LEAN SOLUTIONS ACADEMY



Lean & Six Sigma Training

Lean Yellow Belt Certification

CLASS SCHEDULE

Day 1

- Roles and Responsibilities of Belts
- What is Lean & Six Sigma?
- Lean Principles
- Standard Work
- 8 Wastes
- 5S
- Voice of the Customer (VOC) and CTQs Process
- Jidoka
- Poke Yoke

Day 2

- Day 1 Review
- PDCA
- Kaizen
- Pull
- Kanban
- Flow
- Visual Management
- SMED
- Total Productive Maintenance
- **YELLOW BELT EXAM (as Homework)**

LEAN SOLUTIONS

QUIZ 1 REVIEW:

1. What was the name of the first company to use the name 'SIX SIGMA' to describe its Quality Management System?
   - **MOTOROLA**

2. What is the First Principle of Lean production ? What is the most important thing that a Lean process must produce?
   - **VALUE** (for the customer of the process)

3. Which Japanese company is considered as being the first to use true 'Lean Production "effectively and successfully"?
   - **TOYOTA**

4. A basic principle of Six Sigma is to always find the true original source of a defect or problem. This is called _____?
   - **ROOT CAUSE ANALYSIS**

5. A "Six Sigma Process" is often described one that produces no more than 3.4 DPMO What does DPMO stand for?
   - **DEFECTS PER MILLION OPPORTUNITES FOR DEFECTS**

LEAN SOLUTIONS

QUIZ 1 REVIEW:

6. What is the role of a Yellow Belt on a Lean Six Sigma project?
    - A YELLOW BELT IS A TEAM MEMBER WHO ASSISTS A GREEN OR BLACK BELT, USING THEIR KNOWLEDGE OF THE PROCESS THAT THEY CURRENTLY ARE WORKING WITHIN.

7. What is the role of a Green Belt in an organisation ?
    - A GREEN BELT IS A PROJECT TEAM LEADER FOR SMALL AND MEDIUM SIZED PROCESS IMPROVEMENT PROJECTS.

8. What is the role of a Black Belt in an organisation ?
    - A BLACK BELT IS A PROJECT TEAM LEADER FOR LARGE PROBLEM SOLVING / IMPROVEMENT PROJECTS or OVERSEES THE WORK OF GREEN BELTS FOR MULTIPLE PROJECTS. A BLACK BELT IS A FULL TIME PROBLEM SOLVER FOR THE ORGANISATION.

LEAN SOLUTIONS

QUIZ 2 REVIEW:

1. All work shall be highly specified as to content, sequence, timing and _____.
   - **OUTCOME**

2. True or False? Standard work provides a routine for consistency of an operation.
   - **TRUE**

3. True or False? Standard work helps to hide problems.
   - **FALSE**

4. Discussion: Why is it so important to audit standard work?

LEAN SOLUTIONS

QUIZ 2 :

1. Which of the traditional 8-Wastes of ‘DOWNTIME is concerned with reducing the complexity of processes and taking out unnecessary steps or activities ?
   - **NON-ESSENTIAL PROCESSING / OVER PROCESSING**

2. What is the name of the Waste of producing more that the customer demand can absorb ?
   - **OVER-PRODUCTION**

3. What is Waste called when an activity or step in process needs to be repeated because it was not done ‘Right-First-Time’ ?
   - **REWORK / DEFECTS**

4. What Waste results in Queues or Backlogs of materials or work ?
   - **WAITING (DUE TO A BOTTLE-NECK IN THE PROCESS)**

5. What is the Japanese word for ‘Waste’ ?
   - **MUDA**

LEAN SOLUTIONS

QUIZ 3 REVIEW:

1. Which stage of the 5S method is used to ensure that the workers have the good habits and discipline to continue the other 4S tasks?
   - **SUSTAIN**

2. In 5S the action of removing unnecessary tools, equipment and materials from the workspace is called _____.
   - **SORT**

3. Cleaning the workplace of dirt, dust and litter is called what in 5S ?
   - **SHINE**

4. Give one example of a 5S method used for **SET IN ORDER / STRAIGHTEN**
   - **SHADOW BOARDS**
   - **RACKS**
   - **COLORED LABELS**
   - **FLOOR MARKING etc**

LEAN SOLUTIONS

QUIZ 4 REVIEW:

1. What Tool is used to understand what is Critical to Quality (CTQ) by Forming 3 categories: *threshold, performance,* and *excitement*?
   - **KANO ANALYSIS**

2. Splitting Customers into groups according to different needs or behaviours is called _____.
   - **SEGMENTING**

3. CTQs are also sometimes called CTCs or CTSs. What does CTS stand for?
   - **CRITICAL TO SATISFACTION**

4. Give one example of a method used to understand the **Voice of the Customer**?
   - **SURVEYS**
   - **FEEDBACK**
   - **FOCUS GROUPS**
   - **REPEAT SALE METRICS, etc**

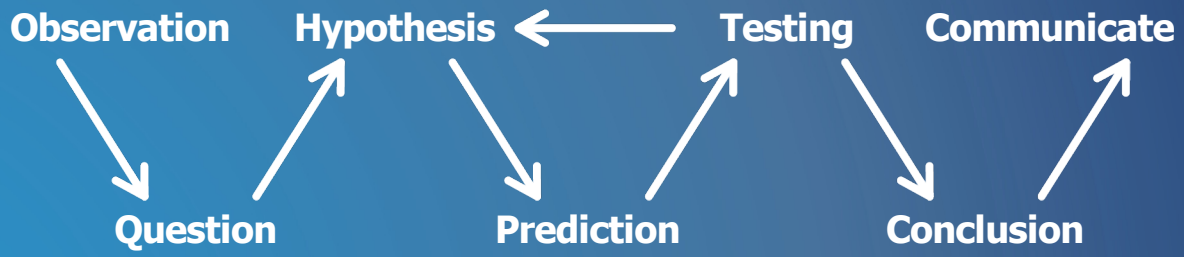
LEAN SOLUTIONS



PDCA

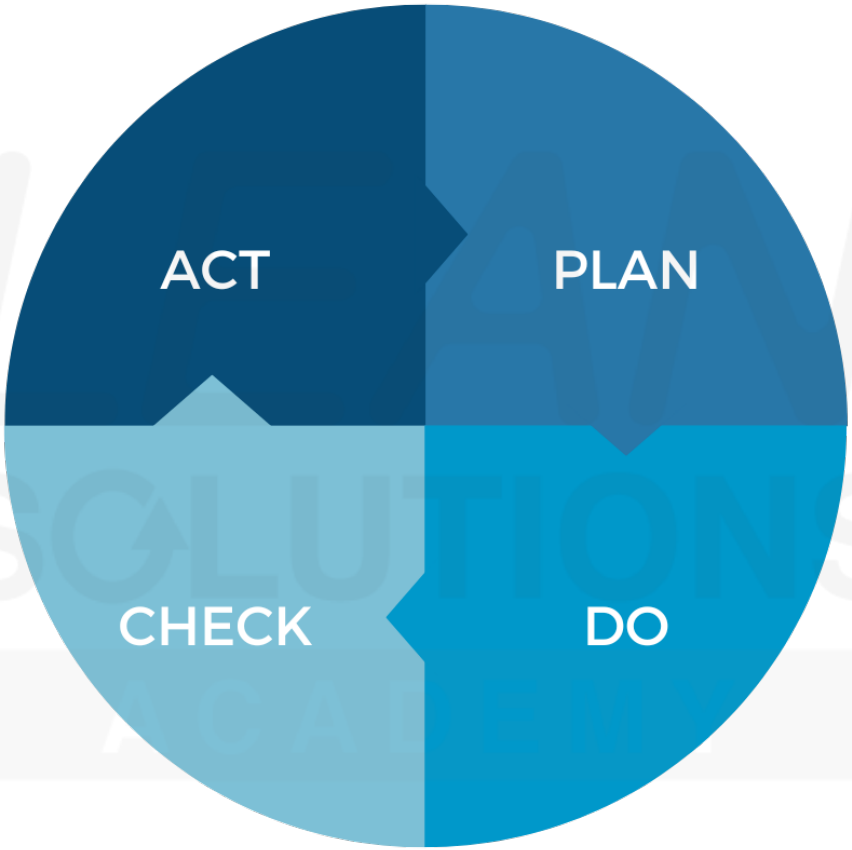
LEAN
SOLUTIONS

SCIENTIFIC METHOD



LEAN SOLUTIONS

BALL TOSS EXERCISE



LEAN SOLUTIONS



KAIZEN &

CONTINUOUS IMPROVEMENT

LEAN SOLUTIONS



WHAT IS KAIZEN?

- Kaizen is a Japanese word made up of two distinct characters:
- Small changes for the better = Continuous Improvement
- Managing daily improvement (part of Lean Management System)
- Continuous Improvement Projects

LEAN SOLUTIONS

WHAT IS A KAIZEN EVENT?

A Kaizen Event (different than Kaizen as a mindset) is a focused team activity with a specific, aggressive breakthrough objective aimed toward solving a well-defined problem.

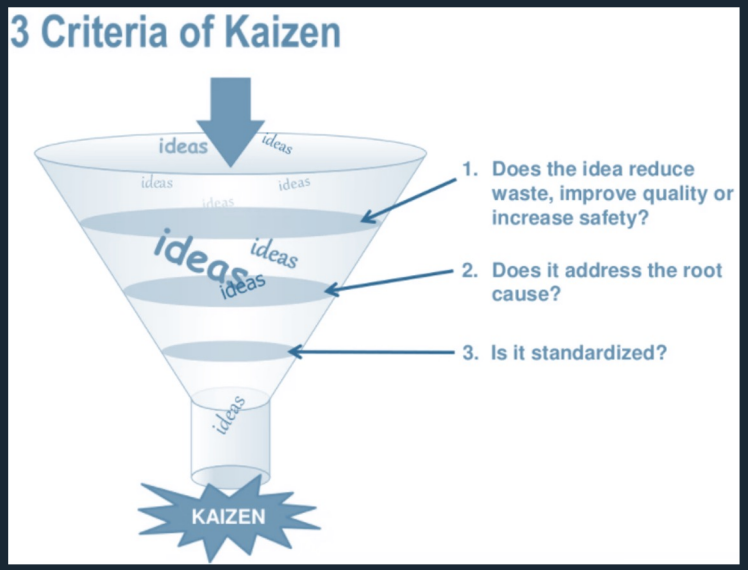
You can expect to accomplish huge results in a very short time frame (usually 2-5 days).

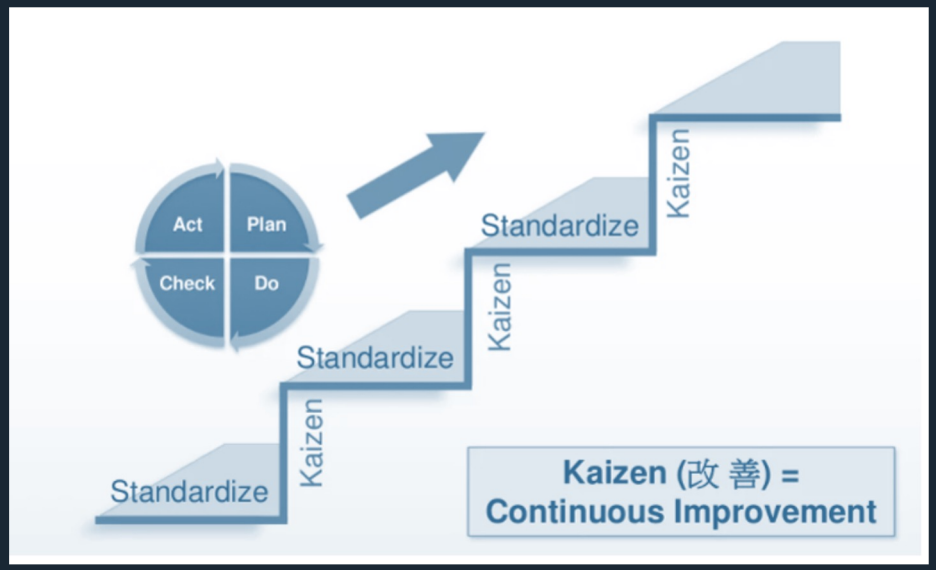


Huge results
In a
Short time
frame

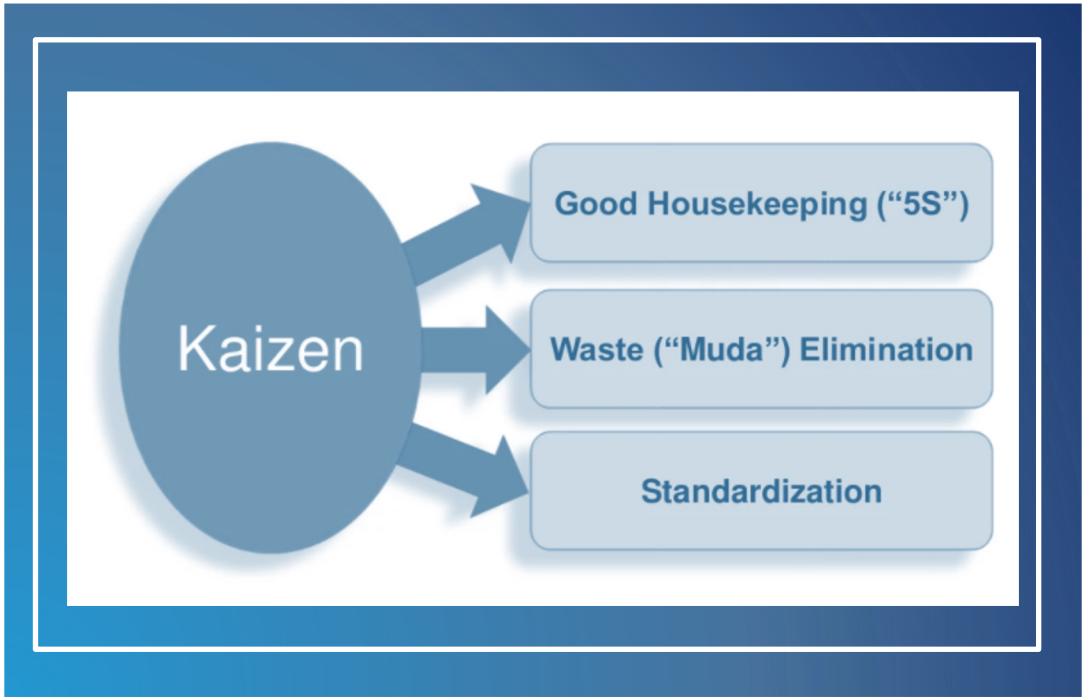
LEAN SOLUTIONS

KAIZEN IS A CONTINUOUS PROCESS





LEAN SOLUTIONS



VARIETIES OF KAIZEN METHODS

Individual (1-2 people) Versus Teamed (5-9)

Day-to-Day (2 second- improvements) Versus Special Event

Limit the hours spent on the project
The project scope must be considered when limiting available time

LEAN SOLUTIONS





Kaizen	Innovation
Un-dramatic	Dramatic
Low Cost	High Cost
Low Risk	High Risk
Human Effort	Technology
No Brainer	More Thought

LEAN SOLUTIONS

BENEFITS
OF KAIZEN

- Empowers employees, enriches the work experience & brings out the best in everyone
- Promotes the growth of the Employee & the Company
- Improves quality, safety, cost structures, delivery, environments, throughput & customer service/ satisfaction
- Provides guidance from employees & serves as a barometer for leadership



TRADITIONAL KAIZEN

One Week Commitment

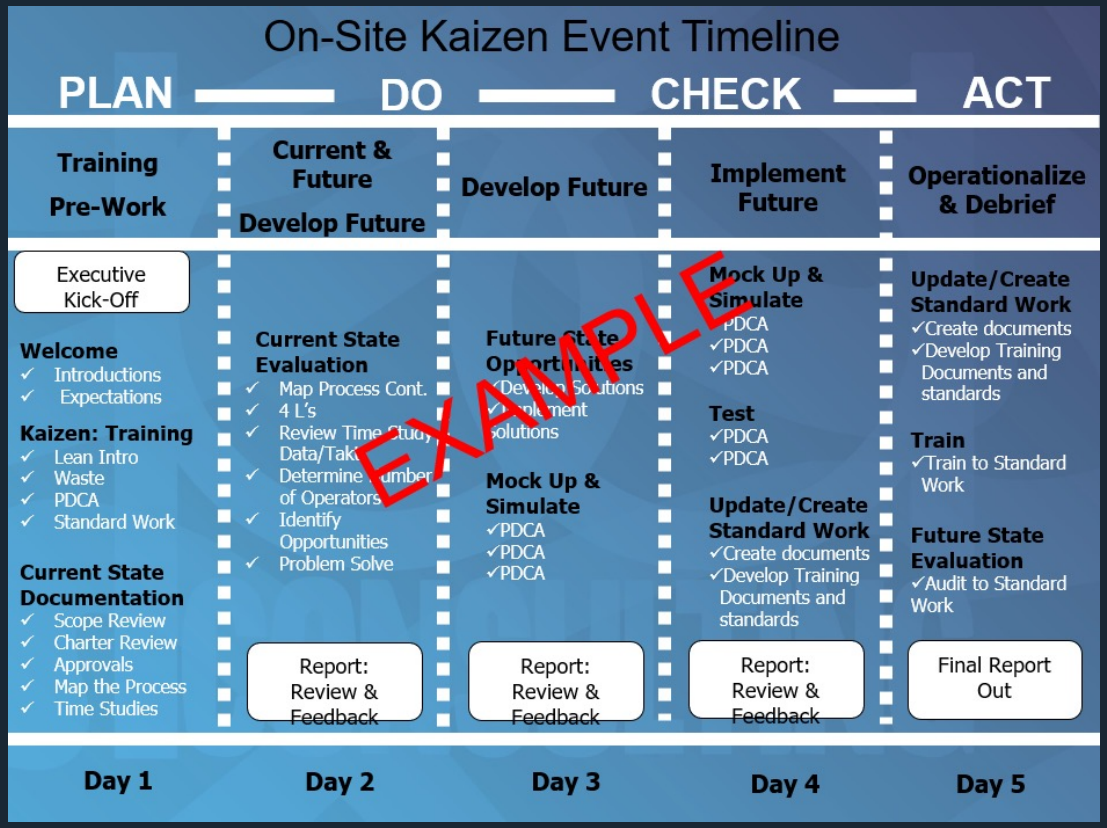
Lots Of Prep Work

Lots Of Ideas & Actions



LEAN SOLUTIONS

WHAT'S IN A WEEK – A LOT



LEAN SOLUTIONS



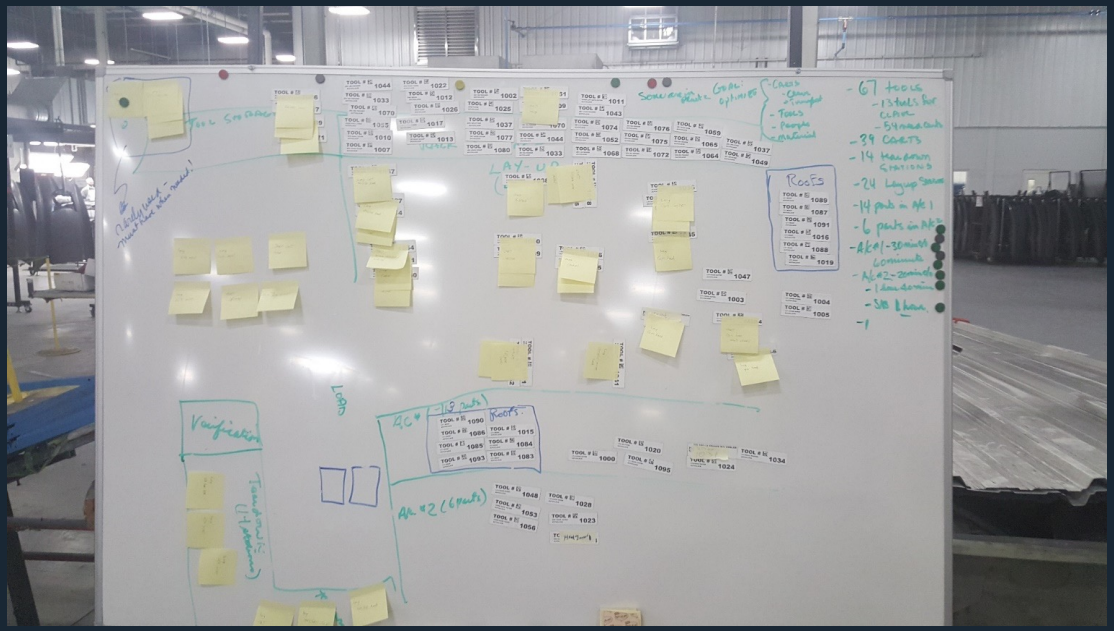
WHAT'S

Different About The Kaizens At Plasan?

- The weeklong 5-Day Kaizens have been swapped
- Four, quick, 5 hour Kaizens were held in the month of January.
- Involved in the Kaizens were representatives from Maintenance, Engineering, Quality, Supervisors, Team Leads, and the experts, the operators.

LEAN SOLUTIONS

AUTO CLAVE QUICK KAIZEN



DEPLOYMENT CHAMPION - SUPERVISOR

LEAN SOLUTIONS

TOOL CART STORAGE
LOCATED BY TEAR DOWN

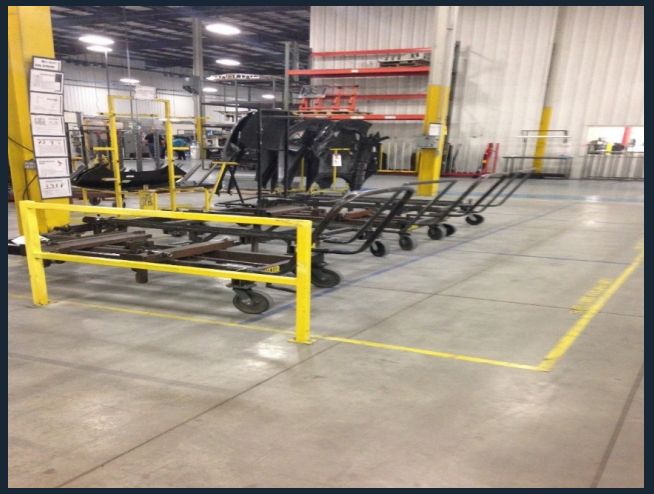


LEAN SOLUTIONS

GUARD RAIL WAS ADDED

TO PREVENT OVERFLOW INTO CART PARKING

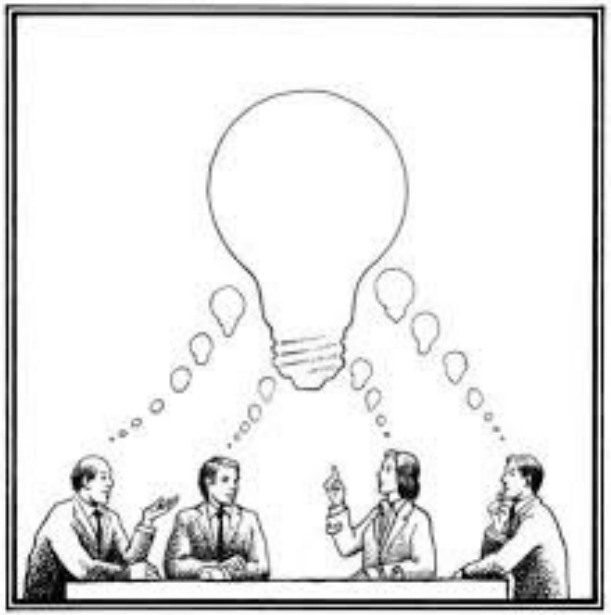




LEAN SOLUTIONS

WHAT CAN WE DO DIFFERENTLY?





LEAN SOLUTIONS

SUGGESTED
KAIZEN PROCESS

1. Employee identifies a problem, waste/loss, or an opportunity for improvement and writes it down.
2. Employee develops an improvement idea and discusses it with his or her supervisor.
3. Supervisor reviews the idea within 24 hours and encourages immediate action.
4. Employee implements the idea. If a larger improvement idea is approved, the employee should take leadership to implement the idea.
5. Idea is written up on a simple form in less than three minutes.
6. Supervisor posts the form to share with and stimulate others and recognizes the accomplishment.

LEAN SOLUTIONS

CAPTURE THE IDEAS

Continuous Improvement Idea

Name: Shift: Dp #: 3016- Date:

Which of the seven wastes does this idea reduce? (Circle One)

Over-Production Transportation Motion Waiting Inventory Defects Over-Processing

Which measure does this impact on the team board? (Circle One)

Safety Quality Schedule Cost Culture Environment

Continuous Improvement Idea ***(Attach additional information, as required.)***

Improvement Results ***(Attach additional information, as required.)***

Reviewed	Accepted	Not Accepted	Implemented	Complete	Implemented = Completed by mbr Complete = Recognized by mgmt	Award given/amount: Date:
☐	☐	☐	☐	☐		

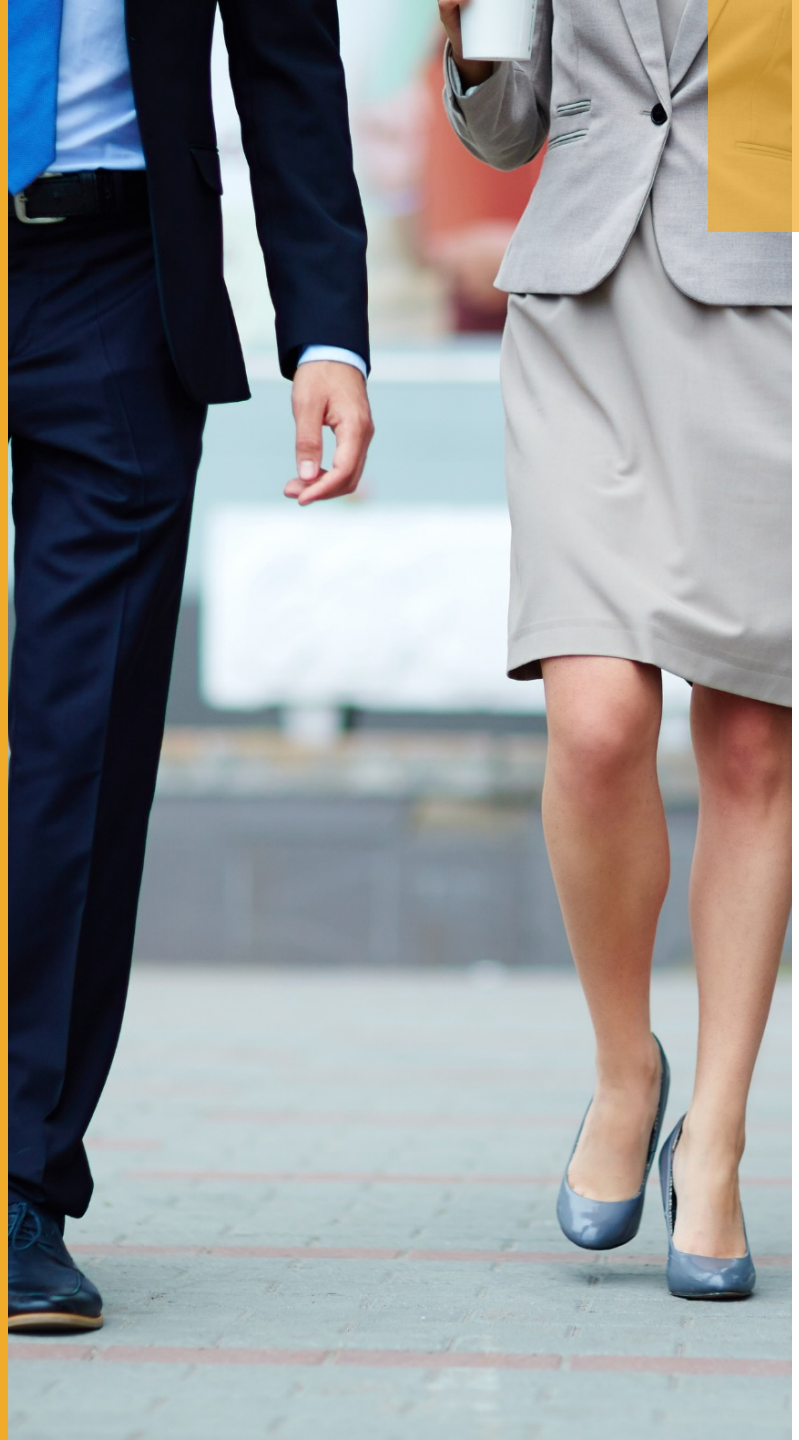
:pe 02/11/2019 WHITE: HMS YELLOW: Team Leader/Supv PINK: Member

LEAN SOLUTIONS



GEMBA WALKS

LEAN SOLUTIONS



WHAT IS A GEMBA WALK?

The Gemba walk is an essential part of the Lean management philosophy.

- Its purpose is to allow managers and leaders to observe the actual work process, engage with employees, gain knowledge about the work process and explore opportunities for continuous improvement.
- A Gemba Walk is also an opportunity for managers and leaders to coach and receive coaching.

LEAN SOLUTIONS

GEMBA WALKS
ARE NOT DONE ALONE

Gemba walks are meant to be coaching opportunities.

Step 1: Use your LSW to establish a day/time and stick to your schedule. Make it routine!

Traditional Management Style: "Do It My Way"



Lean Leadership Style: "Follow Me, and We'll Figure This Out Together"



LEAN SOLUTIONS

DEFINE
THE PURPOSE

Define ‘purpose’ for walk – why doing it?

Define scope for walk – where headed?

Coach appropriate behaviors to participants:

- One conversation at a time.
- Show respect. Listen more than you talk.
- Make no on the spot judgements, seek to understand.

LEAN SOLUTIONS

TYPES OF GEMBA WALKS

- Safety
- 5S
- Waste – Waste Walk
- Process Focus – Never Focus on Individuals
- Walk the Value Stream of a Product





WHAT TO DO

ON A GEMBA WALK

- If with another leader, ask to SEE their leader standard work
- Review Hr x Hr and Tier Boards
- Review corrective actions / plans for top issues
- Discuss team board problem solving process
- Review training matrix and ensure plans are in place
- Pay attention to lean waste and review plans

LEAN SOLUTIONS

TIPS & POINTS
TO REMEMBER

Step 1: Create a Theme

Before a walk begins, managers should pick a theme to guide the entire Gemba walk. This narrows the focus of the Gemba walk and yields better results, as attention is not spread amongst different themes and objectives. Once a theme has been chosen it's easier to tailor your Gemba walk questions to the theme you chose, and ask quality questions.

LEAN SOLUTIONS

TIPS & POINTS
TO REMEMBER

Step 2: Prepare the Team

Inform the team by explaining what a Gemba walk is and what to expect from a routine Gemba walk. Share this in your Tier Meetings. Consider sharing your checklist, too.

This lowers a team's anxiety as the Gemba walk will not be perceived as an evaluation, but rather, a collaboration between participants. Getting buy-in from the team beforehand will also raise questions that could have been missed.

LEAN SOLUTIONS

TIPS & POINTS
TO REMEMBER

Step 3: Focus on the Process

Stick to the evaluation of the process and how things are done. Here, a checklist can help. By writing questions that force you to assess the process, not the person, you can avoid the most common Gemba walk mistakes: **blaming.**

Remember: **You are there to identify opportunities of improvement in the process and barriers on the shop floor hindering productivity.**

LEAN SOLUTIONS

TIPS & POINTS
TO REMEMBER

Step 4: Keep the Value Stream Front & Center

Make sure your checklist traces the whole value stream. By sketching these questions out beforehand, you can ensure you don't miss any crucial stations or processes.

Focusing the bulk of your Gemba walk on the value chain is more effective in identifying bottlenecks and potential pockets of waste. Removing such bottlenecks will improve overall performance across the value chain.

LEAN SOLUTIONS

TIPS & POINTS
TO REMEMBER

Step 5: Record Your Observations

Record everything. Record every data point you encounter on your Gemba walk. Don't make assumptions or recommendations before journaling everything you find on the Gemba walk. Here, checklists are helpful. You can record your observations as answers to the questions you know you need answered. You can also just take notes or record and document your findings via video.

Regardless of method: **record, record, record!**

LEAN SOLUTIONS

TIPS & POINTS
TO REMEMBER

Step 6: Get a Second Vantage Point

Once the Gemba walk has concluded and all relevant information has been recorded, seek a second opinion. Better yet, have another team member write their own checklist. **Having a fresh set of eyes review your findings could yield important insights.**

Comparing checklists can help you locate any gaps in your own thinking. This second perspective could be someone far removed from the operations or an experienced operator who did not take part in the Gemba walk. Feedback reveals overlooked information.

TIPS & POINTS
TO REMEMBER

Step 7: Solicit Feedback

Present your findings to the team regardless of outcome. Whether your findings were insignificant and no changes need to be made to the operations or vice versa. This brings the collaboration between stakeholders full circle and negates any feelings of being watched by the team during the Gemba walk.

If changes need to be made, include them in your presentation tying back to your findings. This brings buy-in from all stakeholders and increases probability of success once the change to operations occurs.

Conclusion

Gemba walks are a crucial observational method for assessing a manufacturing operation. Checklists are an easy, quick tool for adding structure to your observations, and for getting more out of the gemba walks you schedule. Use a checklist and stick to your plan.

LEAN SOLUTIONS

QUESTIONS
TO ASK

Simple 3 Question Summary:

1. What is Working?
2. What Is NOT Working?
3. Given That, What Will You Do Differently Going Forward?

LEAN SOLUTIONS

GEMBA CHECKLIST



LEAN SOLUTIONS

QUIZ 5:

1. What does kaizen stand for?
   - **SMALL CHANGE FOR THE BETTER / CONTINUOUS IMPROVEMENT**

2. What are the three criteria of kaizen?
   - **DOES THE IDEA REDUCE WASTE, IMPROVE QUALITY, AND/OR INCREASE SAFETY?**
   - **DOES THE IDEA ADDRESS THE ROOT CAUSE?**
   - **IS IT STANDARDIZED?**

3. What are the different types of Gemba walks?
   - **SAFETY, 5S, WASTE, VALUE STREAM WALK**

LEAN SOLUTIONS

LEAN SOLUTIONS ACADEMY

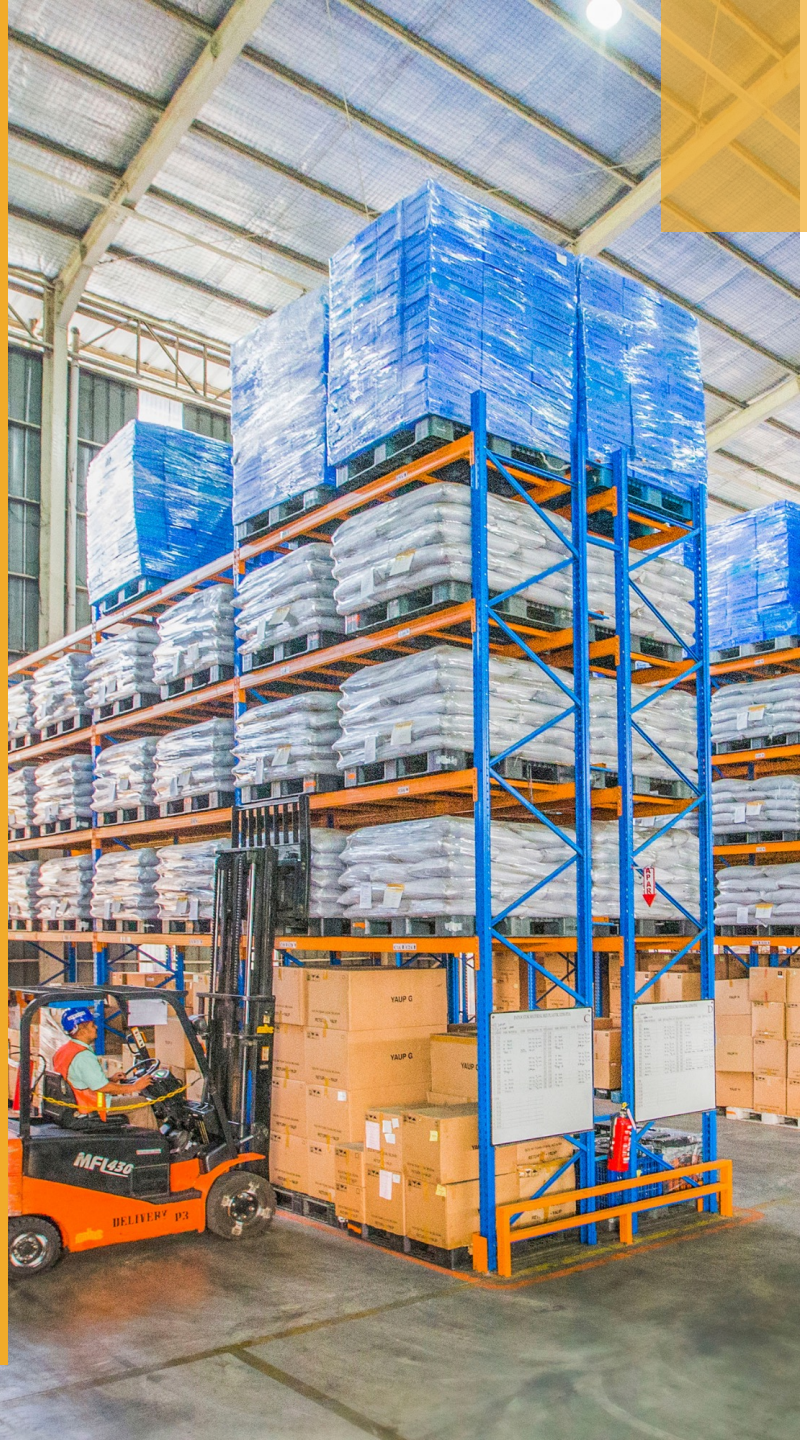


Changeover Reduction

SMED

brought to you by:

PATRICK ADAMS CONSULTING



WHAT IS

QUICK CHANGEOVER?

A process for *dramatically* reducing setup time changeover time

Also Known as:

- Single Minute Exchange of Dies (SMED)
- Setup Reduction

LEAN SOLUTIONS

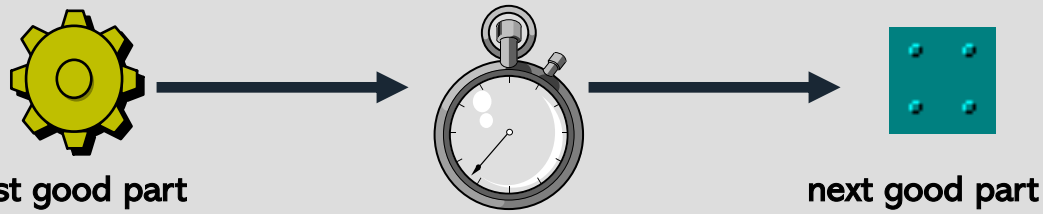


LEAN
SOLUTIONS

SET UP DEFINITION

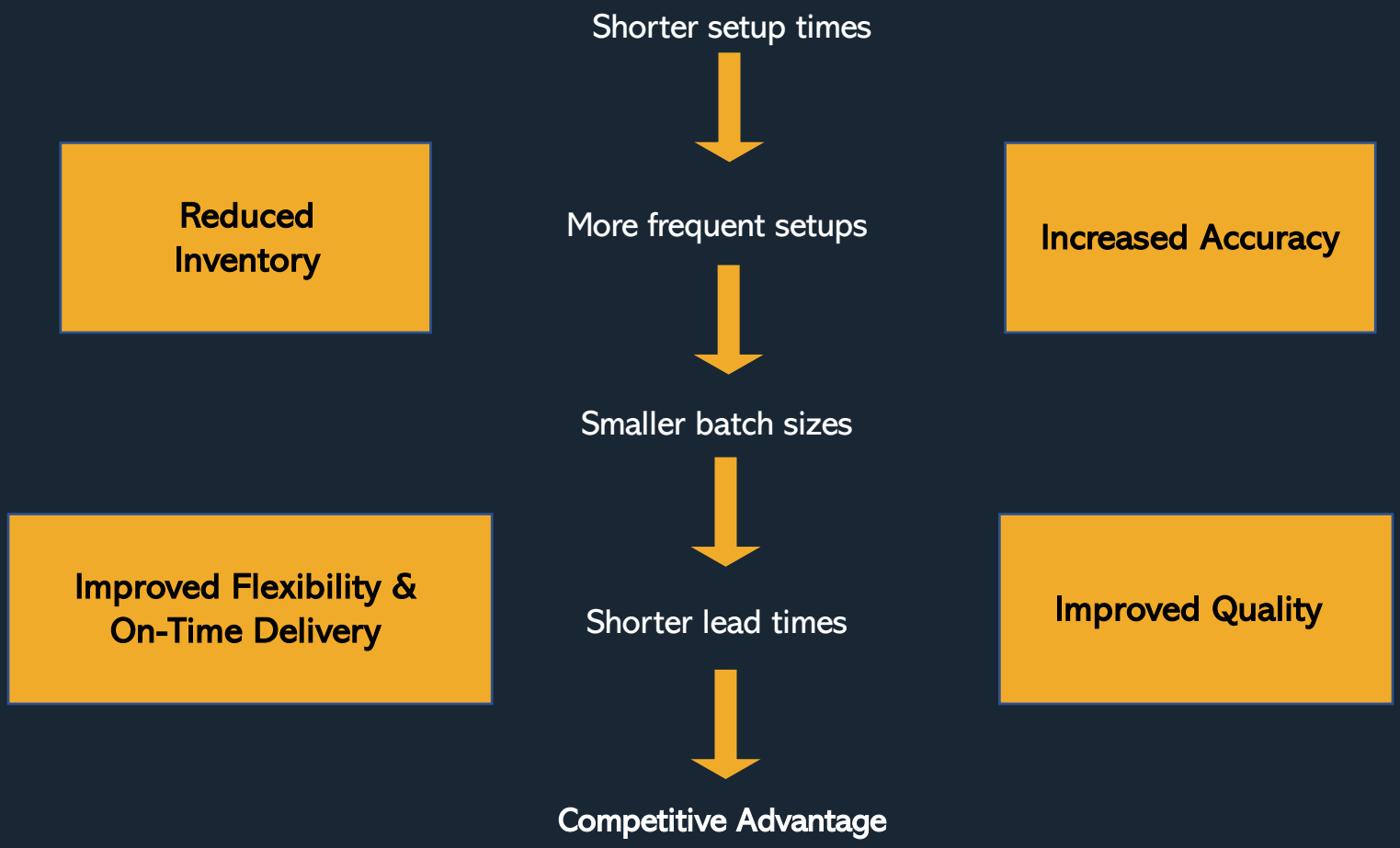
During this time the equipment is idle and not producing parts.

The length of time it takes to changeover a machine from the last good part of a production run to the first good part of the next production run.

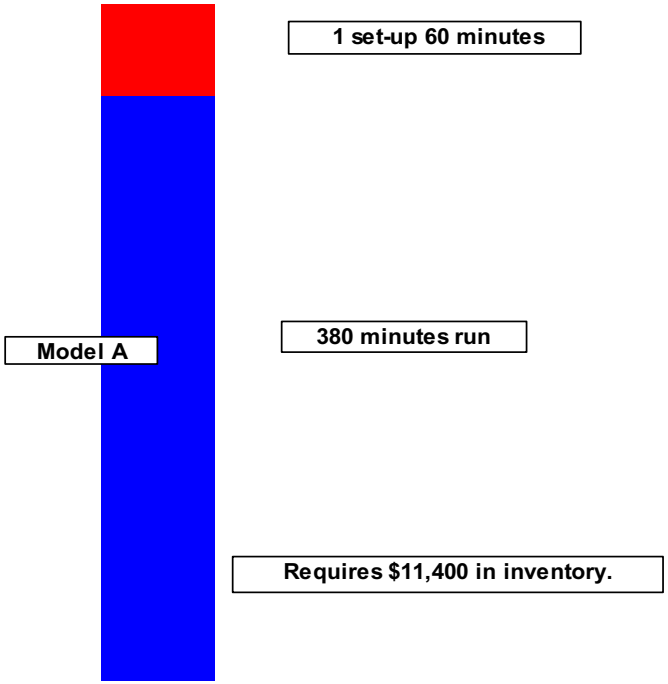


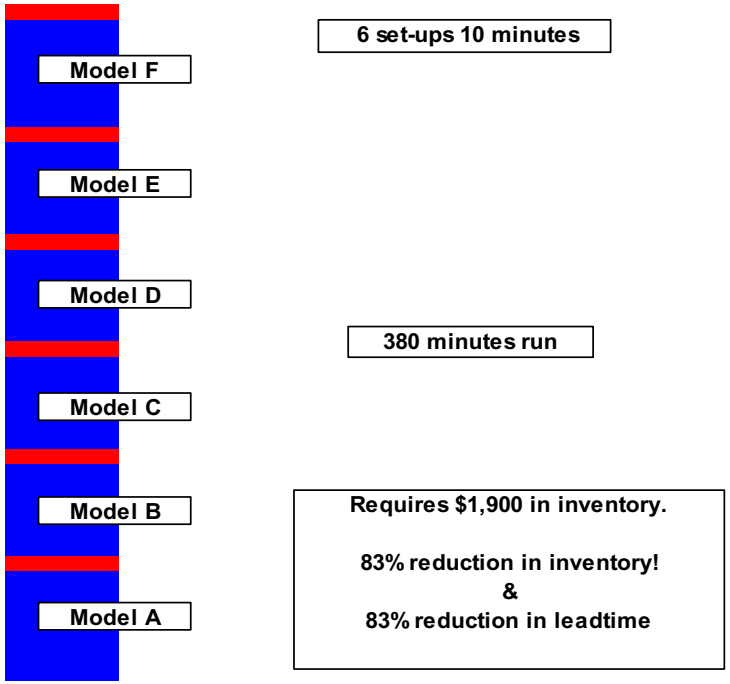
LEAN SOLUTIONS

WHY IMPLEMENT
QUICK CHANGEOVER



LEAN SOLUTIONS





6 different models produced.
1900 parts required per day.
Cycle Time = 12 seconds
1900 parts /12 seconds each =
380 minutes required per day.

It will take 6 days to cycle thru all models requiring inventory of at least 6 days of each model. That is 11,400 pieces total,if each costs $1 there is $11,400 because of set-up.

LEAN SOLUTIONS

QUICK CHANGEOVER: DEFINITION

Internal Set-Up Activities

- An activity or task that can only be performed while the machine is stopped. (Stopping the machine to change a tool)

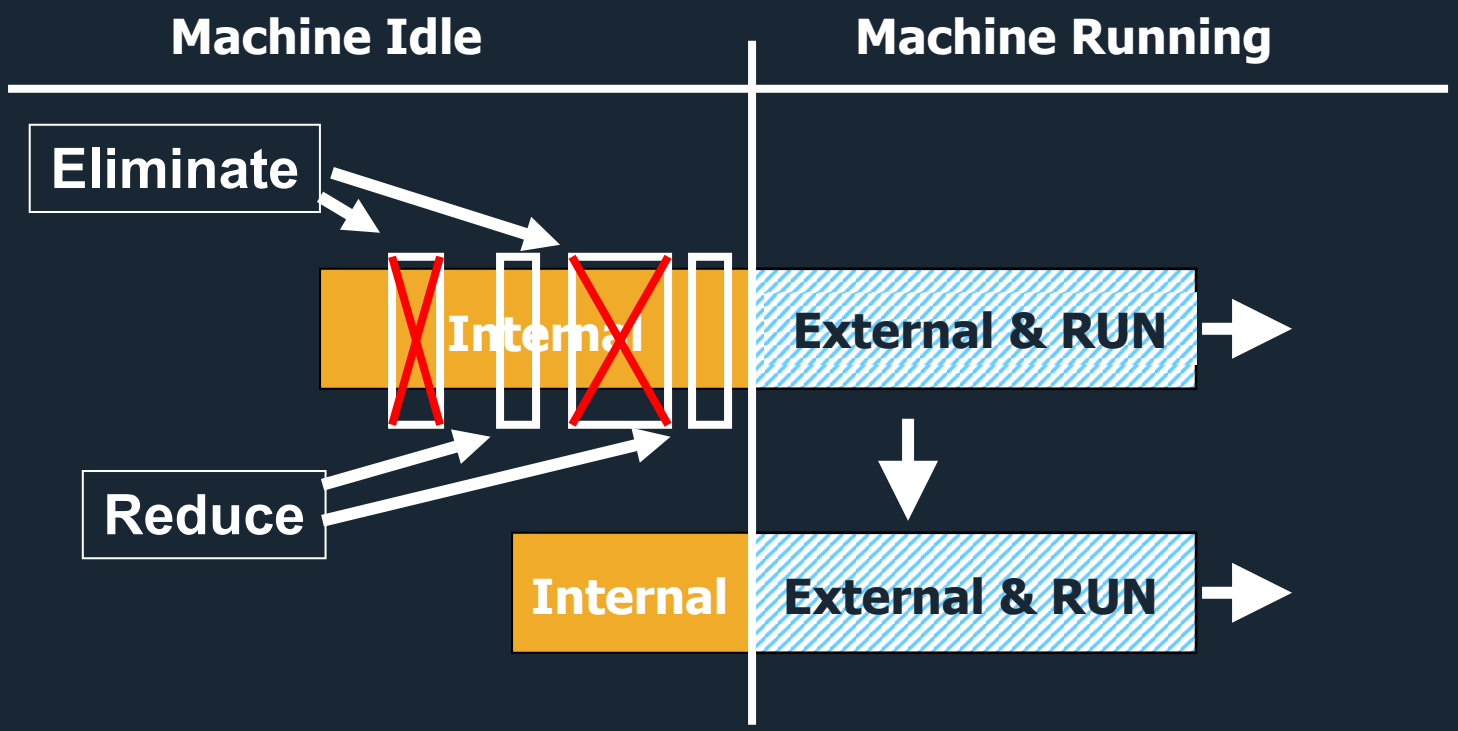
External Set-Up Activities

- An activity or task that can be performed while the machine is running (Prepare tools, tooling, and required paperwork, while the machine is running)

LEAN SOLUTIONS

Steps	Pre-Work	
1. Measure total changeover time, study current conditions. "Document Reality." (Video)		60 Minutes
2. Identify internal vs. external steps and calculate individual times.		5 5 3 5 3 8 6 11 3 11 E I E I E I E I E I
3. Strip out external steps and pull them forward before previous part run ends.	20 Min. E	I
4. Reduce and eliminate the internal setup, adjustments, etc.	20 Min. E	I 20 Minutes
5. Reduce the external elements.	10 Minutes E	I 20 Minutes
6. Identify parallel tasks. Two people working in harmony with one another, rather than one.	10 Minutes E	I 10 Minutes
7. Practicing the new and improved changeover method	8 Minutes E	I 8 Minutes
8. Standardize and improve the new changeover procedure over time.	8 Minutes E	I 8 Minutes

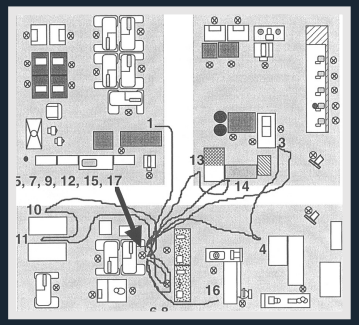
LEAN SOLUTIONS

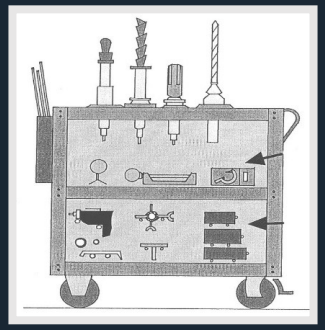


LEAN
SOLUTIONS

REDUCE/ELIMINATE INTERNAL STEPS

- Implement good 5S
- Standardize spacer & fixture heights
- Pre-set stops, gauges, limit switches, and tools
- Add center lines and reference planes
- Use of Changeover Carts
- Preset locations to eliminate measurement





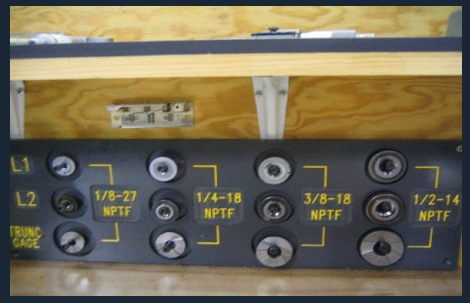


LEAN SOLUTIONS

REDUCE/ELIMINATE INTERNAL STEPS

- Numerical Settings vs. “feel”
- Gauges used so that adjustment can be preset without producing any defective parts
- Color-coding setup locations per part numbers
- V-notch and pin locators for dies
- Quick Release Clamps (one-turn / one-motion)



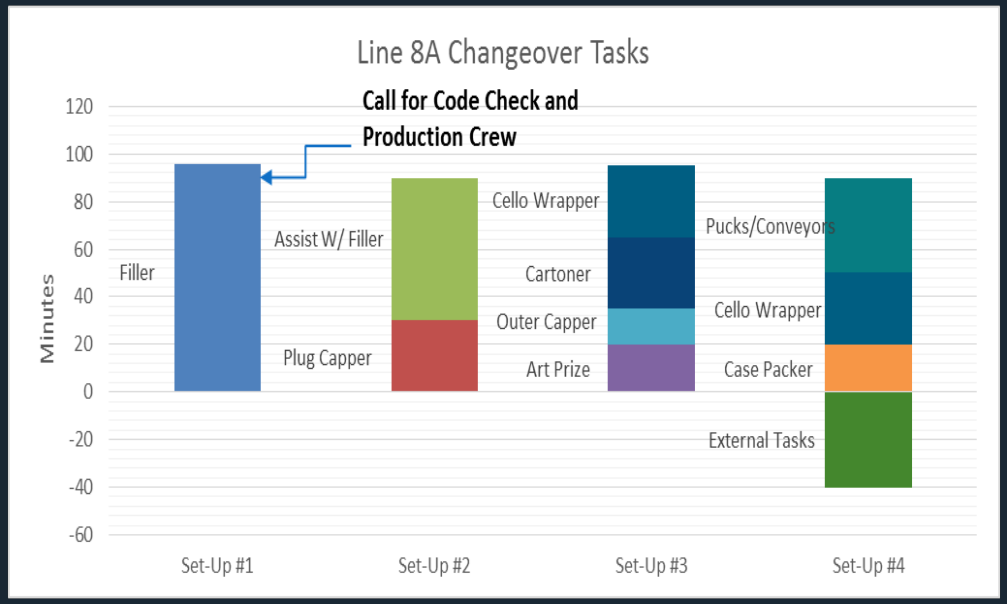




LEAN SOLUTIONS

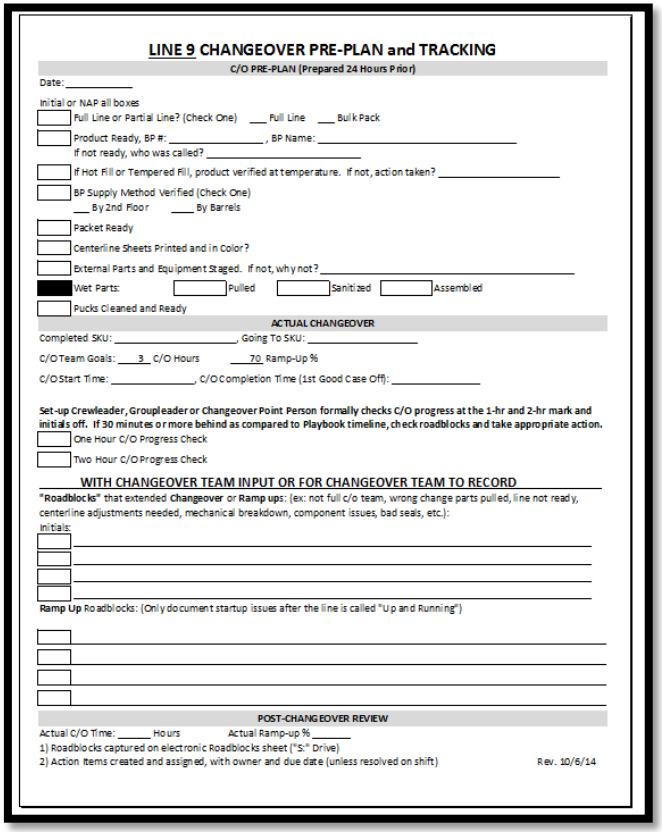
REDUCE/ELIMINATE INTERNAL STEPS

- Develop changeover sequencing (playbook)
- Develop standardized work chard (create a checklist)



LEAN SOLUTIONS

REDUCE/ELIMINATE INTERNAL STEPS



LINE 9 CHANGEOVER PRE-PLAN and TRACKING

C/O PRE-PLAN (Prepared 24 Hours Prior)

Date: _____

Initial or NAP all boxes

☐ Full Line or Partial Line? (Check One) ___ Full Line ___ Bulk Pack

☐ Product Ready, BP #: _____, BP Name: _____
If not ready, who was called? _____

☐ If Hot Fill or Tempered Fill, product verified at temperature. If not, action taken? _____

☐ BP Supply Method Verified (Check One)
___ By 2nd Floor ___ By Barrels

☐ Packet Ready

☐ Centerline Sheets Printed and in Color?

☐ External Parts and Equipment Staged. If not, why not? _____

■ Wet Parts: ☐ Pulled ☐ Sanitized ☐ Assembled

☐ Pucks Cleaned and Ready

ACTUAL CHANGEOVER

Completed SKU: _____, Going To SKU: _____

C/O Team Goals: ___3___ C/O Hours ___70___ Ramp-Up %

C/O Start Time: _____, C/O Completion Time (1st Good Case Off): _____

Set-up Crewleader, Groupleader or Changeover Point Person formally checks C/O progress at the 1-hr and 2-hr mark and initials off. If 30 minutes or more behind as compared to Playbook timeline, check roadblocks and take appropriate action.

☐ One Hour C/O Progress Check

☐ Two Hour C/O Progress Check

WITH CHANGEOVER TEAM INPUT OR FOR CHANGEOVER TEAM TO RECORD

"Roadblocks" that extended **Changeover** or **Ramp ups**: (ex: not full c/o team, wrong change parts pulled, line not ready, centerline adjustments needed, mechanical breakdown, component issues, bad seals, etc.):

Initials:

☐ _____
☐ _____
☐ _____
☐ _____

Ramp Up Roadblocks: (Only document startup issues after the line is called "Up and Running")

☐ _____
☐ _____
☐ _____
☐ _____

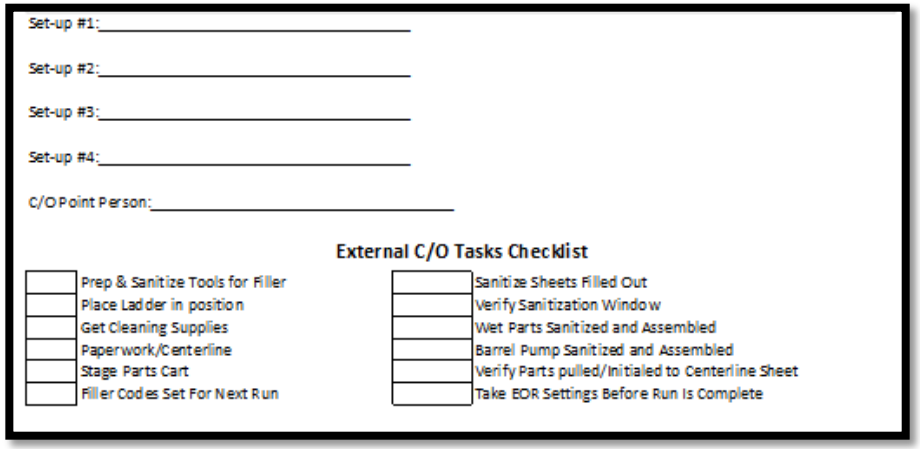
POST-CHANGEOVER REVIEW

Actual C/O Time: _____ Hours Actual Ramp-up % _____

1) Roadblocks captured on electronic Roadblocks sheet ("S:" Drive)
2) Action Items created and assigned, with owner and due date (unless resolved on shift)

Rev. 10/6/14

Pre-Plan Meeting & Checklist



Set-up #1: _____

Set-up #2: _____

Set-up #3: _____

Set-up #4: _____

C/O Point Person: _____

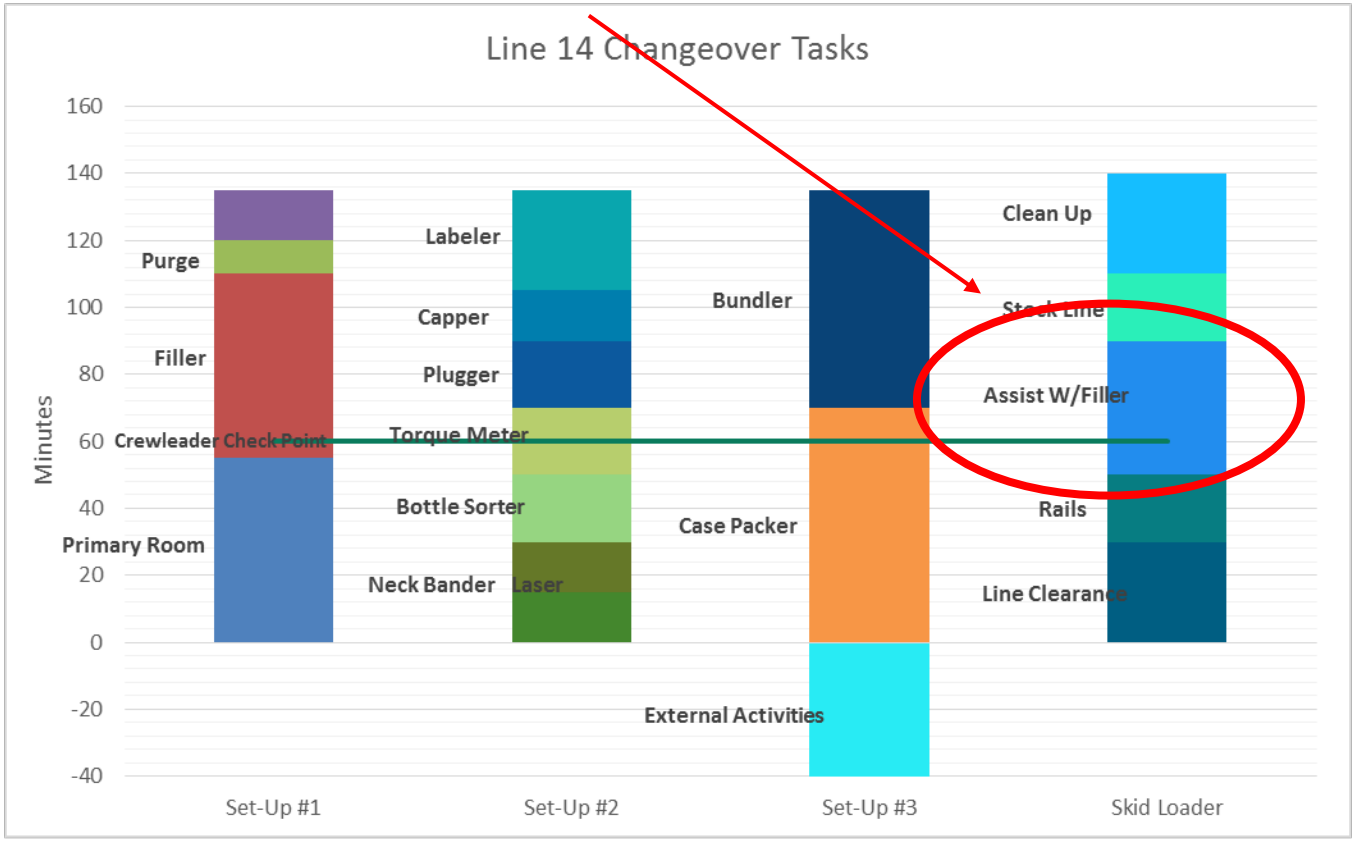
External C/O Tasks Checklist

☐ Prep & Sanitize Tools for Filler	☐ Sanitize Sheets Filled Out
☐ Place Ladder in position	☐ Verify Sanitization Window
☐ Get Cleaning Supplies	☐ Wet Parts Sanitized and Assembled
☐ Paperwork/Centerline	☐ Barrel Pump Sanitized and Assembled
☐ Stage Parts Cart	☐ Verify Parts pulled/Initialed to Centerline Sheet
☐ Filler Codes Set For Next Run	☐ Take EOR Settings Before Run Is Complete

LEAN SOLUTIONS

PARALLEL TASKS

Identify areas where two or more people can work together.



LEAN SOLUTIONS

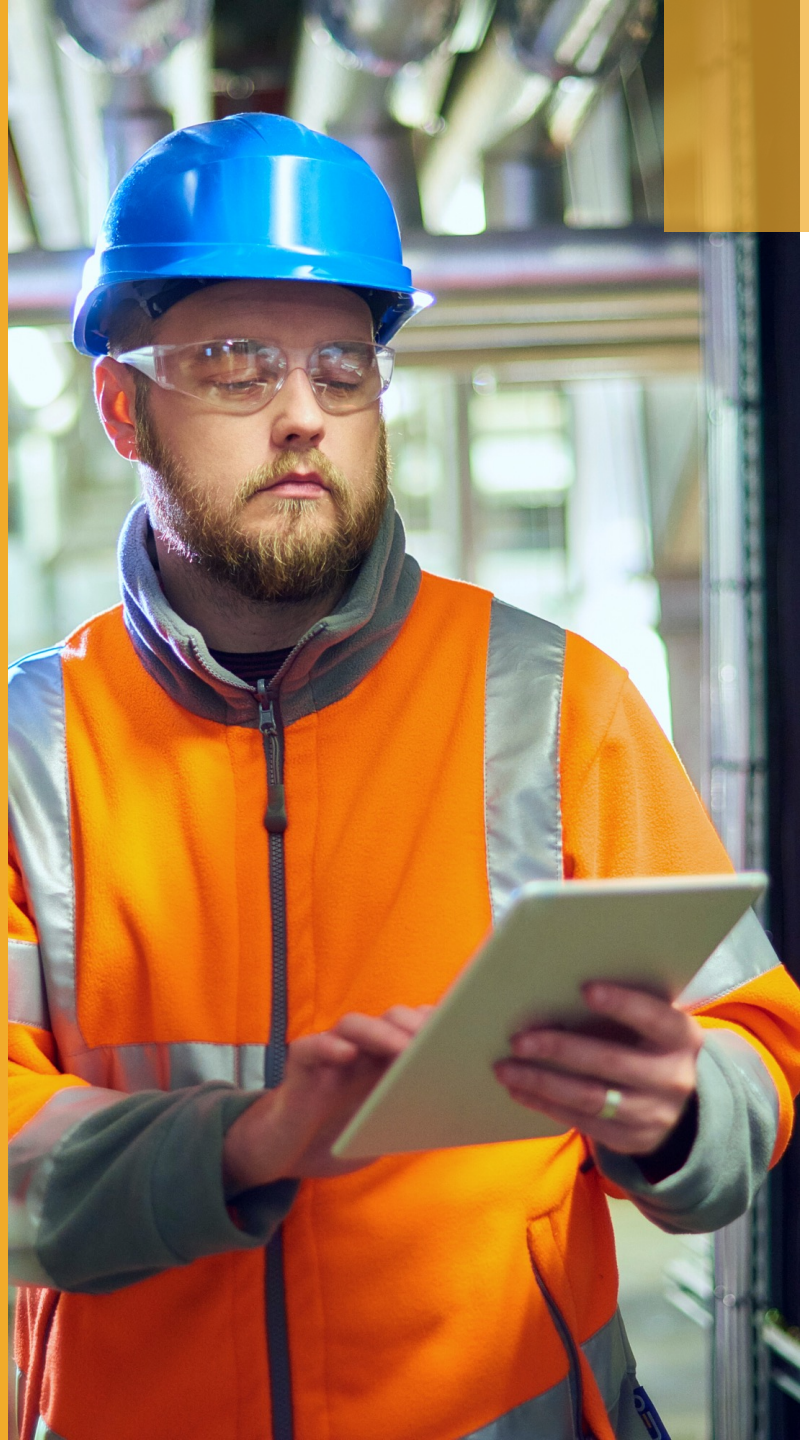
STANDARDIZE/IMPROVE THE PROCEDURE OVER TIME







LEAN SOLUTIONS



TOTAL PRODUCTIVE MAINTENANCE

LEAN SOLUTIONS



WHAT IS

TOTAL PRODUCTIVE MAINTENANCE?

A set of techniques which ensures that each and every machine in the production process is always able to perform its required task

LEAN SOLUTIONS

WHAT IS

TOTAL PRODUCTIVE MAINTENANCE?

- The approach needs to be Total; It requires the participation of all employees. Production operators are trained to handle routine maintenance activities such as lubricating, cleaning, tightening and inspecting equipment on a regular basis
- It blurs the distinction between the roles of production and maintenance by placing a strong emphasis on empowering operators to help maintain their equipment.

LEAN SOLUTIONS

WHY IMPLEMENT
TOTAL PRODUCTIVE MAINTENANCE?

TPM increases stability by…

- Reducing unscheduled downtime
- Determining abnormal / normal conditions at a glance
- Improving knowledge on equipment operation and maintenance
- Equipment performs as expected
- Equipment is ready when needed

LEAN SOLUTIONS

TPM APPROACH

A shared responsibility for the equipment;

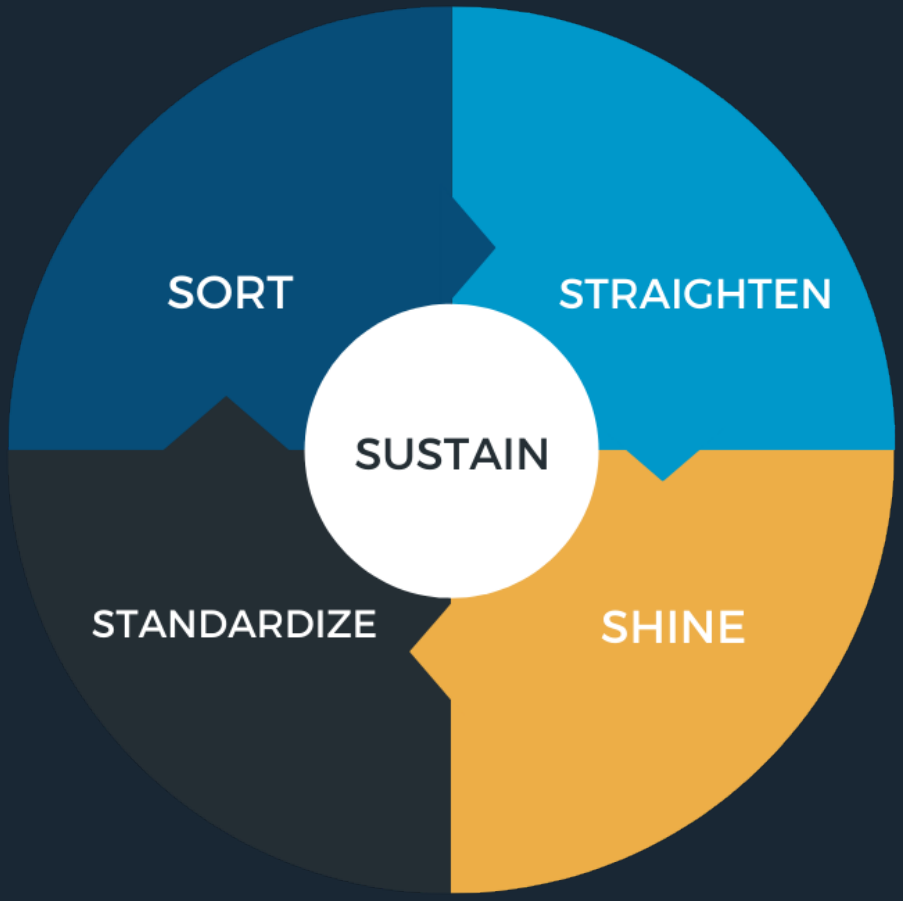
- It gives operators a chance to take ownership of their equipment
- Frees up the resources needed to fix problems caused by lack of maintenance
- Operators work together with maintenance

It seeks the total productivity of all the equipment;

- Achieved by focusing on the elements which account for the usual major losses, or downtime that occur to equipment

LEAN SOLUTIONS

RESTORE TO ORIGINAL CONDITION



LEAN
SOLUTIONS

DOES THE MACHINE HAVE AN OIL LEAK?



DOES THE MACHINE HAVE AN OIL LEAK?





MEASURE OEE

OEE stands for “Overall Equipment Effectiveness”.

OEE is a metric that identifies the percentage of planned production time that is truly productive. It was developed to support TPM initiatives by accurately tracking progress towards achieving “perfect production”.

Simply put – it identifies the percentage of manufacturing time that is truly productive.

LEAN SOLUTIONS

DEVELOP

THE ROUTINE & SCHEDULE

- Research equipment-maker's recommendations
- Add "experience-based" things to be done
- Utilize all your resources when determining tasks
- Use Preventative Maintenance System already in place

LEAN SOLUTIONS



TRAIN PERSONNEL
ON RESPONSIBILITIES

Operating equipment correctly and safely

- Do operators know how to start-up, shut-down and operate the equipment?
- Can operators run the equipment safely?
- Can operators changeover the equipment safely and in the targeted time?

Knowing recommended equipment maintenance

- Do operators have the required level of knowledge on the equipment?
- Do operators understand how to perform the required Preventative Maintenance routine, and scheduled tasks?

LEAN SOLUTIONS

OUR ROLES & RESPONSIBILITIES

Operators perform routine maintenance

- Think of them as the car owner
  - Goal is to keep the car at optimal performance
    - Learn to properly operate car
    - Check and refill fluids
    - Keep automobile clean
    - Provide feedback to mechanic when problems occur

Maintenance delivers specialized service

- Think of them as the Mechanics
  - The goal is a well running automobile
- Provide pre-scheduled maintenance
- Diagnose problems when car not performing to expectations
- Trained to handle more complex repair
- Provide feedback to car owner

LEAN SOLUTIONS



MONITOR

TO IMPROVE

- Visual card systems are effective to monitor the TPM Systems
- TPM Tasks are listed on colored cards; Red/Incomplete and Green/Completed
- Tasks are broken up into Daily, Weekly, and Monthly Requirements
- When a TPM task is complete the card is turned from red to green
- Cards are flipped back to red depending on the frequency of the TPM task i.e., the beginning of the week, or month
- The TPM system is monitored using Layered Process Audits

LEAN SOLUTIONS

TPM FOUNDATION:
DAILY DATA

Hour by Hour can be used to identify the losses that are occurring

There are five main categories of losses:

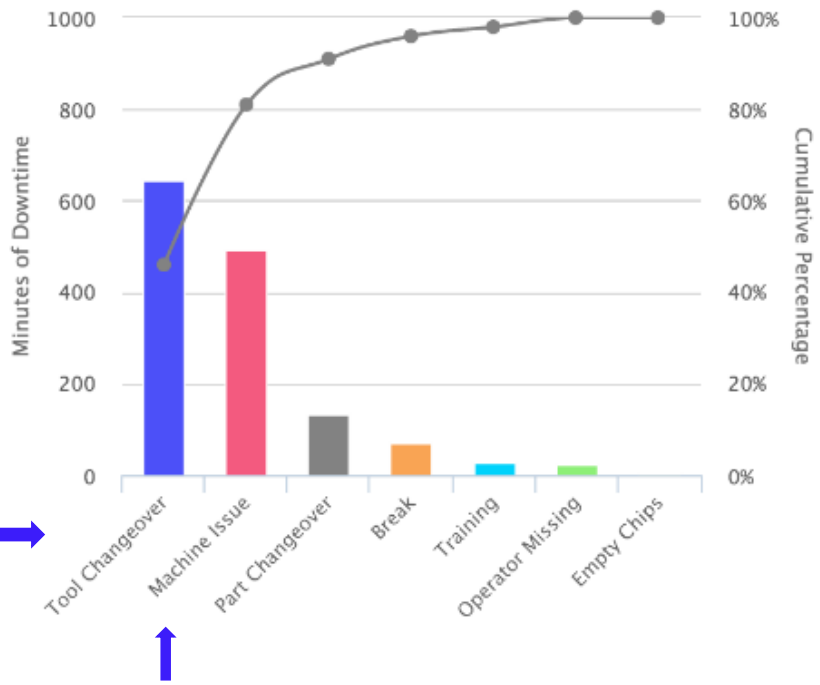
1. Equipment downtime
2. Changeover
3. Minor stops
4. Speed Loss
5. Rework/Scrap

Break down each category for effective Problem Solving

LEAN SOLUTIONS

PARENTO ANALYSIS

Use Team Improvement Boards to Pareto Losses



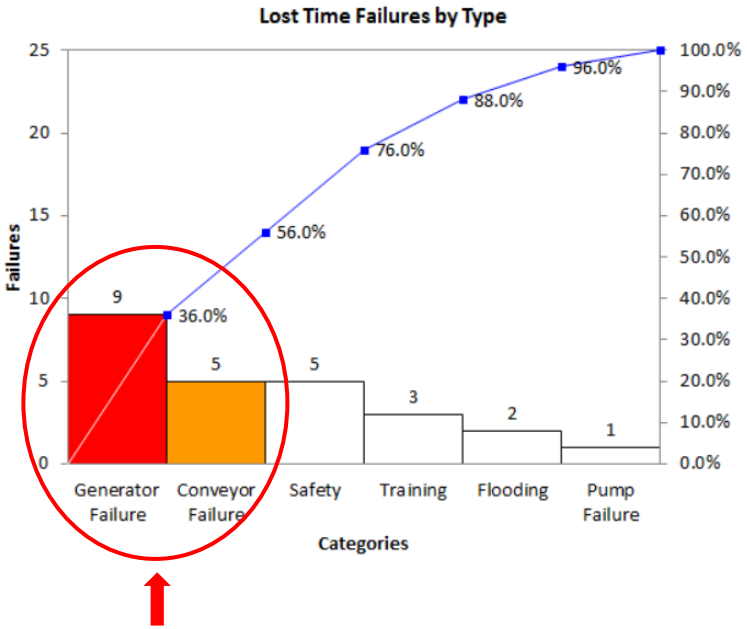
Reduce the Planned (Changeover)

Eliminate the Unplanned Issues

LEAN SOLUTIONS

PARENTO ANALYSIS

Second Level Breakdown Pareto May Be Necessary



Breakdown the Machine Issues

LEAN SOLUTIONS



VISUAL
MANAGEMENT

LEAN
SOLUTIONS



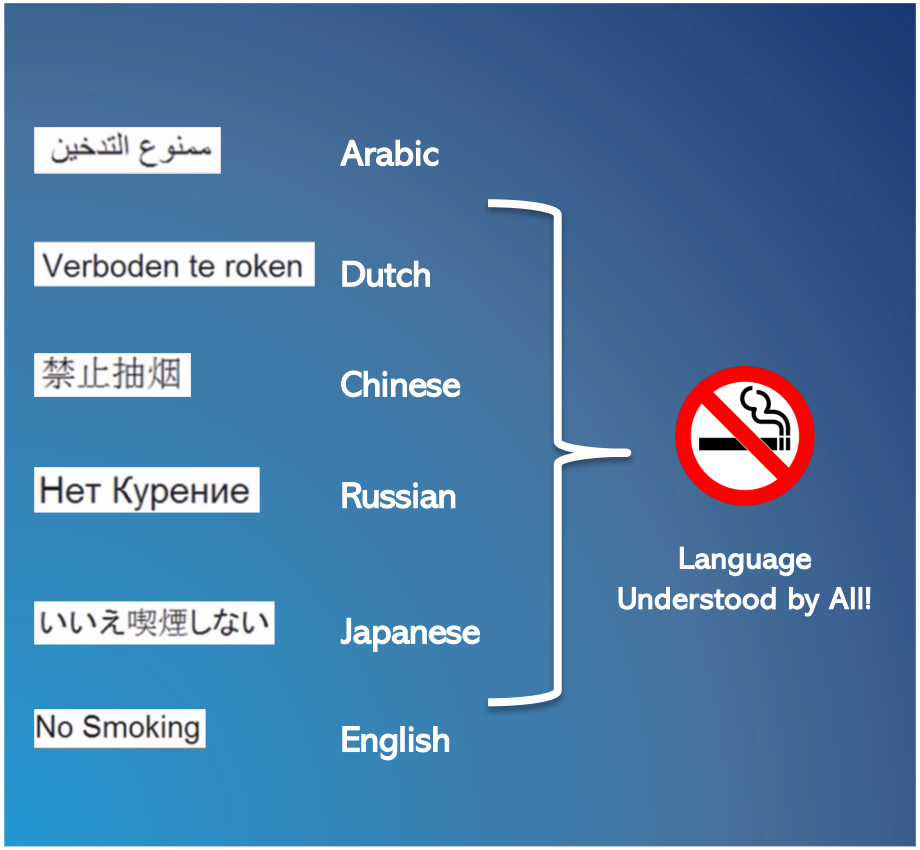
LEARNING
OBJECTIVES

- Understand what is Visual Management
- Understanding why Visual Management is important in a Lean Environment
- Learn how to implement Visual Management that fits in your organization

LEAN SOLUTIONS

What is Visual Management?

LEAN SOLUTIONS



VISUAL

MANAGEMENT

Can you understand what
is show on the left?

LEAN
SOLUTIONS



WHAT IS
VISUAL MANAGEMENT?

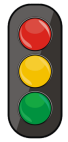
- The ability to manage everything in your business visually



- Managing visually is the ability of a system to quickly show the current status to anyone that stands and observes, within 30 seconds.



- ***EVERYONE*** in your business understands and knows how to respond if something is wrong.



LEAN SOLUTIONS

WHAT IS
VISUAL MANAGEMENT?

- Visual Management helps us become more effective problem-solvers by helping us with problem detection, since it helps us identify abnormalities quickly and easily.

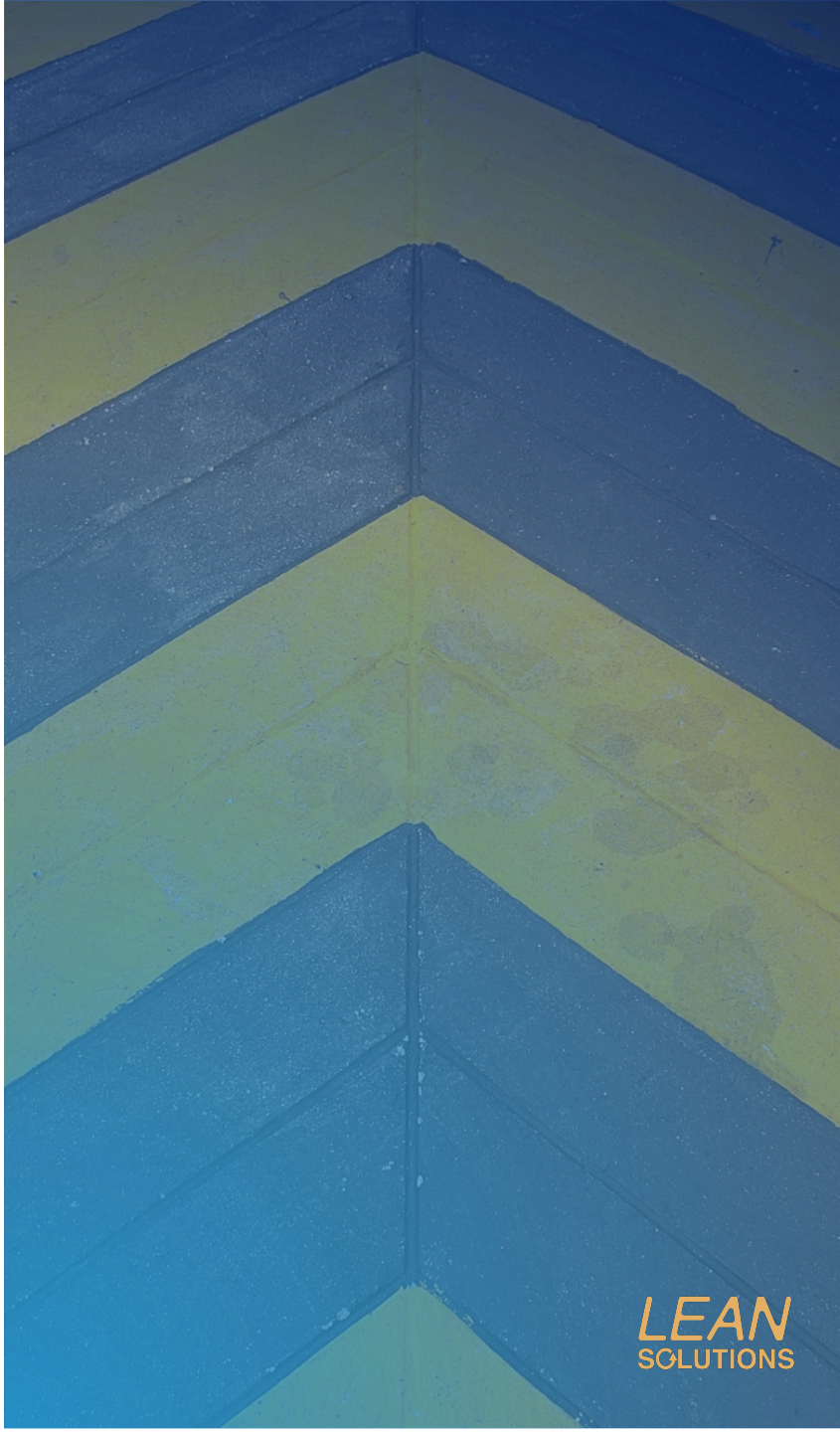
- Visual Management helps us manage with our eyes. Done correctly, it helps us see at a glance how we're doing without having to read through reports, look up data, or wait for a briefing.

LEAN SOLUTIONS

4 COMMON TYPES

VISUAL SIGNALS

- Visual Instructions
- Visual Management
- Visual Representations



4 COMMON TYPES

- Visual Signals
- **VISUAL INSTRUCTIONS**
- Visual Management
- Visual Representations



4 COMMON TYPES

- Visual Signals
- Visual Instructions
- **VISUAL MANAGEMENT**
- Visual Representations



4 COMMON TYPES

- Visual Signals
- Visual Instructions
- Visual Management
- **VISUAL REPRESENTATIONS**





WHY

VISUAL MANAGEMENT

Provide Real Time Information

Reduce Waste and Poor Quality

Empowerment and Ownership

Drive Accountability

Faster Response Time to Problems

LEAN SOLUTIONS

WHY

VISUAL MANAGEMENT

Easy to See Processes

Workflow is Clear

Inexperienced Can Understand

Easier to Manage

LEAN SOLUTIONS



WHY

VISUAL MANAGEMENT

Develop a Routine

Daily, Weekly, Monthly

Show All Areas of the Organization

Should be a Display of Plant Performance

LEAN SOLUTIONS

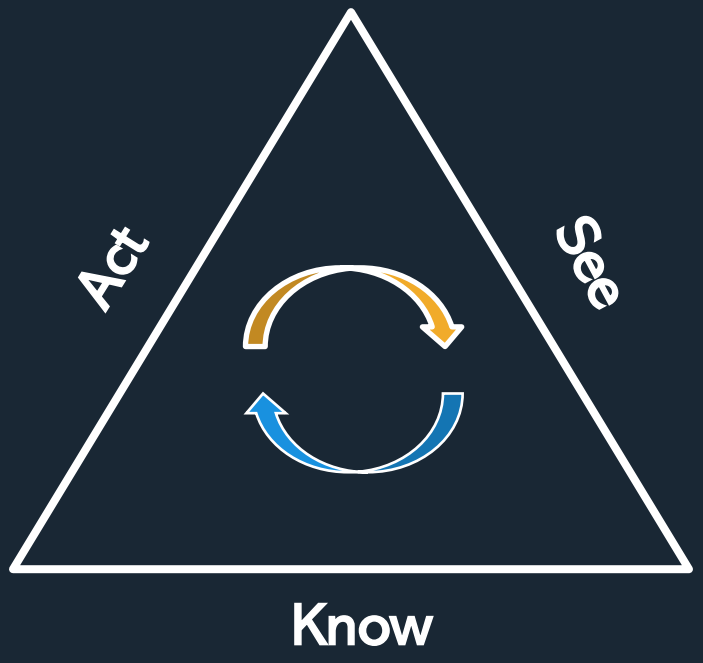
THE VISUAL OFFICE

Make problems visible

Communicate status

Improve productivity

Improve confidence



VISUAL MANAGEMENT CYCLE

LEAN SOLUTIONS

How do we Implement Visual Management?

LEAN SOLUTIONS

SAFETY

AND SIMPLE IDENTIFICAITON

Fire Dangers

Fire Extinguishers

Chemical Dangers

Storm Shelters

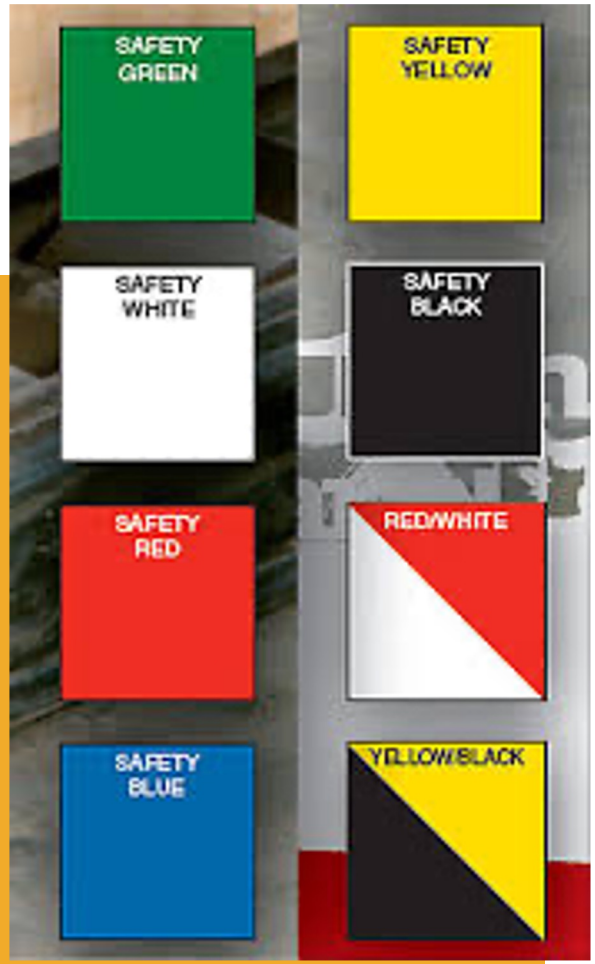
Emergency Shut Off's

Electrical Box Clearance

High Voltage Notification

Evacuation

LEAN SOLUTIONS



COMMON
COLORS

DANGER

WARNING

CAUTION

NOTICE

LEAN SOLUTIONS

VISUAL MANAGEMENT AND 5S







LEAN
SOLUTIONS

DESIGNING VISUAL SYSTEMS

- Who is your audience
- Using the right media
- Don't overdo it

LEAN SOLUTIONS

LEADING CHARACTERISTICS

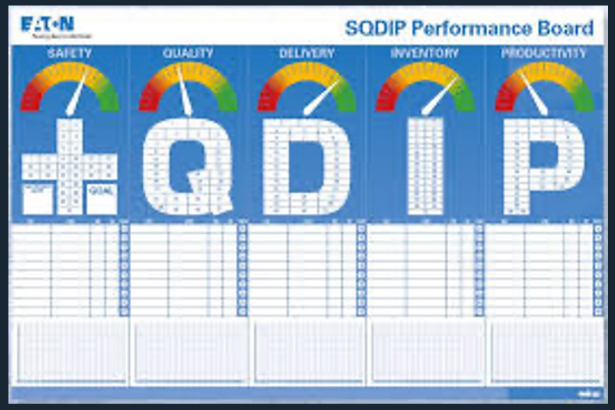
- Clear and easy to understand
- Team ownership
- Promote team ownership
- Close to the process
- Limit the data displayed

LEAN SOLUTIONS

VISUAL MANAGEMENT
BOARD EXAMPLES



Safety Cross



QDPI Indicators
with Safety 1st

LEAN SOLUTIONS

HOW TO START

YOUR VM JOURNEY

- Go See
- Brainstorming Activity – What problems are you trying to solve?
- Team members understand why VMS are beneficial
- Discuss VMS components
- Create board using the VM board elements
- Try it out! Check and adjust as needed

LEAN SOLUTIONS



POINTS
TO REVIEW

- Keep it Clear and Concise
- Who, What, Where
- Basic Markings First
- Understandable for All

LEAN SOLUTIONS

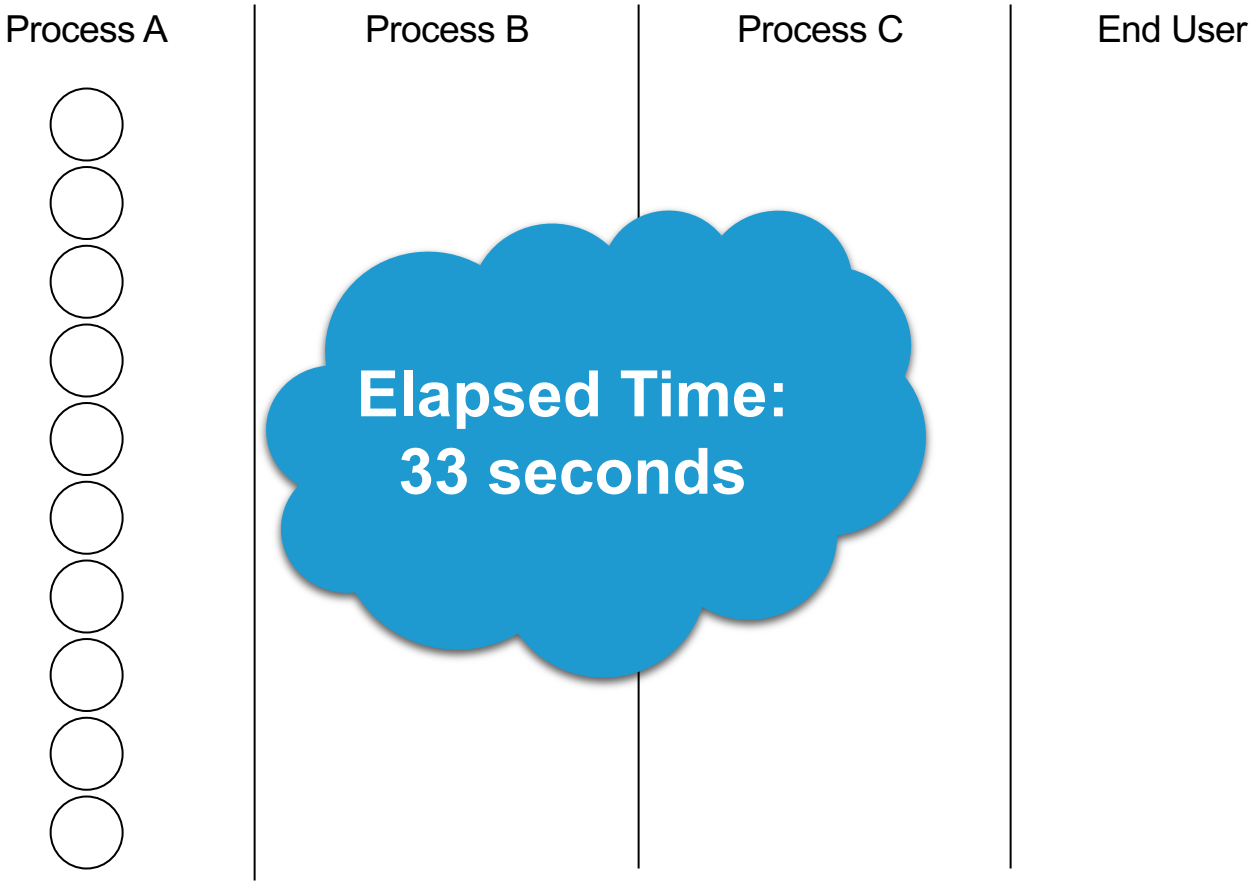


6 FUNDAMENTALS OF LEAN

- Value
- Value Stream
- Flow
- Pull
- Perfection

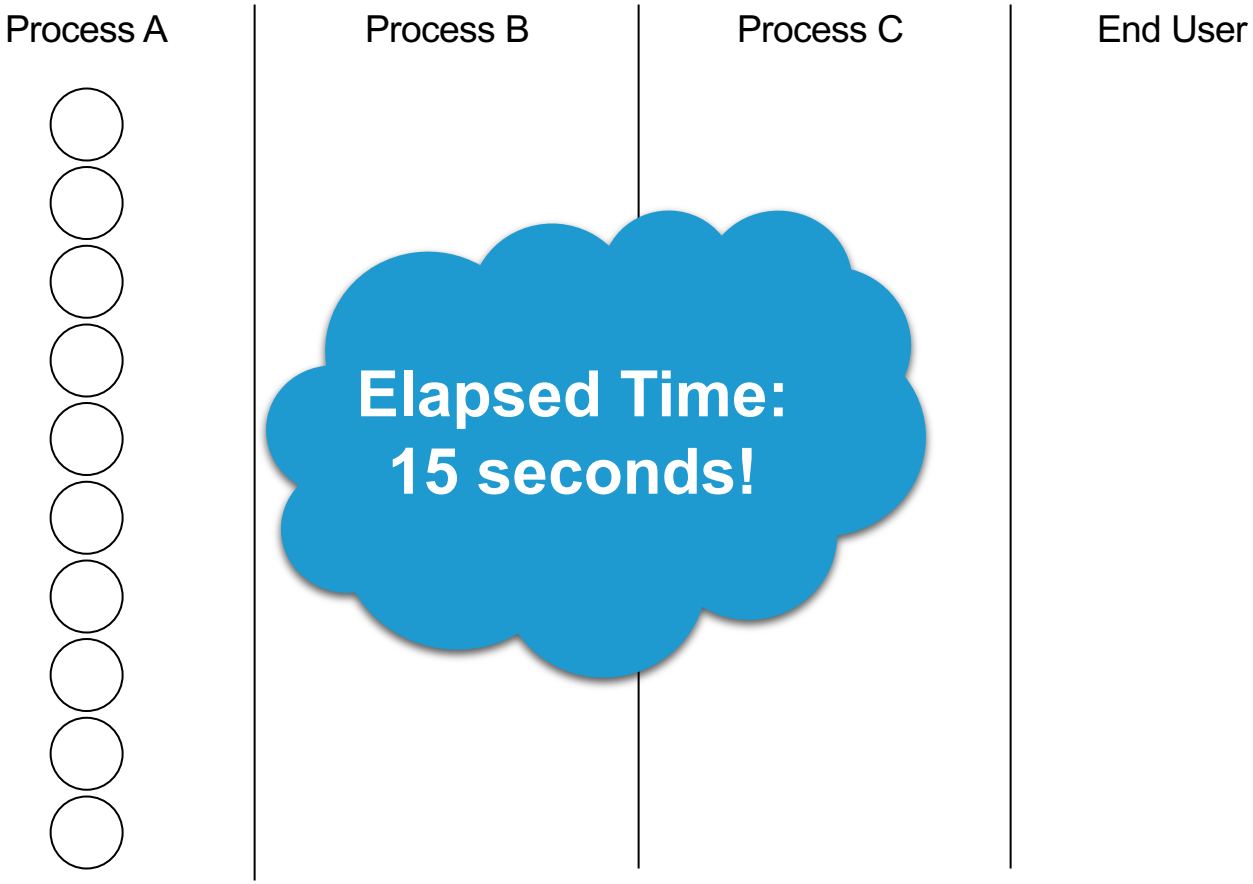
LEAN SOLUTIONS

BATCH & QUEUE



LEAN SOLUTIONS

SINGLE PIECE FLOW



LEAN SOLUTIONS

Upstream (suppliers)



Downstream (customers)

"The ideal arrangement for Flow production should resemble a watershed: the river being the main assembly track, fed by tributaries in the shape of sub-assembly lines which, in turn, would be supplied by streams representing the machine lines fed by brooks typifying the material conveyors. Each part should flow continuously forward … ultimately to the sea - the customers."

Frank Woollard, *Principles of Mass and Flow Production*, 1954

LEAN SOLUTIONS

FLOW & PULL

Enablers for Flow

1. Use Single Piece Flow or Smaller Batches
2. Total Productive Maintenance (TPM)
3. Line Balancing (Cycle Times and Takt Times)
4. Theory of Constraints
5. Mistake Proofing (Poka Yoke)
6. Jidoka
7. SMED (Quick Change Over)

LEAN SOLUTIONS

ONE PIECE FLOW VS BATCH

One Piece Flow



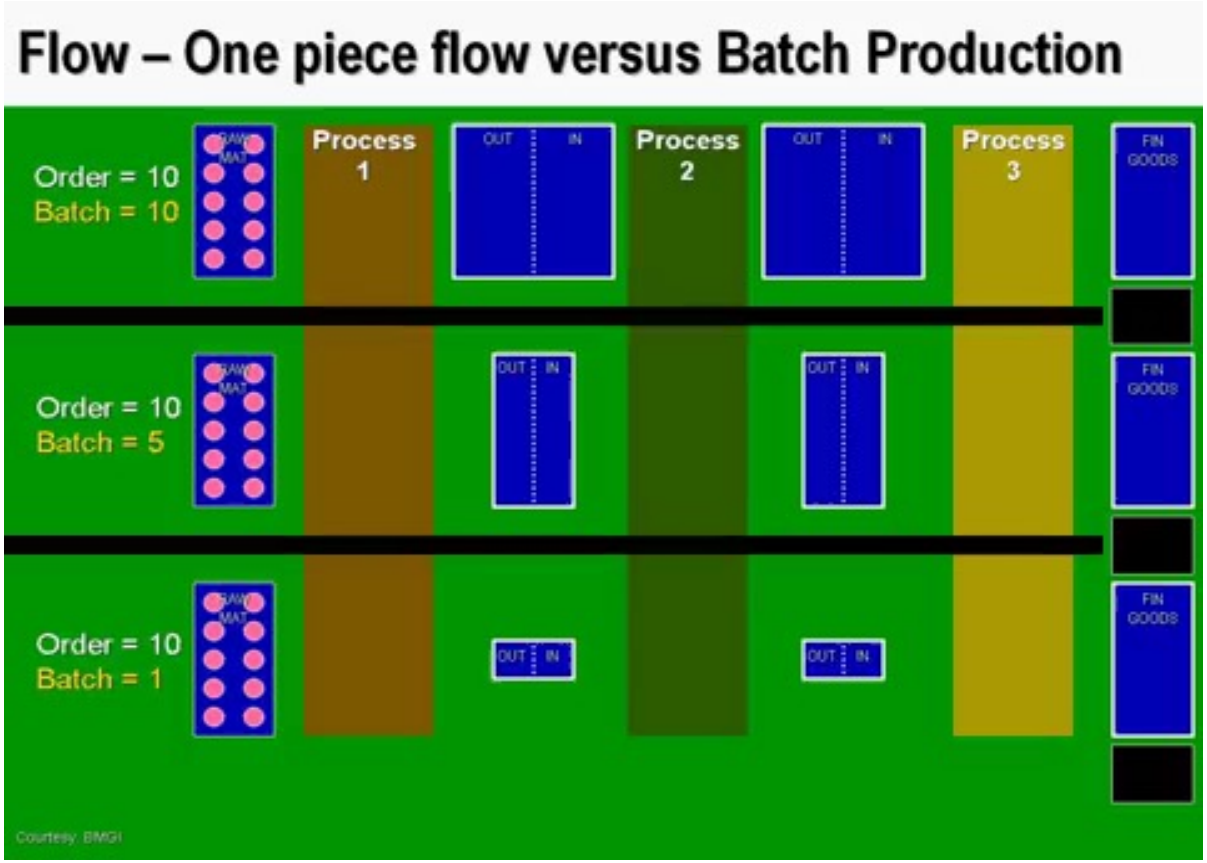
Batch



https://www.youtube.com/watch?v=cnLuztl-aGg

LEAN SOLUTIONS

ONE PIECE FLOW VS BATCH



https://www.youtube.com/results?search_query=single+piece+flow+vs+batch

LEAN SOLUTIONS

BATCH VS SINGLE PIECE FLOW



https://www.youtube.com/watch?v=cu9CVFEHee4&list=PLGvZFHF27rGzmn1iFmj8v_3rCn07ytImO

LEAN SOLUTIONS

LINE BALANCING

Understand the TAKT TIME and CYCLE TIMES of the operations in your process and BALANCE your line. The goal is :

CYCLE TIMES = TAKT TIME

Definitions:

TAKT TIME = Demand Time = Time needed to produce each unit of product or service in order to keep up with customer demand

CYCLE TIME = Actual time taken for production of each unit or service

Note: Always be aware for the specific definition of Cycle Time in your work or business because there can be subtle differences between companies

LEAN SOLUTIONS

LINE BALANCING EXAMPLE

Demand is 4,800 units per month. Assuming 30 days per month and 8 hours per day.

Therefore TAKT TIME in minutes is:

Total time period in minutes ÷ total number units demanded

(30 x 8 x 60) ÷ 4800 = 3 minutes

LEAN SOLUTIONS

QUIZ 6:

1. What is the Japanese name used for ‘Mistake Proofing’ of a process step ?
   - **POKA YOKE**

2. FLOW is critical to any process. What needs to Flow in an Airport or Hospital ?
   - **PEOPLE, INFORMATION, LUGGAGE, EQUIPMENT**

3. **SMED** is an acronym used in Lean Manufacturing. What is another name for SMED?
   - **QUICK CHANGE OVER**

4. A fundamental concept of any Lean Process is that it has no delays, constraints, waiting or bottlenecks. This Lean concept is called _____.
   - **FLOW**

LEAN SOLUTIONS

Case Study of Improved Flow Production

LEAN SOLUTIONS

PRODUCTS



Shelves for Food Sector



Modular Cold Rooms

LEAN SOLUTIONS

THE PLANT





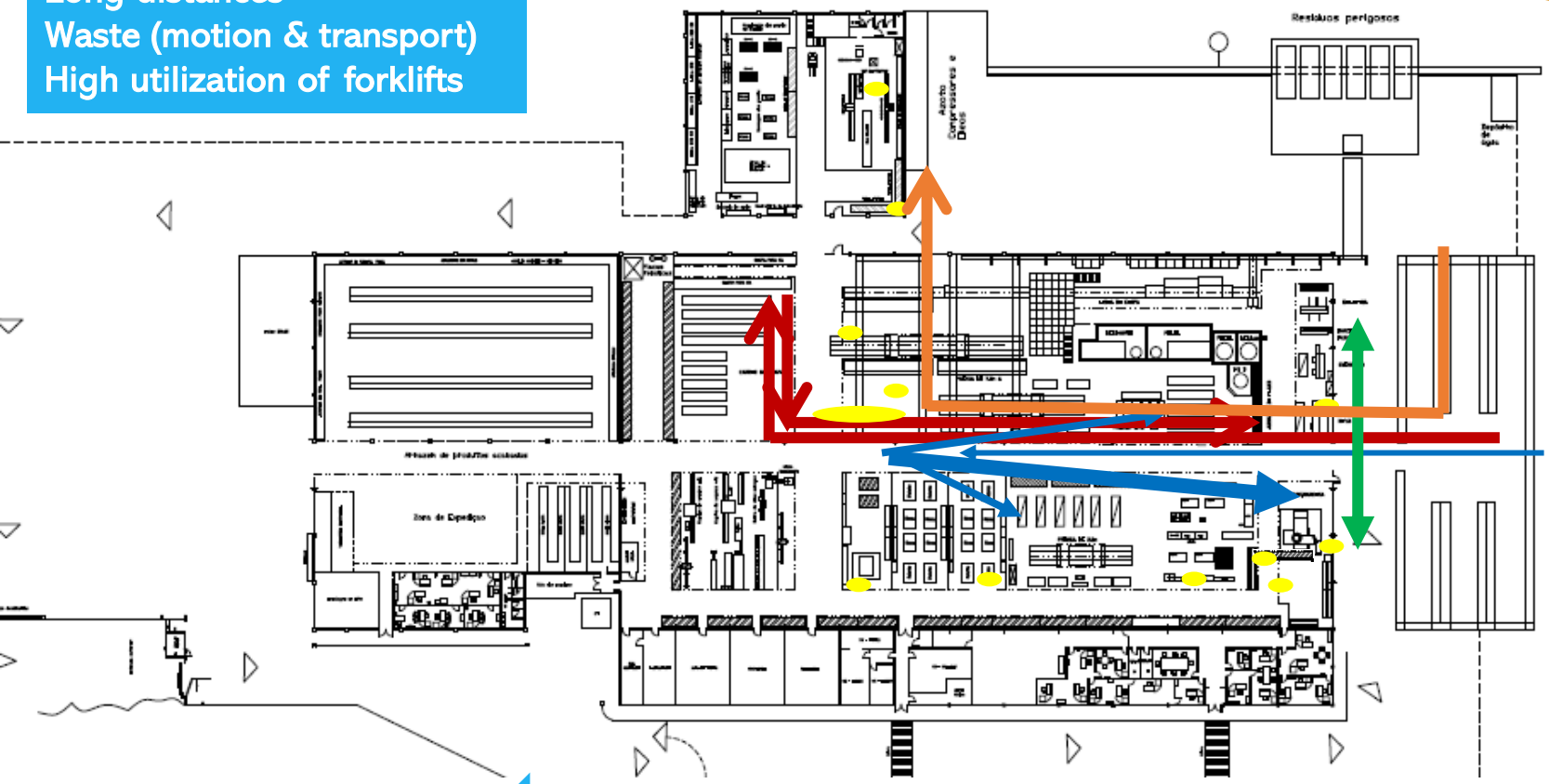
LEAN SOLUTIONS

ANALYSIS OF FLOWS

IN JANUARY - 2017

Flow Analysis
Long distances
Waste (motion & transport)
High utilization of forklifts

WIP



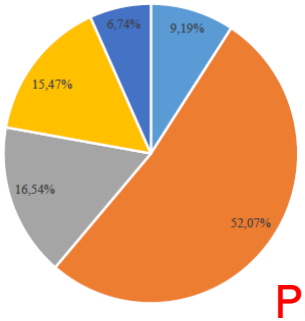
LEAN SOLUTIONS

DATE ANALYSIS

IN JANUARY - 2017

Collection of times and distances

Materials transported by Operator from:

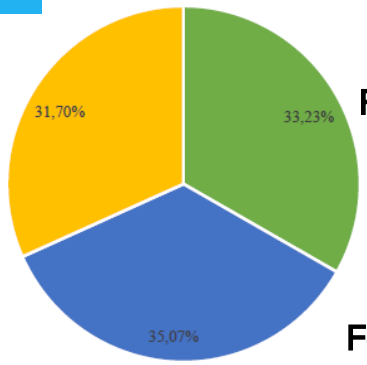


Logistics: 26%

Not adding value

Production!! 52%

How is transported:



Manual

Pallet truck

Forklift

LEAN SOLUTIONS

To / From

From \ To	Armazém	Linha Chapa	Armazém Chapa	Puncionadora	Máquinas Tradicionais	Preparação da prensa de 3,2m	Prensa 3,2m	Prensa 5,2m	Prensa 6m	Prensa 12m	Ferragem Pivotantes	Ferragem Deslizantes	Corte PVC	Angulos	Máq. Madeiras	Alumínios	Salas Limpas	Coolblok	Estabilização	Expedição	Rua
Armazém					I	II	II				卌	卌 II	卌 II	III	II	III	卌	卌 II		卌 卌 卌 卌 III	
Linha Chapa			卌 卌 I	卌 IIII				IIII	I	II							II				卌
Armazém Chapa	卌							IIII	卌	卌 卌 I											
Puncionadora					卌 卌 卌 III	II					I						I				III
Máquinas Tradicionais				I		卌 卌 卌 卌 IIII		卌 II		I	卌 II	I								IIII	
Preparação da prensa de 3,2m					I						I									I	III
Prensa 3,2m											IIII	卌					II				
Prensa 5,2m		IIII	卌 I																卌 III	II	I
Prensa 6m		I	II					I		III	I				I				IIII	卌 II	I
Prensa 12m		III	II																II	卌 II	卌 I
Ferragem Pivotantes	II				I										I	II	I		卌 卌 卌 III	卌	
Ferragem Deslizantes						I	I									III	II		卌 I		II
Corte PVC	II					III		I			卌	III									
Angulos			I			II	I												II	III	I
Máq. Madeiras	I								II			I					II				I
Alumínios						III				I	卌 II	卌 卌 I								I	
Salas Limpas			I	I		I		I						I						I	I
Coolblok																				I	
Estabilização											I									卌 卌 卌 卌 卌 III	
Expedição								I			I			II					IIII		卌 卌
Rua	I	卌 II		IIII	III	I	I	II	III	IIII	III	II		I	I					卌	

Matrix of all production flows and their frequency

Data for layout changes, milk-run and raw-material storage

IMPROVEMENTS

OF FLOWS IN 2018

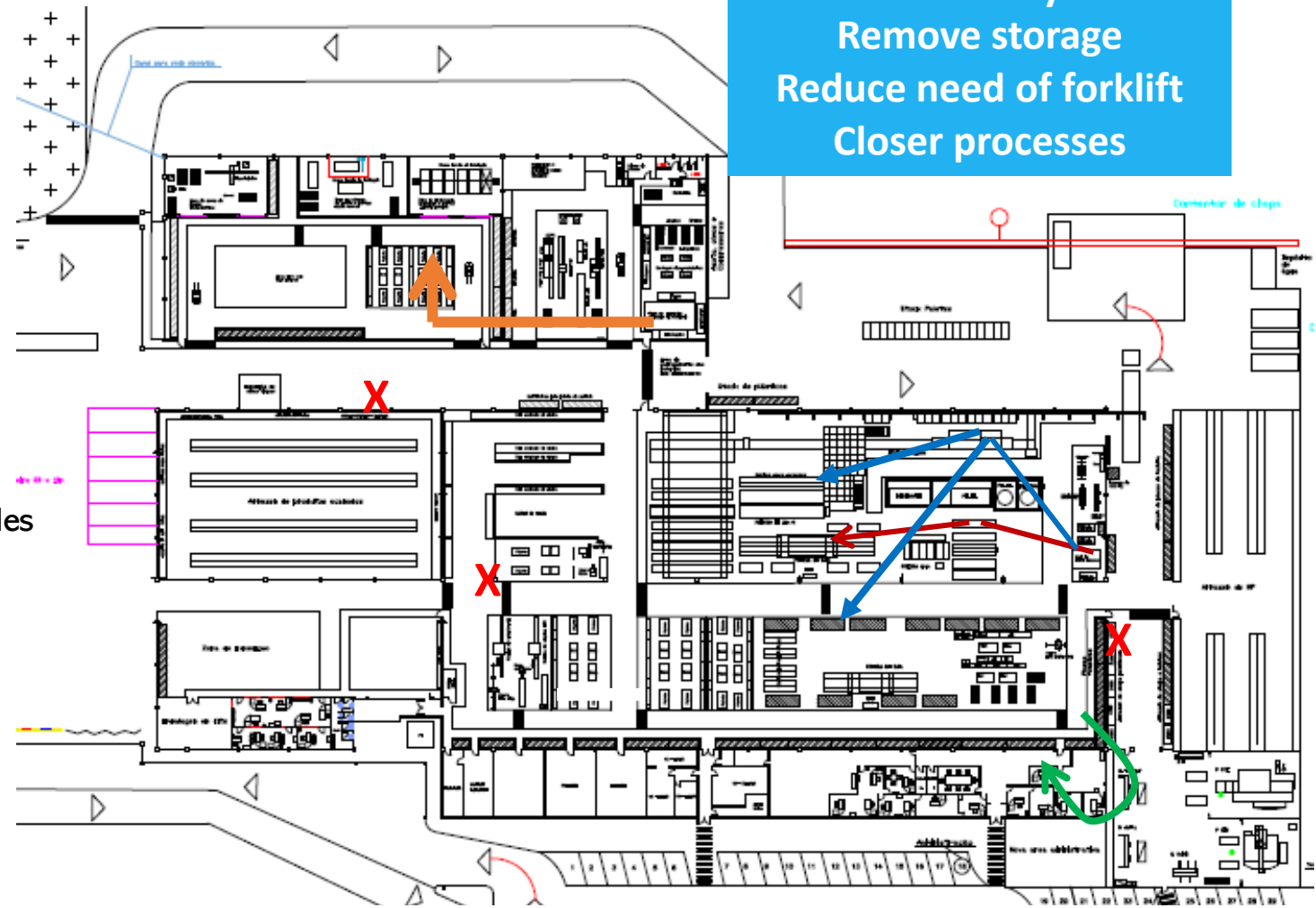
Aluminium profiles

Steel plates

Wood pannels

Plastic and rubber profiles

Machines Layouts
Remove storage
Reduce need of forklift
Closer processes

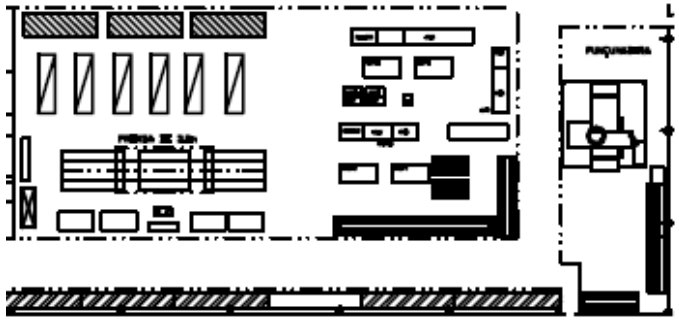


LEAN SOLUTIONS

CREATING FLOW

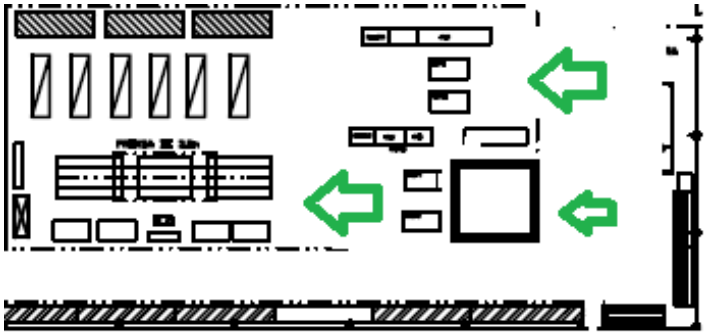
DOOR INJECTION PRESS

Before



- No material Flow
- Machine stopped due to lack of prepared parts.
- Preparation stopped due to lack of components.
- Push production. No balance.
- Use of forklifts. Rack storage.
- 4 shifts (7 days / week) – total of 14

After



- Material Flow
- Machine is **pulling** production from Prep
- Preparation with Kanban system from warehouse.
- Reduced use of forklifts. Materials in conveyors or pallets.
- 3 shifts (5 days / week) – total of 13
- Tools: 5S, Kanban, Create Flow, Kaizen

LEAN SOLUTIONS

Make Space for Flow

CLEAR AISLES



5S & Organization also played an important role in reducing waste

No Need for Forklifts



From “we need more forklifts trucks!” to “we need more wheels and trolleys”

LEAN SOLUTIONS

Layout Changes - More Flow, Less Waste

Change Layouts (team work)



Changed machine position so that material could flow directly to warehouse or next process

Reduce stock / increase flow



Remove pallet racking storage => material needs to flow + less use of forklifts

LEAN SOLUTIONS

Removing WIP – More Flow, More Space

Prodution Area Shelves /WIP



Removing this racks was one of the first actions. Benefits helped to reduce resistance to change!

Flow, space and less WIP



The next step was changing machines and giving a fresh look to the shopfloor!

LEAN SOLUTIONS

Reducing the Need of Forklift Trucks

Milk-run for long profiles



Long aluminium profiles (6m / 20ft) were now simple to deliver to cutting machine

Materials moved in trolleys

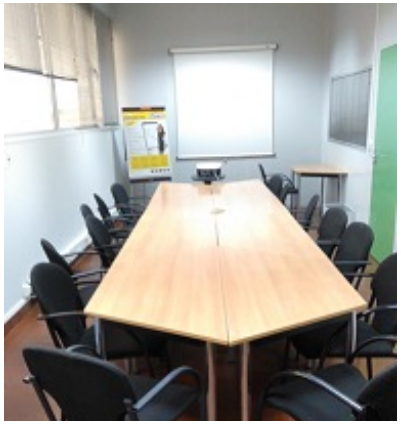


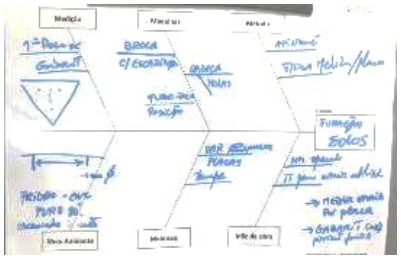
Build trolleys to materials that are difficult to transport, assuring no damages or scratches

LEAN SOLUTIONS

QUALITY ACTIONS

PROBLEM SOLVING TRAINING



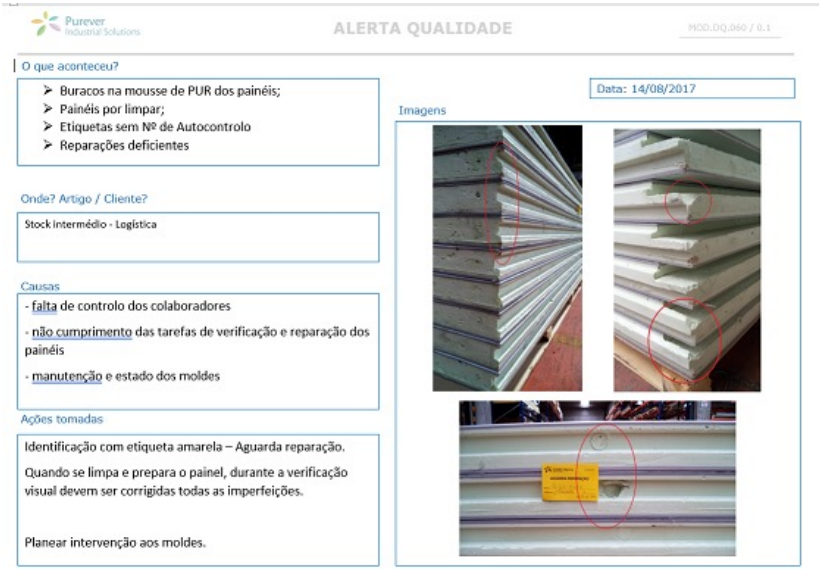


Train

& Practice

Basic Quality Tools!!

QUALITY ALERTS



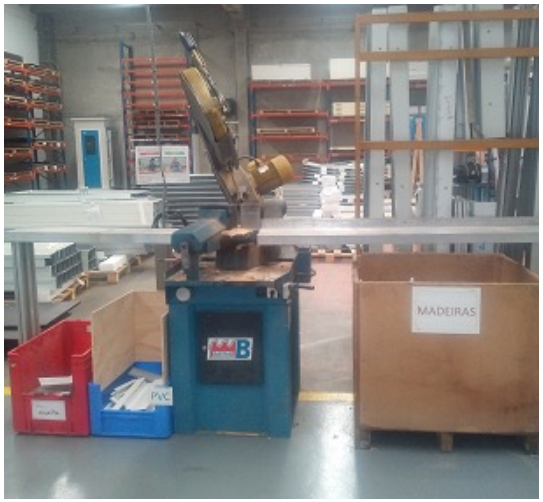
Visually displayed in all areas

LEAN SOLUTIONS

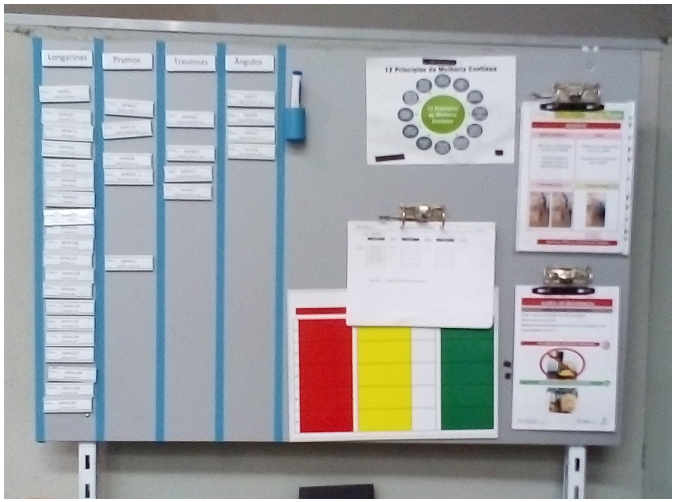
MORE IMPROVEMENT EXAMPLES



Ergonomic
No pallet.
No Forklift.
No damages.



Kanban Board
near operator



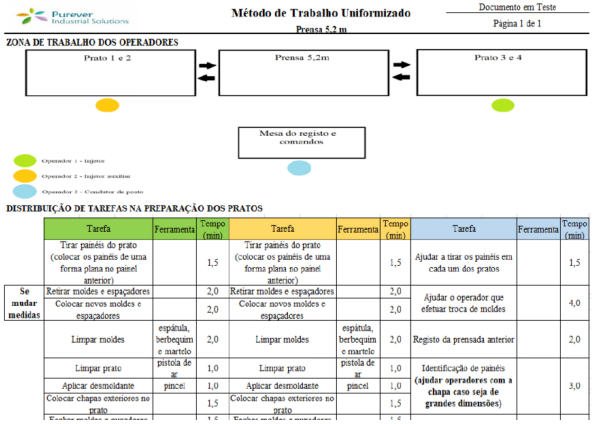
Colour code to
prevent mistakes

LEAN
SOLUTIONS

SMED (RAPID CHANGEOVER)



Organization & Visual Management



Método de Trabalho Uniformizado

Prensa 5,2 m

Documento em Teste

Página 1 de 1

ZONA DE TRABALHO DOS OPERADORES

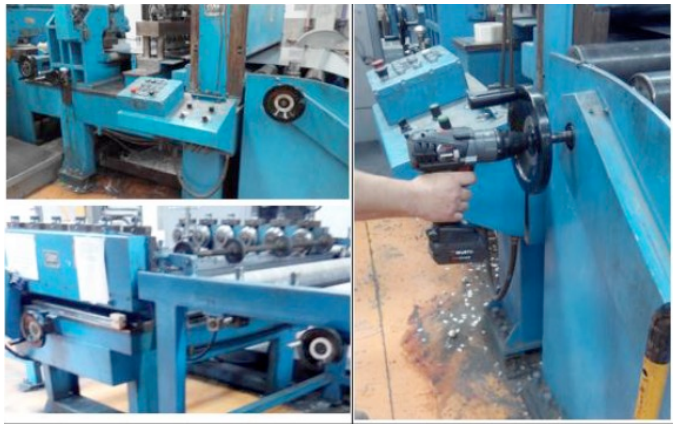
Prato 1 e 2 | Prensa 5,2m | Prato 3 e 4

Mesa do registo e comandos

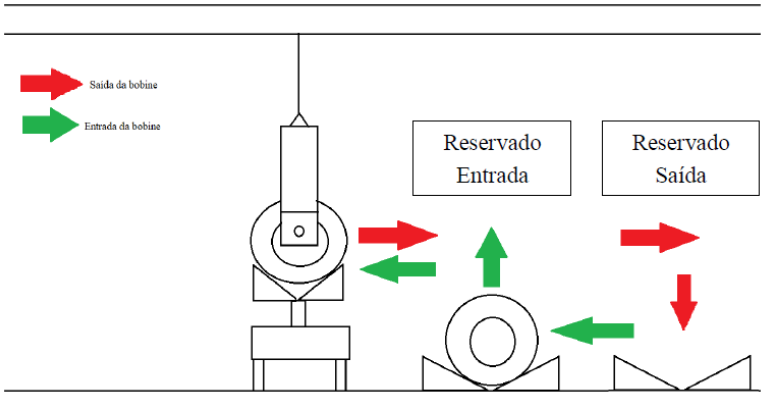
DISTRIBUIÇÃO DE TAREFAS NA PREPARAÇÃO DOS PRATOS

	Tarefa	Ferramenta	Tempo (min)	Tarefa	Ferramenta	Tempo (min)	Tarefa	Ferramenta	Tempo (min)
	Tirar painéis do prato (colocar os painéis de uma forma plana no painel anterior)		1,5	Tirar painéis do prato (colocar os painéis de uma forma plana no painel anterior)		1,5	Ajudar a tirar os painéis em cada um dos pratos		1,5
Se mudar medidas	Retirar moldes e espaçadores		2,0	Retirar moldes e espaçadores		2,0	Ajudar o operador que efetuar troca de moldes		4,0
	Colocar novos moldes e espaçadores		2,0	Colocar novos moldes e espaçadores		2,0			
	Limpar moldes	espátula, berbequim e martelo	2,0	Limpar moldes	espátula, berbequim e martelo	2,0	Registo da prensada anterior		2,0
	Limpar prato	pistola de ar	1,0	Limpar prato	pistola de ar	1,0	Identificação de painéis (ajudar operadores com a chapa caso seja de grandes dimensões)		3,0
	Aplicar desmoldante	pincel	1,0	Aplicar desmoldante	pincel	1,0			
	Colocar chapas exteriores no prato		1,5	Colocar chapas exteriores no prato		1,5			

Standards & Team Work



Reduce time



Preparation – External activities

LEAN SOLUTIONS

RESULTS 2017 VS 2018

Weekly Results

RESULTS	Jun-17	Nov-18
OUTPUT (m2/week)	500	1500
OEE	41.7 %	78.9 %
Defects	1.5%	0.2%
Average WIP	50 Units	25 Units

LEAN SOLUTIONS



6 FUNDAMENTALS OF LEAN

- Value
- Value Stream
- Flow
- Pull
- Perfection

LEAN SOLUTIONS

Pull

(Downstream Demand Driven Production)

LEAN SOLUTIONS

Pull is Sometimes Referred to as

'Just-In-Time Production'

LEAN SOLUTIONS

JUST IN TIME

"PULL" and "KANBAN" are fundamental for…a JUST-IN-TIME process

- WHAT is needed
- HOW MUCH is needed
- WHERE it is needed
- (WHEN it is needed)

Note: 'WHEN' is usually not necessary because it assumed it is needed ASAP

LEAN SOLUTIONS

KANBAN

Kanban is the Japanese word for ‘card’ or ‘ticket’

The Kanban card was an authorization for materials to be moved from an Upstream location to a Downstream location. The card had printed on it What was needed How much was needed and Where it is needed.

A sequence of Kanbans pulls material through the process

Electronic signals are generally used today, but the system is still called a Kanban

LEAN SOLUTIONS

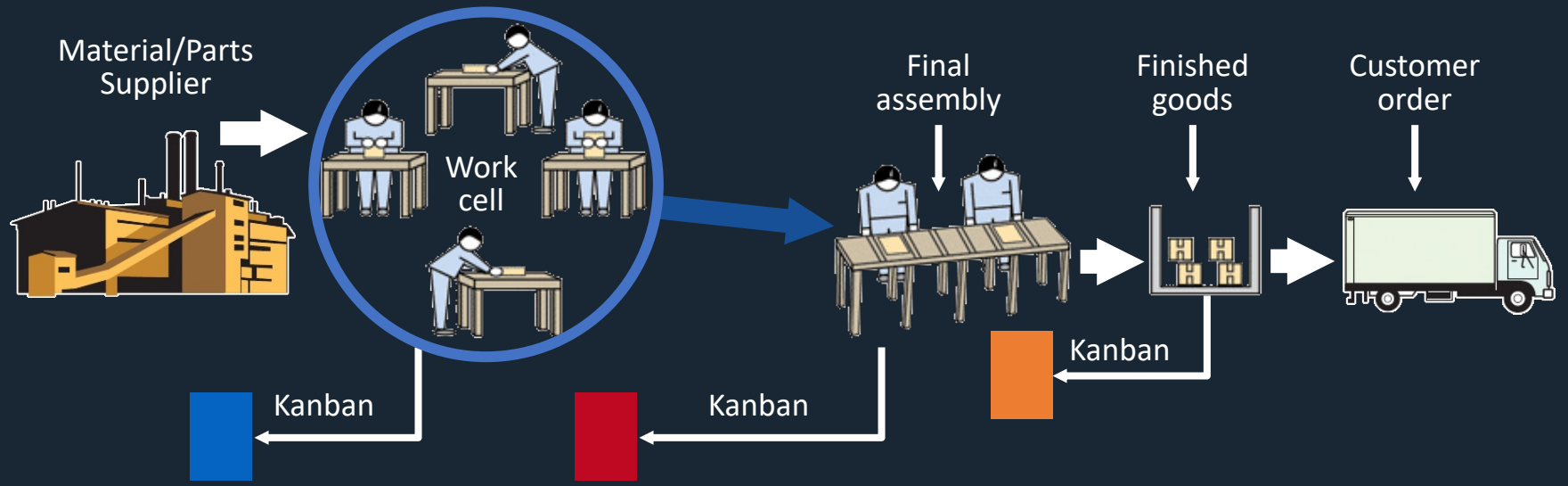
KANBAN CARD EXAMPLE



LEAN SOLUTIONS

KANBAN

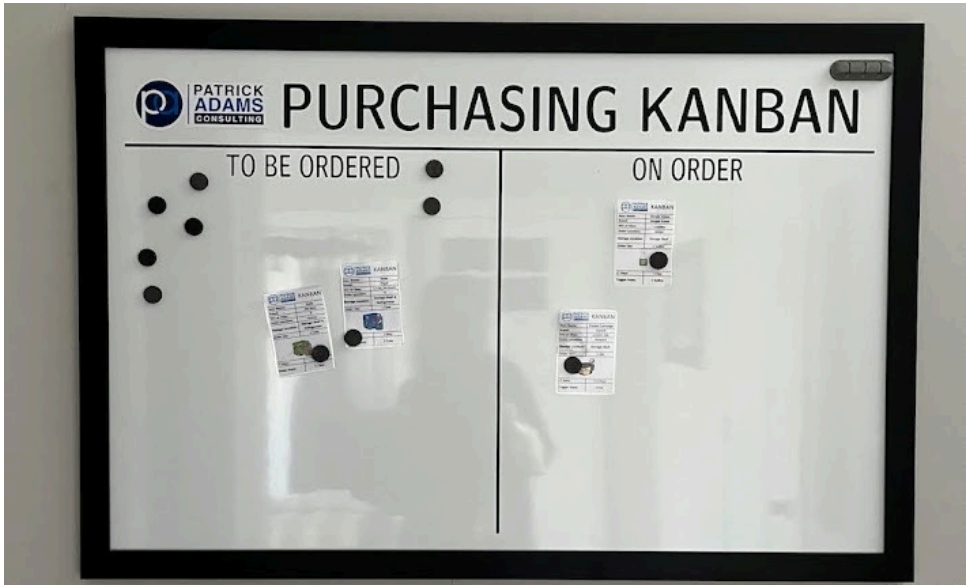
Good Kanban Systems Help to Minimize Inventory & WIP



LEAN SOLUTIONS

KANBAN BOARD EXAMPLES





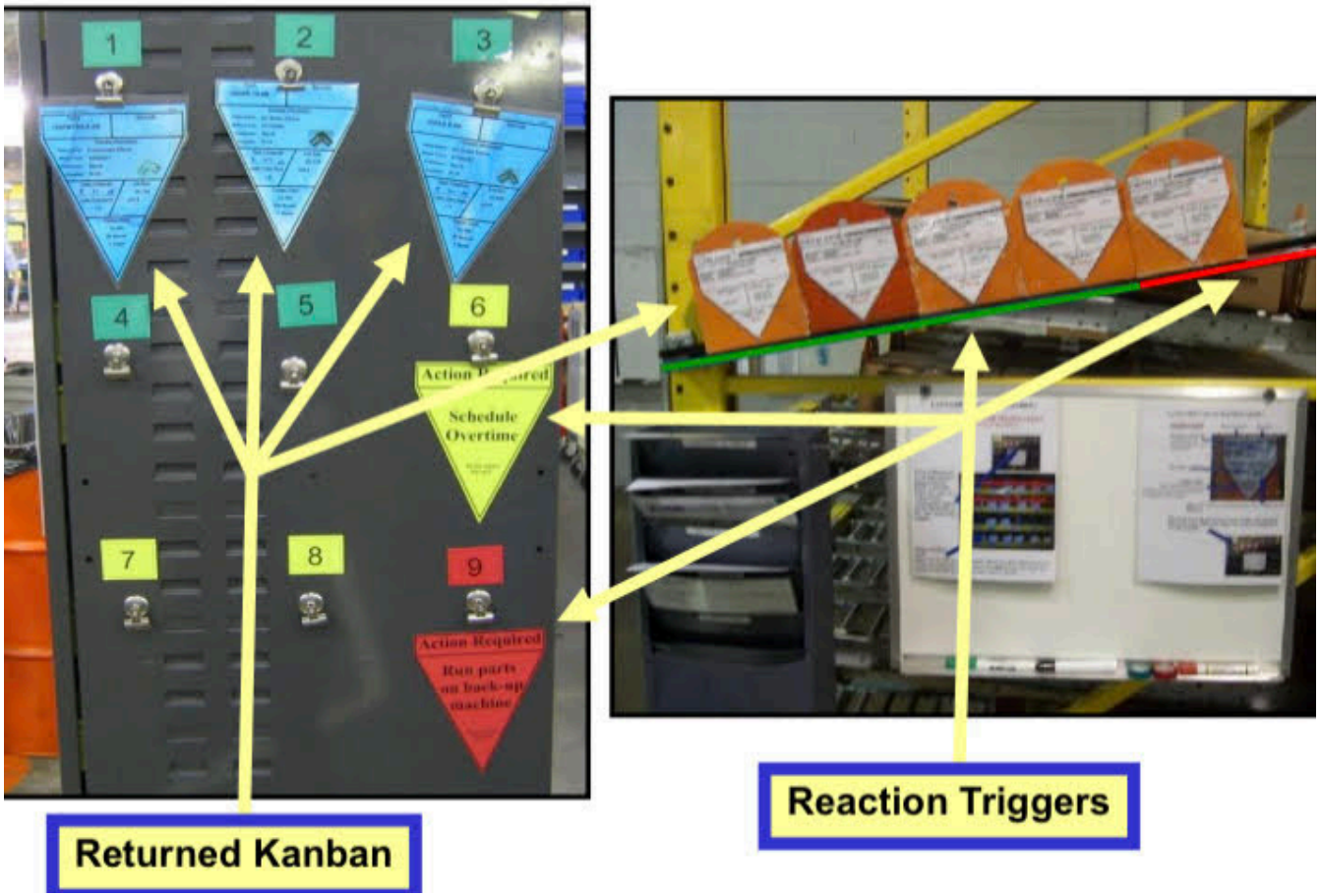
LEAN SOLUTIONS

KANBAN BOARD EXAMPLES



LEAN
SOLUTIONS

KANBAN BOARD EXAMPLES



LEAN
SOLUTIONS

QUIZ 7:

1. What is a ‘Gemba Walk’ ?
   - **Going to see for yourself what is happening where the real work is done**

2. What is the benefit of having a Visual Work Place ?
   - **All team members can see the status of work and operations easily and at the same time.**

3. Give one example of a Visual Management tool or technique ?
   - **Color Coding, Notice Boards, Graphs and Charts, Good Labelling**

4. What are the key components to a good SOP (Standard Operating Procedure)?
   - **What**
   - **How**
   - **Why**
   - **Use a picture or video**

5. A fundamental concept of any Lean Process is that it has well defined and repeatable actions by workers. This concept is call _____work
   - **STANDARDIZED**

LEAN SOLUTIONS

HOMEWORK REVIEW

(Open Computers and Log into your Portal)

LEAN SOLUTIONS

CONGRATULATIONS!

You have completed the Lean Yellow Belt Section.

Good Luck in your Exam!

office@findleansolutions.com



Facebook.com/findingleansolutions

LEAN SOLUTIONS