Creating 5S Climate at the Shopfloor

Murat Ayabakan
Özgür Eken

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Abstract

- Lean manufacturing involves a variety of principles and techniques, all of which have the same ultimate goal: to eliminate waste and non-value added activities at every production or service process in order to bring the most satisfaction to the customer. Lean manufacturing is a systematic approach in order to identify and eliminate waste (non value-added activities).
- For companies to successfully implement lean; it is very much required that they maintain a proper 5S condition in the whole organization. The "5S" is the vital requirement to make all operations standard whereas it helps to point out the continuous improvement areas.
- 5S is a simple tool for organizing workplace in a clean, efficient and safe manner to enhance productivity, visual management and to ensure the introduction of standardized working. [1]

2

Abstract

- This study presents an approach for adapting 5S techniques in a production facility and gives a complete guide about a systematic method. Due to increased demand, high product variety, and a push production system, the plant has suffered from excessive wastes, unorganized workstations, and unhealthy work environment. This has translated into increased production cost, frequent delays, and low workers morale.
- Under such conditions, it has become difficult to implement effective continuous improvement studies. 5S is utilized for achieving project objectives. The work was a combination of both culture changes and physical changes on the shop floor. The project has drastically changed the plant and developed the infrastructure for a successful implementation of lean manufacturing studies.

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Introduction

- Muda

  Muda (in Japanese) simply stands for waste, but has a broad meaning:

  - unnecessary or excessive use of materials, space and production resources
  - any incurred cost due to non-added value jobs to the product:
    - Overproduction
    - Waiting time
    - Transportation
    - Overprocessing
    - Inventory
    - Defects
    - Motion [2]

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Introduction

- Lean Thinking

The core idea is to maximize **customer value** while minimizing **muda**. Simply, lean means creating more value for customers with fewer resources.[2]

Benefits are; lower costs, higher quality and shorter lead times.

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Introduction

- Lean Thinking Key Understanding – Profit & Cost

  Cost + Profit ≠Price

  Price – Cost = Profit

In order to increase profit do not raise the price – it is determined by the market.

Reduce Cost

Unless you reduce the cost, you cannot expect a profit! [3]

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Introduction

THE IDEAL CHARACTERISTICS OF LEAN PROCESSES

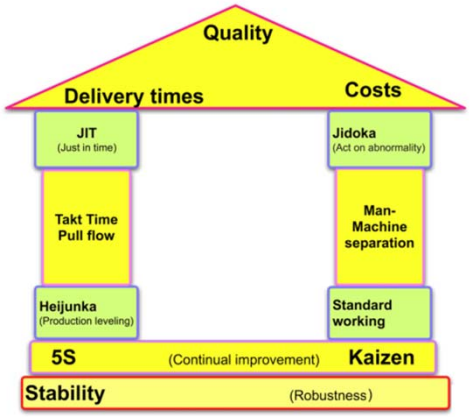

Fig.1. Lean Manufacturing House [4]

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5S Methodology

- 5S is key pillar of lean thinking and a system of process improvement that is adopted to reduce waste, order workplace and improve labor productivity.
- 5S approach makes sure that the excess of objects is considered as dirt and should be cleaned.
- 5S technique aims to improve flow within the company rather than clean the floor.

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5S Methodology – Basics

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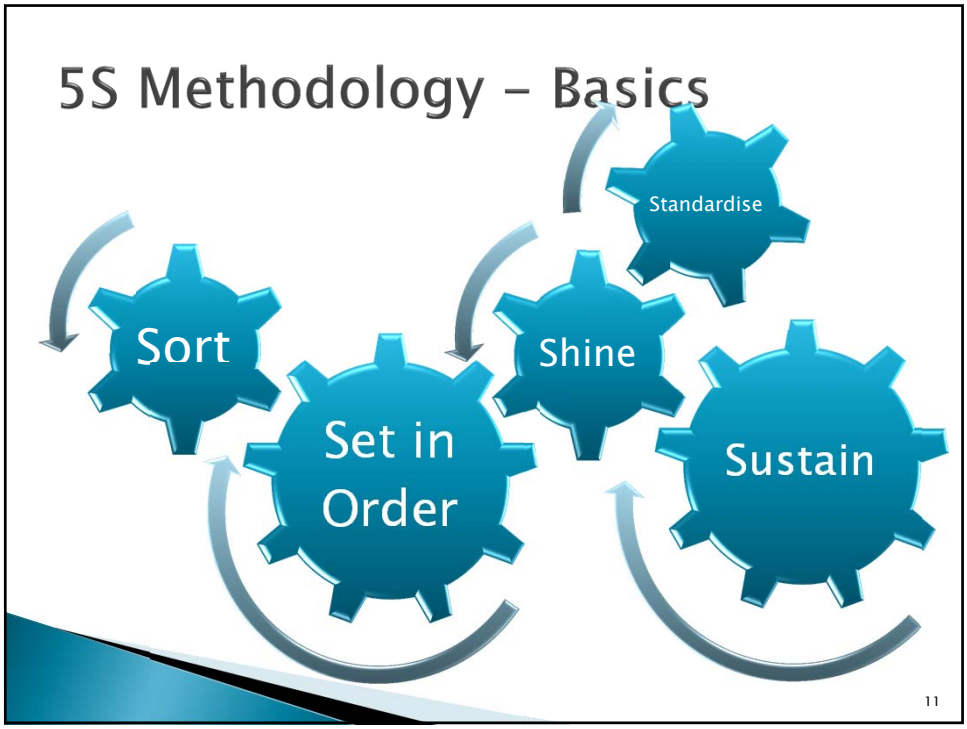

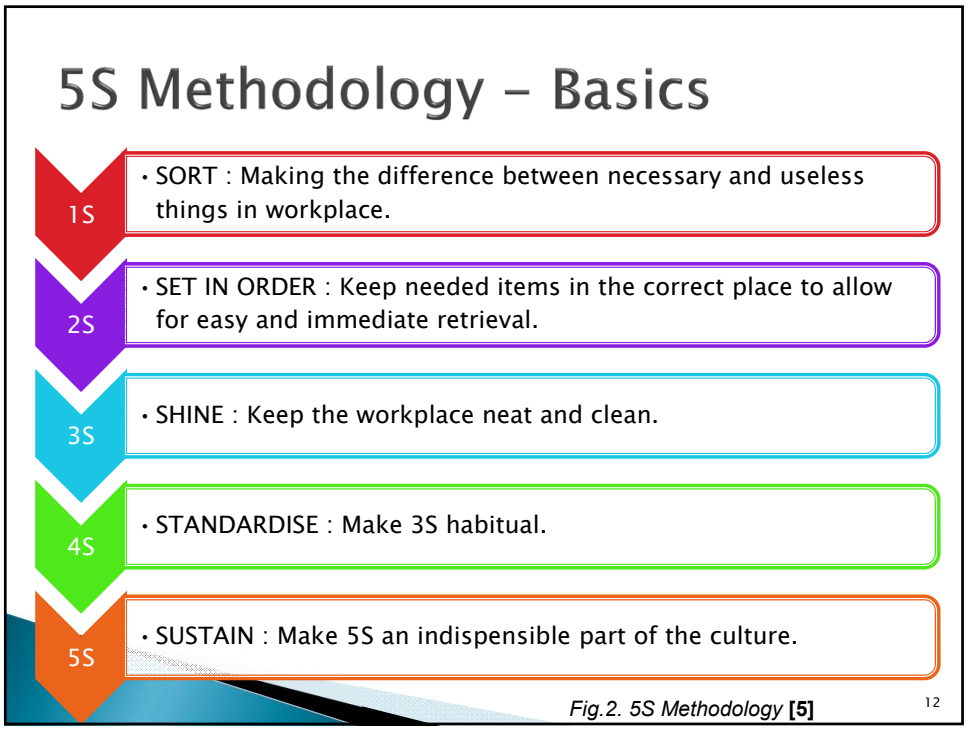

Fig.2. 5S Methodology **[5]**

5S Methodology

To achieve lean and clean shopfloor,organising the production with below principles are imperative:

- All objects need to be immediately seen by the operators in a glance.
- The objects to be moved to correct place.
- Fixed position–quantity–identified objects.

5S is the first step to be implemented in an organisation that aims to improve processes through lean methodology. [6]

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5S Methodology – Outcome

- Clearer process flow
- Reduced space
- Reduced material
- Waste reduction
- Reduced labor time
- Enhanced safety
- Better Machine–equipment reliability
- Easier and faster change–overs/set–up's [7]

5S prepares organisation to facilitate the succesful implementation of other lean methods ; TPM, JIT, working in cells.... [8]

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Industrial Application

- Kayalar Press
  - Established in 1970's.
  - Family owned company
  - Armature and fittings production , leader in the sector
  - Big variety of production methods
  - Indoor space 12.000 sqm.
  - Labor : 600 blue-collars , 100 white-collars

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Industrial Application – Snaphot

Try to cope with:

- Increased Costs
- Increased Demand
- Product Variety

Suffering from :

- Undefined process flow
- Excess Stock – Waste
- Unorganized workstations
- Unhealty Work climate

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Industrial Application – Snaphot

Excessive stock of materials – Dirty and dispersed work environment
Unsafety and unhealty climate – What is un/needed not clear
No min-max level defined – No designation of materials

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Industrial Application – Planning

#	Activity	1M	2M	3M	4M	5M	6M
1	Kick – off	O					
2	Campaign	O					
3	Team Members Assignment	O					
4	Training	O					
5	1S – Redtag Application	O	O				
6	1S – Redtagged Items Evaluation		O				
7	1S – Finalize sorting			O			
8	2S – Set in Order Standard				O		
9	3S – Shine – Cleaning & Standards				O	O	
10	4S – Standardization – Paint floor					O	
11	5S – Sustainability – 5S Patrol System						O
12	5S – Sustainability – 5S Audit System						O

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Industrial Application – Training

- 2 sessions of training given to team members
  - 5S Introduction and 3S
  - Keep 5S stable (5S)
- Activity champion assigned
- Campaign started
- Activity planning shared

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Industrial Application – 1S

Red Tag Activity

Red Tagging

As part of the ***Sort*** step, a red tag is placed on items that do not belong in the work area. These items are then placed in the red tag holding area.

"Red Tag" Unnecessary Items

When following the "red tag" process, take these steps:

1. Identify unneeded, misplaced items.
2. Attach red tags.
3. Move the items to a holding area.
4. Dispose of the truly unneeded items.

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Industrial Application – 1S
Red Tag Activity

Red Tagging Criteria

When attempting to determine if an item is unneeded, ask yourself these questions:

- Does it have a function in this area?
- Is it needed? How often? By whom?
- How often is it needed?
- If we remove it, will it really matter?
- Is it in the way? Does it take up too much space?

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Industrial Application – 1S
Red Tag Activity





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Industrial Application – 1S

Red Tag Activity

Red Tag Holding Areas

- The red tag holding area is near the work station that is being "5S'ed" and is temporary. It is usually available for about one week for workers to reclaim items if they determine they do indeed need something that they had initially removed.
- The red tag area needs to be clearly marked.
- After one week, the red tag area is moved to a central location. This area is available for employees to reclaim items for 30 days.

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Industrial Application – 1S

Red Tag Activity

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Industrial Application – 1S

Red Tag Inventory

- Unneeded items recorded in an inventory list.
- Decided what to be done after regular meetings
- Target is a blank list after 1S

KÜRESAN KIRMIZI KART TOPLAMA ALANI LİSTESİ

K.K No	K.K Alan Adı	Malzeme Adı	Kategori	Adet	Sebep	Teklidiği Tarih	Düzenleme Metodu	Düzenleme Tarihi	Yönetim Kararı	Düzenleme Tarihi	Sonuç
1	Küresan	Hafif kollektör 8 delik	Ürün	1 kasa	YZDK	18.Haz	Sınıflandırma yapılarak tekrar kullanılacak, Adres ve tanım				
2	Küresan	Hafif kollektör 11 delik	Ürün	1 kasa	YZDK	18.Haz	Sınıflandırma yapılarak tekrar kullanılacak, Adres ve tanım				
3	Küresan	Hafif kollektör 6 delik	Ürün	1 kasa	YZDK	18.Haz	Sınıflandırma yapılarak tekrar kullanılacak, Adres ve tanım				
4	Küresan	Hafif kollektör 5 delik	Ürün	1 kasa	YZDK	18.Haz	Sınıflandırma yapılarak tekrar kullanılacak, Adres ve tanım				
5	Küresan	Hafif kollektör 12 delik	Ürün	1 kasa	YZDK	18.Haz	Sınıflandırma yapılarak tekrar kullanılacak, Adres ve tanım				
6	Küresan	1" küre dişme aparatları	Aparat	12000	YZDK	18.Haz	Adres ve tanımlama				
7	Küresan	1" kollektör	Ürün	6 kasa	YZDK	18.Haz	Sınıflandırma yapılarak tekrar kullanılacak, Adres ve tanım				
8	Küresan	1 1/4 " kollektör	Ürün	7 kasa	YZDK	18.Haz	Sınıflandırma yapılarak tekrar kullanılacak, Adres ve tanım				
9	Küresan	3/4 " kollektör	Ürün	2 kasa	YZDK	18.Haz	Sınıflandırma yapılarak tekrar kullanılacak, Adres ve tanım				
10	Küresan	Mengene	M/E	1 adet	Gerekli değil	18.Haz	Yönetim karar verecek K.K depo alanında bekliyor				
11	Küresan	Kollektör delme aparatı	M/E	1 kasa	Gerekli değil	18.Haz	Yönetim karar verecek K.K depo alanında bekliyor				
12	Küresan	1" kollektör	Ürün	7 kasa	YZDK	18.Haz	Sınıflandırma yapılarak tekrar kullanılacak, Adres ve tanım				
13	Küresan	Sola taşıyıcı piston	M/E	8 adet	Gerekli değil	18.Haz	Yönetim karar verecek K.K depo alanında bekliyor				
14	Küresan	Argo CNC su pompası	M/E	1 adet	Gerekli değil	18.Haz	Yönetim karar verecek K.K depo alanında bekliyor				
15	Küresan	Mantar pano	Diğer	1 adet	Gerekli değil	18.Haz	Yönetim karar verecek K.K depo alanında bekliyor				
16	Küresan	Şerit testere	M/E	5 adet	YZDK	18.Haz	Adres ve tanımlama				
17	Küresan	CNC GOODWAY fener milli kapağı	M/E	1 adet	YZDK	18.Haz	Adres ve tanımlama				

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Industrial Application – 2S

Set in Order Application

BEFORE	AFTER
	
– Unused equipments in front of fire cabinets – Chemical materials everywhere without any definition	– All has its own location – Clearly labelled and marked – Seperate space for all chemicals, marked and labelled

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Industrial Application – 2S

Set in Order Application

BEFORE	AFTER
	
– What in where not known – Impossible to find anything while needed – Dirty	– All materials sorted and located in defined places – Labelled to make all visible and easy to be seen

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Industrial Application – 2S

Set in Order Application

BEFORE	AFTER
 	
– Lot size not defined – Product spread on the shopfloor – OK/NG not noticed – Over-production cannot be noticed.	– Lot size defined – Pull system – Min/max level defined – Materials in defined location

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Industrial Application – 2S

Set in Order Application

BEFORE	AFTER
	
– Needed/Unneeded quantity not defined – Dispersed – Easy to be broken	– Fixed location – Min/max level defined

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Industrial Application – 2S

Set in Order Application

BEFORE	AFTER
	
– Swarf spread on the shopfloor – Dirty – Min/max level uncontrolled – Normal/abnormal condition not noticed	– Swarf in boxes – Min/max defined – Cleaner, more tidy – Easy to notice abnormal condition – Lot size fixed

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Industrial Application – 3S

Shine after Set in Order

BEFORE	AFTER
	
– Dirty workplace – Greasy shopfloor	– Cleaned and painted – All materials in correct place – Any abnormality easily detected

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Industrial Application – 3S

Shine after Set in Order

BEFORE	AFTER
	
– Dirty and unhealty work environment – Dispersed and dangerous instrumentation	– Painted and cleaned – Instrumentation improved

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Industrial Application – 4S

Standardise

BEFORE	AFTER
	
– Compliance to 5S requirement cannot be judged. – Dirty, dispersed environment	– All machines/equipments' locations clearly marked. – Walking lanes/ work area clearly defined. – Clean and healty environment.

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Industrial Application – 4S

Standardise

BEFORE	AFTER
	
– What in where not defined – Abnormal condition cannot be easily detected	– Painted and cleaned shopfloor – What in where clearly defined – Designated location for all materials/equipments/ machines – Abnormal condition easily detected

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Industrial Application – 4S

Standardise

BEFORE	AFTER
	
– What in where not defined – Abnormal condition cannot be easily detected	– Painted floor – What in where clearly defined – Designated location for all materials/equipments/machines – Abnormal condition easily detected

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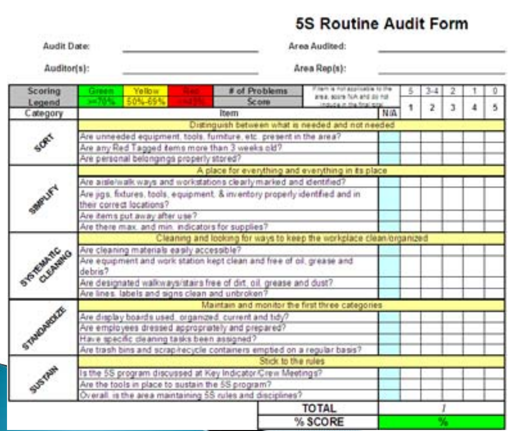
Industrial Application – 5S

Sustainability

- Series of planned audits in time which aims to maintain the benefits made with the previously 4s, building a habit and discipline on this methodology, as well as continuous improvement in the job.



5S Routine Audit Form

Audit Date: ____________ Area Audited: ____________

Auditor(s): ____________ Area Rep(s): ____________

Scoring Legend	Green >=70%	Yellow 50%-69%	Red	# of Problems / Score	If item is not applicable to the area, score N/A and do not include in the final score	5	3-4	2	1	0

Category	Item	N/A	1	2	3	4	5
SORT	Distinguish between what is needed and not needed						
	Are unneeded equipment, tools, furniture, etc. present in the area?						
	Are any Red Tagged items more than 3 weeks old?						
	Are personal belongings properly stored?						
SIMPLIFY	A place for everything and everything in its place						
	Are aisle/walk ways and workstations clearly marked and identified?						
	Are jigs, fixtures, tools, equipment, & inventory properly identified and in their correct locations?						
	Are items put away after use?						
	Are there max. and min. indicators for supplies?						
SYSTEMATIC CLEANING	Cleaning and looking for ways to keep the workplace clean/organized						
	Are cleaning materials easily accessible?						
	Are equipment and work station kept clean and free of oil, grease and debris?						
	Are designated walkways/stairs free of dirt, oil, grease and dust?						
	Are lines, labels and signs clean and unbroken?						
STANDARDIZE	Maintain and monitor the first three categories						
	Are display boards used, organized, current and tidy?						
	Are employees dressed appropriately and prepared?						
	Have specific cleaning tasks been assigned?						
	Are trash bins and scrap/recycle containers emptied on a regular basis?						
SUSTAIN	Stick to the rules						
	Is the 5S program discussed at Key Indicator/Crew Meetings?						
	Are the tools in place to sustain the 5S program?						
	Overall, is the area maintaining 5S rules and disciplines?						
	TOTAL	/					
	% SCORE	%					

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Industrial Application

Activity Summary

- Activity started with an audit to grasp the current situation.
- Problems listed and activity strategy defined
- A pilot area selected. Team members assigned.
- Campaign started with a training in the company
- Initially there were no clear boundaries to work areas. Difficult to move materials from one area to another.

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Industrial Application

Activity Summary

- Semi and final products were mixed on the shopfloor.Workplace was unclean and flooded with excess stock,scrap.
- No labels, designated space for workplace. Dispersed and unhealty environment. Workflow unclear.
- First started with redtag activity to sort the needed and unneeded items.
- All unneded items were removed. All area cleaned. Instrumentation improved. Walls, floor painted.
- Workplace, walking lanes, box/material locations clearly marked.

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Industrial Application

Activity Summary

- 5S Patrol and Audit Plan established.
- Open items pursued and maintain good 5S condition.
- 5S application has resulted in a clean and organised work area. Flow improved.
- New layout adopted to facilitate machines control and supervision. Easy transportation and access of material handling.
- Now it is like *another plant.*

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Discussion & Conclusion

- This study presents an industry application of 5S methodology. Main **motivation** to initiate this activity in the company to eliminate excessive stock, improve process flow, organize workplace and make work climate healty.
- Before the activity the plant was the combination of dirty machines, excess materials,scraps spread all over shopfloor creating a plenty of flow complications, space limitations and production problems.
- Main approach is to make all staff aware of the problem they are suffering and understand the negative impacts. This created a self motivation and helped the activity finalized succesfully.

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Discussion & Conclusion

- It was not possible to implement any lean techniques, apply quality systems under those conditions.
- Moreover, without 5S; no process can be standardised. Without standardised processes; company cannot define the technological needs, cannot evaluate any innovative implementation correctly.
- This activity aimed to clean,identify and streamline the processes. A practical 5S methodology implemented as a project.
- A thorough clean up process is started, layout, process flow improved and 5S is implemented using clear forms and procedures.

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Discussion & Conclusion

- In the beginning operators showed resistance to change with the following arguments:
  - What is so special about sorting and arranging?
  - Why should we clean since it gets dity again?
  - Sorting and arranging will not effect the results
  - We have already done this before without success.
  - We are too busy.
- During the activity, after started to achieve good results , operators gave more support and effort.
- Results showed tangible changes along with improved operator morale and increased productivity.
- The methodology and approach can be adapted to other types of manufacturing processes as well as offices and service processes.

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