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নির্ভরতার
গ্যারান্টি



Lean Tools Implementation at APFL

"Lean is about making small changes that add up to big results."



Report Preparation & Guidelines by

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Why to become Lean?

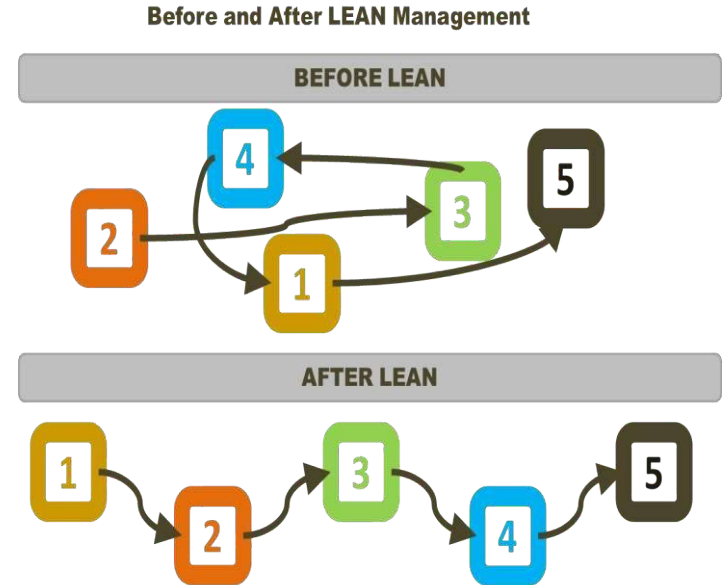
What is Lean?

Lean is a systematic method for eliminating waste within a manufacturing system. It focuses on improving efficiency, quality, and customer satisfaction. Lean principles can be applied to any type of business, but they are most commonly used in manufacturing.

Why is APFL factory implementing Lean?

APFL factory is implementing Lean to improve its efficiency and reduce costs. Lean can help to:

- Reduce waste by identifying and eliminating non-value-added activities
- Improve quality by reducing defects and improving product consistency
- Increase productivity by streamlining processes and reducing cycle times
- Shorten lead times by improving the flow of materials and information
- Improve customer satisfaction by delivering products and services on time and to the customer's specifications



02

Lean Tools Implemented at APFL

List of Lean tools that are being implemented at APFL factory

- **5S:** A method for organizing and maintaining a workplace (Implemented at Solvent Cement Floor)
- **Kanban:** A visual system for managing work (Implemented at Solvent Cement Floor)
- **Kaizen:** A process of continuous improvement (at Pipe & Fittings Production Process)
- **SMED:** *It can help to reduce die change time, improve efficiency, and increase productivity. (Implemented at Pipes Production Machines)*
- **VOC:** *is the feedback that customers provide about their experiences with a product or service.*



03

Implementation Plan

Lean implementation plan for APFL factory:

Phase 1: Preparation

After assessing the current production processes and production floor conditions ,we preliminary selected four Lean tools : 5S,KANBAN,KAIZEN and SMED to implement at APFL factory

Phase 2: Implementation

Begin implementing Lean tools and methods in selected areas. For example, we implemented 5S tool on Solvent cement production floor .

Phase 3: Sustainment

- Continue to monitor progress and make adjustments as needed.
 - Standardizing Lean tools and methods.
 - Providing continuous training on Lean.

04

Before-After Scenario Analysis

Scenario based Lean Tool Implementation-5S

5S is a workplace organization method that uses a five-step process to create a more efficient and productive work environment. The 5S's stand for:

- **Sort:** Identify and remove unnecessary items from the workspace.
- **Set in Order:** Organize the remaining items in a logical and efficient way.
- **Shine:** Clean and inspect the workspace regularly.
- **Standardize:** Create and maintain standards for 5S activities.
- **Sustain:** Continuously improve and maintain 5S practices.

We Implemented **5S** at APFL factory production floor under the supervision of **5S team** that helped to reduce the cycle time of production and helped to standardize the process **as shown in upcoming slides**. In few cases the 5S's tool is enhanced by adding another extra 'S' that refers to Safety.

5S Committee

Ref: APFL/Factory/HR & Admin/2023/208

Date: 5/10/2023

Notice

We are pleased to announce that we have formed a 5S Implementation Committee to oversee the planning, execution and maintenance of the 5S program in our organization. The 5S program is a set of techniques to improve our workplace organization, efficiency and safety by following the five principles of Sort, Set in order, Shine, Standardize and Sustain.

The 5S Implementation Committee consists of representatives from all levels and departments of our organization. The committee members are:

Sl	Name	Department	Designation	Designation (Committee)
1	Md.Shariful Islam	Production	AGM (Lead-Factory)	President
2	Md. Abu Hasnath	Electrical	Deputy Manager	Member
3	Md. Rasel Molla	QC & RnD	Deputy Manager	Member
4	Md. Yasin Bhuiyan	Production	Deputy Manager	Member
5	Sabbir Ahmed	HR & Admin	Senior Officer	Member
6	Md Abdullah	Utility	Officer	Member
7	Dewan Hafiz Nabil	Production	Trainee	Member
8	Sifat Ajmeer Haque	Production	Trainee	Member

The committee will be responsible for:

1. Assess and analyze the current state of the organization's workspace and identify areas for improvement.
2. Develop and implement a comprehensive 5S implementation plan, including specific goals, timelines, and resources required.
3. Communicate and educate employees about the benefits and objectives of the 5S methodology.
4. Conduct regular audits and inspections to ensure compliance with 5S practices and identify areas that need further attention or improvement.
5. Coordinate and facilitate team meetings and training sessions to train employees on the principles and techniques of 5S.
6. Continuously monitor and evaluate the effectiveness of the 5S implementation, and make adjustments or improvements as necessary.

We hope that all staff will support and cooperate with the 5S Implementation Committee to make our workplace a better place to work.

On behalf of Akij Plastics Ltd. (Pipes & Fittings)



Md Shariful Islam
AGM (Lead-Factory)

5S implementation on Solvent Cement Production Floor

Before

1

After

Workstation Setup before 5S



Workstation Setup After 5S



A standardized work table is added with fixed position for each worker to work

5S implementation on Solvent Cement Production Floor

Before

2

After

Worker Safety before 5S



After 5S



As you can see, workers were working without safety measure before and now they are using safety kits

5S implementation on Solvent Cement Production Floor

Before

3

After

Empty wall before 5S



After 5S



Safety signs are now added on the floor so that everyone knows about what precautions they should take.

5S implementation on Fittings Production Floor

Before

4

After

Random poly bag positioning before 5S



After 5S



Poly bags are now stored in a rack so that it can be found easily when needed.

Scenario based Lean Tool Implementation-KAIZEN

Kaizen is a Japanese term that means "continuous improvement." It is a business philosophy that focuses on making small, incremental improvements to all aspects of a business, from manufacturing processes to customer service. Kaizen is based on the idea that even small improvements can add up to significant results over time. It is all about Change for Good.

Here are some of the key principles ofKaizen:

- Focus on the process, not the outcome.
- Empower employees.
- Celebrate successes.

Actions like packaging cost reduction, inventory level reduction, and other effective measures, are being taken to improve the efficiency of APFL production processes **as shown in upcoming slides:**

KAIZEN implementation on Solvent Cement Production Floor

Before

1

After

Refilling Setup before Kaizen



Refilling Setup After Kaizen



An Automated Refill machine is now used for refilling.

KAIZEN implementation on Solvent Cement Production Floor

Before

2

After

Cap Sealing Setup before Kaizen



Cap Sealing Setup After Kaizen



An Automated cap sealing machine is now used.

KAIZEN implementation on Pipe Production Floor

Before

3

After

Die punch before Kaizen



Die punch After Kaizen



Before an inseparable die-punch was used, and it requires to disassemble the entire punch to change the die. Now the punch has two separable parts and does not need to remove the entire one.

KAIZEN implementation on Sheet Production Floor

Before

4

After

Crashing before Kaizen

Before this modification, the output crash fell to the floor. After that, workers transferred the crash to the storage bag. It requires extra workforce, time, cost, and high amounts of waste

After Kaizen



The sheet crash machine is modified so that the output crash falls into the bag directly rather than in floor. It reduced the extra work needed to transfer the crash from floor to bag

Scenario based Lean Tool Implementation-KANBAN

Kanban is a visual work control system that helps to manage the flow of work in a manufacturing process. Kanban is typically implemented using a Kanban board, which is a physical or digital board that displays the status of all work in progress. The board is divided into columns, each of which represents a different stage of the production process. For example, a Kanban board might have the following columns:

- To Do
- In Progress
- Done

Kanban cards are used to track the status of each individual work item. The cards are typically colored to indicate the stage of the process that the item is in. For example, red cards might represent "To Do" items, yellow cards might represent "In Progress" items, and green cards might represent "Done" item.

Few examples of KANBAN board use in APFL factory is given in upcoming slides:

Kanban implementation on APFL Production Floors

Solvent Cement Floor

1

Fittings Floor

KANBAN BOARD (কানবান বোর্ড)		
Solvent Cement		
TO DO	In Progress	Done
Automation of the Packaging	Capacity Increasing	Safety
Finalizing the Recipe	Product Quality Improvement	Line Balancing
Setup and Exhaust System		

KANBAN BOARD (কানবান বোর্ড)		
FITTINGS		
TO DO	In Progress	Done
Poly site optimization	Cartoon like DO Factors Re-check	Poly Keeping Rack Development
Improving Housekeeping	Preventive maintenance of mk 33	

Kanban implementation on APFL Production Floors

Sheet Floor

2

Pipe Floor

KANBAN BOARD (কানবান বোর্ড)		
TO DO	SHEET In Progress	Done
Improving Product through Consistency	Producing Sheet from raw material	Check Machine Condition
Reducing Down Time		

KANBAN BOARD (কানবান বোর্ড)		
TO DO	PIPE In Progress	Done
Cost Reduction		SMED done for m/c no. 5.
	SMED for other Possible m/c	

Scenario based Lean Tool Implementation-VoC

Voice of Customer (VoC) is a qualitative market research method that collects data on customer needs, wants, and expectations. It is a critical tool for businesses of all sizes, as it can help them understand their customers better and make better decisions about product development, marketing, and customer service.

There are many different ways to collect VoC data, but some of the most common methods include:

- Market Visit
- Customer surveys
- Customer interviews
- Focus groups
- Social media listening

An example of VoC collected by QC department is given in next slide:

VoC- Collected through Market Complain Analysis



AKIJ PLASTICS LTD.
Raimoni, Trishal, Mymensingh
Market Complain Reports Summary

SI no:	Complain Date	Address	Complain Details	Complain Category
1	23.01.2023	M/S Aysha corporation , Barishal.	Fitting product Short Qty.	Short Qty.
2	06.02.2023	M/S Siddik sanitary . Khulna	Fitting product Short Qty.	Short Qty.
3	29.04.2023	Tejgaon , Dhaka	Loose bundling pipes .	Bundle loose
4	02.05.2023	Tejgaon , Dhaka	Column pipe accessories rusty problem.	Rusty Problem
5	25.05.2023	Dupchaciya , Bogra	Pipes and fittings water leakage problem .	Leakage Problem
6	30.05.2023	Hathazari, Chittagong.	Pipes and fittings water leakage problem .	Leakage Problem
9	20.06.2023	Gazipur chowrasta, Gazipur.	Plumbing pipe bent problem.	Bend Problem
7	04.07.2023	Station road , Brammonbaria.	Brass fittings brass insert crack.	Brass insert crack
8	26.07.2023	Shekghat, Sylhet Distributor Name: M/S B.M Traders	4" PN-09 SRP (Class-D) Pressure pipe Under thickness .	Under thickness
10	11.07.2023	Mohammad Ali And Brothers. Jabeda khotir , khorompur , Sherpur	3/4" X 3/4" X 1/2" Brass Tee,Brass insert cracked.	Brass insert crack
11	23.09.2023		110mm SWR Pipe Color variation.	Pipes color variation
12	28.09.2023		Fittings bin card wrong .	bin Card wrong
13	01.10.2023	Bangladesh Trading Centre Pvt Ltd, T k Bhabon,44 jubilee road, Chittaging.	Brass Fittings Rust	Brass fittingRust Problem
14	02.10.2023	M/s- Tasin hardware and electric. (5396820) Maijbag, Issargonj -Mymensingh.	3" Class-C(PN-9) pipe Outside scratches problem.	Outside scratches problem
15	02.10.2023		CPVC pipes border sample colour red, But pipes border colour different .	Border color variation
16	05.10.2023		Solvent cement freezing problem .	Solvent cement Freezing problem
17	07.10.2023		Solvent cement freezing problem .	Solvent cement Freezing problem
18	11.10.2023	Sylhet Distributor Name: M/S B.M Traders	1" X 1" X 1/2" Brass Tee but Brass insert missing.	Brass insert missing
19	11.10.2023	Mohammad Ali And Brothers. Jabeda khotir , khorompur , Sherpur	cPVC Pipe Under OD problem.	OD Problem
20	17.10.2023	Step media ltd. Asulia,Savar , Dhaka	PVC Board outside finising problem. Print laminating Paper does not adjust on board.	
21	24.10.2023	Doyapara bazar ,Doha Nobabgonj. Bismillah Hardware	PVC Board 5mm, Under thickness and more soft.	under thickness and more soft

Scenario based Lean Tool Implementation-SMED

SMED (Single-Minute Exchange of Die) is a lean manufacturing technique that aims to reduce the time it takes to change dies on machines. It is a systematic approach that involves identifying and separating internal setup activities (those that must be performed while the machine is stopped) from external setup activities (those that can be performed while the machine is running).

SMED is particularly beneficial for pipe manufacturing machines, which often require frequent die changes. By reducing setup time, SMED can help to increase production efficiency and reduce costs. Here is a brief overview of the SMED process:

- Identify and separate internal and external setup activities.
- Convert internal setup activities to external setup activities.
- Streamline external setup activities.
- Standardize the setup process.

External Activities	Internal Activities
<ul style="list-style-type: none">✓ Prepare the new die and place it in position.✓ Gather all the necessary tools and equipment.✓ Clean and lubricate the machine	<ul style="list-style-type: none">✓ Remove the old die.✓ Install the new die.✓ Adjust the machine settings

SMED implementation on Pipe Production Machine no. 05

Before

Time required to perform External Activities before SMED

External Activities	Time Required (Minutes)
➤ Prepare the new die and place it in position.	17 min
➤ Gather all the necessary tools and equipment.	10 min
➤ Clean and lubricate the machine	8 min
Total:	35 min

SMED implementation on Pipe Production Machine no. 05

Time Reduction

Time reduction of External Activities through SMED

- ❑ **Time reduction in Preparing the new die and place it in position:** To reduce the time required (17 min) for die changing, the die punch is modified and separated into 2 separatable parts. Which enables to reduce the time required to remove it and again placing it for new die.
- ❑ **Time Reduction in Gathering all the necessary tools and equipment:** A standardize tool arrangement box is now used so that all the necessary tools are available during die change and it helps to reduce the time notably .
- ❑ **Clean and lubricate the machine:** The cleaning and lubricating is done simultaneously with the other two external activities and it now requires very less time.

SMED implementation on Pipe Production Machine no. 05

After

Time required to perform External Activities after SMED

External Activities	Time Required (Minutes)
➤ Prepare the new die and place it in position.	12 min
➤ Gather all the necessary tools and equipment.	5 min
➤ Clean and lubricate the machine	3 min
Total:	20 min

05

Challenges of Lean

Challenges We Faced during Lean Implementation

- Resistance to change
- Difficulty in changing ingrained habits
- Lack of resources
- Lack of expertise



On Going Works

- **Fittings**: Initiative taken to reduce overall Packaging cost.
- **Sheet**: Initiative taken to produce Sheets of above 12mm thickness.
- **Pipe**: Trial on going for SMED implementation in other possible machines .
- **Solvent Cement**: Work on going to fully Automate the Can Refilling, Sealing and packaging system.

Thanks!

Do you have any questions?

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