International
Labour
Organization

Setting new lines

Sewing 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 Setting new lines is a training for garment manufacturers to improve sewing room operations. Participants will work on arranging workstations, allocating and training operators. This module takes about 2.5 hours to complete.

Upon completion of the training, participants should have:

- Learnt how to allocate the best workers to the lines and how to draw a flow plan.
- Discussed best practices in terms of preparing workstations.
- Learnt how to identify training needs and train workers adequately.
- Identified ways to reduce line-setting time.

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 sewing room series.

Indicator 1	Target achievement (%)
Definition	The percentage of the daily production target that was achieved (that was actually sewn in terms of good production). It can be calculated separately for each line, or for all lines together. The closer to 100%, the better.
Purpose	To understand how efficiently each sewing line operates, how realistic production targets are, and begin to identify how to improve efficiency in the sewing room.
Calculation	(# pieces produced today / daily production target) x 100% Notes: The daily target should be based on the SMV, and line efficiency discounted. Target = (working hours x 60 / SMV) x line efficiency %
Frequency	Calculate daily (for each line or all lines), then calculate a monthly average.
Responsible	Sewing room manager, Line supervisors

Indicator 2	Work-in-progress (WIP)
Definition	The amount of pieces that have not been completed yet, and are being sewn or waiting in between two work stations. It is calculated separately for each line, or for all lines together. Very low and very high WIP are both signs that lines are not well balanced.
Purpose	To understand how efficiently your sewing lines operate and how well the lines have been balanced, and begin to identify how to better balance sewing lines and improve their efficiency.
Calculation	Total # of pieces fed to the line – Total # of pieces sewn by the line Notes: Total # of pieces fed or sewn refers to the total # of pieces fed or sewn for one specific order, in one specific line.
Frequency	Calculate daily (for each line or all lines), then calculate a monthly average.
Responsible	Sewing room manager & line supervisors


TEAM
4
TARGET
2311
SP/ 30
SLEEVE/ 50
FRONT/ 99
BELT/CO 30

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 setting new lines in an organized way 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.

Sopheak is a new sewing room manager at the HS garment factory. She finds out that the factory takes two full days to set new lines, which delays production and makes the factory less productive. Workers from each team are randomly allocated to a work station on line-setting day, without consideration for their skills. As a result, training takes more time as many operators need to learn a new operation. Lastly, machines are not arranged on stations according to the operation breakdown (sequence of operations). Operators sometimes need to get up and walk to another station to get the needed cut parts. Machines are not checked before line-setting, and operators sometimes find out that their machine is malfunctioning.

To solve these problems, Sopheak meets with line supervisors, and agrees on new rules for line-setting with them. From now on, work stations will be arranged in a line according to the operation breakdown, and machines will be tested by mechanics before line-setting. Operators will be allocated to stations based on their skills and performance, and training needs will be assessed in advance.

Thanks to these changes, line-setting time has been reduced to about one day. This frees up time for production. Mistakes and malfunctions are also avoided, which avoids material waste.

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

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

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JUKI

Session 2

Learning about the topic

Goals

Learning how to allocate workers to operations based on skills and performance using a skills matrix.

Discussing how to arrange and prepare work stations in a systematic way to avoid mistakes and failures.

Learning how to identify training needs before line-setting and how to organize trainings.

Discussing solutions to efficiently reduce line-setting time.

Session 2

Overview

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

100 minutes

Learning manual, pens, and markers

This training module aims to help you improve the way your sewing room operates by focusing on line setting. Line setting is the process of preparing machinery and workers based on the operation bulletin and line plan, before starting production for a new style order. Adequate line setting makes your sewing room more productive and improves quality by ensuring that production runs smoothly and that operators perform well. Throughout this module, you will work on the four steps below.

Allocating workers

Preparing work stations

Training workers

Reducing line-setting time

First, you will learn how to allocate operators to each work station in a systematic way. Then, you will discuss how to draw a flow plan and prepare work stations accordingly, and train workers when needed. Finally, you will discuss how to reduce line-setting time for better efficiency.

Activities

Activity
2a
30 minutes

Allocating workers

Workers should be **allocated** to a workstation before you start production and based on the operation bulletin. Allocating workers well will reduce the time you need to spend training them! In this activity, you will learn how to properly allocate workers.

Instructions:

1) To better allocate operators, you can use a skills matrix. Together, read the explanations in table 2. Then, look at the example of a matrix in table 3, and make sure everyone understands.

2) Together, discuss, then fill in the "operator name" column of the operation breakdown in table 4 by allocating workers to each operation based on table 3. Solutions are at the bottom of the page.

3) Sometimes, highest performance isn't the best choice. Together, discuss the four questions in table 5 and circle the correct answer. Then, compare with the solutions at the bottom of the page.

Table 2. Skills matrix

A **skills matrix** indicates the skills (operations they can perform) and performance (efficiency) of each operator in a line. It helps allocate workers and identify training needs. A grade tells you what percentage of the hourly target the operator can achieve for a specific operation. For instance:

Grade A: The operator achieves 100% of the hourly target for this operation.
Grade B: The operator achieves 60% of the hourly target for this operation.
Grade C: The operator achieves 40% of the hourly target for this operation.

Production targets are individual. So, if the hourly target is 100 pieces, a grade A operator will have a personal target of 100 pieces per hour, whereas a grade B operator will have a personal target of 60 pieces per hour.

Operators should be allocated to work stations based on **2 criteria**:
- Skills (operation) required and machine type to be used
- Performance required to reach target

Grades can be determined for each operator by doing a time study and comparing their SMV with 100% efficiency SMV. To learn more about time studies and SMV, ask for the “Making an operation bulletin” module.

Table 3. Skills matrix

Operator name	Operation	Shoulder join	Neck rib tuck	Neck join	Label make	Back neck binding	Front neck top
	Machine	OL	LS	OL	LS	FL	FL
Anna		B	A				
Bim		A	B	C			
Neha			C				A
Chy				A	C		
Dora					A		
Eli				A	A		
Faran						B	B
Gani				B		C	B

An **operation breakdown** is a list of all operations needed to make a style, together with estimated time, labour, and machine requirements. To learn more about how to make an operation breakdown, ask for the “Making an operation bulletin” module.

Table 4. Operation breakdown

#	Operations	Machine type	# of operators	Operator names
1	Shoulder join	Over lock	1	
2	Neck rib tuck	Lock stitch	1	
3	Neck join	Over lock	2	
4	Label make	Lock stitch	1	
5	Back neck binding	Flat lock	1	
6	Front neck top	Flat lock	1	

Solutions: 1. Bim will produce 100%. 2. Anna will produce 100%. 3. Chy & Eli will both produce 100%. 4. Dora is available and can achieve 100%. 5. Faran will produce 60% and Gani 40%, so assign them both to reach 60+40 = 100%. 6. Neha will produce 100%.

The operation breakdown tells you how many operators are needed for each operation. But, depending on your operators' skills and performance, you may need more. For instance, you may need one B-grade and one C-grade operator if no A-grade operator is available!

Table 5. Allocating workers

1. Operator P is A grade (100%), and operator Q is B grade (60%) for operation #6. If hourly production target is 100 pieces, how many pieces can they each produce in one hour?
    a. Operator P will produce 60 pieces and operator Q will produce 40 pieces.
    b. Operator P will produce 100 pieces and operator Q will produce 60 pieces.
    c. Operator P will produce 60 pieces and operator Q will produce 100 pieces.

2. Line manager Amit needs an operator for operation #7. Operator Q is B grade (60%); Operator R is B grade (60%); Operator S is C grade (40%). Which one(s) should Amit pick?
    a. Operator Q
    b. Operators R & S
    c. Operators Q & S

3. What will happen if Amit picks only operator R?
    a. There will be a bottleneck at this workstation as operator R works too slowly.
    b. Work-in-progress will pile up at the next workstation as operator R works fast.
    c. Production will be faster than planned.

4. What will happen if Amit picks operator Q?
    a. Production will speed up.
    b. Production will slow down.
    c. Production should go along as planned to reach targets.

Even if you have already selected and allocated suitable operators to each workstation, you may need to reallocate operators on line-setting day, for example in case of absenteeism, or turnover. If you have a skills matrix, it will be easy to identify a suitable worker quickly.

Solutions: 1. b). 2. Both b) and c) are correct. 3. a). 4. b).

Activity
2b

20 minutes

Arranging work stations

Once you have selected suitable operators, you can move on to **setting up work stations**. This needs to be done according to a pre-drawn flow plan based on the operation breakdown. In this activity, you will learn how to arrange work stations efficiently.

Instructions:

1) Together, draw a flow plan using the template and the operation breakdown in table 6. Use operation # and arrows to show the flow.

2) Together, discuss: What do you need to prepare when setting work stations? Brainstorm, and write your answers in table 7.

3) Together, read the best practices for setting workstations in table 8, and put a ✓ on the right if you apply them in your factory.

Make sure that the flow is always **unidirectional** and moving **forward** (no back-tracking). It should also be **logical**. For example, if there are two work stations for one operation, move the tables so that bundles can be fed to them easily.

#	Operations	# of machines
1	Shoulder join	1
2	Neck join	2
3	Back neck binding	3
4	Front neck top	1
5	Back neck top	2
6	Sleeve hem	1
7	Sleeve join	2
8	Side seam	3
9	Sleeve tuck	1
10	Body hem	2
	Total	20

Table 6. Flow plans

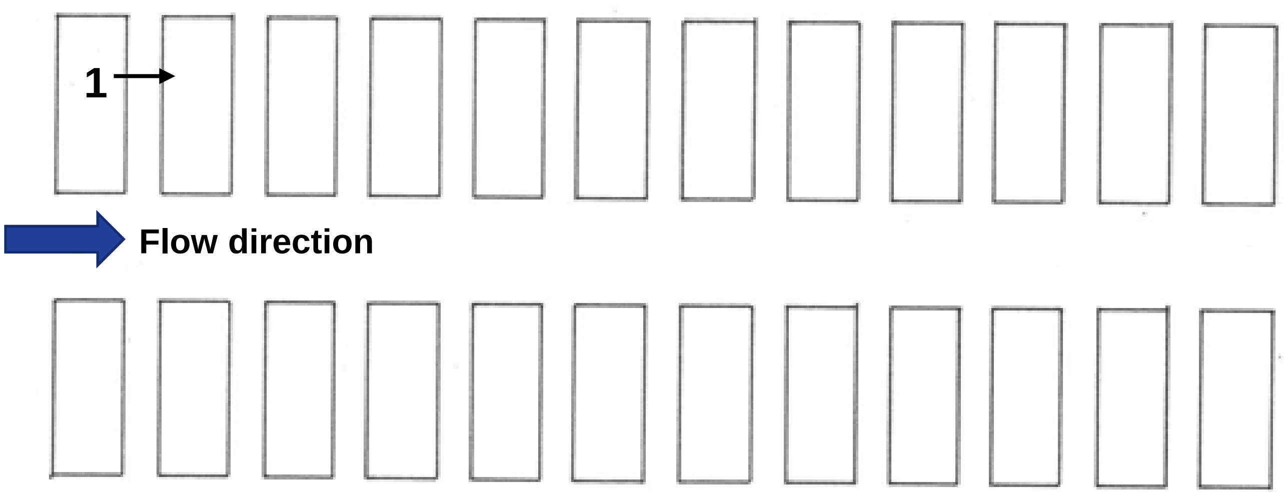

Table 7. Setting workstations
What are the things that you need to prepare when setting workstations? Write down the results of your brainstorming below. Example: Sewing aids.

Table 8. Best practices	
Best practices	✓
1. Make sure mechanics have received the style analysis (operation bulletin) and flow plan a few days before line-setting.	
2. Start setting workstations only if all trims have been received in the stores and bundles are available for issuing in the cutting room.	
3. Mechanics should refer to the operation bulletin to know how many of which machines, tools and aids are needed.	
4. Mechanics should refer to the flow plan to know where to place which machines, tools and aids.	
5. Ensure all machines are tested and function well before setting them on the workstations. Also ensure correct needles are intact.	
6. Ensure that there is enough space for workers to perform their operation well and for workers and supervisors to move around the line.	
7. Verify that there are enough bins and bundles trolleys / baskets at and between all workstations.	
8. Have the mechanics set up workstations outside of production hours to save time if possible.	
9. If work stations can't be set up outside of production hours, brief your workers on style, operations, daily targets and line duration during line-setting.	

Activity

2c

20 minutes

Training workers

Sometimes, workers need be **trained** on line-setting day, for example because they are new, or you could not find someone with suitable skills. In this activity, you will learn how to efficiently train workers.

Instructions:

1) Together, discuss: Do you often need to train workers during line-setting? How do you train them?

2) Have a participant read aloud the four important questions for preparing training in table 9 and the text box below it. Then, discuss: Do you take these questions into account when training workers?

3) Have a participant read aloud the two scenarios in table 10. For each scenario, discuss the four questions and write down your answers in the box. Solutions are at the bottom of the page.

Table 9. The four questions

Who?	Which workers need to be trained?
What?	What operations should each worker be trained to do?
When?	Who should be trained first and why?
How?	Who should train each worker?

You can identify **training needs** based on the skills matrix, when you allocate workers to workstations (operations). Remember: The less training is needed, the shorter line-setting time will be.

To learn more about how to organize and provide trainings for workers, ask for the "Training workers" module!

Table 10. Training workers

Scenario 1 Line manager Anna has identified that during the next line-setting, three workers will need training. Mia and Vijay are new workers and need to learn the neck join operation. Thuy is replacing an absent worker and needs to learn the back neck top operation. Production will start as soon as the workstations are ready to avoid delays. According to the operation breakdown, neck join comes before back neck top. Anna knows all the operations and can train everyone. There is another skilled operator (Mario), who is also assigned to back neck top.	
Who?	
What?	
When?	
How?	
Scenario 2 Based on her worker allocation plans, line manager Elda has noticed that two of her workers, Khem and Ploy, have not been trained to use the new machines for the operations they have been assigned to (neck join). For this, the mechanic's help may be needed. Another worker, Ali, is new and unfamiliar with his operation (label make), which is simple. In the operation breakdown, neck join comes before label make. Elda knows how to perform all operations, and can operate the new machine as well.	
Who?	
What?	
When?	
How?	

Solutions – 1: **Who?** Mia, Vija, Thuy. **What?** Mia & Vijay → Neck join; Thuy → Back neck top. **When?** Mia & Vijay, because their operation comes first. **How?** Anna can train everyone, but they will save time if Mario trains Thuy while Anna trains Mia and Vijay.

Solutions – 2: **Who?** Khem, Ploy, Ali. **What?** Khem, Ploy → new machine; Ali → Label make. **When?** Khem & Ploy, because their operation comes first. How? Elda can train everyone. The mechanic can advise on the new machines during training.

Activity

2d

30 minutes

Reducing line-setting time

Setting a new line well is very important for productivity and quality. But, if it takes too much **time**, it lowers productivity. Ideally, it should not take more than one day. In this activity, you will discuss ways to reduce line-setting time while ensuring it is done adequately.

Instructions:

1) Together, discuss:

- How long does it typically take to set a line in your factory?
- Is this enough / not enough / too much time? Why?

2) Together, brainstorm: What causes higher line-setting times? Write down your ideas in table 11.

3) Together, read through the list of common causes for high line-setting times in table 12 (left column). Then, discuss: Does this happen in your factory? If so, circle it in the table.

4) Together, read through the list of solutions to reduce time in the third column, then match each one with the cause it would best address in the first column by writing down the corresponding letter in the second column. Solutions are at the bottom of the page.

Table 11. Line-setting delays
Write down the results of your brainstorm below. Example: Materials have not been received yet.

Table 12. Reducing line-setting time

Cause of delay	Letter	Solution
Bundles are only fed to the lines once all operators are ready.		A. Perform a style analysis and operation breakdown before starting production to correctly assess skills and time requirements.
All cuttings and trims needed have not be received and fed to the lines yet.		B. Based on the operation bulletin, assign operators to each operation and draw a flow plan before line-setting and feeding.
The operation breakdown has not been done, so skills and time requirements have not been assessed.		C. Break down the first 5 to 10 bundles during line feeding so that these bundles can reach the end of the line more quickly.
Operators are absent.		D. Assess skills requirements during the operation breakdown, and select operators accordingly
Operators do not have the right skills for the operation they need to perform.		E. .Ensure that operators selected are (will be) present during line-setting.
Setting the lines takes longer because machine setting is done at the same time as training.		F. Start line planning only after trims and fabric have been received in the stores; Make sure you request materials in time for production.
Setting the machines takes longer because of machine failure or poor maintenance.		G. Start feeding the bundles once the first or first few operators of the line have been trained to avoid delays due to operators sitting idle.
Bundle size is too big, and it creates a bottleneck as operators are slower at the start.		H. Assign a mechanic (or at least an assistant) to each line who is familiar with the machines, so that he/she can act quickly in case a problem arises.
Operators have not been pre-selected and there is no pre-drawn flow plan before line-setting day.		I. Set up all necessary machines, tools and equipment in advance, outside production hours if possible. Test them before setting up to avoid wasting time replacing defective ones.

Solutions: G, F, A, E, D, I, H, C, B.

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 allocate and train workers and arrange work stations for more efficient, quicker line-setting.

Allocating workers

Preparing work stations

Training workers

Reducing line-setting time

In this session, you will think of ways to apply your new knowledge to improve line-setting in your sewing room by reviewing best practices and drafting your own action plan.

Skills matrix and line layout 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 line-setting 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. Setting new lines	
Best practices	✓
1. Operators are selected before line-setting and feeding starts.	
2. Operators are allocated to work stations based on their skills and performance.	
3. A skills matrix is available and updated regularly to record workers' capacities (skills & performance).	
4. Work stations are prepared based on a pre-drawn flow plan, designed based on the operation bulletin.	
5. Potential reasons for line-setting delays are identified and eliminated in advance based on a checklist prepared by the line supervisor.	
6. Line-setting time is kept to one day maximum.	

Activity

3b

15 minutes

Your action plan

In this activity, you will think of ways to apply your new knowledge to improve line-setting 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. Setting new lines – Action Plan				
Problem identified				
Solutions identified	**Action(s) to be taken**	**Person responsible**	**By when?**	**How will improvements be measured?**

Setting new lines

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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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