

Bergey Improvements Overview

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Purpose

- Bergey faces continuing pressures to reduce costs, reduce lead times and continue to provide quality, high value products to its customer.
- The task is “how do we incorporate and implement a *Continuous Improvement Methodology*” throughout the company
- The answer is to get the leadership educated in the benefits of a Lean Enterprise approach to running the business. Lean is a “top down driven program”
- Once the leadership is behind this approach, we will educate the workforce and we teach and implement the concepts along with your team:
 - Focused 5S training
 - Focused Practical Problem Solving Kaizen Event

Manex

(The Corporation for Manufacturing Excellence)

- Since 1995, Manex has provided a broad array of proven solutions and resources exclusively to manufacturers, distributors, and their supply chains, enabling them to compete on a global scale
- Manex uses a holistic and proven approach, from strategy to implementation, to impact all facets of business performance
 - Services areas include *Strategy, People, Process* and *Performance*
 - Results: growth, profitability, and competitive advantage
- *Manex is one of 60 NIST/MEP Centers throughout the US. We are here to help manufacturers, distributors, and their supply chains grow profitably*

Manex (*cont'd*)

- Focused on results and delivering Rapid Return On Investment to position clients for long-term success: Typical result is 6:1. Spend a dollar get six back. Better than the bank
- Affiliate of the National Institute of Standards and Technology (NIST) Manufacturing Extension Partnership (MEP) program. NIST MEP frequently cited as among the country's most effective and successful public-private partnerships
- Leading Consulting Firms (*such as Booz Allen Hamilton*) cited NIST MEP as a significant factor in mastering innovation and in company growth and success
- Value Manex provides to clients is measured by NIST to ensure we meet and exceed clients' business objectives

Manex Approach

Phase 1: Lean Manufacturing Training with Simulation

Phase 2: Value Stream Map

Phase 3: 6S Training and Kaizen events

Phase 4: Practical Problem Solving- 5 day Kaizen Event

- VSM Overview
- VSM Program for Tower Sections

- 1-5 day Kaizen Events with Teams
- Standard work
- In process inspection
- Shop area focused

- 1 Hands on Demonstration of One Piece Flow; Executive team and SKU workforce
- Creation of mock P and L for financial impact

- 6S Training: 4 hours'
- 1 Hands on 6S event

Lean Manufacturing with Simulation Agenda

Introductions

Lean Manufacturing

History & Culture

Principles

Obstacles

Benefits & Results

Simulation Round 1

Leadership Role & Behaviors

Lunch

Lean Services

Eliminating Waste

5S Principles

Standard Work

Simulation Round 2

Pull & Flow

Total Productive Maintenance

Set-up Reduction

Value Stream Mapping & Kaizen

Practical Problem Solving

Simulation Round 3

Typical Simulation Pictures



Simulation *Profit & Loss*

AirLego P&L						
Parameters	Round 1		Round 2		Round 3	
Labor:	Employees		Employees		Employees	
Direct/Indirect (\$20 Per Hour - \$160 Per Day)	14	\$2,240.00	14	\$2,240.00	12	\$1,920.00
Total Labor Cost		\$2,240.00		\$2,240.00		\$1,920.00
Material:	Planes / Parts		Planes / Parts		Planes / Parts	
Airplanes Delivered (Material Cost = \$60)	6	\$360.00	28	\$1,680.00	63	\$3,780.00
WIP (Incomplete Airplanes = \$6.67 to \$30)	98	\$1,105.88	40	\$561.67	22	\$267.50
Inventory (Parts = \$3.33)	60	\$199.80	28	\$93.24	94	\$313.02
Defects						
External (to the customer)	3	\$720.00	1	\$240.00	0	\$0.00
Internal (within the facility)	0	\$0.00	1	\$60.00	2	\$120.00
Total Material Cost		\$2,385.68		\$2,634.91		\$4,420.52
Leased Space	Tables		Tables		Tables	
Cost Per Table (\$150/Table)	5	\$750.00	5	\$750.00	3	\$450.00
Warehouse (\$450/warehouse)	1	\$450.00	1	\$450.00	1	\$450.00
Total Leased Space Cost		\$1,200.00		\$1,200.00		\$900.00
Total Cost		\$5,825.68		\$6,074.91		\$7,240.52
	Planes		Planes		Planes	
Total Revenue	6	\$1,440.00	28	\$6,720.00	63	\$15,120.00
Profit (Dollars)		-\$4,385.68		\$645.09		\$7,879.48

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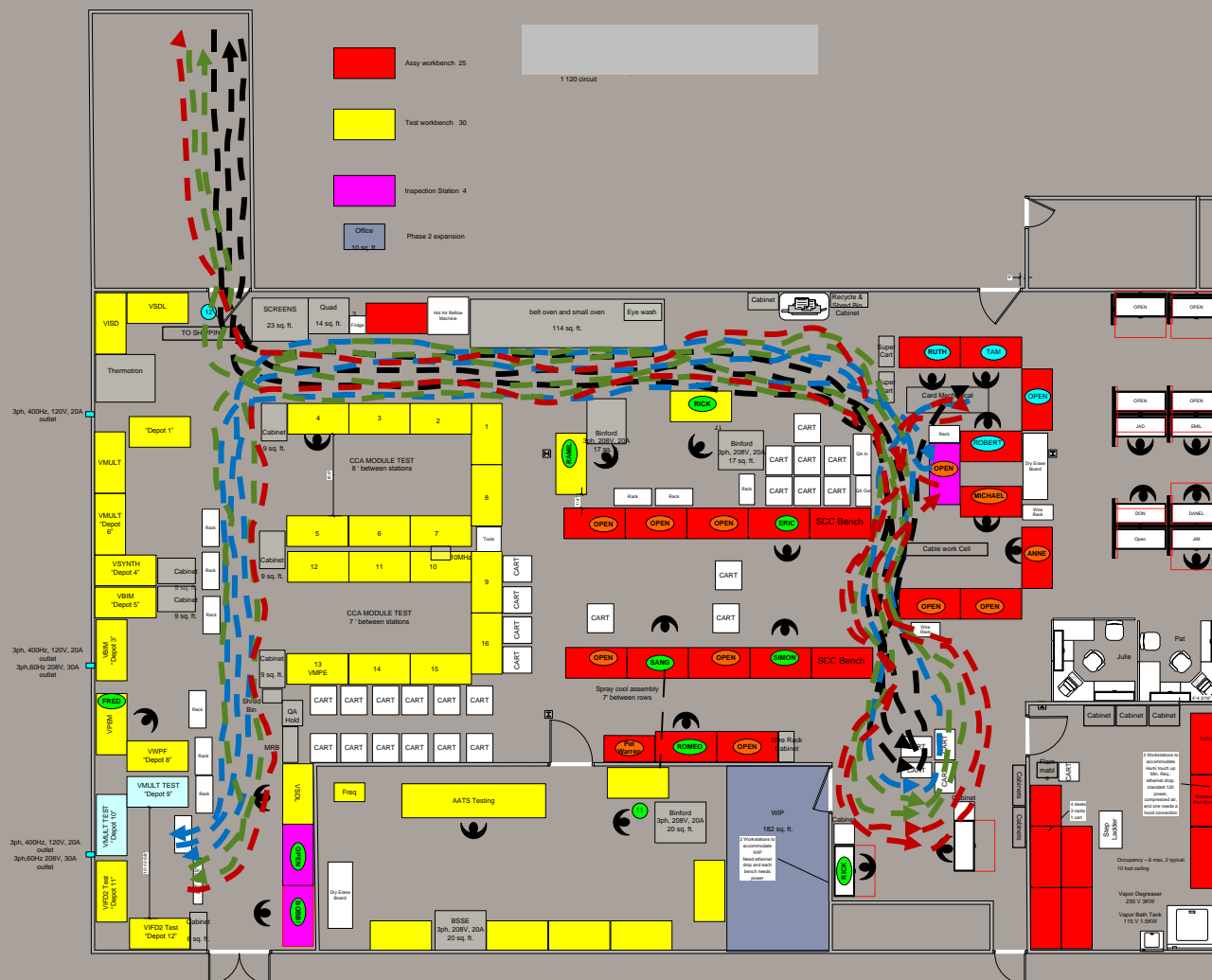
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Manex Proposal

- **Create a current state Value Stream Map to identify areas for improvement.**
- **Need to have accurate cycle times for each operation so that the bottleneck operation can be identified**
- **Current State VSM will show;**
 - Information flow
 - Inventory between stations
 - Non value added costs in the total process
 - Customer demand
 - Creates the road map for improvement
- **Future state map is the Ideal state that we want to move the company to.**
- **Need a team to do this.**

Real life example: Original Layout



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5S Program and Focused Kaizen Event

- **4 hours of classroom training in 5S**
 - Executive team
 - 1 SKU work teams
 - Learn about the importance of workplace organization
- **1 SKU focused Kaizen Events – reduce Waste!**
 - Create Standard Work for affected part
 - Standard Work Combination Table
 - Standard Work Chart
 - Standard Work Process Capacity
 - Create dedicated work fixtures
 - Create correct material flow
 - Understand TAKT time and cycle time
- **Goal: To reduce costs immediately on high running SKUS by reducing cycle times, reducing waste, implementing “build in quality” and improving moral.**

Eliminating NVA (Waste) - DOWNTIME

DEFECTS



OVER PRODUCTION



WAITING



NVA PROCESSING



TRANSPORTATION



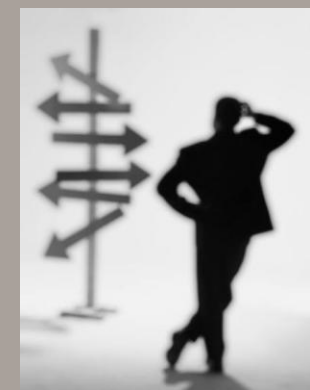
INVENTORY



MOTION



EMPLOYEE



5S System

From Japanese words for five practices leading to a clean and manageable work area.

- **Sort (Seiri)** – Eliminate unnecessary items/materials and ensure needed items are present.
- **Straighten (Seiton)** – A place for everything & everything in its place.
- **Shine (Seiso)** – Cleaning and eliminating the source of contamination.
- **Standardize (Seiketsu)** – A procedure to maintain/monitor the first 3 S's.
- **Sustain (Shitsuke)** – Train, educate and change habits while following the first four S's.
- **Safety** – Create and maintain a safe work environment!

5S Pictures – Before & After



BEFORE

AFTER



Remove the clutter, organize the affected areas so operators do not waste time looking for items they need

Sample Results after Kaizen

Item	Before	After	Improvement
5S Score	0	3.1	HUGE Improvement!
Sq. Ft. (Area)	1344	544	59% Reduction = \$9,600 Annually
Linear Walk	128 ft. Avg.	63 ft. Avg.	51% Reduction
Number Of Workstations	21	10	52% Reduction
Cycle Time (observed cable)	93 seconds	48 seconds	48% Improvement = \$54,000 Annually
Hardware assembly	Done In House	Shift to OEM (Eliminating Hardware Installation on ¼" Jacks)	\$13,800 Annually
Cycle Time (Circuit Board Assembly)	124 seconds	62 seconds	\$30,000 Savings Annually

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Kaizen Goals for Bergey

- Reduce Cycle Times
- Eliminate Clutter
- Improve Layout
- Eliminate Parts Waiting
- Fix Defects In BOM
- Eliminate Passing Bad Parts
- Create Information Flow
- Improve/Create Flow
- Eliminate Tribal Knowledge
- Reduce Linear Walk
- Eliminate Excessive Motion
- Move Toward Pull System
- Reduce Table Count
- Reduce Real Estate
- Reduce Interruptions
- Create Work Instructions
- Reduce WIP
- Eliminate Defects
- Introduce Kitting

Kaizen Process

- **Use the VSM to define the current state opportunity**
- **Brainstorm with team areas for improvement**
- **Create action list!**
- **Implement revised flow / layout**
- **Implement “build in quality” or “quality at source”**
- **Implement material handling processes**
- **Understand the importance of “good quality”**

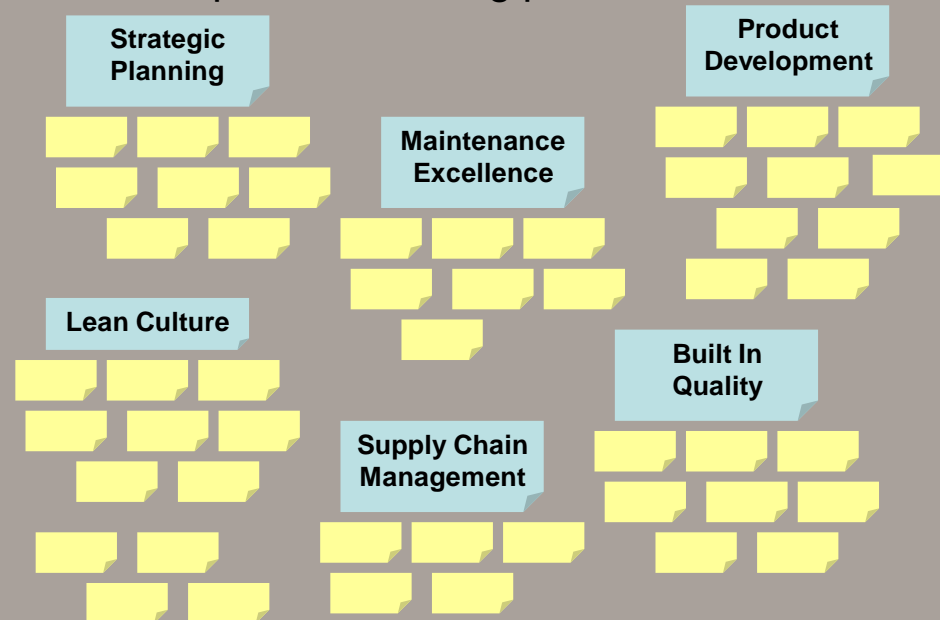
Team Brainstorm

- Using the problem as the basis for your question, ask “What is causing this problem?”
- Post all suggestions

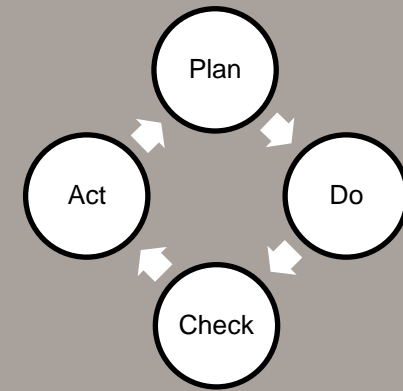
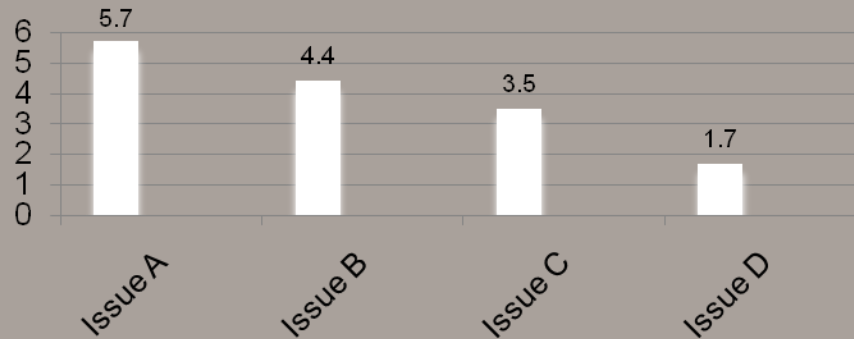


Name the Groups

- Once we name groups, it gives the team something to focus on
- Further brainstorming can now be performed to ensure we have exhausted all of our intellectual resources
- Grouping ideas will also give us a means to manage implementation actions later in the problem solving process



Kaizen Tools



1W

• Why?

2W

• Why?

3W

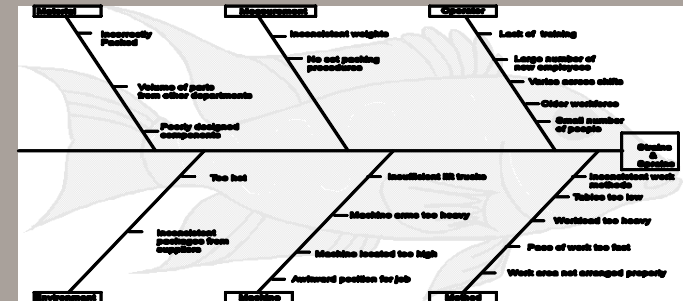
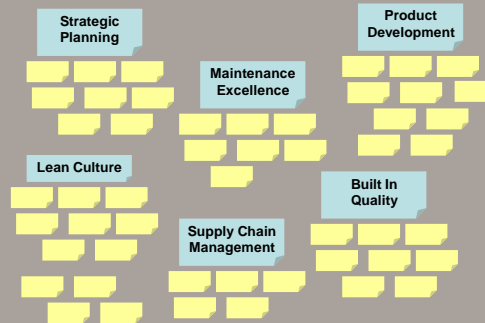
• Why?

4W

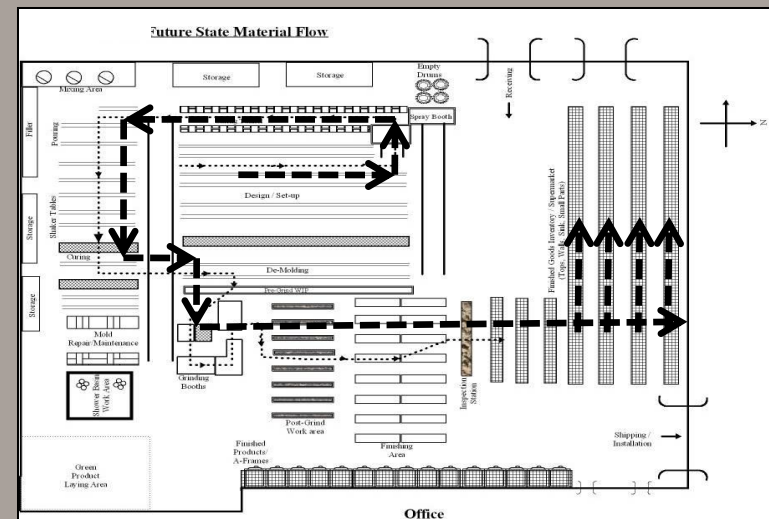
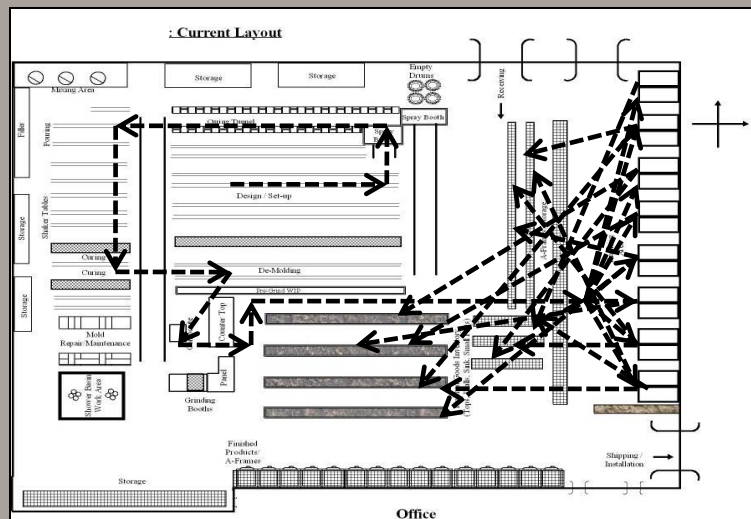
• Why?

5W

• Why?



Eliminate Waste



Situation	KPI
Raw materials and waste	Over 45% waste
Running 3 shifts per day	8 pieces of equipment, 200+ lights and devices
Rework of finished goods	12% QA failure
Profitability	-3.2%

Improvement	KPI
Raw materials and waste	Under 15% waste
Running 2 shifts per day	50% energy consumption and waste streams
Rework of finished goods	1% QA failure
Profitability	+5.7%

Proof That “Lean Systems” Work

It does not matter what business you are in, going Lean will drive up the bottom line

1. Medical device manufacturer reduced their cost of production by over **50%.**
2. Accessories manufacturer increased **net income** more than **20%**
3. Contract manufacturer ***doubled their market share and increased prices by 8%***
4. Food company achieved over **\$400k in sales** per employee, best in class
5. Division of aerospace company ***increased sales by 700%.***
6. ***Leading winery saw \$300,000 in savings during the harvest by reducing waste in their processes.***

Bergey's Challenges

1. Demand can range from 200 – 1,500 sections annually
2. Reliant of skilled, certified welders in a regional with a cyclical demand for welders from higher wage industries (e.g., oil and gas)
3. Galvanizing logistics and delays can cause delivery problems and occasionally expedited shipping expenses
4. High CAPEX for robotic welding
5. Very high CAPEX, environmental permitting and safety risks for in-house galvanizing

3 things MFG strive for

1. **Cost: fixed costs/ variable costs/ labor costs/ shipping costs**
2. **Quality: MFG process/ Supplier & Vendors**
3. **Delivery performance: Incoming / Outgoing**

Cost

1. **Fixed costs: Machines/ Equipment maintainess cost and also rent/ lease cost.**
2. **Variable cots: Material/ vendor cost. Are they using one supplier for steel flanges, plates, legs and girts or ? Maybe quote from more suppliers. Cost of bringing Galvanizing in house or compare with other finishing process**
3. **Labor costs: work with welder to identify if there are improvement can be made to the fixture to help min cycle time. If area more organized, then no wait around time. Look for waste.**
4. **Shipping costs: Find few carriers to compare quotes. Also see if you can find local galvanizing vendors to reduce shipping cost. Or see if you can get the galvanizing vendor to pay the shipping cost somehow.**

Quality

1. **Quality of each MFG process: what is the quality level for semi-auto welding, welding and final inspection. Often times quality levels are skewed to seem higher than reality since operator performs rework without telling anyone. Rework takes a long time, so best is to get it right the first time.**
2. **Quality of supplier and vendors: sometimes supplier and vendors have their own quality problems. Sometimes the operation will simply accept a certain level of quality from suppliers, therefore doing extra work in house. Ex, maybe the legs don't come in straight enough, then welder need to straighten it before starting his work.**
3. **Galvanizing welded components, might have re-galvanizing/ leaching issues. By working with the vendors on product design for manufacturability could eliminate these issues.**

Delivery

1. **Is the company lead times increasing? Maybe due to inefficient in the office or mfg floor? VSM can help in this area.**
2. **Capacity issue? To measure this is to capture takt time and compare that to cycle time of such mfg process**

Questions?

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