Global Engineering Solutions

Serving Globally

Global Engineering Solutions presents,

introduction to :

"LEAN MANUFACTURING CONCEPT"

WHAT IS LEAN MANUFACTURING ?

'LEAN MANUFACTURING ' *is a methodology that focuses on minimizing waste within manufacturing systems while simultaneously maximizing productivity.*

Lean Manufacturing is based on specific principles, such as Kaizen or continuous improvement.

BENEFITS OF LEAN MANUFACTURING :

- Reduction in overhead / operating costs
- Productivity Increase (30% - 40%)
- Throughput Time Decrease (70% +)
- Increase Profit
- Customer Lead Time Reductions (50% +)
- Work in Process Inventory reductions (70%+)
- On Time Delivery to customers (95% +)
- Quality Performance Improvements

LEAN MANUFACTURING TOOLS :

HERE WE WILL DESCRIBE IN SHORT SOME LEAN MANUFACTURING TOOLS :

1)5S
2)CAPA
3)PPAP
4)KAIZEN
5)POKAYOKE

1) What is 5S ?

- 5S is a philosophy and a way of organizing and managing the workspace and work flow with the intent to improve efficiency by eliminating waste, improving flow and reducing process unreasonableness.

‘It is for improvement of working environment’

•The word “5S(five S)” was generalized in 1980’s in manufacturing sector in Japan, as Toyota Production System (TPS) became famous in the sector and “5S activities” were set as one of the bases of TPS
•Service industry started to used “5S” in 1990’s

5S IN JAPANESE & ENGLISH :

	Japanese	English
S-1	Seiri	Sort
S-2	Seiton	Set
S-3	Seiso	Shine
S-4	Seiketsu	Standardize
S-5	Sitsuke	Sustain

- "SORT" Focuses on eliminating unnecessary items from the workplace

-"Set" is based on finding efficient and effective storage of necessary items

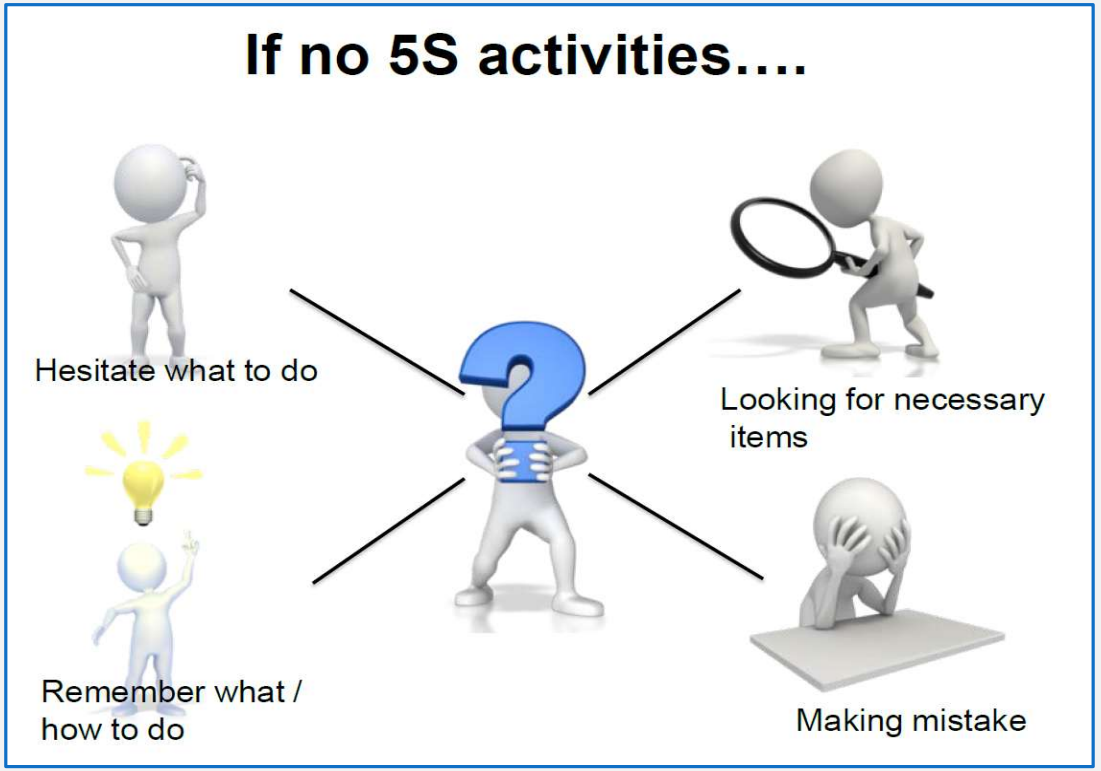
-"SHINE" Cleaning up one's workplace daily so that there is no dust on floors, machines or equipment.

-"STANDARDISE" is to maintain an environment where S1 to S3 are implemented in the same manner throughout the organization.

- "SUSTAIN" is to Maintain S1-S4 through discipline, commitment and empowerment.

What 5S can do? :

- Team work improvement through everyone's participation
- Identify Abnormalities
- Identify wastes and reduce the wastes
- Improve productivities
- Improve safety



Targets of **5S** include:

- **Zero** changeovers leading to product/ service diversification
- **Zero** defects leading to higher quality
- **Zero** waste leading to lower cost
- **Zero** delays leading to on time delivery
- **Zero** injuries promoting safety
- **Zero** breakdowns bringing better maintenance

2) CAPA:

WHAT IS CAPA ?

- Corrective Action
  - eliminate detected nonconformity
- Preventive Action
  - prevent nonconformity occurrence

2) CAPA: example

EXAMPLE OF CAPA FORMAT

1. Introduction

Report Date	:
Manufacturer	: **ABC**
Report Number	: **GMP 300/ Record-10/YY/XXX – (CAPA)**
Inspection Date	: **dd/mm/yyyy**
GMP Status	: **Acceptable/ Unacceptable**

2. CAPA Implementation

Finding	Root Cause	Correction	Corrective Action	Preventive Action	Timeline of Completion
1.1	*Personnel not aware of GMP Requirement*	*Training*			*Jan 2018*

ASEAN Guidelines on GMP for Traditional Medicines / Health Supplements - 2015
Evaluation of CAPA

2) CAPA: Report format

CAPA FORM

Corrective Actions & Preventive Actions

Format No.:

CAPA Reference No.:	Start Date:
Non Conformity / Improvement/ Preventive Action:	
Details	

Present Status	Target:	Target Date:

CAPA Leader:

Team Member:
1.
2.
3.
4.
5.
6.

Root cause analysis

Corrective action:	Responsibility	Target date of completion	Actual date of completion

Horizontal Deployment / Preventive Action	Responsibility	Target date of completion	Actual date of completion

Document change :	Responsibility to change	Target date of completion	Actual date of completion

Verified By :

3) PPAP :

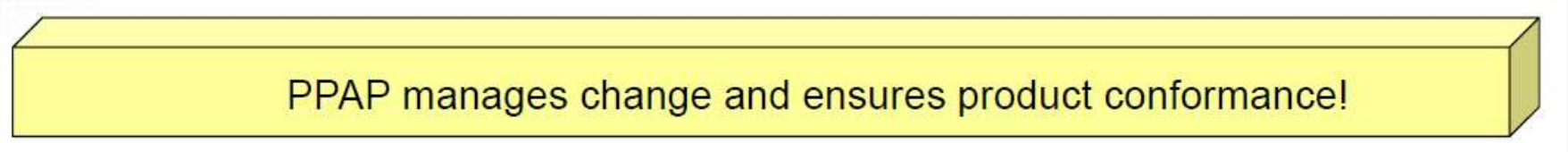
WHAT IS PPAP ?

It is ***Production Part Approval Process***

➢ **PPAP's purpose is:**

✓ To provide the evidence that all customer engineering design record and specification requirements are properly understood by the manufacturing organization.

✓To demonstrate that the manufacturing process has the potential to produce product that consistently meets all requirements during an **actual production run at the** quoted production rate.



When is PPAP “typically” required?

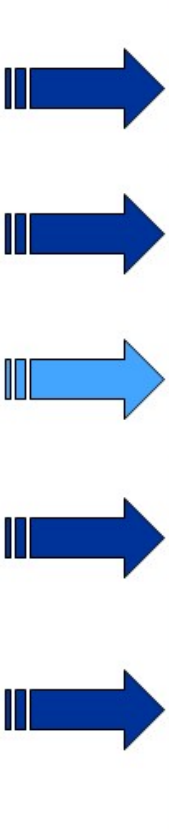
✓If the process or the part changes it requires PPAP submission

- New part
- Revised part
- Supplier related changes
- Changes in tooling, equipment or inspection
- Change in the manufacturing process or method

Benefits of PPAP Submissions

- ✓Helps to maintain design integrity
- ✓Identifies issues early for resolution
- ✓Reduces warranty charges and prevents cost of poor quality
- ✓Assists with managing supplier changes
- ✓Prevents use of unapproved and nonconforming parts
- ✓Identifies suppliers that need more development
- ✓Improves the overall quality of the product & customer satisfaction

PPAP Submission Levels :



Level 1	Production Warrant and Appearance Approval Report (if applicable) submitted to Eaton
Level 2	Production Warrant, product samples, and dimensional results submitted to Eaton
Level 3	Production Warrant, product samples, and complete supporting data submitted to Eaton
Level 4	Production Warrant and other requirements as defined by Eaton
Level 5	Production Warrant, product samples and complete supporting data (a review will be conducted at the supplier's manufacturing location)

3)PPAP:

Documents required for PPAP

1. Design Records
2. Engineering Change Documents
3. Customer Engineering Approval, if required
4. Design Failure Modes & Effects Analysis **(DFMEA)**
5. Process Flow Diagram
6. Process Failure Modes & Effects Analysis **(PFMEA)**
7. Control Plan
8. Measurement Systems Analysis **(MSA)**
9. Dimensional Results
10. Material, Performance Results
11. Initial Process Study
12. Qualified Laboratory Documentation
13. Appearance Approval Report **(AAR)**
14. Sample Product
15. Master Sample
16. Checking Aids
17. Customer-Specific Requirements
18. Part Submission Warrant **(PSW)**

List of PPAP Documents

Customer:		Number of samples:
Part:	Drawing number:	Submission date:

Document	*Requirement to submit*	*Number of comment*
1. Process Flow Diagram		
2. Process FMEA		
3. Control Plan		
4. Design and drawing documents		
5. List of gauges		
6. Input Material Attests		
7. List of WPS		
8. List of Welders		
9. Results of Welding Procedure Qualification		
10. Initial Process Studies		
11. Measurement System Analysis Studies (MSA)		
12. Dimensional Report		
13. Heat Treatment Protocol		
14. NDT Protocols		
15. Reports of Laboratory Tests		
16. Qualified Laboratory Documentation		
17. Packaging Instruction		
18. Approved Changes and Variations		
19.		
20.		

Prepared by:	Date:	Date of customer approval:
Distribution list:		

4)KAIZEN:

What is Kaizen and how does it work ?

Kaizen is a Japanese word comprised of two separate words, Kai and Zen.
The translation of "Kai“ from Japanese into English is "Change."
In English "Zen" means "Good."
Kaizen is simply translated to English as "change for the better" or "continuous improvement."

Kai = Change *Zen = Good*

Continuous Improvement :

Continuous improvement is the process of constantly making things better than they were before.

Kaizen Definition:

- Kaizen can be defined as the philosophy and practice of continuous improvement.
- It refers to the practice of looking for ways to improve work processes on a regular basis.
- The practice involves small, incremental changes rather that large changes.
- With Kaizen, all people within the organization look for possible improvement opportunities, not just managers or executives.

Kaizen Examples:

Before KAIZEN:

There was a strain in mounting the Bracket bellow support on to slim3 machine. 2 persons required to assemble the cover

After KAIZEN:

Fixture made by using simple frame from in-house parts. Single person can assemble the cover. Easy handling of part since crane will be used

Kaizen Examples:

Before

Inadequate cleaning material

Poor Storage of cleaning material

After

Cleaning, Safety, CLIT material Station

Proper Storage of Cleaning, Safety, CLIT Station

Kaizen Examples :

5S

Before	After
	

5) POKAYOKE:

WHAT IS **'POKAYOKE'** ?

It's a JAPANESE word which means in English **"Mistake-Proofing"**

- Poka-Yoke is a system to prevent mistakes from happening or immediately catches any mistake that has happened so that it can be corrected.

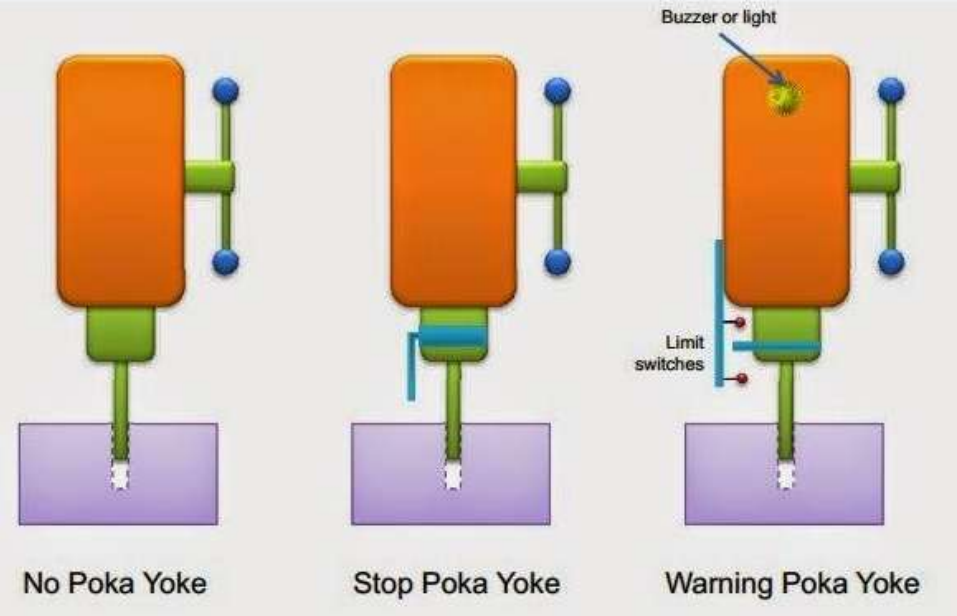
- The aim of Poka-Yoke is to design processes so that mistakes are prevented or corrected immediately, thus eliminating defects at the source

5) POKAYOKE WORKSHEET:

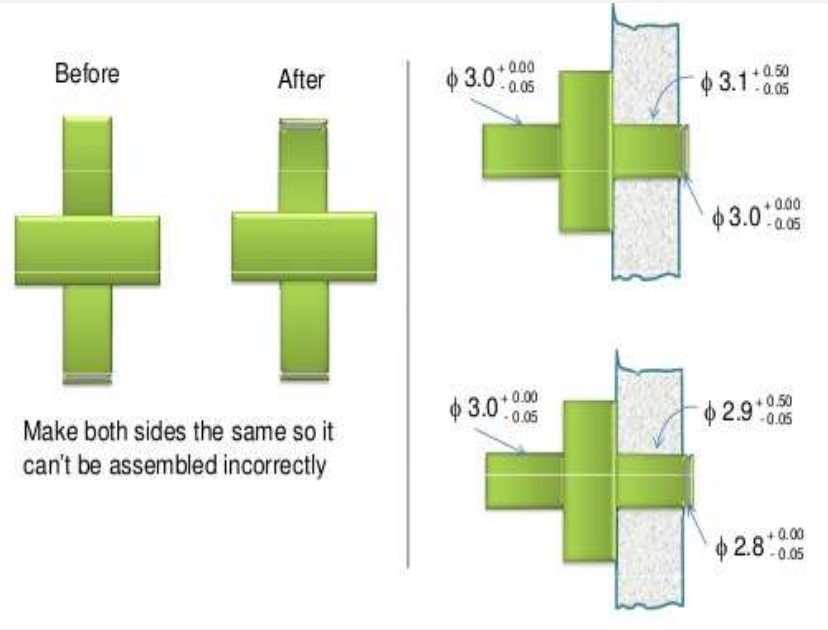
Description of the Incident:	
Top three Causes for the Incident	
Poka-Yoke Solutions	
Elimination: Can the activity be eliminated?	
Replacement: Can the activity be automated?	
Prevention: Can the mistake be physically prevented?	
Facilitation: Can visual controls be utilized?	
Detection: How can the mistake be immediately detected?	
Mitigation: How can the effect of the mistake be minimized?	

5) POKAYOKE examples:

Drilling Operation POKA-YOKE

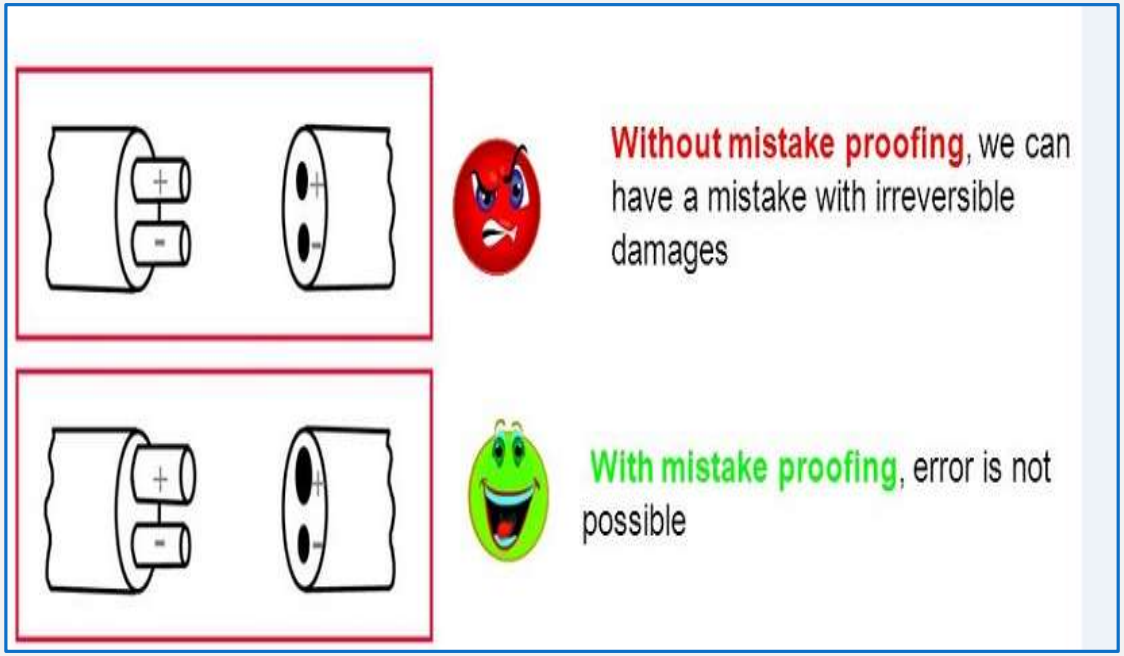


GO-NOGO POKA-YOKE



5) POKAYOKE examples:

SYMBOLS IDENTIFICATION POKA-YOKE



COLOUR CODING POKA-YOKE

Initial problem: RCA cables was wrongly inserted into the jacks
Poka Yoke : Color coding on cable helps identify the correct jacks to be inserted

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