the cut order	
2. Bundle ID #	
3. Number of bundles in each size	
4. Total number of parts	
5. Colour & dye lot #	
6. Fabric roll #	
7. Cutting operator's name	
8. Cut #	
9. Buyer's name	
10. Each bundle has a ticket attached to it	
11. Style / order #	
12. Size of garment parts in the bundle	
13. Ply numbers	
14. Number of garments in the bundle (unit count)	
15. Cut components in each bundle (sleeve, collars, etc.)	

Solutions: 1. Yes, 2. No, 3. Yes, 4. Yes, 5. Yes, 6. No, 7. No, 8. Yes, 9.No, 10. Yes, 11. Yes, 12. Yes, 13. No, 14. Yes, 15. Yes

To learn more about how to assemble cut parts into bundles and ticket the bundles adequately, ask your facilitator for the “Preparing for sewing” module!

Table 8. Inspecting bundles

Scenario: Nang is a QC inspector. Today, she carries out the bundle inspection for cut #61278. According to the cut order information received by the cutting manager:

- This cut should contain 80 bundles of 10 garments (unit count), for a total of 800 garments.
- There should be 20 bundles in size S, 40 in size M, and 20 in size L.
- Cut component / garment = 10 (2 fronts, 2 sleeves, 1 back, 2 collars, 2 yokes, 1 pocket), so each bundle contains 10 x 10 = 100 parts.

Nang inspects 10% of bundles (8 bundles). In one bundle, there are only 9 pieces instead of 10. In another bundle, all the collars are missing. In another bundle, there are 5M and 5S garments.

Practice questions

1. Calculate the defect rate for this cut using the following formula:

   Defect rate = (# of defective bundles / # of bundles inspected) x 100

   = (___ / ___) x 100 = ____ %

2. The acceptable defect rate in Nang’s factory is 10%. Will cut #65798 pass or fail the inspection? Circle the correct answer.

   Pass / Fail

3. What should Nang do next?

At least **10%** of all bundles should be inspected. If defects are found, you should check another 10%. If defects are found again you may even have to check 100%.

An inspection checklist is a good start to ensuring a quality inspection, but it is not enough – there should be a **record** for each bundle inspected to better identify defects or mistakes! In activity 2d, you will learn how to record inspection reports.

Solutions: 1. Defect rate = (3 / 8) x 100 = 37.5%; 2. Fail, because 37.5% > 10%.

Activity

2d

30 minutes

Recording inspection results

It is important to **record** the results of each cut inspection, so that you can identify cutting problems, find solutions and improve production systems. In this activity, you will learn how to record the results of your cut part and bundle inspections using an appropriate inspection report.

Instructions:

1) Have a participant read aloud Scenario 1 in table 9. Then, together, fill in the cut parts & panels inspection report (shaded cells) in table 10. The first line has been filled in to guide you.

2) Have a participant read aloud Scenario 2 in table 11. Then, together, fill in the bundle inspection report (shaded cells) in table 12. The first line has been filled in to guide you.

3) Together, solve the following questions and fill in the answers in both reports. Solutions are at the bottom of the pages.

- What is the total number of defects for each inspection?
- What is the defect rate for this cut for each inspection?
- Did this cut pass or fail each inspection?

4) Together, discuss: How can inspection results (reports) be used to improve cutting operations and cutting quality?

Cut parts & panels inspection and bundle inspection may not take place on the same day. So, it can be better to have two different forms. Both should be handed to the cutting room manager and QC manager after completion.

Table 9. Scenario 1 – Cut parts & panels inspection

Today, Nang inspects cut #651489. There are 100 blocks of 50 plies (cut size ratio S/M/L of 1:2:1), for a total of 5,000 cut parts. As it is a knit fabric, Nang inspects 100% of cut parts blocks and panels, and finds out that:

- There is an oil stain on one part in block S pocket. *[Example]*
- There is a mis cut in block M2 band.
- There is a missing notch and measurement error in block S fly.
- There is ragged cutting in block L front.

Table 10. Cut parts & panel inspection report

Date	6 March 19	**Style #**	TE8945	**Inspector**	Nang P.
Cut #	651489	**Colour #**	Black – 89	**Cutter**	Rajesh N.
Order #	4516	**Dye lot #**	54623	**Buyer**	TextCo Plus
Rule of thumb: 10%		**Item**	Men's Pant	**Total # of parts?**	

Part	**Defects**								**Total defects**	**Remarks**
	Mis cut	Measure-ment	Ragged cutting	Notches	Stain	Tear	Pilling	Bow		
S pocket	0	0	0	0	1	0	0	0	1	Fabric
M2 band										
S fly										
L front										
Total										

Defect rate	
Pass or Fail?	

Solutions: 1. Total: 5 defects; 2. 5 / 100 x 100 = 5%; 3. The cut passed the inspection because 5% < 10 %

Table 11. Scenario 2 – Bundle inspection

After cut parts have been numbered and bundle, Nang carries out a random bundle inspection. The cut is supposed to contain 100 bundles of 50 cut parts (5 garments) each, for a total of 5,000 parts (500 garments). There should be 25 S bundles, 50 M bundles, 25 L bundles. Nang inspects 10% (10 bundles) and finds out that:

- There is a ticketing error on bundle 15. The style# is wrong. *[Example]*
- There is a cut component error in bundle 56. There are 4 bands and no flys.
- There is a size error in bundle 98. The back parts are in M instead of S.
- There is a missing part (missing band) in bundle 36.

Table 12. Bundle inspection report

Date	6 March 2019	**Style #**	TE8945	**Inspector**	Nang P.
Cut #	651489	**Colour #**	Black – 89	**Cutter**	Rajesh N.
Order #	4516	**Dye lot #**	54623	**Buyer**	TextCo Plus
Rule of thumb: 10%				**Item**	Men's Pant

Total # of bundles?		**# bundles inspected**	
Bundles / size?	S M L XL	**Missing ticket?**	Yes / No
Cut components	2 front, 2 back, 2 bands, 2 front pocket, 2 fly (10 in total) x 5		

Bundle #	**Mistakes**					**Total**	**Remarks**
	Missing part	Cut component	Part size	Ticketing error	Others		
15				1			Wrong style#
56							
98							
36							
Total							

Defect rate	
Pass or fail?	

Solutions: 1. Total: 4 defects; 2. 4 / 10 x 100 = 40%; 3. The cut failed the inspection because 40% > 10%

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Session 3

Action items

Goals

Summarizing and revising the new knowledge gained.

Identifying concrete applications of the new knowledge that benefit your factory.

Session 3

Overview

One member should read the full session out loud to the rest of group

20 minutes

Learning manual, pens, and markers

Throughout this module, you gained new knowledge on how to conduct a cut inspection by carrying out cut parts, panels and bundle inspections, then recording your results.

Inspecting **cut parts & panels**

Inspecting **bundles**

Recording inspection results

In this session, you will think of ways to apply your new knowledge to improve the way you conduct cut inspections by reviewing best practices and drafting your own action plan.

Cut parts & cut panels inspection report and bundle inspection report templates are available online for you to print out and use in your own factory. To obtain it, contact your factory's FIT coordinator!

Activities

Activity

3a

5 minutes

Best practices checklist

In this activity, you will review best cut inspection practices as a next step for evaluating your own and implementing improvements.

Instructions:

1) Together, look at the list of best practices in table 13, and put a ✓ in the column on the right if you use these practices in your factory.

Table 13. Cut inspection

Best practices	✓
1. Trained, designated workers (checkers) carry out cut inspections as required.	
2. 100% of cut parts and panels are inspected for cutting defects and fabric defects before numbering and bundling.	
3. At least 10% of bundles are inspected for each cut or an appropriate AQL is used after bundling.	
4. There are clear guidelines for a cut to pass or fail an inspection (10% rule or an appropriate AQL of 4.0).	
5. Inspection results are recorded in cut inspection reports (cut parts and panels inspection report, bundle inspection report).	
6. When a cut fails inspection, reasons for defects should be identified, then solutions implemented to avoid them happening again.	

Activity

3b

15 minutes

Your action plan

In this activity, you will think of ways to apply your new knowledge to improve cut inspection in your factory by drafting your own action plan.

Instructions:

1) Together, fill in the action plan (table 14) on the next page. Identify a key problem that you want to solve and write down the solutions you identified while working on this module.

Table 14. Cut inspection – Action Plan

Problem identified				
Solutions identified	**Action(s) to be taken**	**Person responsible**	**By when?**	**How will improvements be measured?**

Cut inspection

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