International Labour Organization

Spreading fabric

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

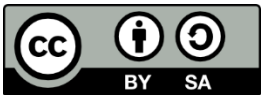
This FIT module on Spreading fabric is a training for garment manufacturers to improve cutting room operations. Participants will work on spreading and marking fabric more efficiently and accurately. This module takes about 2.5 hours to complete.

Upon completion of the training, participants should have:

- Learnt to select the right spreading type and mode and ensure quality during the spreading process.
- Learnt how to mark fabric efficiently, and in a way that does not damage fabric.
- Learnt how to plan and record style lay plans and cut information using lay sheets.

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

Authors: Alix Machiels, Sara Andersson, Charles Bodwell, Jayantha R. de Silva.



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 spreading fabric adequately 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. He spots several problems. Laying helpers only know one way of spreading fabric, and do not select the method best suited to the fabric type and marker plan. Helpers have not been taught how to ensure quality when laying fabric, so plies are of different lengths and not aligned with cutting table length. Or, there is too much tension in the fabric as helpers pull on it to make it flat. As a result, cut parts tend to shrink later on, and garments sizes become inaccurate. Finally, no one holds records, so there is no available information to evaluate efficiency for the cutting room.

Ritthy decides to make some changes. With the laying leader, he organizes a training for all helpers to learn how and when to use each spreading method. He drafts a checklist of things to verify during spreading operations (such as tension, defects, etc.), and agrees with merchandising and marker makers to develop at least 6-8 piece markers to optimise fabric utilization and laying and cutting efficiencies by making use of the table lengths. He also coordinates with the sample room to start using pre-drawn paper markers, and helpers are taught how to lay them on fabric. Then, he drafts a lay sheet to record information on each lay daily.

Thanks to these changes, the best spreading method is used. It makes spreading more efficient and saves time and fabric. Quality improves. Shrinkage is avoided. Thanks to the new paper markers, the fabric is cut more accurately and does not get damaged. Lay details can be used by management to evaluate efficiency, and plan operations better.

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 spreading processes in your factory.

Understanding and comparing different types of spread.

Discussing spreading practices, and how to ensure quality during spreading operations.

Learning about good practices in marking fabric for cutting.

Learning how to use a lay sheet to plan and record marker planning operations.

Session 2

Overview

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

120 minutes

Learning manual, pens, and markers

This training module aims to help you improve the way your cutting room operates by focusing on fabric spreading. Spreading fabric properly and with care is very important to ensure the quality of cut parts and finished garments, as improper spreading will cause fabric shrinkage, or distortion. Throughout this module, you will work on the four steps below.

Planning spreading

Spreading fabric

Marking fabric

Recording spreading

First, you will start by discussing your spreading system, then learn more about different types of spreads, best spreading and marking practices, and finally, how to plan spreading for a style and record details using a lay sheet.

Activities

Activity
2a

20 minutes

Spreading

Spreading is the process of placing lengths of fabric on a spreading or cutting table in preparation for the cutting process. In this activity, you will discuss spreading in your factory.

Instructions:

1) Together, read through the list of words in table 2, then match each one with the right definition by writing the corresponding letter in the right column. Solutions are at the bottom of the page.

2) Together, discuss the five questions in table 3.

Table 2. Important words

a. Lay height	b. Spread / Lay	c. Marker	d. Ply
Stack of fabric plies that have been prepared for cutting, so total amount of fabric prepared for a single marker.			
Total height of the spread or lay. It depends on the number of plies and on the fabric thickness.			
Specific arrangement of pattern pieces for a specific style and the sizes to be cut from a single spread.			
Layer of fabric that is spread on the cutting table as part of the spread / lay.			

Solutions: b – a – c – d

Table 3. Spreading	
What?	What does spreading consist in (which steps / actions)?
Who?	Who participates in the spreading process (including planning)?
When?	When does spreading take place? What comes before and after?
How?	Which methods and tools do you use for spreading?
Why?	What happens if fabric is not properly spread?

Activity

2b

20 minutes

Planning spreading

There are different **types of spreads** (or lays), depending on how the lay is constructed, and in which direction it is spread. The type of lay that you will use for spreading should be chosen and planned in advance. In this activity, you will discuss the different types of lays.

Instructions:

1) Together, look at table 4 comparing flat vs stepped spreads below, then discuss:

- Which spread type is simpler? Which takes the most time?
- Which spread type is the most efficient? Which spread type wastes the most fabric and why?

2) Together, look at table 5 showing the three different spreading modes, then discuss:

- For manual spreading, which spreading mode is the simplest? The most difficult? The fastest?
- Which mode saves most time and fabric?
- Which mode should be used for asymmetrical fabrics?

3) Have a participant read aloud the text box below table 5, and make sure everyone understands.

Table 4. Flat vs stepped spreads

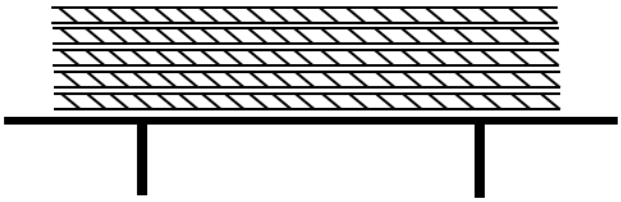
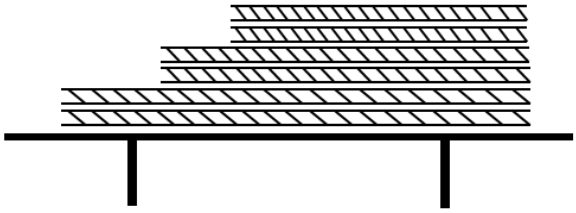
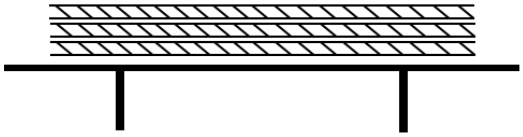
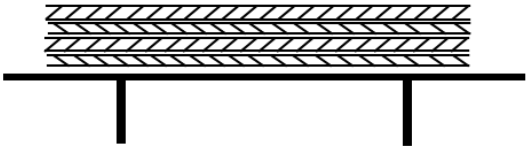
Flat (or "straight")	**Stepped** (or "block")
	
Ply length depends on marker length. All plies have the same length, and only one marker is used. The marker contains all sizes.	Plies have different lengths, and more than one marker is used (one for each step). Each marker contains only one size.

Table 5. The 3 spreading modes	
Spreading mode	**Illustration**
One way spreading The fabric roll is kept on a roller stand and the fabric end is pulled by two spreading operators walking along both sides of the table, then cut (scissors or end cutter). Every layer starts from the same end.	
Face to face spreading Same as one way spreading, but the fabric is folded and held into place, then the next layer is spread onto the previous one. Then, the fabric is cut (scissors or end cutter) near the roll.	
Lap / Zigzag / Continuous spreading The fabric is never cut, and each layer is clamped, then spread onto the previous one.	

Flat spreads are simpler to use, and generate less fabric waste, as only one marker is used, and each marker can fit different sizes, which allows for better marker utilization. **One way** is the most commonly used spreading mode, but **lap laying** is the fastest (no need to cut the plies) and wastes less fabric. Only **one way** can be used for asymmetrical fabrics. It cannot be used for short pile fabrics (e.g. velvet, fake fur, corduroy, etc.), as the plies would slip over each other

Avoid tearing the fabric near the roll during spreading, as the fabric will get damaged and it will cause sizeable end losses. Instead, use scissors or end cutters. Tearing is only recommended in the instance where there is fabric bowing.

Activity

2c

30 minutes

Spreading fabric

Spreading fabric properly and with care is very important to ensure the quality of cut parts and sewn garments. Improper spreading causes fabric shrinkage or distortion. In this activity, you will discuss how to improve spreading quality in your factory.

Instructions:

1) Together, discuss:

- In your factory, do you use manual or mechanical spreading?
- Which tools do you use during spreading?
- Which tools do you use to cut or tear fabric, and why?

2) Together, look at the nine spreading steps in table 6, and put them in the right order by writing a number from 1 to 9 in the column on the right. Solutions are provided at the bottom.

3) Together, read through the list of things to check during spreading to maintain good quality in table 7. Then, brainstorm other things and add them to the list.

4) Together, discuss:

- What happens if plies are not properly aligned?
- What happens if the fabric is too tight or too loose?
- What happens if the fabric is not completely flat or skewed?
- What happens if there is static electricity in the fabric?

To maximize fabric use, the width and length of the spread fabric should be as close as possible to the width and length of the cutting table. This is why it is recommended to use **optimum markers** (6-8 piece markers and drawn to maximize the fabric widths).

The spreading steps listed in this activity are basic operation steps for standard fabrics. The procedures may need to be modified slightly for more synthetic types of fabric (for example to avoid slippage).

Table 6. Spreading procedures	
Steps	**#**
Laying helpers cut the fabric carefully and accurately using end cutters / scissors.	
Laying helpers adjust or remove the tension and wrinkles.	
Fabric length and width is equal to marker length and width (+end allowances).	
Two helpers pull the fabric end away from the frame and spread it on the table.	
The fabric roll is drawn from its package.	
Pattern boards / marker paper is laid onto the spread fabric and fastened.	
The fabric end is secured into place by clamps, pins (on ends loss) or weights.	
The fabric roll is placed on a frame (if applicable).	
Laying helpers work back from the end, aligning the edges.	

Table 7. Maintaining quality

Examples of things to pay attention to during spreading:

- Fabric defects that have not been detected by the storerooms
- Correct tension in the fabric
- The fabric is completely flat
- Plies are correctly aligned
- Correct spread length, type, mode, and height (as according to plan)
- The table is clean and free of sticky tape, stickers, surface damage / deterioration, or any other aspects that can damage the plies.

Results of your brainstorm:

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

Activity

2d

20 minutes

Marking fabric

Once the fabric is properly spread, the marker is laid and fastened onto the top layer, or, pattern pieces are laid onto the fabric according to marker planning, then traced using chalk or pencil before being cut. In this activity, you will discuss **marking** practices.

Instructions:

1) Together, discuss the following questions: In your factory, do you use CAD markers, pre-drawn markers, or do you use pattern boards to mark the fabric for cutting?

2) Together, go through the list of good practices for the method used in your factory in table 8, and put a ✓ in the column on the right if you do these things in your factory.

3) Have a participant read aloud the text box below table 8.

Table 8. Marking fabric	
Good practices	✓
If using CAD markers or hand-drawn markers:	
1. Make sure the marker paper is aligned with the fabric edges, and fasten it to the top layer using clamps.	
2. Make sure the marker paper is laid completely flat on the fabric (no air bubbles or wrinkles).	
3. Do not transfer “sewing markings” such as seam lines and button holes before cutting. This should be done by sewing helpers in the sewing lines.	
4. After cutting, keep the marker paper attached to the stack of cut pieces so that the top layer can be identified for numbering / bundling.	
If using manual marking with pattern boards:	
1. Make sure pattern boards are laid onto the fabric according to the marker plan, and in the correct direction.	
2. Pattern boards should be held down on the fabric to make sure they do not sheet during cutting (for example using weights or clamps).	
3. Mark the fabric only when the pattern board has been fastened / laid onto the fabric in a stable way.	
4. Mark by pressing into and towards the pattern board, marking the fabric and the edge of the pattern equally, to mark as accurately as possible.	
5. Choose a marking tool that will not damage the fabric. Usually, tailor’s chalk or invisible ink pens are the best choices.	

In general, it is recommended to use paper markers rather than tracing pattern boards, as it is more accurate, saves time, saves material and is far more efficient. Nowadays, computer-assisted design (**CAD**) machines are a simple and a cheap way to improve marker efficiency. Computer-assisted manufacture (CAM) can also be employed to cut fabric more quickly and accurately.

Activity

2e

30 minutes

Using lay sheets

A **lay sheet** (or laying sheet), is a form used to plan and record marker planning operations for each style. This is important to help you evaluate and improve marker efficiency. In this activity, you will learn how to fill in and use lay sheets.

Instructions:

1) Together, discuss:

- Do you use lay slips to record / plan marker planning?
- What information should appear on a lay sheet?

2) Have a participant read aloud scenario 1 in table 9. Then, look at the lay sheet in table 10, and make sure everyone understands how it has been filled in for Marker 1.

3) Have a participant read aloud scenario 2 in table 9, and use the information to fill in Marker 2 and 3 on the lay sheet in table 10. Then, calculate and fill in the missing information in the shaded cells.

4) Together, answer the 6 practice questions in table 11. Solutions are provided at the bottom of the page.

Table 9. Using lay sheets

Scenario 1 (Marker 1):
Ritthy prepares the lay sheet for cut order 5494372, processed on Feb 4, 2019, for buyer A&C, on white, solid, open-width fabric, using multi-size open-garment markers, laid on N/E/W marker mode. Planned cut quantity is 1,000 and the buyer allows for up to 5% extra cut, which would be 1,050 pieces.
For Marker 1, the fabric roll is 2500 cm long, 200cm wide, and the marker is 2480cm long, 190cm wide. End loss for length is 20cm, and 10cm for width, including selvage. The size ratio for this marker is 1:2:2:1 (6 pieces marker). There are 50 plies. So, the cut quantity/size is 50S, 100M, 100L, 50XL. The total cut is 300 pieces.

Scenario 2 (Marker 2, 3):

- For Marker 2, the fabric roll is 2500 cm long, 200cm wide, and the marker is 2490cm long, 195cm wide. The size ratio is 2:2:2:2 (8 pieces marker). There are 50 plies.
- For Marker 3, the fabric roll is 2500cm long, 200cm wide. End bit for length is 8cm, and 12cm for width. The size ratio is 1:2:2:1. There are 60 plies.

Table 10. Lay Sheet

Style #	5494372	**Marker mode**	N/E/W
Date	Feb 4, 2019	**Multi / single size**	Multi
Fabric colour	White	**Half / Open garment**	Open
Buyer	A&C Textiles	**Fabric type**	Solid, open-width
Buyer allowance	Up to 5% extra	**Planned quantity**	1,000

Size	S	M	L	XL	**Total**	**Size ratio**	Marker 1	1:2:2:1	6 pcs
Planned quantity	200	300	300	200	1,000		Marker 2	2:2:2:2	8 pcs
Planned + 5%	210	315	315	210	1,050		Marker 3	1:2:2:1	6 pcs

Date	**Marker No.**	Marker length	Fabric length	End loss	Marker width	Fabric width	End loss	**Number of plies**	**Cut quantity**				**Cumulative cut quantity**	**Marker utilization**	**Fabric utilization**
									S	**M**	**L**	**XL**			
Feb 8	1	2480	2500	20	190	200	10	50	50	100	100	50	300	82%	80%
Feb 9	2	2490	2500		195	200		50						78%	75%
Feb 12	3		2500	8		200	12	60						91%	88%
Total		8,562	8,700	138	771	800	29	140		320		210	1,060		

Total fabric area	7,500 x 800 = _____ sqm	**Fabric utilization**	___ %
Total marker area	7,462 x 573 = _____ sqm	**Marker utilization**	___ %

Table 11. Practice questions

1. Calculate the total fabric area and total marker area using the formulas provided (length x width). Write down your answers in the lay sheet above.

Tip: Don't forget to divide answers by 100 to obtain square meters instead of cm!

2. If the total marker area used for garments is 62,000 sqm, what is the fabric utilization (%) for this cut order? Is it good?
   Write down the answer in the lay sheet above.

3. If the total marker area used for garments is 62,000 sqm, what is the marker utilization (%) for this cut order? Is it good?
   Write down the answer on the lay sheet above.

4. What will be total cut quantity for Marker 2? For Marker 3?
   What is the total (cumulative) cut quantity for all markers?

5. The buyer allowed for up to 5% extra cut allowance. What is the total cut quantity for size S? Will the buyer accept this quantity?

6. The buyer allowed for up to 5% extra cut allowance. What is the total cut quantity for size L? Will the buyer accept this quantity?

Solutions: 1. Total fabric area = 60,000 sqm; Total marker area = 42,757 sqm; 2. Fabric utilization = 97%, Yes; 3. Marker utilization = 69%, No; 4. Marker 2 = 400, Marker 3 = 360, Total = 1,060; 5. Total for S = 210, Yes because 200 + 5% allowance = 210; 6. Total for L = 320, No because 300 + 5% allowance = 315.

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 plan the spreading process, spread and mark fabric, and record lay and cut operations more efficiently and precisely.

Planning spreading

Spreading fabric

Marking fabric

Recording spreading

In this session, you will think of ways to apply your new knowledge to improve your spreading procedures by reviewing best practices and drafting your own action plan.

A lay sheet template is 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 fabric spreading practices as a next step for evaluating your own and implementing improvements.

Instructions:

1) Together, look at the list of best practices in table 12, and put a ✓ in the column on the right if you use these practices in your factory.

Table 12. Spreading fabric

Best practices	✓
1. The type of spread and spreading mode is determined in advance based on the type of fabric that needs to be spread and cost considerations.	
2. Laying helpers understand the different types of spreads and spreading modes and can use them accordingly.	
3. Laying helpers are well-trained in spreading procedures, and know how to maintain quality and detect / avoid defects during spreading.	
4. Helpers make sure that the marker paper is laid accurately and fastened onto the fabric using clamps prior to cutting.	
5. Marker and lay planning details (including efficiency) and cut information are recorded using lay sheets.	
6. Lay sheets are used to evaluate marker efficiency across cut orders, and identify potential improvements.	

Activity

3b

15 minutes

Your action plan

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

Instructions:

1) Together, fill in the action plan (table 13) 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 13. Spreading fabric – Action Plan				
Problem identified				
Solutions identified	**Action(s) to be taken**	**Person responsible**	**By when?**	**How will improvements be measured?**

Spreading fabric

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FIT is being piloted in Asia under the regional Decent Work in the Garment Sector Supply Chains in Asia project funded by the Government of Sweden.

Decent Work Technical Support Team for East and South-East Asia and the Pacific

United Nations Building, 10th Floor
Rajdamnern Nok Avenue,
Bangkok 10200, Thailand
Tel.: 662 288 1234 Fax. 662 288 3058
Email: BANGKOK@ilo.org

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