INTERNSHIP REPORT

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We are truly grateful to everyone involved for making this internship a rewarding and educational experience.

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INTRODUCTION

1. Purpose of the Internship

Our internship in the Industrial Engineering (IE) department provided a valuable opportunity to gain practical experience in optimizing manufacturing processes.

The main purpose of our project-based internship was to compile a SAM bank containing different articles of Pillows, Comforters and Mattress Pads. This involved analyzing various production processes, studying work elements, and determining the standard time required for each operation.

2. Objectives

Our key objectives during the internship were:

- Drafting Process Flowcharts: Mapping out each stage of the production process to visualize the workflow.
- SAM Study: Conducting time and motion analysis to determine the Standard Allowed Minutes for each operation, essential for labor planning and monitoring performance.
- Gemba Walk with 5S Agenda: Experiencing workshop activities, interacting with workers, and identifying improvement opportunities while implementing the 5S methodology (Sort, Set in Order, Shine, Standardize, Sustain) to ensure smooth flows associated with the manufacturing process.
- Machine Utilization Analysis: Assessing downtime, capacity, and efficiency to improve overall production output.

3. Internship in Industrial Engineering – Pillows & Comforters Department

This project-based internship was highly relevant in the field of Industrial Engineering, as it provided hands-on experience in:

- Man
- Machine
- Material

We gained valuable insights about the role of an Industrial Engineer in a professional setting. By working in a real-world environment, we developed technical, analytical, and problem-solving skills, preparing us for future challenges in the industry.

COMPANY PROFILE

1. Company Overview:

Utopia Industries is a large-scale modern textile firm that was founded in April 2018 with a vision to be a prominent manufacturer and provider of innovative textile solutions around the globe. The company integrates dyeing, weaving, knitting and printing facility within its location that covers an area of around 3 million sq. ft covered.

Utopia Industries is committed to developing innovative and distinctive lifestyle merchandise for distinct customer niches. A few of the products that they manufacture and export are Pillows, Comforter, Plastics, Cookware, Knit garments, Bed Sheets, Towels, and other Textile products. Leveraging the state of art technology, maintaining high quality standards and delivering quick service, has earned the trust of our customers overseas, enabling them to export to top notch countries like US, CA, UK and EU.

2. Mission and Vision:

The mission of Utopia Industries is to contribute to the prosperity and self-reliance of Pakistan through manufacturing excellence. With a steadfast commitment to their goals, they aim to foster a transformative industrial revolution by empowering local talent, embracing sustainability, and encouraging collaborative partnerships. The mission of Utopia Industries is to create 100,000 jobs and achieve $1 billion in annual exports, thus elevating Pakistan's global standing and leaving an enduring positive impact on both the economy and society.

Utopia Industries envisions a future where Pakistan becomes a pioneer in industrial growth and self-sustainability. Their goal is to lead a manufacturing and industrial revolution that positions Pakistan as a global. They aspire to establish a dynamic ecosystem that transforms Pakistan into an industrial powerhouse, laying the foundation for a thriving and prosperous legacy for future generations.

3. Products:

Bedding
Luxurious bedsheets and duvet covers made from premium materials, designed for comfort and style.

Pillows
Perfectly balanced pillows offering fluffiness and support, available in various patterns, colors, and sizes.

Comforters
Warm, breathable comforters that provide cozy sleep, available in different colors and machine-washable for easy care.

Mattress Protector
Waterproof mattress protectors that shield your mattress from stains and spills while providing a soft, breathable layer.

Towels
Soft, absorbent, and durable towels available in various sizes and styles, crafted from high-quality materials.

Linen Napkin
Stylish napkin linens made from cotton and polyester blends, perfect for elevating your dining experience.

Home Essentials
Functional home products like pantry organizers and furniture risers, designed to improve organization and convenience.

Personal Care
Grooming essentials such as manicure sets, safety razors, and precision tweezers, promoting hygiene and self-care.

Kitchen
A variety of cookware and utensils, including skillets, pans, and knives, designed to enhance your cooking efficiency and experience.

LITERATURE REVIEW

1. 5S Methodology

The 5S methodology is a workplace organization system aimed at improving efficiency, productivity, and safety. The word 5S abbreviates as:

- **Seiri (Sort):** Removing unnecessary items from the workplace to reduce clutter and improve workflow.
- **Seiton (Set in Order):** Organizing necessary items so they are easily accessible, reducing search time and increasing efficiency.
- **Seiso (Shine):** Keeping the workplace clean to prevent defects, enhance safety.
- **Seiketsu (Standardize):** Establishing standardized procedures to maintain consistency in the production process.
- **Shitsuke (Sustain):** Developing a culture of discipline to ensure that 5S principles are continuously followed.

2. Gemba Walks

Gemba (現場 Genba in Japanese) means "the actual place" where value is created. In Lean Manufacturing and Continuous Improvement, it refers to the workplace—such as a factory floor or assembly line—where processes occur. The concept emphasizes "go and see" to observe, understand, and improve operations. Steps of Gemba Walk are as follows:

1. Have a Plan – Define the purpose and objectives of the Gemba walk.
2. Follow the Value Stream – Focus on the process flow to identify inefficiencies.
3. Focus on Processes, Not People – Analyze systems rather than individual performance.
4. Document Your Observations – Record findings to support data-driven improvements.
5. Ask Questions – Engage with employees to gain insights into daily challenges.
6. Don’t Suggest Changes During the Walk – Observe and collect data first before making improvements.
7. Walk in Teams – Collaborate with cross-functional teams for diverse perspectives.
8. Mix Up the Schedule – Conduct Gemba walks at different times to capture variations in processes.
9. Follow-Up with Employees – Discuss findings and encourage feedback.
10. Return to Gemba – Continuously monitor improvements and refine processes.

3. Machine Utilization

Machine Utilization refers to the efficient use of equipment to maximize productivity while minimizing downtime. It involves working status of machines that are either operational, idle or out of order. It is mainly used to evaluate the productivity of a machine.

By analyzing machine utilization, industries can identify bottlenecks, reduce idle time and improve production output.

4. Standard Allowed Minutes (SAM)

SAM is the amount of time that should be allocated to a particular operation under standard conditions.

$$\text{SAM} = \text{Basic Minutes} \times \text{Bundle Allowance} \times \text{Machine /Personal Allowance}$$

5. Standard Minute Value (SMV)

SMV is the cost affiliated with time based on SAM and is used to estimate optimal cost required to manufacture a product. SMV accounts for:

- Personal allowances (manpower breaks and fatigue).
- Machine delays (setup and maintenance time).
- Operational variability (unpredictable production changes).

6. Process Flowchart

A process flowchart is a visual representation of the sequence of operations in a manufacturing or service process. It illustrates the workflow, decision points, and interactions between different stages of production.

The benefits of using a process flowchart include:

- Provides a clear visualization of the entire process, aiding decision-making.
- Ensures consistency in production by clearly defining each step.
- By analyzing process flowcharts, industries can improve efficiency, minimize waste, and enhance overall process control.

6. Production Related Times

In industrial engineering, different time measurements are used to analyze production processes. Below are the key types of production-related times:

- **Cycle Time:** The total time required to complete a specific task, from raw material to the finished product.
- **Takt Time:** The time interval between the ending of one operation to the beginning of another.
- **Processing Time:** The actual time spent on a specific task or operation, excluding waiting or idle time.
- **Lead Time:** The total time from order receipt to the final delivery of the product.

Site 05

Introduction:

At Utopia Site-05, pillows are manufactured using advanced technology and high-quality materials, filled with lofty & fluffy PSF through carding for extra comfort. Each pillow is carefully designed to be durable and meet customer requirements related to both quality and cost.

Main Articles of Pillow Department:

Gusset Pillow

Throw Pillow

Bed Pillow

Body Pillow

Square Pillow

Toddler Pillow

Quilted Pillow

Neck Pillow

Week-1

2025/01/02 - 2025/01/08

Key Activities and Tasks Performed:

1. Production Floor Visit:

Conducted a detailed observation of the Cut-to-Pack operations in pillow department to analyze the manufacturing processes and understand the material flow throughout the production system. This allowed us to gain hands-on insights about the operations associated with the manufacturing of pillows.

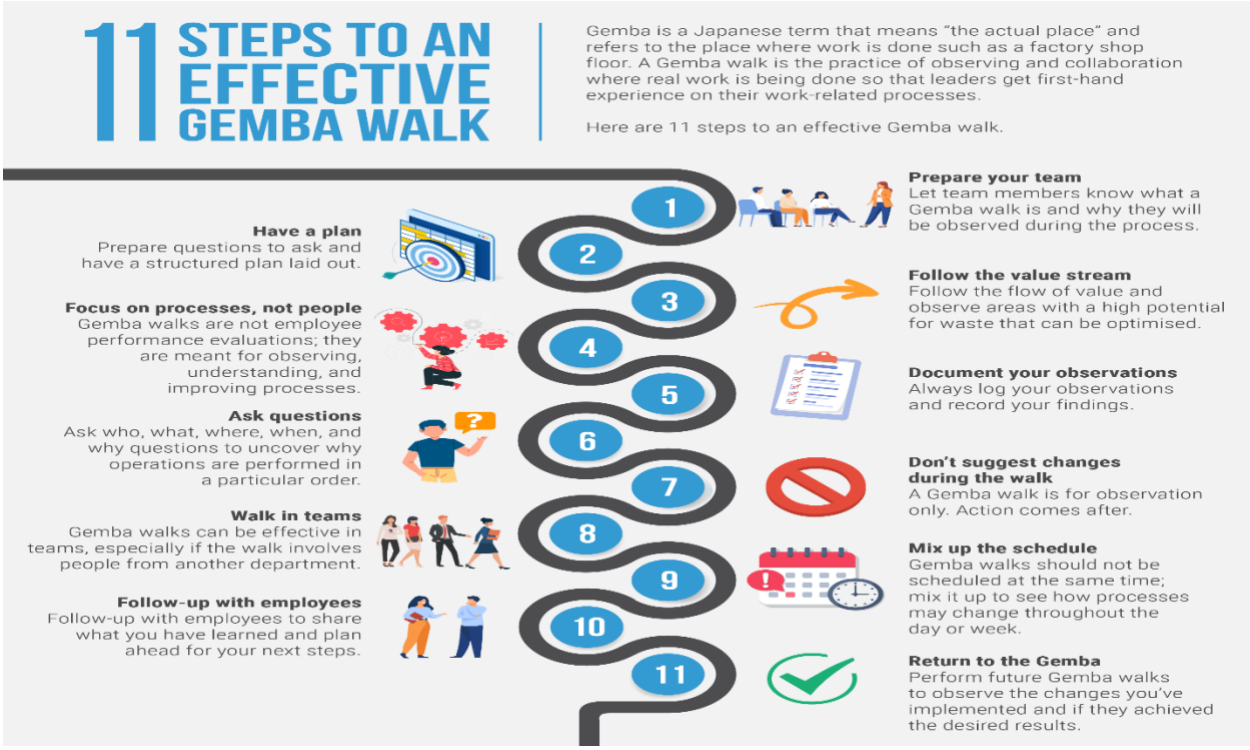
During the observation, we were able to see the mechanisms and operations of various machines and equipment used in the production process.

2. Process Flow Analysis:

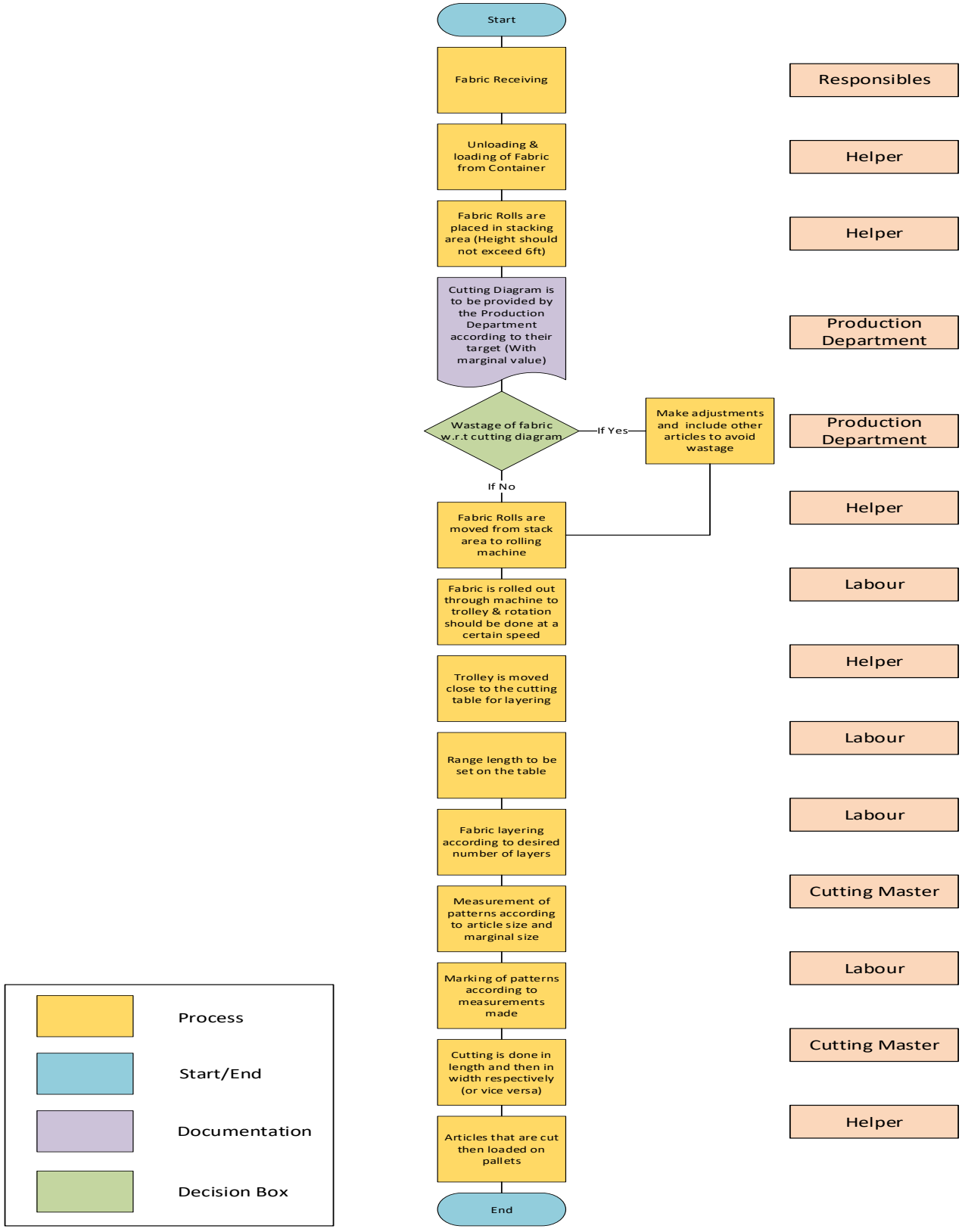
Performed a comprehensive evaluation of each stage in the production process, focusing on operational workflows, and identifying both values added and non-value added activities. This analysis aimed to optimize process performance by identifying areas where improvements could be made to enhance productivity and reduce waste.

3. Gemba Walk:

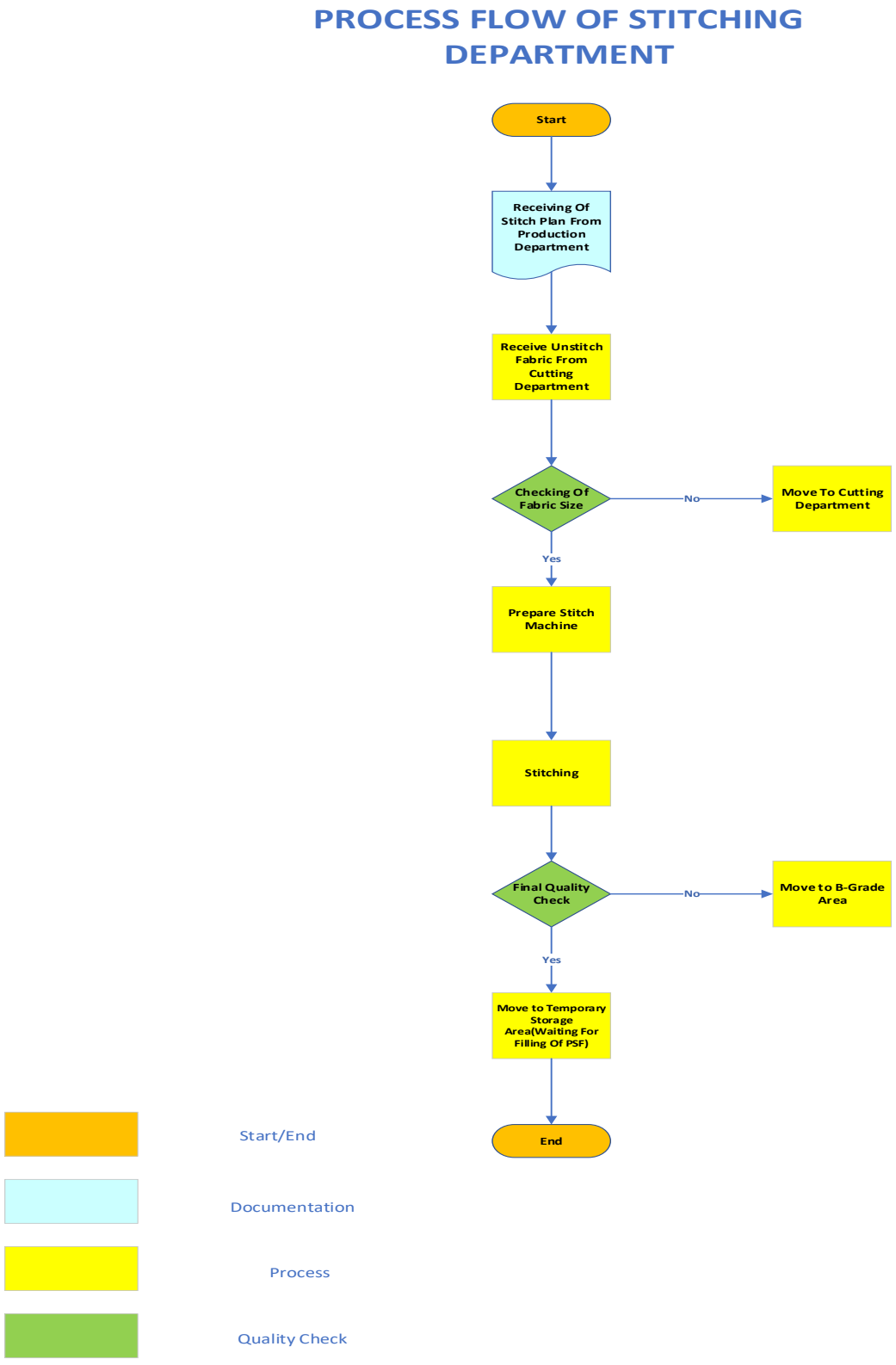
We developed a detailed evaluation sheet on basis of the agenda pre-described in 5S to make it look more easier to understand according to the scores assigned to particular floors of Site-05 according to the observations made in Gemba Walk.



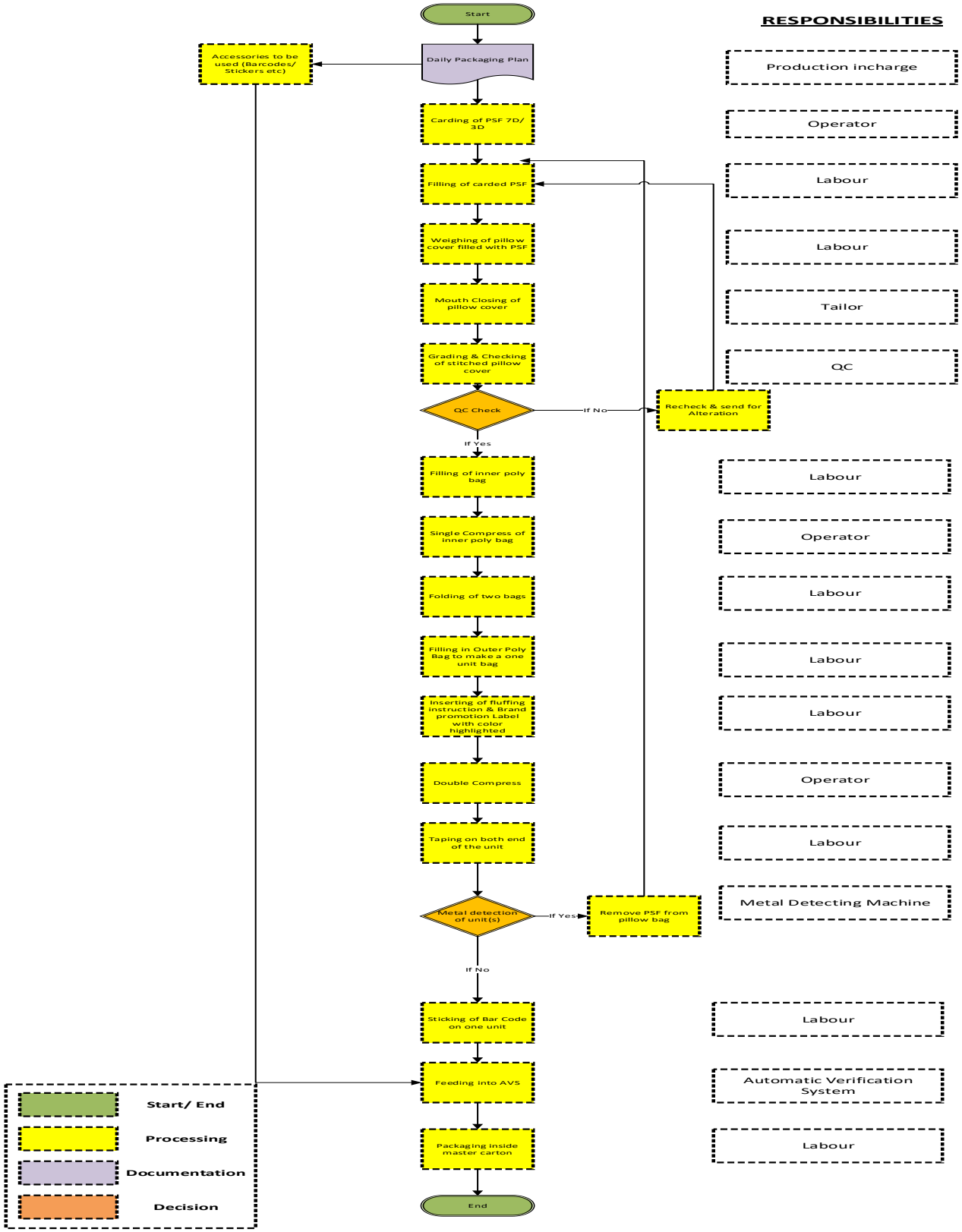
Process Flowchart (Cutting Section – Pillow Department)



Process Flowchart (Stitching Section – Pillow Department)



Process Flowchart (Packing Section – Pillow Department)

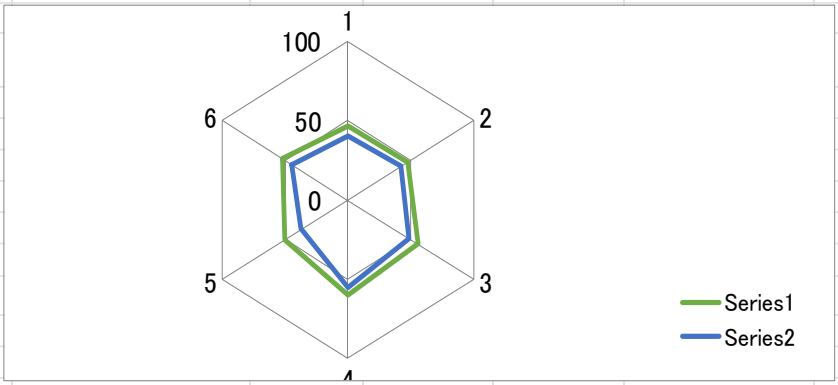


MONITORING AND EVALUATION SHEET FOR THE PROGRESS OF 5-S ACTIVITIES:

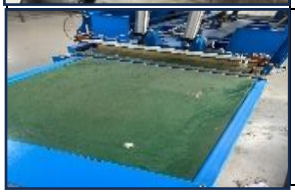
	DESCRIPTION	Very poorly	Poorly	Fairly	Well	Very well	AWARD MARKS
1	**SORT** Clutter free Environment on production floor. Evidence of removal of unwanted items should be evident all around.						
1.1	Unwanted items removed from Premises, including pallets, lifters, trollies, basket etc.	1	2	3	4	5	2
1.2	Walls are free of FG stacking, Damaged Panaflex	1	2	3	4	5	2
1.3	Are defective or excess materials segregated and labeled for disposal or recycling?	1	2	3	4	5	3
	TOTAL	**Full mark 15**					**7**
						Acquired marks / 15 x 100 =	**47**
2	**SET IN ORDER** Ability to find whatever is required with the least possible delay, evidence of eliminating the waste of time throughout the Institute/Organization.						
2.1	Is the storage area well-defined with designated spots for items such as fabrics, threads, and filling materials?	1	2	3	4	5	3
2.2	Are pathways and workstations clear and free of obstructions to allow smooth operations?	1	2	3	4	5	1
2.3	Are fire extenguisher blocked or not?	1	2	3	4	5	2
2.4	Material handling e.g. Finshied goods, PSF bales, Empty cartons etc.	1	2	3	4	5	3
2.5	Are sewing and filling machines positioned for optimal workflow?	1	2	3	4	5	3
	TOTAL	**Full mark 25**					**12**
						Acquired marks / 25 x 100 =	**48**
3	**SHINE** The Cleanliness all round the Institution should have been carried out according to the 5-S Concepts.						
3.1	Are machines regularly cleaned?	1	2	3	4	5	4
3.2	Are workstations and storage areas free of dust and dirt?	1	2	3	4	5	3
3.3	Are spills or waste materials (e.g., fabric scraps, threads) promptly cleaned up?	1	2	3	4	5	1
3.4	unused machines are properly covered	1	2	3	4	5	4
3.5	Aisles have adequate space for movement and are swept / mopped?	1	2	3	4	5	2
	TOTAL	**Full mark 25**					**14**
						Acquired marks / 25 x 100 =	**56**
4	**STANDARDIZE** High level of Standardization in all activities carried out in SORT, SHINE, SET IN ORDER and the evidence of such standards being practiced all around.						
4.1	Are safety instructions (e.g., fire exits, first aid) visible and standardized across all areas?	1	2	3	4	5	3
4.2	Are all workstations uniformly organized to avoid variability between operators?	1	2	3	4	5	3
	TOTAL	**Full mark 10**					**6**
						Acquired marks / 10 x 100 =	**60**
5	**SUSTAIN** Evidence of an disciplined approach to all 5-S activities through proper Training & Development, which shows the sustainability in the long term.						
5.1	Are employees consistently following the 5S principles without deviations?	1	2	3	4	5	3
5.2	Are regular audits conducted, and are the results shared with the team?	1	2	3	4	5	4
5.3	Are team members encouraged and trained to take ownership of their areas?	1	2	3	4	5	3
5.4	Are any identified inefficiencies or issues from previous audits resolved promptly?	1	2	3	4	5	
	TOTAL	**Full mark 20**					**10**
						Acquired marks / 20 x 100 =	**50**
	GRAND TOTAL for 5S activities	**Full mark 135**					**49**

GRAPHICAL REPRESENTATION:

5S Score



	Pillow	Sort	Set	Shine	Standardize	Sustain	Average
Current CV results	Cut-to-Pack	47	48	56	60	50	52.1
Previous CV results	Cut-to-Pack	40	42	49	55	37	45
Previous CV results							0.0
	7) Enter the name of section and Date						
	3 time CV average	28.8888889	30	35	38.33333333	29	

Evidences	Issues Identified	Suggested Solutions
	WIP	Increase Man-Power
	Wastage of PSF	Excess PSF should be kept under control
	Pathway Blockage	Pathway should be clear from obstacles
	Poor Handling of pillows	Pillows should be place in their respective trolly
	Poor 5S (Shine)	Ensure right placement of ribbon in trolley
	Poor 6S (Safety)	Follow safety standards
	Poor Housekeeping	Training required

Machines Utilized in Stitching Area:

Single Needle (SNL)

Uses 1 top thread and 1 bobbin thread to create a **Lock Stitch**.

Double Needle (DNL)

Uses 2 top threads and 1 bobbin thread to create a **Double Lock Stitch.**

Overlock (3/4-thread): Uses 1/2 top threads (depending upon the type if 3 or 4) and 2 looper threads to create a **Chain Stitch.**

Safety (5-thread): Uses 3 top threads and 2 looper threads to create an overlock (Chain Stitch plus safety stitch (Lock Stitch).

MH380 Uses 2 top threads and 2 bobbin threads to create a lockstitch**.**

Week-2

2025/01/09 - 2025/01/15

Key Activities and Tasks Performed:

1. **Machine Utilization Analysis:**
   Machine Utilization refers to the efficient use of equipment to maximize productivity while minimizing downtime. It involves working status of machines that are either operational, idle or out of order. It is mainly used to evaluate the productivity of a machine.
   By analyzing machine utilization, industries can identify bottlenecks, reduce idle time and improve production output.
2. **Time Study & Methods Engineering Concepts:**
   Gained insights into different types of production times, including Lead Time, Cycle Time, Takt Time, and Processing Time, to enhance workflow efficiency. Additionally, conducted a Standard Allowed Minutes (SAM) study to analyze the time required for Cut-to-Pack operation of Pillows.
3. **Thread Consumption Calculation:**
   Conducted detailed calculations to determine the amount of thread required for different stitching operations based on machine factors and wastage considerations.
4. **Fabric Consumption Analysis:**
   Measured and calculated the fabric consumption of various articles, ensuring material optimization and cost-effectiveness. One of the most important factors while calculating fabric consumption is allowances that are allocated in terms of cutting wastage & stitching allowance.

5. Thread Consumption:

This section presents the thread consumption calculations for various stitching operations. These calculations help in material planning, minimizing thread wastage, and ensuring cost-efficient production

The formula used is as follows;

$$\text{Thread Consumption} = \text{Perimeter (m)} \times \text{Wastage (15\%)} \times \text{Machine Factor}$$

Machine Factors depend on the number of yarn usage in machine given below as.

Machine	Factor
Single Needle SNL ((Chain Stitch)	3
Double Needle DNL (Lock Stitch)	6
MH380 (Chain Stitch)	14
4-Thread O/L (Chain Stitch)	18
5-Thread Overlock (Chain Stitch)	24

THREAD CONSUMPTION							
Gusset (18x36)							
Operation	Machine	Factor	Perimeter (inches)	Perimeter (meters)	Wastage	Thread Consumption w/o Wastage	Thread Consumption with Wastage
Dori Making	4-Thread Overlock	18	108	2.7432	15%	49.37769876	56.78435357
1-side Dori attachment	4-Thread Overlock	18	108	2.7432	15%	49.37769876	56.78435357
2-side Dori attachment	4-Thread Overlock	18	108	2.7432	15%	49.37769876	56.78435357
Gusset 1-side attachment	SNL	3	108	2.7432	15%	8.229616459	9.464058928
Gusset 2-side attachment	SNL	3	108	2.7432	15%	8.229616459	9.464058928
						164.5923292	189.2811786
Square (14x14)							
4 Sided stitch	SNL	3	56	1.422402845	15%	4.267208534	4.907289815
Throw Pillow (18x18)							
Cord Making	4-Thread Overlock	18	72	1.8288	15%	32.91846584	37.85623571
4 Side Cord attachment	SNL	3	72	1.8288	15%	5.486410973	6.309372619
						38.40487681	44.16560833
Body Pillow (20x54)							
4 -Side Stitching	5-Thread Safety	24	148	3.759207518	15%	90.22098044	103.7541275
Bed Pillow (20x36)							
Cord Making	MH380	18	112	2.84480569	15%	51.20650241	58.88747777
4 Side Cord attachment	SNL	3	112	2.84480569	15%	8.534417069	9.814579629
double stitch	DNL	6	112	2.84480569	15%	17.06883414	19.62915926
						76.80975362	88.33121666
Neck Pillow (6x16)							
1-Side Round Stitch	SNL	3	18.849	0.478765558	15%	1.436296673	1.651741173
2-Side round Stitch	SNL	3	18.849	0.478765558	15%	1.436296673	1.651741173
Straight Stitch	SNL	3	16	0.406400813	15%	1.219202438	1.402082804
						4.091795784	4.705565151
Toddler Pillow (13x18)							
Cord Making	MH380	18	62	1.57480315	15%	28.34645669	32.5984252
4 Side Cord attachment	SNL	3	62	1.57480315	15%	4.724409449	5.433070866
double stitch	DNL	6	62	1.57480315	15%	9.448818898	10.86614173
						42.51968504	48.8976378

6. Fabric Consumption:

The table below illustrates the fabric consumption details for different pillow sizes and designs. This data is crucial for optimizing fabric usage, reducing material waste, and enhancing production efficiency.

FABRIC CONSUMPTION OF PILLOW				
Gusset (18x36)				
Cut Size	**Shell Consumption**	**Gusset Tape Consumption**	**Piping Consumption**	**Total Consumption**
20.5 x38.5	0.98	0.04	0.08	1.10
Square (14x14)				
16.5x16.5	0.42			0.42
Throw Pillow (18x18)				
20.5x20.5	0.52		0.06	0.58
Body Pillow (20x54)				
21.5x55.5	1.41			1.41
Bed Pillow (20x36)				
22.5x38.5	0.98		0.08	1.06
Neck Pillow (6x16)				
8.5x18.5	0.47			0.47
Toddler Pillow (13x18)				
15.5x20.5	0.52		0.04	0.56

7. Capacity Calculation per Plant:

The plant capacity is determined based on the Standard Allowed Minutes (SAM) of the critical activity, which in this case is the SAM of the Filling Plant.

The Filling Plant is identified as a **bottleneck** in the Pillow Department due to the high investment costs associated with it. Unlike other production stages, increasing output is not feasible by adding machines, as it would require significant capital investment. Additionally, since the machine is semi-automated, increasing the workforce will not enhance its efficiency. Therefore, production planning must be strategically aligned with the existing capacity of the Filling Plant to ensure optimal utilization and process flow.

CAPACITY / PLANT							
Article	Size	SAM (Cut-to-Pack)	SAM of Critical Activity (Filling	Stitching Style	Gross Weight (g)	Total Available Minutes/Day	Capacity/Plant
Neck Pillow	6x16	5.14	0.13	SNL	370g	1200	9230.769231
Square	14x14	3.18	0.17	SNL	340g	1200	7058.823529
Toddler Pillow	13x18	4.35	0.25	DNL	315g	1200	4800
Square	12x20	4.05	0.3	SNL	400g	1200	4000
Square	16x16	2.92	0.19	SNL	450g	1200	6315.789474
Square	14x22	3.33	0.21	SNL	540g	1200	5714.285714
Square	18x18	3.58	0.19	SNL	510g	1200	6315.789474
Square	20x20	3.72	0.23	SNL	650g	1200	5217.391304
Throw Pillow	20x20	3.72	0.23	SNL (With Piping)	530g	1200	5217.391304
Premium Bed Pillo	18x26	4.58	0.11	DNL (With Piping)	1200g	1200	10909.09091
Square	22x22	3.44	0.34	SNL	770g	1200	3529.411765
Premium Bed Pillo	19x26	5.72	0.347	DNL (With Cord)		1200	3458.213256
Premium Bed Pillo	20x26	5.53	0.18	DNL	1070g	1200	6666.666667
Square	24x24	4.05	0.25	SNL	900g	1200	4800
Gusset	18x36	6.51	0.79	SNL	1490g	1200	1518.987342
Square	26x26	4.76	0.35	SNL	1120g	1200	3428.571429
Premium Bed Pillo	20x36	4.65	0.58	DNL	1420g	1200	2068.965517
Quilted Pillow	32x32	6.74	0.65	SNL	1361g	1200	1846.153846
Body Pillow	20x54	7.74	1.59	5-thread Safety	2240g	1200	754.7169811

8. Standard Allowed Minutes (SAM):

Standard Allowed Minute (SAM) is a measurement of the time it takes to complete an article from Cut to Pack. It's used in the textile industry to estimate the cost of production, plan capacity, and calculate machinery requirement.

The SAM calculated for various articles of pillow department is as follows:

The formula for SAM is;

$$SAM = Basic\ Minutes \times Bundle\ Allowance \times Machine\ /Personal\ Allowance$$

- **Bundle Allowance** is the time for handling multiple tasks together
- **Basic time** is the time taken to complete one production cycle.
- **Machine and personal allowance** are times for machine downtime and worker breaks.

Style	Size	SAM
Neck Pillow	6x16	5.14
Square	14x14	3.18
Toddler Pillow	13x18	4.35
Square	12x20	4.05
Square	16x16	2.92
Square	14x22	3.33
Square	18x18	3.58
Square	20x20	3.72
Throw Pillow	20x20	3.72
Premium Bed Pillow	18x26	4.58
Square	22x22	3.44
Premium Bed Pillow	19x26	5.72
Premium Bed Pillow	20x26	5.53
Square	24x24	4.05
Gusset	18x36	6.51
Square	26x26	4.76
Premium Bed Pillow	20x36	4.65
Quilted Pillow	32x32	6.74
Body Pillow	20x54	7.74

9. Reasons for Using SAM:

- **Workforce Efficiency**
  Helps determine the required number of workers and their productivity levels.
- **Capacity Planning**
  Aids in calculating plant capacity, ensuring optimal resource allocation.
- **Bottleneck Identification**
  Identifies critical operations (e.g., Filling Plant in the Pillow Department) that may limit overall production efficiency.
- **Performance Benchmarking:**
  Provides a standardized measure to compare worker efficiency and set realistic production targets.
- **Cost Estimation & Line Balancing:**
  Helps in labor cost calculations and balancing workload across different production stages.

Week-03

2025/01/16 - 2025/01/22

Key Activities & Tasks Performed:

1. **Overview of Lean Manufacturing:**

   Learned about Lean Manufacturing and how impactful and effective it is for any industry which is aiming towards optimization and utilization of raw materials and resources to achieve the maximum outcome possible.

2. **Reduce Wastes of Lean Manufacturing:**

   Explored Wastes of Lean Manufacturing and how their reduction can create such a huge influence in manufacturing process. These wastes are referred as DOWNTIME or TIMWOOD and abbreviated as:

   - Defects
   - Overproduction → MUDA
   - Waiting
   - Non-utilized Talent → MURA
   - Transportation
   - Inventory
   - Motion → MURI
   - Extra-Processing

3. **Tools in Lean Manufacturing:**

   Experienced and analyzed application of various tools related to Lean Manufacturing and how they add value in process optimization towards increasing productivity of any operation. Some of them are as follows:

   - SMED (Single Minute Exchange of Die)
   - KANBAN
   - Push & Pull System
   - VSM (Value Stream Mapping)
   - RCA (Root Cause Analysis)

4. **Importance of Six Sigma in Process Optimization:**

   Acquired valuable insights about variations in process and how they can be controlled by applying Six Sigma methodologies i.e. DMAIC & DMADV in order to achieve outcome of 99.99966% defect-free performance or 3.4DPMO (Defect Per Million Opportunities).

   - DMAIC – focuses on improving efficiency of already existing process.
   - DMADV – focuses on designing new process or redesigning existing ones.

5. **Useful Metrics in Industrial Engineering:**

   Studied about some useful parameters that are a part of Industrial Engineering and

Operations Management which are implied in order to get the most out of the resources provided. Some of these basic metrics are:

- Man-Machine Ratio – MMR refers to the specific number of manpower that is required with respect to the quantity of machines being utilized in a particular process to reduce production cost.
- Cost per Meter – CPM is defined as the cost affiliated with unit meter of any product to make it easier to understand the cost related to a single unit of any product.
- Key Performance Indicators – KPIs are metrics that are used to evaluate valuable performance and efficiency as well. These include Safety, Quality, Production and Inventory.
- Greenfield System – It is a method mainly used for cost estimation affiliated with any department and helps to understand the production cost. It includes both management and non-managements costs.

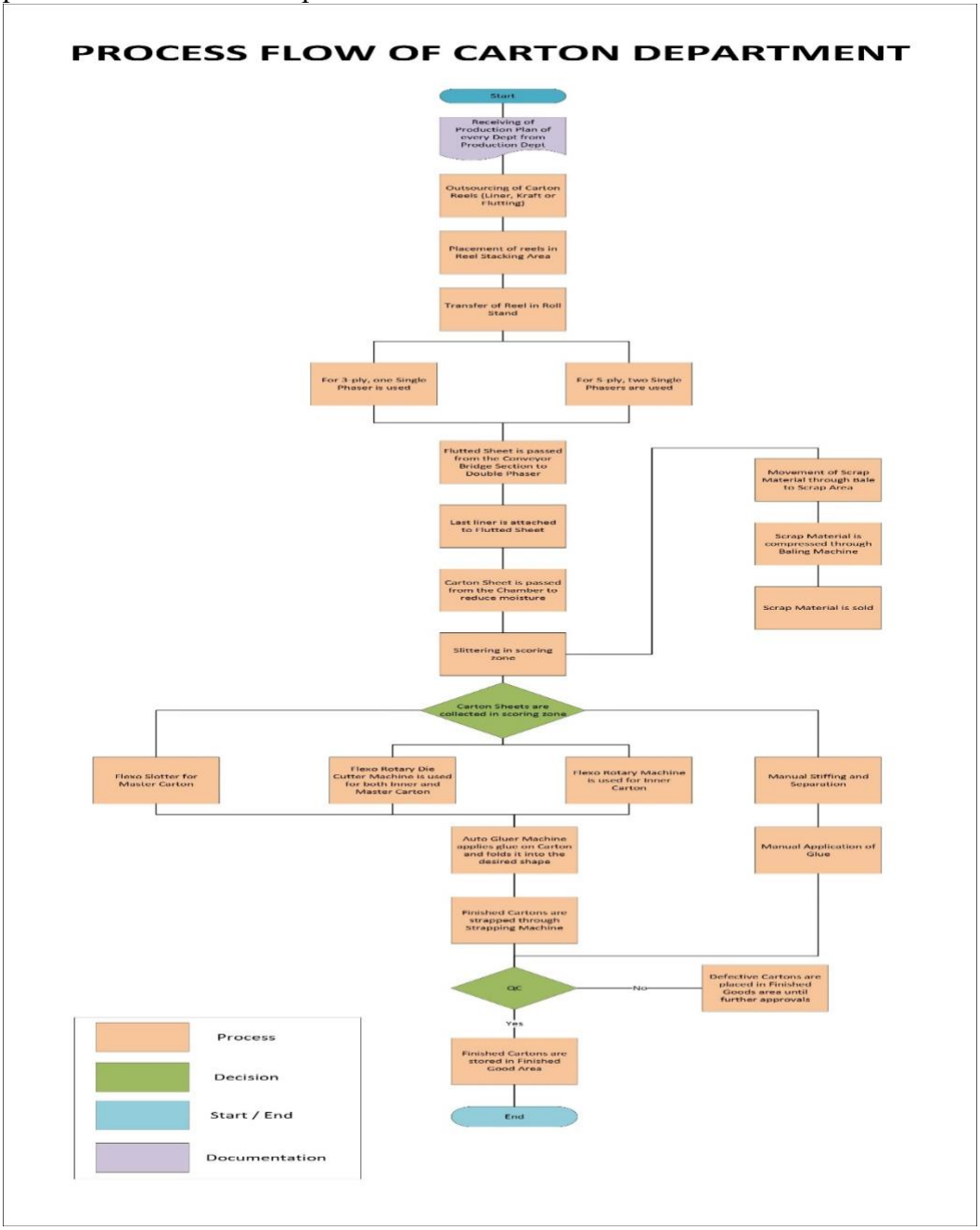
Week-04

2025/01/23 - 2025/01/29

Key Activities & Tasks Performed:

1. Drafting Process Flow of Carton Making Department:

After being able to memorize cut-to-pack pillow departments and floors, we also visited the Carton Department where we gained valuable and detailed making of carton from paper reels to final carton making of different sizes and shapes. Here is the draft of process flow of carton department:



2. Brainstorming of Observations Made Throughout:

While working on floors during these 4-weeks, we observed that there were some improvements that must be made to make the process smoother. Although, those operations are being performed in their proper manner but little improvements could make a huge difference. Some of those observations were eliminated either because they are hard to implement or have no effect in long-term time frame.

3. KAIZENs:

Some of those observations can be really helpful for process optimization and those observations are presented as proposed idea including the problem statement, working, cost-benefit ratio and outcomes. These are:

Addition of Cutter on Double Compress Machine

TITLE
Addition of Cutter on Double Compress Machine
PROBLEM STATEMENT
Taping of Excess Poly after Double Compress
SCOPE
This Addition will Remove the Operation of Taping & Improve Finishing Quality of Outer Poly as well
WORKING
In the packing section, the Double Compress Machine is used to compress the final product within an outer poly and seal it at a specific point. However, a portion of the outer poly remains unsealed, which is then manually folded and taped. This process requires at least two workers (one to fold the excess poly and another to apply the tape) and consumes additional tape to achieve the desired shape of the final product. In the proposed solution, a cutter will be integrated next to the sealing bar to trim the excess poly immediately after sealing. This enhancement will eliminate the need for manual labor previously required for taping and will also make the use of tape unnecessary. Also, the finishing quality of final product will improve.

Benefits After Implementation		
	Proposed Idea	Current Process
Manpower	0	2
Tape Utilization	0Rolls	
Operation Time	18s	18s
Finish Quality	Standard	Vary

This proposed idea will also reduce the SAM as one of the critical operation i.e. taping will be eliminated.

Cost-Benefit Analysis		
	Current Process	Proposed Idea
Cost of Tapes Used Per Day	Cost Per Tape= No.of Tapes Used= Cost of Tapes Used=	There will be no tapes used therefore no cost will be affiliated
Manpower Wages	Wage/Day=2860/person Wage/Day for Taping=5720/Day	There will be no manpower affiliated as the taping operation will be eliminated
Production Per Day	Approximately 450 Square Pillows (18x18) are packed per day	550 Square Pillows (18x18) are packed per day

OUTCOME
According to the working done above, it is approximated that the implementation of proposed idea will be benificial for the company in terms of both productivity & cost saving.

Installation of Fabric Spreading Machine

TITLE

Installation of Fabric Spreading Machine (OSHIMA)

PROBLEM STATEMENT

Manual Fabric Layering can cause severe issues related to safety, defects and inefficiency.

SCOPE

To increase productivity by means of reduced time for layering, improving safety and efficient layering with accuracy

WORKING

The Oshima Automatic Fabric Spreading Machine evenly spreads fabric onto a cutting table with consistent tension control along with roll opening. The machine enhances speed and efficiency, reducing manual labor and improvng safety standards. This increase in speed also reduces the SAM for layering. Reduces the risk of repetitive strain injuries and improves worker ergonomics as the machine lifts and unroll fabric rolls itself as well. This will result in efficient fabric layering without safety threat and reduce labour as well.

Benefits After Implementation

	Current Process	Proposed Idea
Manpower	2	0

Cost-Benefit Analysis

	Current Process	Proposed Idea
Manpower Wages	Wage/Day=2860/person Wage/Day for Roll Opening & Layering=5720/Day	No Cost affiliated with Manpower
Time Per Roll Opening & Layering (Roll Length=200 MTR)	Time Required for Complete Roll Opening & Layering considering Layer Length of 330"=18.902min	Time Required for Complete Roll Opening & Layering considering Layer Length of 330"=7.158min
Production Per Day	Available Minutes=210min Production=210/18.902 =>11.10	Available Minutes=210min Production=210/7.158 =>29.33

According to the calculations done above, it can be concluded that productivity of Roll Opening and Layering can be increased by 2.64 times by the installation of Fabric Spreading Machine (OSHIMA).

RETURN ON INVESTMENT (ROI)

Fabric Spreading Machine (OSHIMA) Price=$12,889

Cost Saved Monthly in terms of Manpower Wages=$532.48/Monthly

Cost Saved Monthly in terms of Increased Productivity:

Assume if Sqaure Pillow (18x18) is being cut then;

According to traditional Roll Opening & Layering Process, 2,028 Pillows will be cut whereas, after installation of Fabric Spreading Machine the productivity will increase by 2.64times therefore almost 5,353 Pillows wil be cut.

If the price of single Square (18x18) Pillow is $4.75 therfore a total of $5,577 production is done whereas according to new process a total production of $25,426 production of same article Square (18x18) is done.

Net Sales Daily=$25,426-$5,577=$19849/Day

OUTCOME

According to the working shown above, it can be approximated that the porposed idea about installation of Fabric Spreading Machine will be benificial for the company in terms of both productivity and safety. Also, the money invested for the installatin will be recovered under a month.

SITE 06

Introduction:

During our internship, we had the opportunity to gain firsthand experience at Site 6, where the manufacturing of comforters and mattress pads takes place. Site 6 is equipped with advanced technology and utilizes premium materials to produce high-quality comforters and mattress pads that prioritize both comfort and durability.

Comforter:

Utopia Industries offers a range of comforters designed for warmth and breathability. Available in various patterns, colors, and sizes, our comforters are made to suit different preferences and provide comfort for a good night's sleep. They are also machine-washable, making maintenance simple and convenient. With a focus on practicality and quality, Utopia's comforters are built to offer comfort and durability over time.

Mattress Pad:

Utopia Industries' waterproof mattress protectors provide an effective barrier against liquids, keeping your mattress clean and fresh. These protectors help prevent spills and stains, allowing you to rest easily without worrying about accidental mishaps. Made from breathable and soft fabric, they offer both comfort and protection, ensuring a dry and cozy sleep. Designed for practicality and durability, Utopia's mattress protectors extend the life of your mattress while providing peace of mind night after night.

WEEK 1
02/01/2025-08/01/2025

Key Activities and Tasks Performed:

1. Visited Both Production Floors:

- Visited the comforter and mattress pad production floors to observe the manufacturing processes.
- Gained an understanding of the general workflow and layout of both production areas.

2. Observed and Analyzed Process Flow:

- Carefully observed each stage of the production process for both comforters and mattress pads.
- Identified key operations and workflows involved in the production of both products.

3. Created Process Flowchart:

- Developed a process flowchart for the comforter and mattress pad production, mapping out each step and decision point from start to finish.
- We Analyzed the flow of materials, labor, and machinery to identify potential inefficiencies.

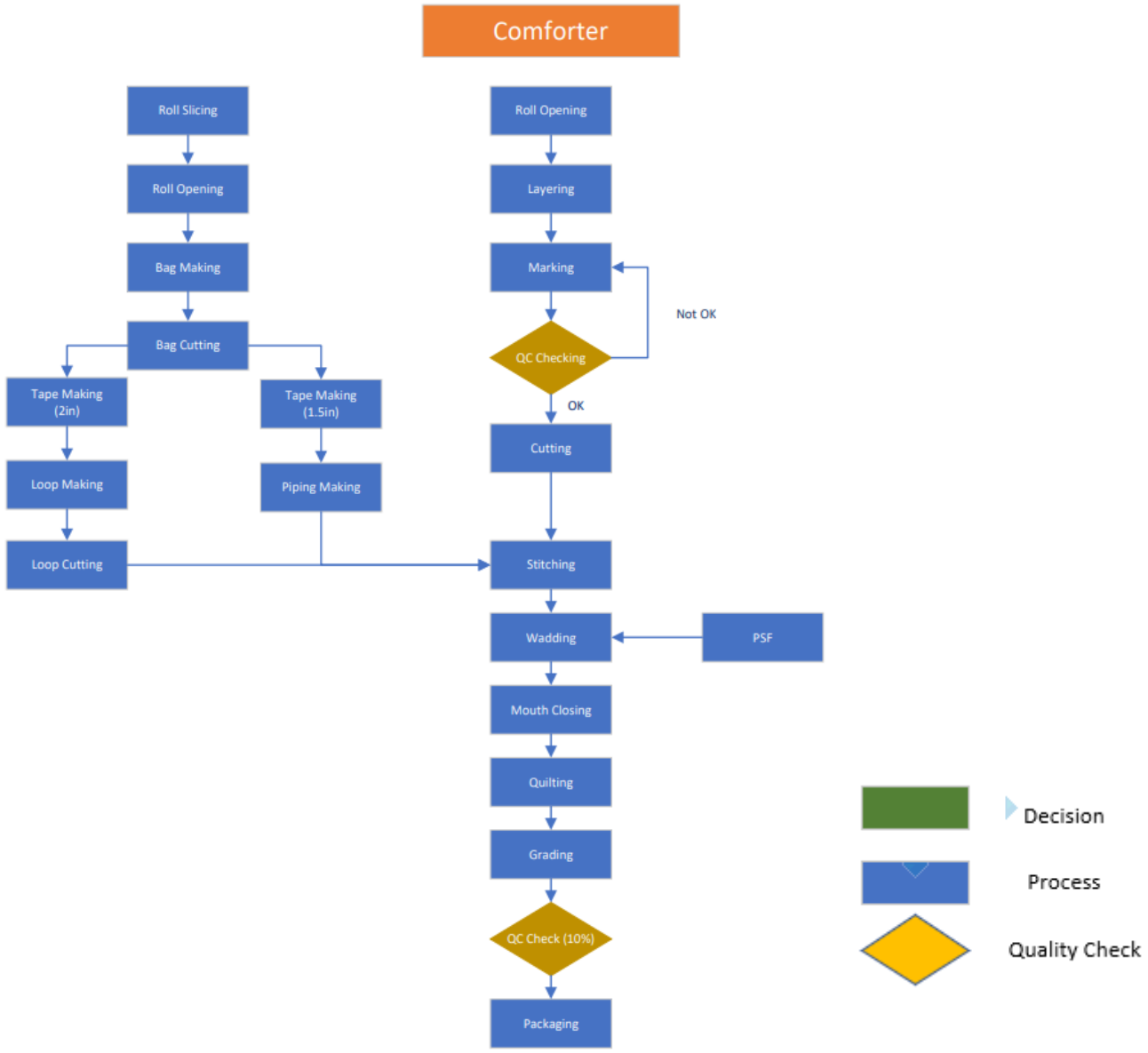
4. Interdepartmental Visits:

- Conducted visits to various departments including HSE (Health, Safety, and Environment), Quality, and the Mechanic Workshop.
- Gained insights into how each department contributes to overall production and the importance of their role in maintaining quality and safety standards.
- Observed safety practices in the workplace during the HSE visit and understood the processes involved in ensuring a safe working environment.

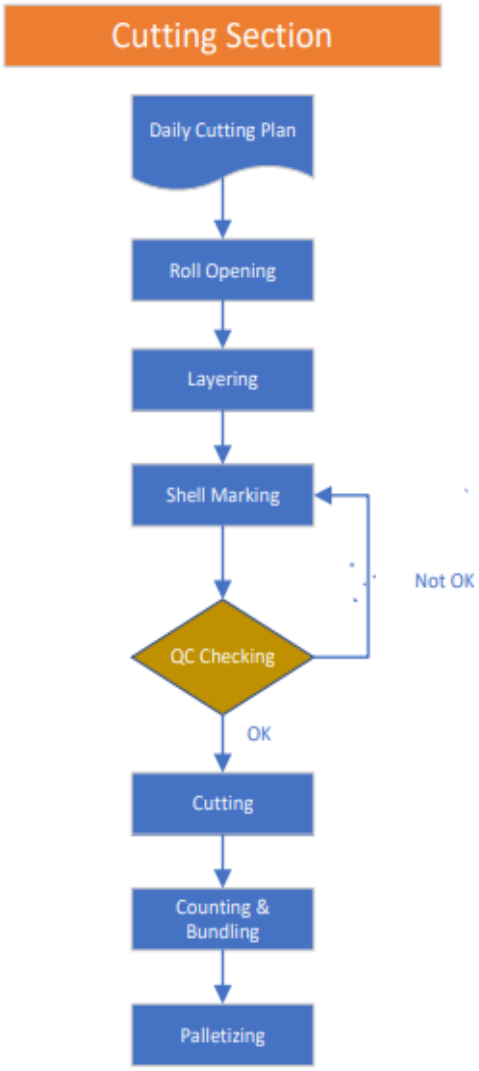
Working:

We created a Process flow chart for the Comforter and Mattress Pad
Following is the Process Flow Charts

COMFORTER:

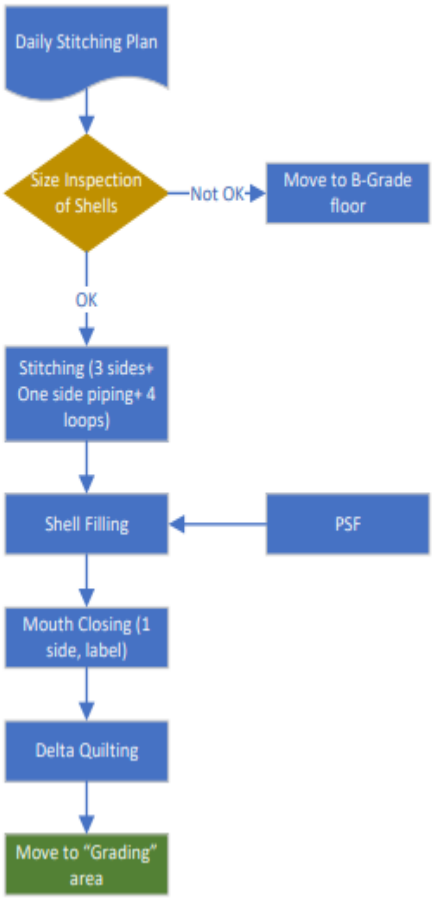


SECTION WISE PROCESS FLOW:

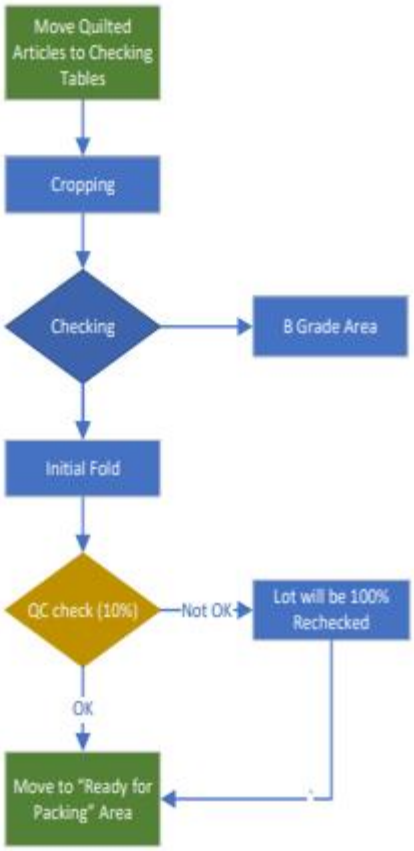


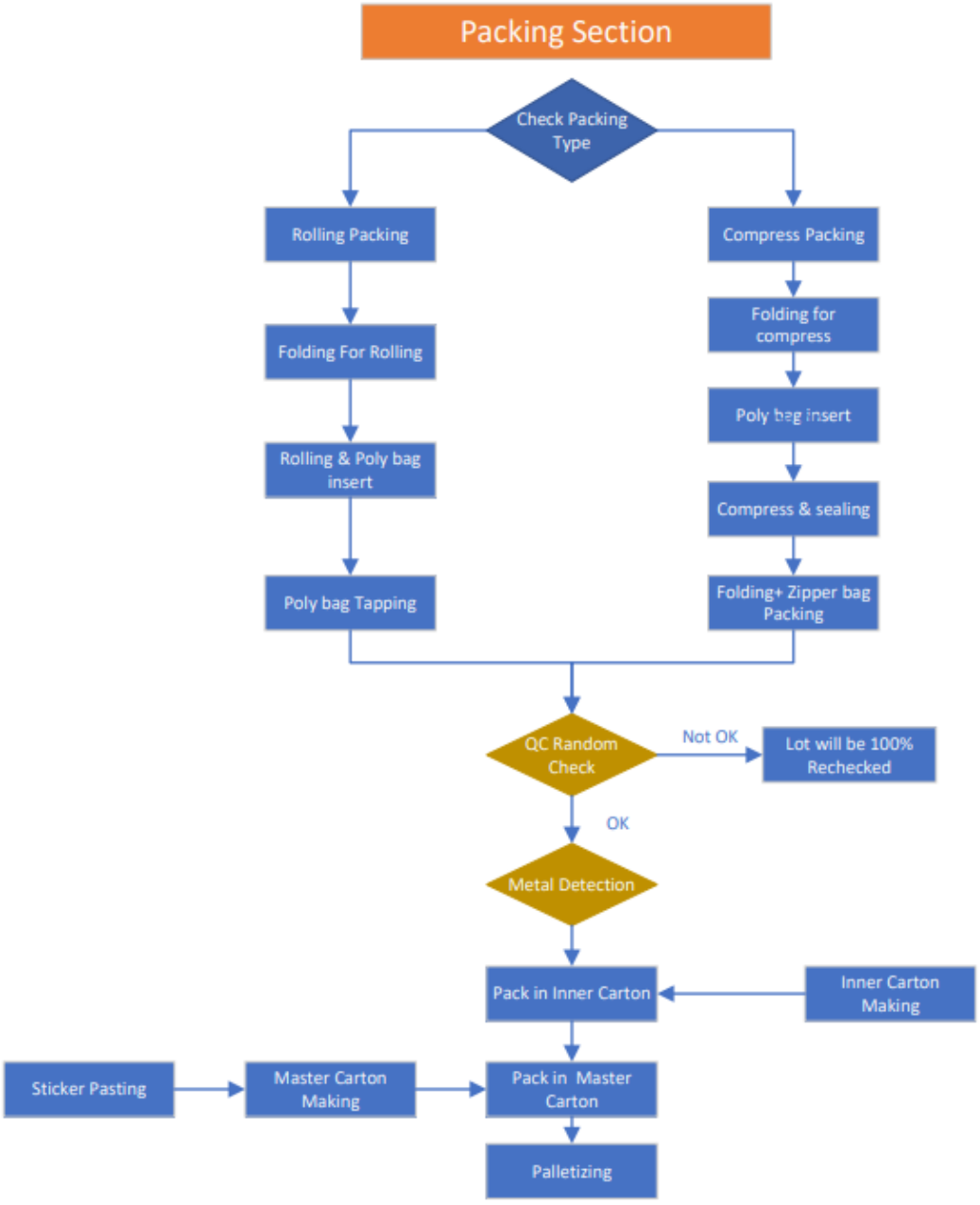

Piping Section
Roll Slicing
Roll is moved from cutting to piping section
Roll opening
Bag Making
Bag Cutting
Tape Making (1.5")
Tape Making (2")
Loop Making
Piping Making
Loop Cutting
Move to "Stitching" Area

Stitching Section



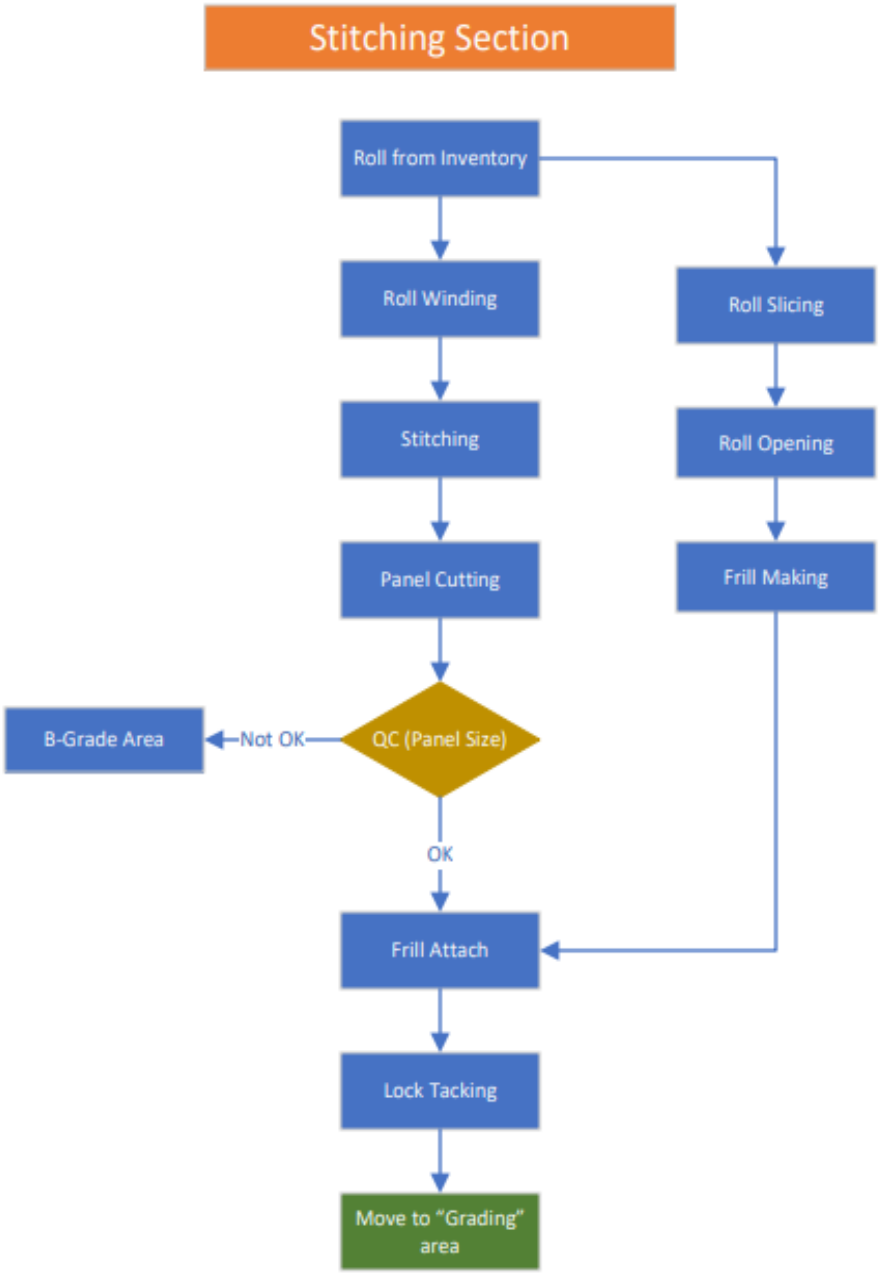
Grading Section



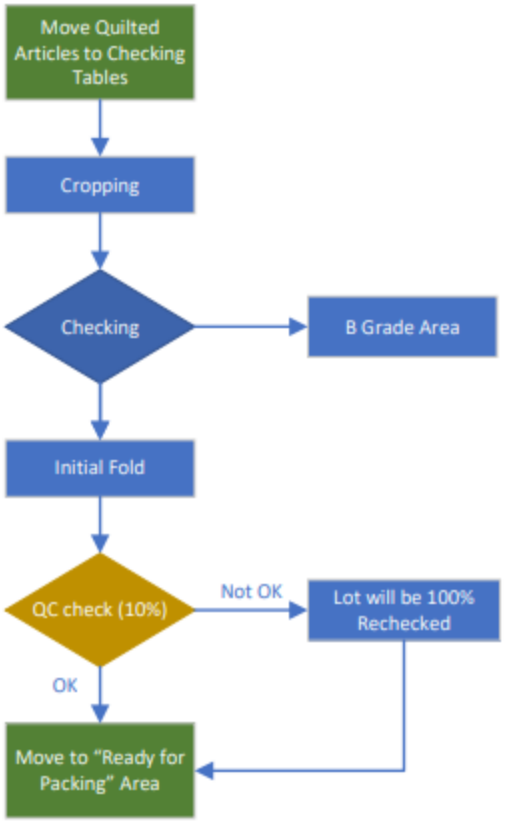

Packing Section
Check Packing Type
Rolling Packing
Folding For Rolling
Rolling & Poly bag insert
Poly bag Tapping
Compress Packing
Folding for compress
Poly bag insert
Compress & sealing
Folding+ Zipper bag Packing
QC Random Check
Not OK
Lot will be 100% Rechecked
OK
Metal Detection
Pack in Inner Carton
Inner Carton Making
Sticker Pasting
Master Carton Making
Pack in Master Carton
Palletizing

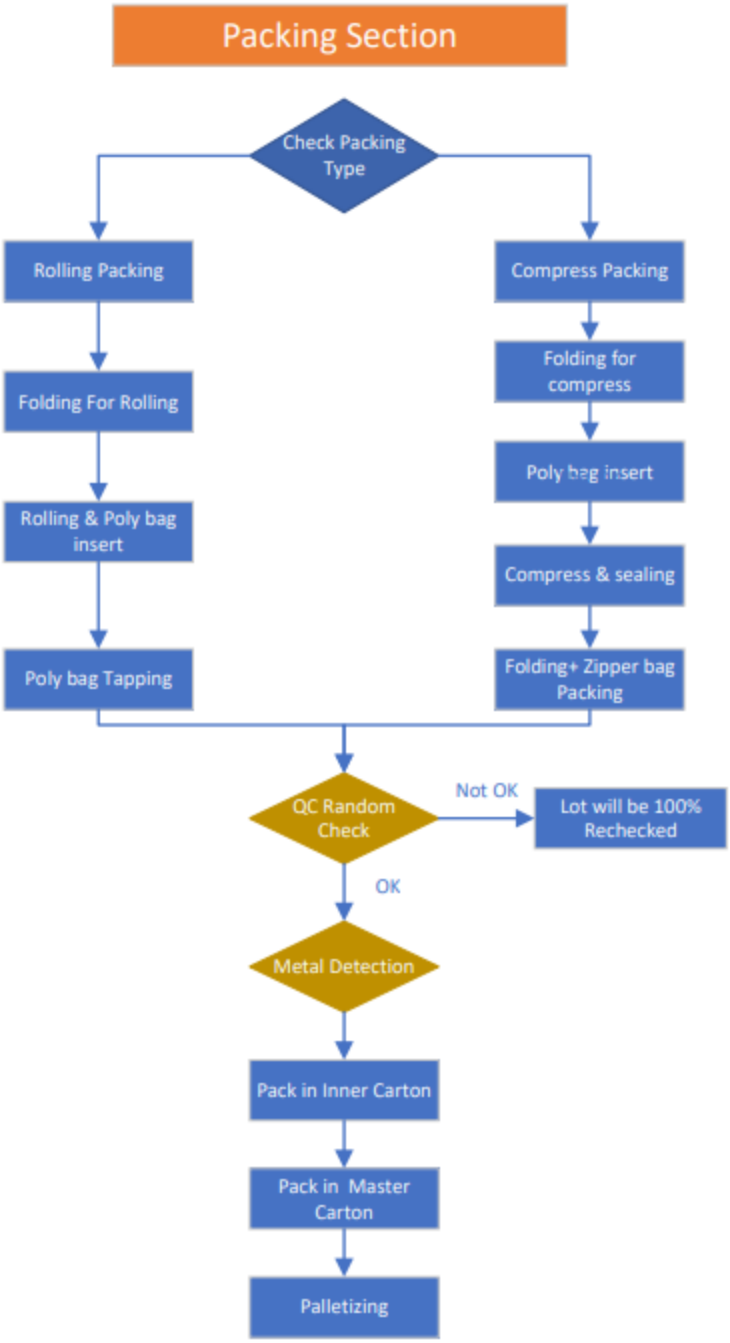
MATTRESS PAD:

SECTION WISE PROCESS FLOW:



Grading Section




Packing Section
Check Packing Type
Rolling Packing
Folding For Rolling
Rolling & Poly bag insert
Poly bag Tapping
Compress Packing
Folding for compress
Poly bag insert
Compress & sealing
Folding+ Zipper bag Packing
QC Random Check
Not OK
Lot will be 100% Rechecked
OK
Metal Detection
Pack in Inner Carton
Pack in Master Carton
Palletizing

Interdepartmental Visits:

Health, Safety, and Environment (HSE) Department:

Our visit to the HSE department highlighted the organization's commitment to maintaining a safe and healthy working environment. We were introduced to safety protocols and preventive measures in place to mitigate workplace hazards. The department emphasized the importance of personal protective equipment (PPE), emergency evacuation procedures, and fire safety measures. Additionally, we learned about the environmental initiatives implemented to reduce the company's ecological footprint, such as waste management strategies and energy-saving practices.

Machine Workshop:

The Machine Workshop visit provided an overview of the machinery and equipment used in the production process. The workshop serves as the hub for the maintenance, repair, and calibration of machinery, ensuring uninterrupted operations. We observed skilled technicians performing routine maintenance and troubleshooting equipment issues. The team explained the importance of predictive and preventive maintenance to avoid downtime and enhance operational efficiency. This visit underscored the critical role of the workshop in supporting the overall production process.

Quality Department:

In the Quality Department, we were introduced to the rigorous quality assurance and quality control processes employed to maintain product standards. The department demonstrated the various tests conducted on raw materials and finished products to ensure compliance with industry standards and customer requirements. We also gained insights into statistical process control (SPC) and the use of advanced testing equipment to monitor production quality. The team emphasized the importance of identifying defects early in the process to minimize rework and wastage, thereby enhancing overall productivity.

Key Takeaways:

This comprehensive visit provided a holistic understanding of how different departments work collaboratively to ensure the smooth functioning of the organization. The HSE department fosters a safe and sustainable workplace, the Machine Workshop ensures the reliability of equipment, and the Quality Department upholds the organization’s reputation by delivering high-quality products. These observations laid the foundation for understanding the importance of cross-departmental collaboration and its impact on the overall success of the company.

WEEK 2
09/01/2025-15/01/2025

Key Activities & Tasks Performed

1. SAM Study of Comforter:

- Conducted a Standard Allowed Minute (SAM) study for comforter production to determine the standard time required for each operation.
- Covered four comforter sizes: Twin (64x88), Full (82x86), Queen (88x88), and King (90x102).
- Collected time study data to analyze variations in processing time across different sizes.

2. Fabric, PSF, and Thread Consumption Calculation:

- Measured and calculated the fabric consumption required for each comforter size.
- Determined the Polyester Staple Fiber (PSF) usage for quilting and padding
- Analyzed the thread consumption based on different stitching operations to optimize material usage.

3. Gemba Walk with Focus on Machine Utilization:

- Conducted Gemba walks on the shop floor to observe real-time machine operations.
- Assessed machine utilization by identifying downtime, bottlenecks, and efficiency gaps.
- Noted areas where machine performance could be improved to enhance productivity.

4. Gemba Walk with 5S Agenda:

- Evaluated the implementation of 5S methodology (Sort, Set in Order, Shine, Standardize, Sustain) in the production area.
- Identified areas needing improvement in workplace organization and cleanliness.
- Suggested corrective actions to maintain a more systematic and efficient work environment.

Working:

SAM Study:

We conducted a Standard Allowed Minute (SAM) study to produce comforters. The objective of this study was to determine the standard time required for each operation involved in the manufacturing process. By analyzing SAM, we aimed to improve labor planning, cost estimation, and production efficiency.
We focused on four different comforter sizes:

- Twin **(64x88in)**
- Full **(82x86in)**
- Queen **(88x88in)**
- King **(90x102in)**

Each size required different levels of material handling, stitching, and finishing operations, impacting the overall time required for production. Through this study, we collected time study data, identified variations in operation times across different sizes, and gained insights into optimizing workflow efficiency.

This SAM analysis was crucial in setting realistic production targets, evaluating operator performance, and improving overall process standardization within the manufacturing u

QUEEN (88x88in)

Utopia Industries

Article	COMFORTER	Size	88 x 88	Available minutes	600	Planned Efficiency			Allowance		Date		
Data Gathering			Observe Cycle Time for each(seconds)			Avg Time	Rating	Basic time	Basic Minutes	M/C	Other	Bundle Loading Time (Min)	SAM	Capacity
Section	Operation Description	M/C Type	MP	1	2	3	4	5	6	7	8	9	10								
CUTTING																					
	Fabric Roll Movement																			0.16	
Cutting	Roll Opening	H	1	2.359	3.051	2.282	2.205	2.077	2.103	2.718	3.282	2.769	2.564	2.54	100%	2.54	0.04	5%	0%	0.02	0.06	9307
	Open Fabric movement to cutting table																			0.16	
Cutting	Layering	H	2	9.113	9.274	9.355	9.435	9.516	9.677	8.790	8.629	8.065	9.274	9.11	100%	9.11	0.15	0%	0%	0.00	0.15	3950
Cutting	Marking	H	1	0.356	0.269	0.331	0.311	0.317	0.327	0.317	0.308	0.298	0.311	0.31	100%	0.31	0.005	0%	5%	0.00	0.006	109022
Cutting	Cutting	O	1	0.516	0.327	0.377	0.380	0.470	0.489	0.394	0.489	0.403	0.397	0.42	100%	0.42	0.01	10%	5%	0.00	0.008	73784
	Cutting SAM																				0.550	1091
STITCHING																					
Stitching	Roll Opening	H	1	0.47	0.46	0.47	0.46	0.48	0.49	0.46	0.48	0.49	0.50	0.47	100%	0.47	0.01	0%	10%	0.00	0.01	68963
Stitching	Bag Making	O	1	2.58	2.50	2.54	2.65	2.35	2.46	2.28	2.52	2.59	2.52	2.50	100%	2.50	0.04	5%	10%	0.00	0.05	12527
Stitching	Bag Cutting	O	1	0.59	0.64	0.59	0.60	0.55	0.57	0.70	0.58	0.55	0.61	0.60	100%	0.60	0.01	5%	5%	0.00	0.01	54882
Stitching	Tape Making (15in)	O	1	15.12	14.59	15.71	15.94	14.71	13.24	14.41	14.12	13.82	15.39	14.69	100%	14.69	0.24	5%	5%	0.02	0.29	2073
Stitching	Piping Making	O	1	38.06	37.65	37.71	37.35	38.53	39.12	38.82	39.41	37.65	37.06	38.14	100%	38.14	0.64	5%	10%	0.00	0.73	821
Stitching	Loop Making	O	1	2.57	2.52	2.54	2.52	2.52	2.48	2.44	2.50	2.65	2.50	2.52	100%	2.52	0.04	5%	10%	0.00	0.05	12407
	Shell Loading																			0.16	
Stitching	Stitching (4 loops with 4 sides piping)	O	1	101.00	110.00	135.00	116.00	131.00	115.00	130.00	127.00	124.100	135.100	123.20	100%	123.20	2.05	5%	10%	0.02	2.38	252
	Shell Off Loading																			0.16	
	PSF Movement & Shell Movement																			0.16	
Stitching	Shell Filling	O	1	16.21	16.09	16.09	22.53	12.87	18.24	15.02	20.38	20.38	15.02	17.48	100%	17.48	0.29	5%	5%	0.02	0.34	1762
	After Wadding Movement for M.C (Bundle of 10pcs)																			0.16	
Stitching	Mouth Closing	O	1	64.38	42.92	69.67	47.21	46.13	60.08	48.28	43.35	52.57	59.01	53.86	100%	53.86	0.90	5%	10%	0.02	1.05	570
	Movement for Delta Feeding (Bundle of 5pcs)																			0.16	
Stitching	Delta Quilting	O	1	140	130	200	125	151	141	142	193	140	165	152.70	100%	152.70	2.55	10%	5%	0.02	2.95	204
	Stitching SAM																				8.66	69
GRADING																					
	Movement Delta to Checking Table (Bundle of 20 pcs)																			0.16	
Grading	Checking	G	2	25	33	47	40	42	43	45	40	41	28	38.40	100%	38.40	0.64	0%	10%	0.02	0.72	829
	Movement Checking to Packing Area (Bundle of 20 pcs)																			0.16	
	Grading SAM																				1.04	
PACKING																					
Packing	Folding	H	1	6	4	4	10	6	7	5	6	8	4	6.00	100%	6.00	0.10	0%	10%	0.02	0.13	4615
Packing	Rolling+Polybag insert	O	1	10	15	17	9	9	12	10	10	9	14	11.50	100%	11.50	0.19	0%	10%	0.02	0.23	2539
Packing	Poly bag tapping	H	1	2	2	1	2	2	1	2	2	1	3	1.80	100%	1.80	0.03	0%	10%	0.00	0.03	18182
	Carton Movement Warehouse to Floor (Inner + Master)																			0.16	
Packing	Inner Carton making	H	1	8	6	6	7	5	10	8	6	7	5	6.80	100%	6.80	0.11	0%	10%	0.00	0.12	4813
Packing	Inner carton packing+taping	H	1	8	6	7	5	7	6	7	8	5	7	6.60	100%	6.60	0.11	0%	10%	0.00	0.12	4959
Packing	Master carton sticker pasting	H	1	12	15	15	13	14	12	12	13	15	12	13.30	100%	13.30	0.22	0%	10%	0.00	0.24	2461
Packing	Master carton making	H	1	8	10	10	13	11	10	9	10	11	12	10.40	100%	10.40	0.17	0%	10%	0.00	0.19	3147
Packing	Master carton packing+taping	H	1	15	21	20	16	17	12	15	14	16	15	16.10	100%	16.10	0.27	0%	5%	0.00	0.28	2130
	Pallet Making to moving to warehouse																			0.16	
	Packing SAM																				1.68	358
	Total SAM																				11.927	50

SAM Summary of Twin Size (64x88in):

- Cut Size: **70x94in**
- Cutting SAM: **0.52**
- Stitching SAM: **6.87**
- Grading SAM: **0.78**
- Packing SAM: **1.68**

Total SAM: 9.84

SAM Summary of Full Size (82x86in):

- Cut Size: **88x92in**
- Cutting SAM: **0.54**
- Stitching SAM: **7.66**
- Grading SAM: **0.93**
- Packing SAM: **1.68**

Total SAM: 10.81

SAM Summary of King Size (90x102in):

- Cut Size: **96x108in**
- Cutting SAM: **0.64**
- Stitching SAM: **9.59**
- Grading SAM: **1.07**
- Packing SAM: **2.01**

Total SAM: 13.27

Summary of Critical Activity:

Product	Size	Dimension	SAM	Critical Activity	CA SAM	Capacity (20hrs)	No. of Machine	Total Capacity
COMFORTER	Twin	64x88	9.84	Delta Quilting	2.03	592	40	23661
	Full	82x86	10.81	Delta Quilting	2.45	490	40	19620
	Queen	88x88	11.93	Delta Quilting	2.95	407	40	16289
	King	90x102	13.27	Delta Quilting	3.03	395	40	15816
	Twin (NW)	64x88	11.52	Delta Quilting	2.02	593	40	23706
	Full (NW)	82x86	13.21	Delta Quilting	2.45	490	40	19620
	Queen (NW)	88x88	13.99	Delta Quilting	2.95	407	40	16289
	King (NW)	90x102	15.38	Delta Quilting	3.12	385	40	15388

Fabric, PSF, and Thread Consumption Calculation:

➢ Fabric

ITEM DESCRIPTION	Sizes	Sizes (cm)	Fabric consumption (meter)					
			Consumed Length (meter)	Quantity Pcs	Fabric consmp. /Pc (meter)	Side Wastage (cm)	Piping Fabric consmp./Pc (metr)	Total Fabric Consumption (m)
Comforter 80GSM Microfiber with 250 Filling	Twin	162.5x223.5 cm	3.5548	1	3.55	7.56	0.255	3.810
Comforter 80GSM Microfiber with 250 Filling	Full	208.2x218.4 cm	4.4688	1	4.47	12.66	0.280	4.749
Comforter 80GSM Microfiber with 250 Filling	Queen	223.5x223.5 cm	4.7748	1	4.77	7.56	0.292	5.067
Comforter 80GSM Microfiber with 250 Filling	King	228.6x266.7 cm	5.6388	1	5.64	2.46	0.322	5.961

➢ PSF

ITEM DESCRIPTION	Sizes	Sizes (cm)	PSF consumption (Gram)		
			Filling GSM	Area (m2)	PSF Cons. (Gram)
Comforter 80GSM Microfiber with 250 Filling	Twin	162.5x223.5 cm	250	4.68	1169.21
Comforter 80GSM Microfiber with 250 Filling	Full	208.2x218.4 cm	250	5.70	1423.79
Comforter 80GSM Microfiber with 250 Filling	Queen	223.5x223.5 cm	250	6.20	1548.78
Comforter 80GSM Microfiber with 250 Filling	King	228.6x266.7 cm	250	7.42	1854.84

➢ Thread

Thread consumption (meter)											
Cut Size		Final Size		Thread Consumption (Shell SN)	Thread Consumption (Mouth Closing)	Thread Consumption (Delta Quilting)	Thread Consumption (Pippin)	Total Consumption (meter)	MultiNeedle / Delta		SN & O/L
L	W	L	W						50/3 (Needle)	50/2 (bobbin)	40/2
70	94	64	88	22.85	6.63	54.53	22.85	106.87	27.27	27.27	29.48
88	92	82	86	25.07	6.49	60.93	25.07	117.57	30.47	30.47	31.56
94	94	88	88	26.18	6.63	64.13	26.18	123.12	32.07	32.07	32.81
96	108	90	102	28.40	7.60	70.53	28.40	134.93	35.27	35.27	36.00

- **Product Weight:**

ITEM DESCRIPTION	Sizes	Sizes (cm)	Product Weight (Gram)			
			Fabric GSM	Area (m2)	Fabric Weight	Total Weight
Comforter 80GSM Microfiber with 250 Filling	Twin	162.5x223.5 cm	160.00	4.24	704.33	**1873.53**
Comforter 80GSM Microfiber with 250 Filling	Full	208.2x218.4 cm	160.00	5.22	835.27	**2259.06**
Comforter 80GSM Microfiber with 250 Filling	Queen	223.5x223.5 cm	160.00	5.70	911.95	**2460.73**
Comforter 80GSM Microfiber with 250 Filling	King	228.6x266.7 cm	160.00	6.87	1099.97	**2954.81**

5S Score:

5S SCORE COMFORTER									
FLOOR	Section	SORT	SET IN ORDER	SHINE	STANDARDIZE	SUSTAIN	SECTION AVERAGE SCORE	Floor Average	Comforter
DTY FLOOR	Cutting	70%	65%	70%	75%	70%	70%	70%	69%
	Stitching	70%	70%	65%	70%	70%	69%		
	Wadding/Delta	70%	70%	65%	68%	70%	69%		
	Grading	70%	72%	68%	70%	70%	70%		
	Packing	70%	70%	70%	70%	70%	70%		
1ST FLOOR	Wadding/Delta	60%	70%	65%	70%	70%	67%	67%	
	Grading	70%	70%	70%	70%	70%	70%		
	Packing	65%	60%	64%	70%	65%	65%		
2ND FLOOR	Wadding/Delta	70%	70%	70%	70%	70%	70%	69%	
	Grading	70%	70%	60%	70%	70%	68%		
	Packing	70%	72%	68%	70%	68%	70%		

Machine Utilization:

Department	Name of Machine	Total Machines	Running Machines	Utilization (%)	Out of order
Comforter	Single Needle Machine	90	40	44	0
Comforter	Tape Making Machine	3	3	100	0
Comforter	Delta Quilting Machine	40	27	68	1
Comforter	Wadding Plant	5	3	60	0
Comforter	Compress Packing	4	2	50	0
Comforter	Roll Packing	6	3	50	0
Comforter	Metal Detector	3	3	100	0

WEEK 3
16/01/2025-22/01/2025

Key Activities & Tasks Performed

1. SAM Study of Mattress Pad

- Conducted a Standard Allowed Minute (SAM) analysis to establish the standard time required for various production processes
- We studied four mattress pad sizes: Twin (39x75), Full (54x75), Queen (60x80), and King (78x80).
- Recorded and analyzed time study data to identify variations in operational efficiency across different sizes.

2. Fabric, PSF, and Thread Consumption Analysis

- Measured and documented the fabric consumption for each mattress pad size.
- Calculated the Polyester Staple Fiber (PSF) usage to assess material efficiency in quilting and padding.
- Evaluated thread consumption across different stitching processes to optimize resource utilization.

3. Gemba Walk – Machine Utilization Assessment

- Performed Gemba walks to observe machine performance and workflow on the shop floor.
- Assessed machine utilization rates, identifying instances of downtime and inefficiencies.
- Noted key areas for improvement to enhance equipment productivity and minimize waste.

4. Gemba Walk – 5S Implementation Review

- Reviewed the application of 5S principles (Sort, Set in Order, Shine, Standardize, Sustain) in the production facility.
- Identified gaps in workplace organization and cleanliness that required corrective measures.
- Suggested practical improvements to promote a more organized, efficient, and productive work environment

Working:

SAM Study:

We conducted a Standard Allowed Minute (SAM) study to produce mattress pads. The objective of this study was to determine the standard time required for each operation involved in the manufacturing process. By analyzing SAM, we aimed to improve labor planning, cost estimation, and production efficiency.

We focused on four different mattress pad sizes:

- **Twin (39x75 inches)**
- **Full (54x75 inches)**
- **Queen (60x80 inches)**
- **King (78x80 inches)**

Each size required different levels of material handling, stitching, and frill attachment, impacting the overall time required for production. Through this study, we collected time study data, identified variations in operation times across different sizes, and gained insights into optimizing workflow efficiency.

This SAM analysis was crucial in setting realistic production targets, evaluating operator performance, and improving overall process standardization within the manufacturing unit.

QUEEN (60x80in)

1																									
Utopia Industries																									
Article				Mattress Pad	Size	60x80				Available minutes			600			Planned Efficiency						Date			
				Data Gathering			Observe Cycle Time for each(seconds)									Avg	Rating	Basic	Basic	Allowance		Bundle Handling Time	SAM	Capacity
Size			Section	Operation Description	M/C Type	MP	1	2	3	4	5	6	7	8	9	10	Time		time	Minutes	M/C	Other	(Min)		
STITCHING																									
60x80			Stitching	Fabric Roll Movement																				0.16	
60x80		123	Stitching	Rolll Winding		1	3.63	3.66	3.90	3.58	3.74	3.58	3.60	3.48	3.69	3.77	3.7	100%	3.66	0.06	5%	10%	0.00	**0.07**	8545
60x80			Stitching	Moving Winded/Roll to Quiting Machine																				0.16	
60x80		1	Stitching	Quilting		1	74.6	75.0	74.2	74.4	75.0	75.2	74.2	74.6	74.8	74.3	74.6	100%	74.63	1.24	15%	15%	0.00	**1.62**	371
60x80			Stitching	Moving Quilted Roll to Panel Cutting Machine																				0.16	
60x80		1	Stitching	Panel Cutting		2	6	6	5	8	8	5	5	6	5	6	6.0	100%	6.00	0.10	5%	0%	0.00	**0.11**	5714
60x80		26	Stitching	Roll Slicing		1	1.5	1.6	1.7	1.5	1.6	1.7	1.6	1.6	1.5	1.6	1.6	100%	1.59	0.03	5%	10%	0.00	**0.03**	19731
60x80		26	Stitching	Roll Opening		1	3.88	3.8	3.7	3.8	3.8	3.8	3.9	3.8	4	4	3.8	100%	3.80	0.06	0%	10%	0.00	**0.07**	8612
60x80		26	Stitching	Frill Making		1	41.0	42.0	43.0	41.0	44.0	49.0	43.0	42.0	41.0	43.0	42.9	100%	42.90	0.72	5%	0%	0.00	**0.75**	799
60x80			Stitching	Moving Frills to Stitching Area																				0.16	
60x80			Stitching	Panels Movement to Frill Attach																				0.16	
60x80		1	Stitching	Frill Attach		1	42	49	50	44	43	46	47	49	42	49	46.1	100%	46.10	0.77	5%	0%	0.02	**0.83**	726
60x80			Stitching	Movement for Lock Tacking																				0.16	
60x80		1	Stitching	Lock Tacking		1	8	9	9	7	8	7	8	8	9	8	8.1	100%	8.10	0.14	5%	0%	0.02	**0.16**	3709
Stitching SAM																								**4.59**	131
GRADING																									
60x80			Grading	Movement Quilted Pieces to Checking Table (Bundle of 20 pcs)																				0.16	
60x80		1	Grading	Checking		2	14.43	11.1	11.1	11.1	13.32	17.76	19.98	17.76	22.2	18.87	15.8	100%	15.76	0.26	0%	10%	0.02	**0.31**	1942
60x80			Grading	Movement Checking to Packing Area (Bundle of 20 pcs)																				0.16	
Grading SAM																								**0.63**	954
PACKING																									
60x80		1	Packing	Folding		1	4	4	5	5	5	6	5	4	6	5	4.9	100%	4.90	0.08	0%	10%	0.02	**0.11**	5463
60x80		1	Packing	Compressing		1	6	8	7	8	9	9	6	7	8	9	7.7	100%	7.70	0.13	5%	10%	0.00	**0.15**	4065
60x80		1	Packing	Lace tying		1	21	18	25	22	17	18	29	21	22	24	21.7	100%	21.70	0.36	0%	10%	0.00	**0.40**	1508
60x80			Packing	Carton Movement Warehouse to Floor (Inner + Master)																				0.16	
60x80		1	Packing	Inner Carton making		1	6	7	9	8	8	8	6	8	8	6	7.4	100%	7.40	0.12	0%	10%	0.00	**0.14**	4423
60x80		1	Packing	Inner carton Insert		1	3	2	3	4	3	4	4	5	3	2	3.3	100%	3.30	0.06	0%	10%	0.00	**0.06**	9917
60x80		1	Packing	Inner carton Taping		1	8	9	9	7	8	7	7	9	8	8	8.0	100%	8.00	0.13	0%	10%	0.00	**0.15**	4091
60x80		1	Packing	Master carton sticker pasting		1	12	15	15	13	14	12	12	13	15	12	13.3	100%	13.30	0.22	0%	10%	0.00	**0.24**	2461
60x80		1	Packing	Master carton making		1	10	8	10	13	11	10	9	10	11	12	10.4	100%	10.40	0.17	0%	10%	0.00	**0.19**	3147
60x80		1	Packing	Master carton Packing+Taping		1	24	22	28	25	28	24	21	23	24	25	24.4	100%	24.40	0.41	0%	10%	0.00	**0.45**	1341
			Packing	Pallet Making to moving to warehouse																				0.16	
Packing SAM																								**2.20**	273
TOTAL SAM																								**7.42**	81

SAM Summary of Twin Size (39x75in):

- Cut Size: **43x79in**
- Stitching SAM: **3.37**
- Grading SAM: **0.53**
- Packing SAM: **2.20**

Total SAM: 6.10

SAM Summary of Full Size (54x75in):

- Cut Size: **58x79in**
- Stitching SAM: **3.99**
- Grading SAM: **0.60**
- Packing SAM: **2.20**

Total SAM: 6.79

SAM Summary of King Size (78x80in):

- Cut Size: **82x84in**
- Stitching SAM: **5.45**
- Grading SAM: **0.81**
- Packing SAM: **1.68**

Total SAM: 7.94

Summary of Critical Activity:

Product	Size	Dimension	SAM	Critical Activity	CA SAM	Capacity (20hrs)	No. of Machine	Total Capacity
MATTRESS	Twin	39x75	6.10	Multi Needle Quiltin	1.09	1100	13	14302
	Full	54x75	6.79	Multi Needle Quiltin	1.46	819	13	10652
	Queen	60x80	7.42	Multi Needle Quiltin	1.62	742	13	9648
	King	78x80	7.94	Multi Needle Quiltin	2.07	580	13	7535

Benefits of SAM Study to Industrial Engineering (IE)

Conducting a Standard Allowed Minute (SAM) study is a crucial aspect of Industrial Engineering (IE) as it helps in optimizing production processes, improving labor efficiency, and reducing operational costs. Below are the key benefits of the SAM study from an IE perspective:

1. Accurate Labor Cost Estimation:

- Helps in determining the standard time required for each operation, allowing precise calculation of labor costs
- Ensures fair wage allocation based on actual work performed, improving workforce management.

2. Production Planning & Efficiency Improvement:

- Enables setting realistic production targets based on time studies.
- Reduces bottlenecks by identifying time-consuming tasks and optimizing workflow
- Enhances line balancing, ensuring equal work distribution among operators.

3. Workforce Productivity Measurement:

- Provides a benchmark to evaluate operator's performance against standard timings.
- Identifies high-performing workers and those requiring additional training.

4. Process Standardization:

- Establishes standardized procedures for each task, reducing variations in execution.
- Help maintain consistent quality and efficiency across different product batches.

5. Resource Optimization:

- Minimizes idle time and improves machine utilization by setting optimal work rates.
- Helps in better allocation of manpower and machinery based on workload requirements.

6. Cost Reduction & Waste Minimization:

- Reduces unnecessary delays, eliminating non-value-added activities
- Improves material handling efficiency, reducing waste and excess movement.

7. Decision Making & Continuous Improvement:

- Provides data-driven insights for process improvement.
- Helps in implementing Lean Manufacturing and Kaizen principles for continuous efficiency gains

Fabric, PSF, and Consumption Calculation:

➢ Fabric

ITEM DESCRIPTION	Sizes	Sizes (cm)	Fabric consumption (meter)												
			Consumed Length (meter)	Quantity Pcs	Fabric consmp. /Pc (meter)	Side Wastage (cm)	Frill Consumption								
							Req size	Roll Width	No.of Bags from 1 Roll	Consumed Length (metr)	Quantity Pcs	Consumed Length(m)	Fabric consmp./Pc (metr)	Frill Weight (Grams)
Mattress Pad 80GSM Microfiber with 150 Filling	Twin	99.06x190.5 cm	4.0132	2	**2.01**	2.46	3.81	242	98	6.198	32.67	6.20	1.549	68.452
Mattress Pad 80GSM Microfiber with 150 Filling	Full	137.16x190.5 cm	2.9464	1	**2.95**	20.24	3.81	242	98	6.960	32.67	6.96	1.740	76.869
Mattress Pad 80GSM Microfiber with 150 Filling	Queen	152.5x203.2 cm	3.2532	1	**3.25**	7.54	3.81	242	98	7.520	32.67	7.52	1.880	83.063
Mattress Pad 80GSM Microfiber with 150 Filling	King	198.12x203.2 cm	4.1656	1	**4.17**	7.54	3.81	242	98	8.433	32.67	8.43	2.108	93.140

➢ PSF

ITEM DESCRIPTION	Sizes	Sizes (cm)	PSF consumption (Gram)						
			Filling GSM	Area (m2)	PSF Cons. (Gram)	Consumed Area (m2)	Quantity	Wastage (Gram)	Total PSF Weight (1 Unit)
Mattress Pad 80GSM Microfiber with 150 Filling	Twin	99.06x190.5 cm	150	4.43	**664.89**	2.19	2	7.40	328.74
Mattress Pad 80GSM Microfiber with 150 Filling	Full	137.16x190.5 cm	150	3.25	**488.14**	2.96	1	44.73	443.42
Mattress Pad 80GSM Microfiber with 150 Filling	Queen	152.5x203.2 cm	150	3.59	**538.97**	3.47	1	18.40	520.58
Mattress Pad 80GSM Microfiber with 150 Filling	King	198.12x203.2 cm	150	4.60	**690.14**	4.44	1	23.56	666.58

- **Product Weight:**

ITEM DESCRIPTION	Sizes	Sizes (cm)	Product Weight (Gram)			
			Fabric GSM	Area (m2)	Fabric Weight (Grams)	Total Weight (Grams)
Mattress Pad 80GSM Microfiber with 150 Filling	Twin	99.06x190.5 cm	160	2.19	419.11	747.85
Mattress Pad 80GSM Microfiber with 150 Filling	Full	137.16x190.5 cm	160	2.96	549.85	993.27
Mattress Pad 80GSM Microfiber with 150 Filling	Queen	152.5x203.2 cm	160	3.47	638.35	1158.92
Mattress Pad 80GSM Microfiber with 150 Filling	King	198.12x203.2 cm	160	4.44	804.16	1470.74

5S Score:

5S SCORE MATTRESS PAD						
SECTIONS	SORT	SET IN ORDER	SHINE	STANDARDIZE	SUSTAIN	AVERAGE SCORE
CUTTING	75%	73%	78%	74%	70%	74%
STITCHING	75%	72%	68%	68%	62%	69%
GRADING	75%	75%	76%	78%	74%	76%
PACKING	68%	65%	69%	72%	65%	68%
						72%

Machine Utilization:

Department	Name of Machine	Total Machines	Running Machines	Utilization (%)	Out of order
Mattress Pad	Multi Needle Quilting	14	5	36	1
Mattress Pad	Panel Cutting Machine	2	1	50	0
Mattress Pad	Stitching Machine	31	10	32	0
Mattress Pad	Snap Button Machine	2	1	50	0
Mattress Pad	Compress Packing	2	1	50	0
Mattress Pad	Roll Packing	1	0	0	0
Mattress Pad	Metal Detector	2	0	0	0
Mattress Pad	Double Head Machine	1	1	100	0

WEEK 4
23/01/2025-29/01/2025

Key Activities & Tasks Performed

1. Visit to SITE 3 – Warping and Weaving Operations

- Observed the warping process, where threads are aligned and prepared for weaving.
- We studied weaving operations, understanding how fabric is produced from yarn.
- Noted key aspects of material flow, machine efficiency, and process control in fabric production.

2. Visit to SITE 5 – Pillow Manufacturing Process

- Explored the **pillow manufacturing unit**, observing the different stages of production.
- Gained insights into **cutting, filling, stitching, and finishing** processes.
- Assessed quality control measures and production efficiency in pillow manufacturing.

3. Kaizen Proposal – Waste Reduction in Quilting

- Identified fabric wastage in the **quilting process of full-size mattress pads** due to oversized roll width.
- Proposed using **80-inch rolls instead of 87-inch rolls** to reduce fabric waste from **8 inches to 1 inch**.
- Suggested implementation steps to **optimize material utilization**, reduce costs, and improve sustainability

Working:

Visit to SITE 3 – Warping and Weaving Processes:

At **SITE 3**, we studied the **warping and weaving processes**, which are fundamental to fabric manufacturing. Warping involves preparing yarns for weaving, while weaving interlaces warp and weft yarns to form fabric.

Warping Process

Warping is the process of aligning and winding multiple yarns onto a beam under controlled tension. We observed:

- **Creeling:** Yarn cones are placed on creels to ensure smooth feeding into the warping machine.
- **Beaming:** Thousands of yarns are combined and wound onto a warp beam in an organized manner.
- **Tension Control:** Maintaining uniform tension is essential to prevent yarn breakage and defects.
- **Inspection:** The final warp beam is checked for misaligned or broken yarns before moving to weaving.

Weaving Process

In weaving, warp yarns from the beam are interlaced with weft yarns to create fabric. The key steps include:

- **Shedding:** Warp yarns are lifted to create an opening for the weft.
- **Picking:** The weft yarn is inserted through the shed using a shuttle or air-jet mechanism.
- **Beating Up:** The reed pushes the weft into place, ensuring a tight and even weave.
- **Loom Types:** We observed **air-jet, rapier, and shuttle looms**, each optimized for different fabric qualities and production speeds.

Key Learnings

- **Precision in warping** ensures smooth weaving and reduces defects.
- **Loom selection** impacts fabric quality, production speed, and efficiency.
- **Automation in warping and weaving** enhances productivity and minimizes material waste.

This visit helped us understand the **importance of process efficiency, machine utilization, and quality control in textile manufacturing**.

Visit to SITE 5 – Pillow Manufacturing Process

At **SITE 5**, we observed the **pillow manufacturing process**, which involves multiple stages from raw material preparation to the final product. This visit provided insights into the production workflow, material utilization, and quality control techniques used in pillow manufacturing.

Key Processes Observed

- **Cutting:** Fabric is cut into precise dimensions for different pillow sizes using automated and manual cutting techniques.
- **Filling:** Pillows are filled with fiber, ensuring uniform distribution for consistent shape and comfort.
- **Stitching:** The edges are sewn using specialized machines to secure the filling and maintain durability.
- **Inspection & Finishing:** Each pillow is checked for defects such as improper filling or stitching irregularities. The finished products are then packed for distribution.

Key Learnings

- **Process optimization** helps in minimizing material wastage during cutting and filling.
- **Quality control measures** ensure product consistency and durability.
- **Machine utilization** in stitching and filling directly impacts production efficiency.

This visit provided valuable exposure to **mass production techniques, quality assurance, and efficiency improvements in pillow manufacturing**, reinforcing the role of industrial engineering in optimizing manufacturing operations.

Kaizen Proposal – Waste Reduction in Quilting

Problem Statement:

During the quilting process for the Full-Size Mattress Pad, a roll of 87-inch width was being used. The final cut size of the mattress pad is 79 inches, meaning that 8 inches of material was being wasted in every production cycle. This excessive waste leads to higher fabric costs and inefficiencies in raw material utilization.

Root Cause Analysis:

- The roll width used (87 inches) exceeds the required quilted width of 79 inches, leading to unnecessary waste.
- Opportunity to optimize material usage without compromising product quality.

Proposed Kaizen Solution:

To reduce fabric waste, we propose using a roll with a width of 80 inches instead of 87 inches. This adjustment will result in:

- Quilted width of 79 inches (as per requirement).
- Only 1 inch of waste instead of 8 inches, significantly reducing fabric wastage.

Expected Benefits:

Category	Current State	Proposed Improvement	Impact
Material Waste	8 inches per unit	1 inch per unit	87.5% waste reduction
Fabric Utilization	Inefficient	Optimized	Reduced raw material cost
Cost Savings	Higher fabric cost due to waste	Lower fabric cost	Cost reduction in production
Sustainability	More waste generated	Less waste	Environmentally friendly

CONCLUSION

The four-week internship at Utopia Industries provided extensive hands-on experience in industrial engineering applications, focusing on process optimization, labor efficiency, and production planning. Throughout the internship, key activities included conducting SAM (Standard Allowed Minute) studies for comforters and mattress pads, performing Gemba walks, and analyzing machine utilization. These efforts contributed to improving productivity, optimizing resource allocation, and enhancing workplace organization through the implementation of the 5S methodology.

Visits to various production sites, including warping, weaving, and pillow manufacturing units, offered deeper insights into the interconnected nature of textile production. Observing material flow, quality control measures and machine operations helped in understanding how different manufacturing processes contribute to overall efficiency. The exposure to these operations emphasized the importance of process standardization and the role of industrial engineers in maintaining seamless production.

An important aspect of this internship was problem-solving through continuous improvement strategies. The Kaizen proposal for waste reduction in quilting demonstrated the significance of material optimization in cost reduction and sustainability. By analyzing fabric wastage and proposing a more efficient roll width, the initiative aimed to enhance resource utilization while minimizing unnecessary production costs. This experience reinforced the value of data-driven decision-making in industrial settings.

Overall, this internship served as a crucial learning experience, bridging theoretical knowledge with real-world applications. The exposure to manufacturing challenges and improvement initiatives has strengthened my technical, analytical, and problem-solving skills. The knowledge gained during this internship will be instrumental in applying industrial engineering principles to future projects, contributing to process efficiency, operational effectiveness, and continuous improvement in manufacturing environments.