International Labour Organization

Marker planning

Cutting room operations

Factory Improvement Toolset

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Table of Contents

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 Marker planning is a training for garment manufacturers to improve cutting room operations. Participants will work on optimizing marker planning. This module takes about 2 hours to complete.

Upon completion of the training, participants should have:

- Understood the different types of markers and marker modes
- Understood how to use them to maximize marker efficiency and minimize fabric waste.

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	**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

Indicator 2	**Marker utilization (%)**
Definition	The proportion of the marker area that is actually used for garments. It is calculated for each cut (for each marker). The higher the utilization, 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 marker area in *sqm*) x 100% Notes: Marker area used for garments = Fabric (in sqm) actually used for garments Total marker area = Marker length (mts) x Marker width (mts)
Frequency	Calculate for each marker, then calculate the monthly average for 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 quality marker planning 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.

Huynh is a new senior marker maker at the HS garment factory. He reports to the merchandising department but works in the cutting room. During his first week at the factory, he spots several problems. Marker makers use short markers, as they believe it helps them work faster. They only lay one garment size for each marker to make it easier to track production. This wastes a lot of fabric, as shorter, one-size markers actually consume more fabric. Also, workers always lay the same amount of fabric layers (plies) without paying attention to how thick or thin the fabric is, and to how many garment pieces are needed to complete the order.

To solve these problems, Huynh tells the marker makers to make the markers as long as possible (as long as the cutting tables), and combine different sizes of pattern pieces together in order to fit as many pieces as possible on the marker. Then, he teaches them how they can calculate the ideal number of plies to reach a good lay height.

Thanks to these changes, fabric use is maximized, and fabric waste is minimized for each lay. This saves HS factory hundreds of dollars in fabric costs. Although marker drawing takes more time, cutting operators can cut more pieces for each lay. So, overall, cutting room operations became more efficient than before.

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

Table 1. Questions about Huynh's situation
1. What problems has Huynh identified? What impact do these problems have on the factory and its workers?
2. What does Huynh do or change in order to solve these problems?
3. What are the results of Huynh'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 your marker planning operations and understanding key words.

Understanding and comparing different types of markers.

Discussing how to choose the ideal number of plies when planning markers.

Discussing how to choose the ideal marker mode when planning markers.

Session 2

Overview

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

90 minutes

Learning manual, pens, and markers

This training module aims to help you improve the way your cutting room operates by focusing on marker planning. Marker planning is the process of determining the most efficient arrangement of pattern pieces on the fabric to be cut for each order. Good planning helps avoid fabric waste by ensuring that maximum fabric is used, and minimum fabric is wasted. Throughout this module, you will work on the three steps below.

Selecting **marker type**

Selecting **lay height**

Selecting **marker mode**

First, you will discuss your marker planning operations, then learn more about the different types of markers, and how to properly select marker type, lay height, and marker mode to maximize marker efficiency.

Activities

Activity
2a

20 minutes

Understanding markers

Marker planning is very important for production. Good, efficient markers can help your factory save a lot of money! In this activity, you will discuss marker planning practices 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 column on the right. Solutions are at the bottom of the page.

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

Table 2. Important words

a. Marker	b. Marker planning	c. Marker mode	d. Ply	e. Lay height
Process of deciding the arrangement or combination of markers and spread lays for a particular cut order.				
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 piece of fabric.				
It describes the direction in which the pattern pieces are laid onto the fabric to be cut.				
Layer of fabric that is spread on the cutting table as part of the spread / lay. The marker is spread onto the top layer.				

Solutions: b – e – a – c – d

Table 3. Marker planning	
What?	Which type of markers are used in your factory? Do you use computerized (CAD), or manual (hand-drawn) markers?
Who?	Who is in charge of marker planning? In which department?
When?	When does marker planning take place? What comes before and after?
How?	Do you record marker planning? If so, how?
Why?	What happens if marker planning is not properly carried out?

Although Marker planning is generally done in the cutting room, it is better if the person in charge of Marker planning reports to the **merchandising** department. This helps control and keep track of consumption, and thereby saves material.

Activity

2b

30 minutes

Selecting the right marker

Marker planning begins with selecting the right type of markers. **Markers** are arrangements of pattern pieces for a specific style and the sizes to be cut from a single piece of fabric. The more pattern pieces can be fit into a marker, the more efficient the marker. In this activity, you will learn about different types of markers.

Instructions:

1) Markers can vary in length and width. Together, look at the image and explanations in table 4, then answer the three questions on the next page by circling the correct answer.

2) Together, look at table 5 comparing single vs multi size markers on the next page, then discuss:

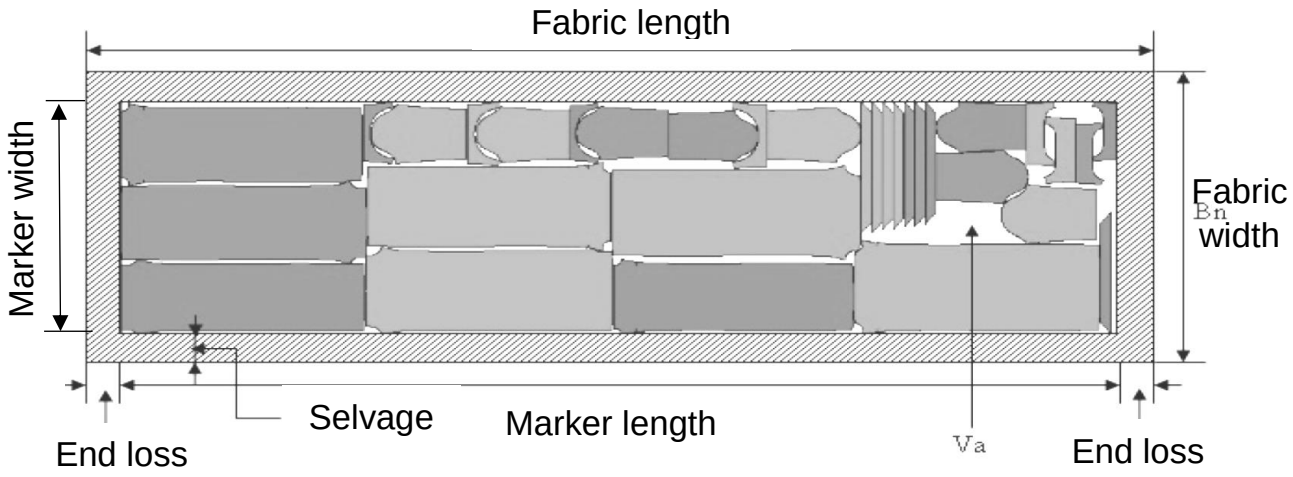
- Which type allows you to fit the most pattern pieces?
- Which type is the most efficient?

3) Together, look at table 6 comparing half and whole garment markers on the next page, then discuss:

- Which type is better for symmetric garments? For asymmetric garments?
- Which type is better for folded fabrics? For non-folded (“open-width”) fabrics?

4) Have a participant read aloud the text box below table 6 and make sure everyone understands.

Table 4. Marker length & width



End loss is the amount of fabric that is wasted at the ends, as the marker cannot cover the fabric on its whole length.
Selvage is the pin marks present on both edges (width) of the fabric roll, caused during the fabric manufacturing process. This part of the fabric cannot be used.

1. Which type of marker allows you to minimize end loss?
   a. Short, narrow markers b. Long, wide markers

2. Which type of marker allows you to fit the most pattern pieces?
   a. Short, narrow markers b. Long, wide markers

3. Which types of marker are the most efficient?
   a. Short, narrow markers b. Long, wide markers

Table 5. Single-size vs multi-size markers

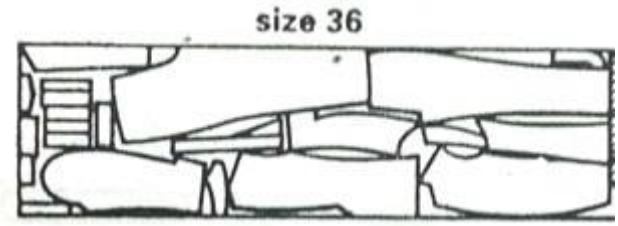
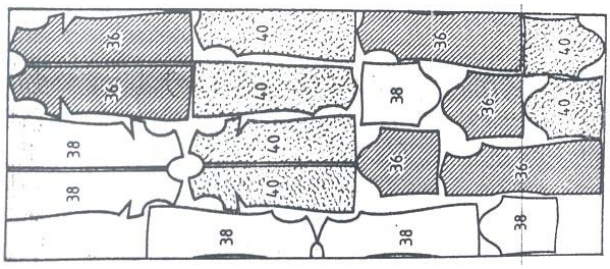
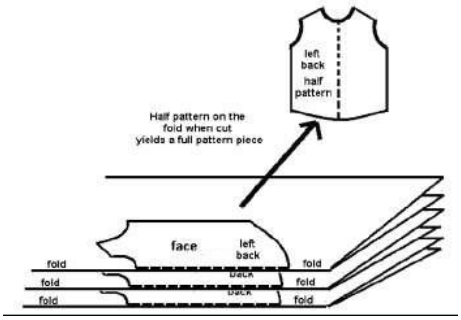
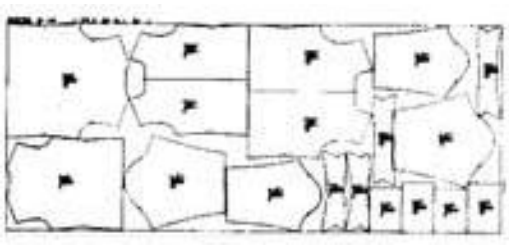
Single-size (or "section")	**Multi-size** (or "continuous")
 The marker contains all garment pieces for one style in only one size.	 The marker contains all garment pieces for one style in all sizes.

Table 6. Half vs whole garment markers	
Half-garment (or “closed”)	**Whole-garment** (or “open”)
 The marker only contains pattern pieces of half a garment (right side for example).	 The marker contains pattern pieces for the whole garment (right and left side).

Long, **wide, multi-size** markers are the most efficient. They minimize end loss, and fit more pattern pieces. Actual fabric width must be obtained from the stores to ensure marker width equals fabric width minus selvage. Half-garment markers are better for folded and symmetrical fabrics, whereas whole-garment markers are better for open-width and asymmetrical fabrics.

Activity

2c

25 minutes

Selecting the right lay height

Marker planning (or lay planning, or marker making) is the process of deciding the arrangement or combination of markers and spread lays for a particular cut order. There are two important factors to consider: lay height, and marker mode (or lay plan). In this activity, you will learn how to optimize marker planning by selecting the right lay height.

Instructions:

1) Together, discuss:

- Do you remember what lay height is? What does it depend on?
- Is there a maximum or minimum layer height in your factory?

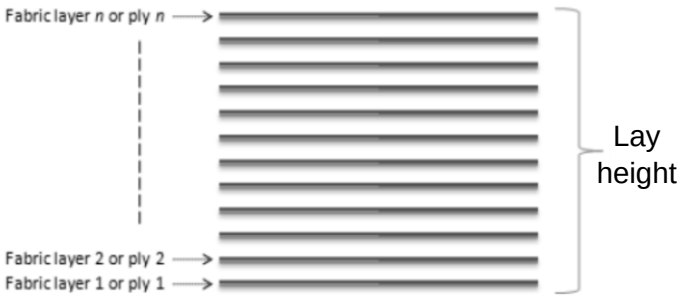
2) Have a participant read aloud the information about lay height in table 7. Then, discuss the three questions in the table.

3) Together, read the scenario in table 8, then answer the four questions in the table. Solutions are at the bottom of the page.

Table 7. Lay height

Lay height depends on the number of plies. The ideal number of plies is the minimum number of fabric plies required to complete a cut order as fast as possible. When choosing the number of plies, pay attention to:

- Fabric thickness, type and weight,
- Height of cutter/knife,
- Cut order (number of garments of each size)



1. How do you select the number of plies (layers of fabric) to be laid when planning for cutting in your factory?

2. Why should you consider fabric thickness, type and weight when deciding on the number of plies?

3. Why does it waste fabric when there are too many plies? Tip: Think about end loss.

Table 8. Scenario

Scenario:
According to cut order #92847, the cutting room needs to cut 6,000 dresses in style A. With efficient marker making, 20 dresses can be cut from each fabric ply. Fabric thickness is 0.05 inches. Cutting knife height is 8 inches.

1. How many fabric plies are needed to cut 6,000 dresses?

2. What will total lay height be, taking into account fabric thickness and number of plies?

3. If cutting knife height is 8 inches, is the lay height too low? Too high? Just right?

4. What could you do to make sure total lay height is appropriate?

When making markers, other factors are relevant to ensure marker efficiency, such as fabric type. To learn more about this, ask your facilitator for the "**Ensuring marker efficiency**" module.

Solutions: 1. 300 plies; 2. 15 inches; 3. Too high; 4. Adjust to knife height by reducing number of plies

Activity

2d

25 minutes

Selecting the right marker mode

Marker planning (or lay planning, or marker making) is the process of deciding the arrangement or combination of markers and spread lays for a particular cut order. There are two important factors to consider: lay height, and marker mode (or lay plan). In this activity, you will learn how to optimize marker planning by selecting the right marker mode.

Instructions:

1) Together, discuss: What is a marker mode? Which marker modes do you use in your factory?

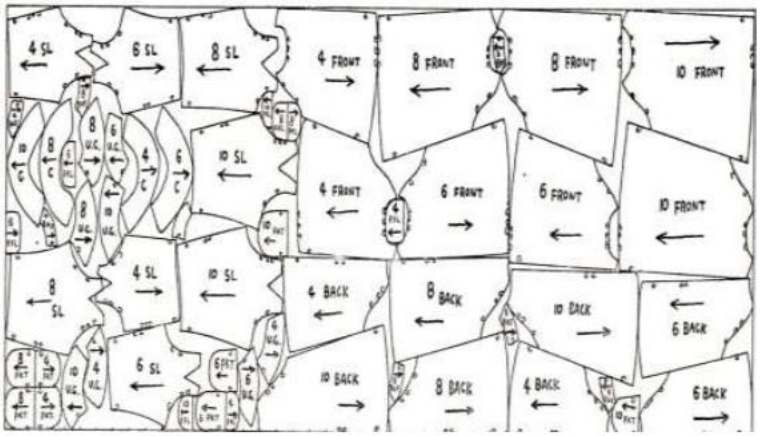
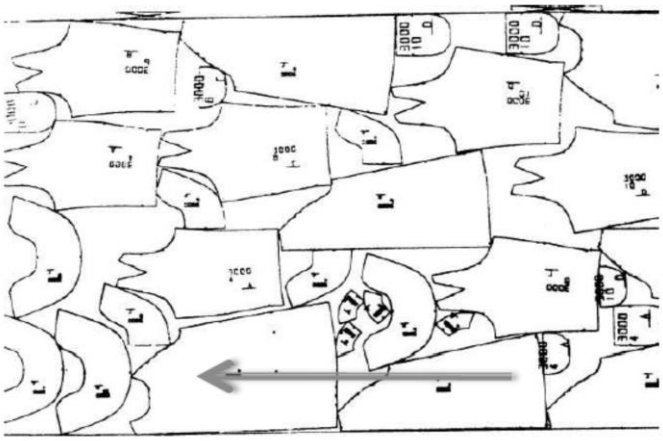
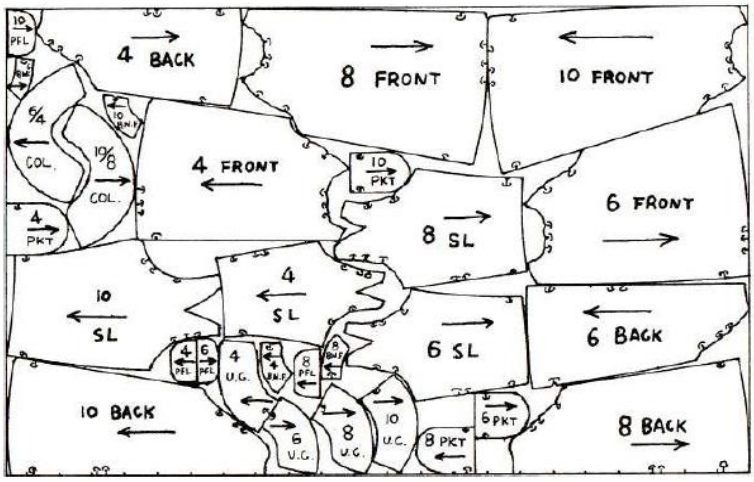
2) There are 3 different marker modes that factories typically use. Together, look at table 9, and match each description (on the left) with the correct image (on the right).

3) Together, discuss:

- Which marker mode yields the best quality?
- Which marker mode yields the highest efficiency? The lowest?
- Which marker mode should be used for asymmetrical fabrics?

4) Have a participant read aloud the text box below table 9 and make sure everyone understands.

Table 9. Marker modes

Marker mode	Image
Example: **Nap One Way (N/O/W)** All the pattern pieces are placed in one same direction.	
Nap Either Way (N/E/W) Pattern pieces are placed in any direction depending on wherever they fit best.	
Nap Up & Down (N/U/D) Each size is placed in a different direction.	

The marker mode you choose depends on the desired results:
N/O/W → Highest quality, lowest efficiency, needed for asymmetric fabric
N/E/W → Highest efficiency
N/U/D → Moderate quality, moderate efficiency

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 proceed to marker planning in a way that maximizes fabric utilization and minimizes fabric waste.

Selecting **marker type**

Selecting **lay height**

Selecting **marker mode**

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

Activities

Activity
3a

5 minutes

Best practices checklist

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

Instructions:

1) Together, look at the list of best practices in table 10, and put a ✓ in the column on the right if you use these practices in your factory.

Table 10. Marker planning

Best practices	✓
1. Marker planning is done by a specialized marker maker.	
2. The person in charge of marker planning coordinates with merchandising to ensure appropriate consumption.	
3. Long, wide, markers are used to maximize fabric utilization. Short markers are drawn to use the segments of fabric rolls left over.	
4. Long, wide cutting tables are used to maximize marker length.	
5. Multi-size markers are used to maximize fabric utilization.	
6. The ideal number of plies (lay height) is calculated in advance based on the cut order content, fabric type, and cutting knife height.	
7. The N/E/W marker mode is used to maximize efficiency.	

Activity

3b

15 minutes

Your action plan

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

Instructions:

1) Together, fill in the action plan (table 11) 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 11. Marker planning – Action Plan				
Problem identified				
Solutions identified	**Action(s) to be taken**	**Person responsible**	**By when?**	**How will improvements be measured?**

Marker planning

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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.

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