



Benefits from a Lean Manufacturing Implementation

Presented to the 2010 TIA Technical Conference

Today's Agenda

- **Introduction to Manex**
- **Implement a Lean Manufacturing System**
 - What is Lean?
 - How Do We Get Started?
 - Define the Current State
 - Prioritize and Implement the Improvements
 - The Need for Continuous Improvement
- **Advanced Concepts**
- **Proof that Lean Systems Work**
- **Start Small – But Start Now!**
 - Create a Success Landscape
- **Key Take-Aways**
- **Questions**

INTRODUCTION TO MANEX

The Corporation for Manufacturing Excellence (Manex)

- **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 include *Strategy, People, Process* and *Performance*
 - Results: growth, profitability, and competitive advantage
- ***Manex is one of 59 NIST/MEP Centers throughout the US. We are here to help manufacturers, distributors, and their supply chains grow profitability***

About the Presenter

Bill Browne – Senior Manager

- 30 years of manufacturing experience
- General Manager capacity at three multi-million dollar enterprises
- “Governor’s Excellence” award recipient for growing international sales (Ohio)
- Full supply chain experience, from CPG to raw materials suppliers
- Six Sigma Master Black Belt and Design for Six Sigma
- MBA, BS in Business & Engineering

Clients include, Mattel, Northrop Grumman, TRW, Bretford, Consolidated Containers, Crossfield Products, Landmark/Cellotape, Label, Military Aircraft Parts, InsulTech, and Morgan Crucible

IMPLEMENT A LEAN MANUFACTURING SYSTEM

Reduce your rate of errors, non-design scrap, and quality issues by nearly 100%

What is a Lean Manufacturing System?

- Lean is a “**systematic approach**” to identify and **eliminate waste** through **continuous improvement** by flowing the product at the **pull of the customer**, in the pursuit of **perfection**
- A systematic approach is a “**step by step**” **process** or a formula
- Waste is anything the customer does not pay for or “**non value added**”
- Continuous improvements are **small, incremental improvements** not major changes
- Pull of the customer is similar to “Burger King” – **have it your way**
- Perfection is always **striving for 100% Good Quality** even though you may not get there

Focus is on NVA or Waste Reduction. The 8 Types of Waste - DOWNTIME

1. **D**efects
2. **O**verproduction
3. **W**aiting
4. **N**on Value Added Processing
5. **T**ransportation
6. **I**nventory
7. **M**otion
8. **E**mployees

Eliminating NVA (Waste) - DOWNTIME

DEFECTS



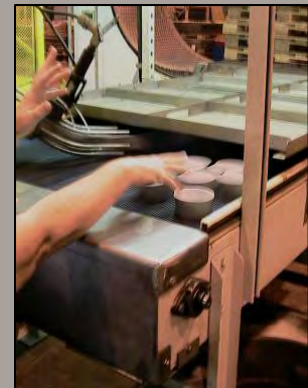
OVER PRODUCTION



WAITING



NVA PROCESSING



TRANSPORTATION



INVENTORY



MOTION



EMPLOYEE



How Do We Get Started?

- **Define the Current State**
 - ✓ Create a Current State Process or Value Steam Map
 - ✓ Review the Product Flow
 - ✓ Uncover Opportunities for Improvement
- **Implement Changes, Reduce the Pain. Create the Future State**
 - ✓ Prioritize the Opportunities
 - ✓ 5S + Safety: The Foundation to Reduce Waste
 - ✓ Implement Changes
 - ✓ Create Improved Layout
- **The Need for Continuous Improvement. What is good enough today is not good enough tomorrow**
 - ✓ Six Sigma and Quality Improvements
 - ✓ Overall Equipment Effectiveness (OEE)

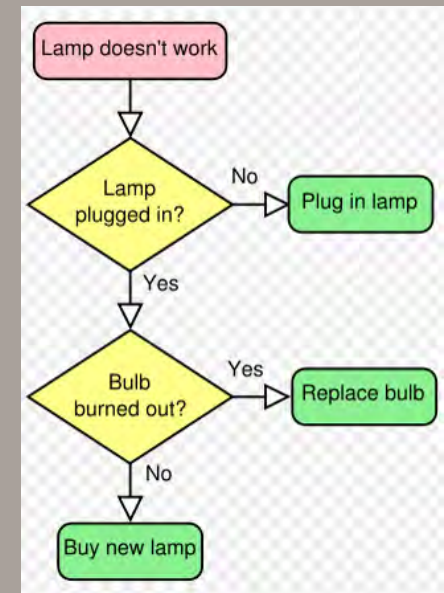
Process Mapping and Value Stream Mapping Uncovers Opportunities

Process Map:

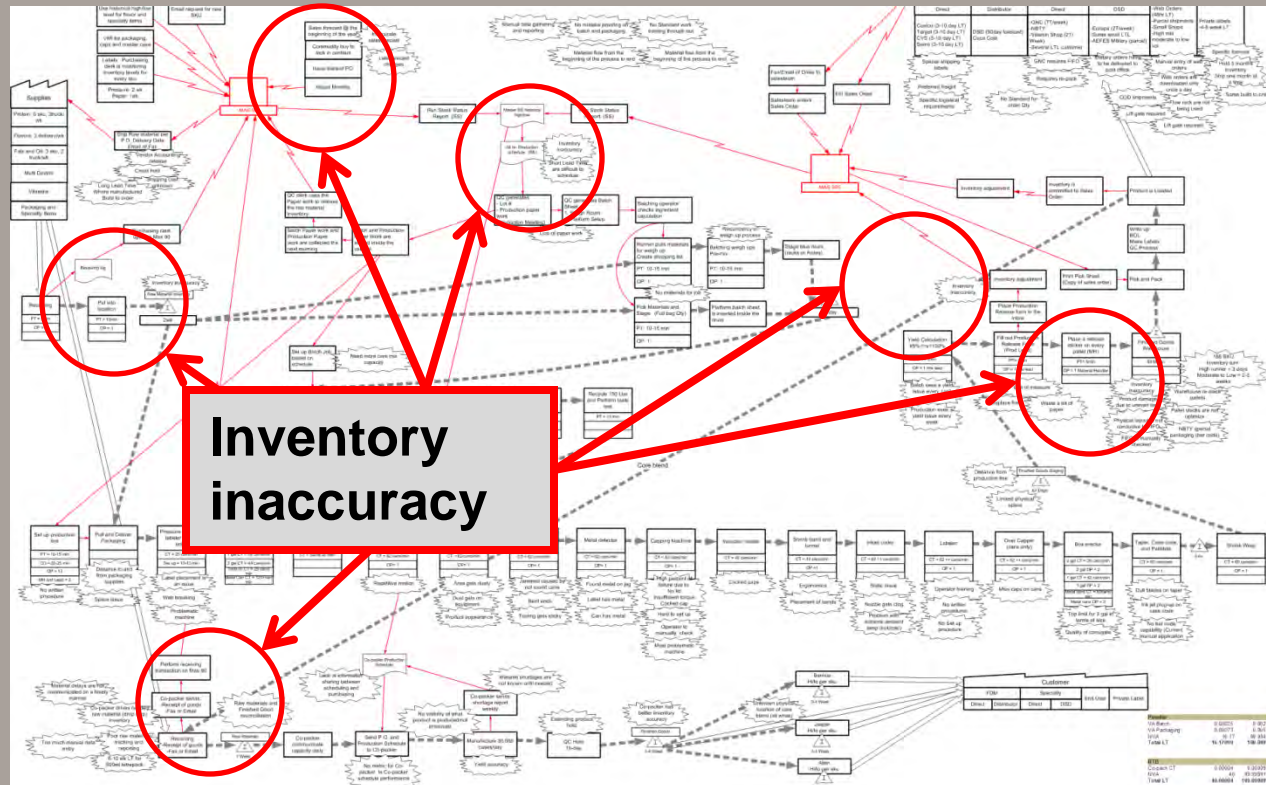
- A method for displaying “detail level” information of how orders are processed or how a product is processed

Value Stream Map:

- A high level overview of a product from order entry through shipping, detailing value added and non value added items
- Both are “visual” representations of the workflow, either within a process or a value stream that shows decision points

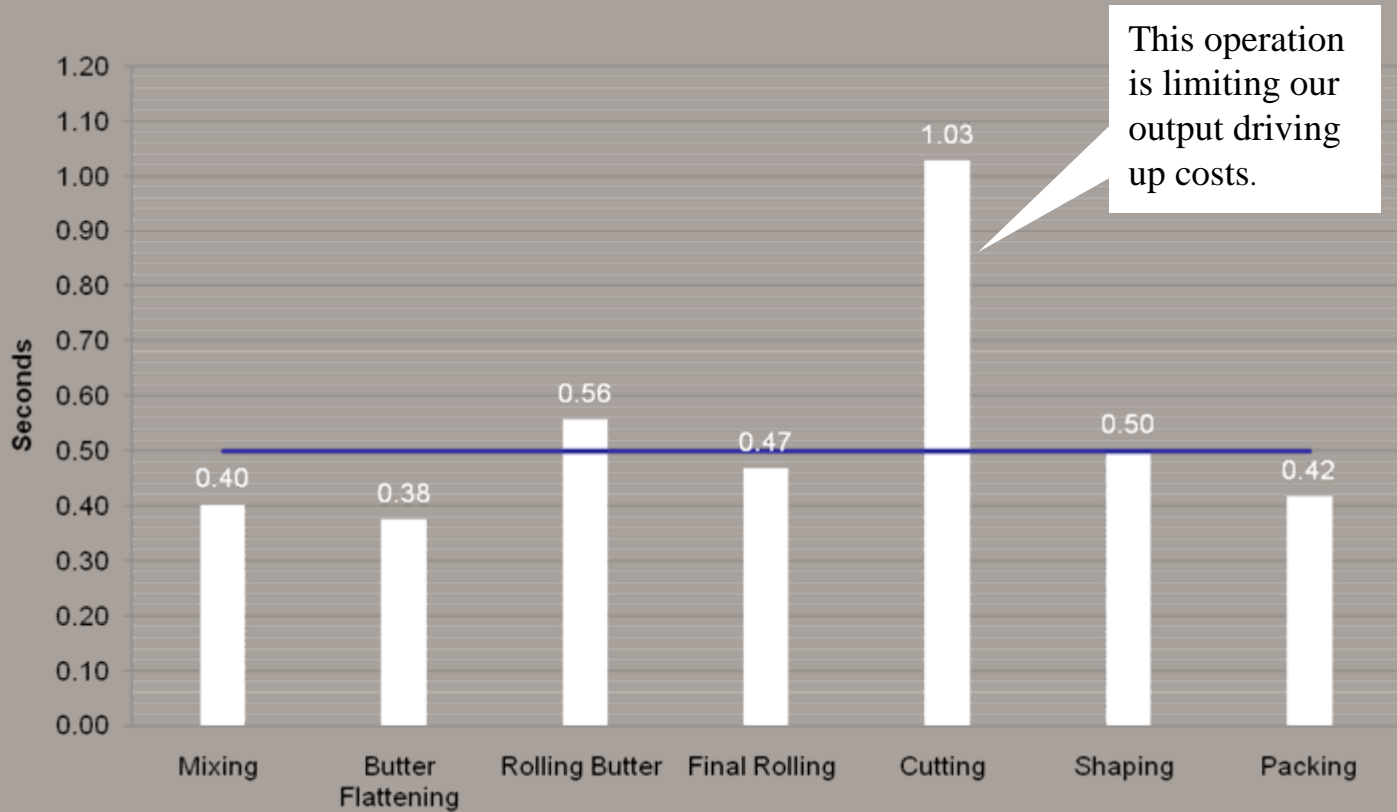


Typical Current State Value Stream Map



High inventory drives up costs in many areas

Process Bottleneck Limits Output



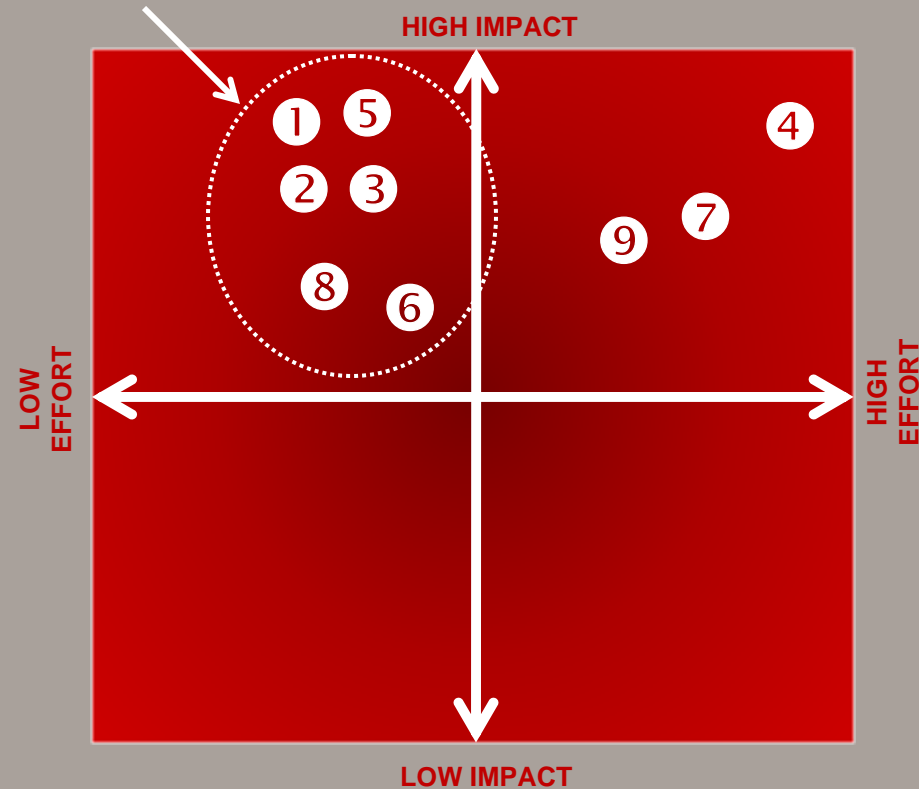
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Impact/Effort Chart: Croissants Line

Low Hanging Fruit

CODE	ISSUE
1	Workplace organization Improvements 5S
2	Scrap Reduction Program
3	Layout improvements / line combinations
4	Hire enough MES to standardize our manufacturing procedures
5	Reduce Change over Time on Croissant Line
6	Reduce errors at Order Entry
7	Purchase high speed packaging line
8	Create training aid
9	Implement new ERP system



Implement 5S + Safety

A methodology for organizing, cleaning, developing, and sustaining a safe, visual, and productive work environment. The foundation for a Lean Enterprise.

Is this a safe and efficient work environment?

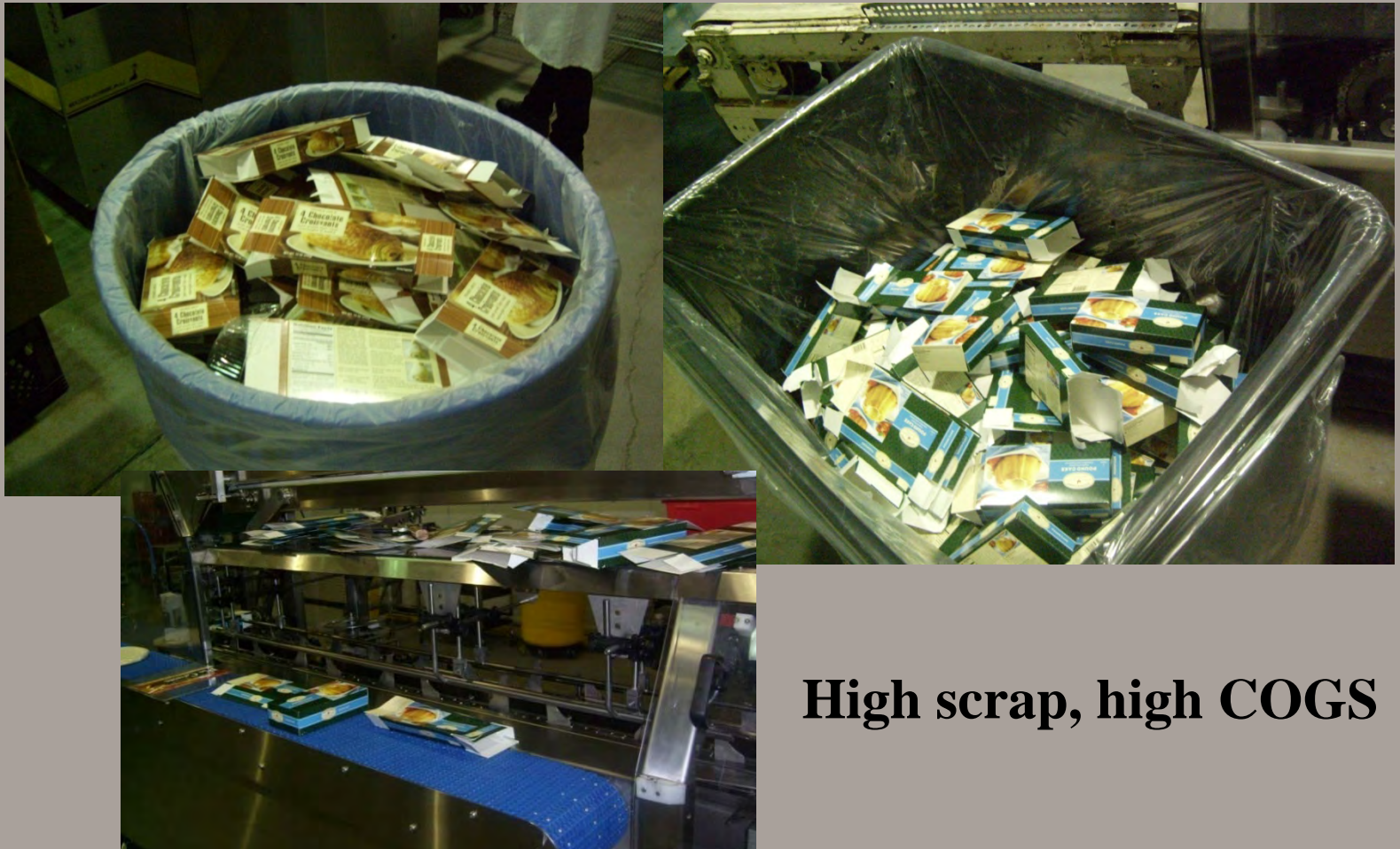


5S System

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

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

Reduce Scrap: Opportunities For Improvement



High scrap, high COGS

Reduce Change Over Time on croissant lines. Organization of critical spare parts

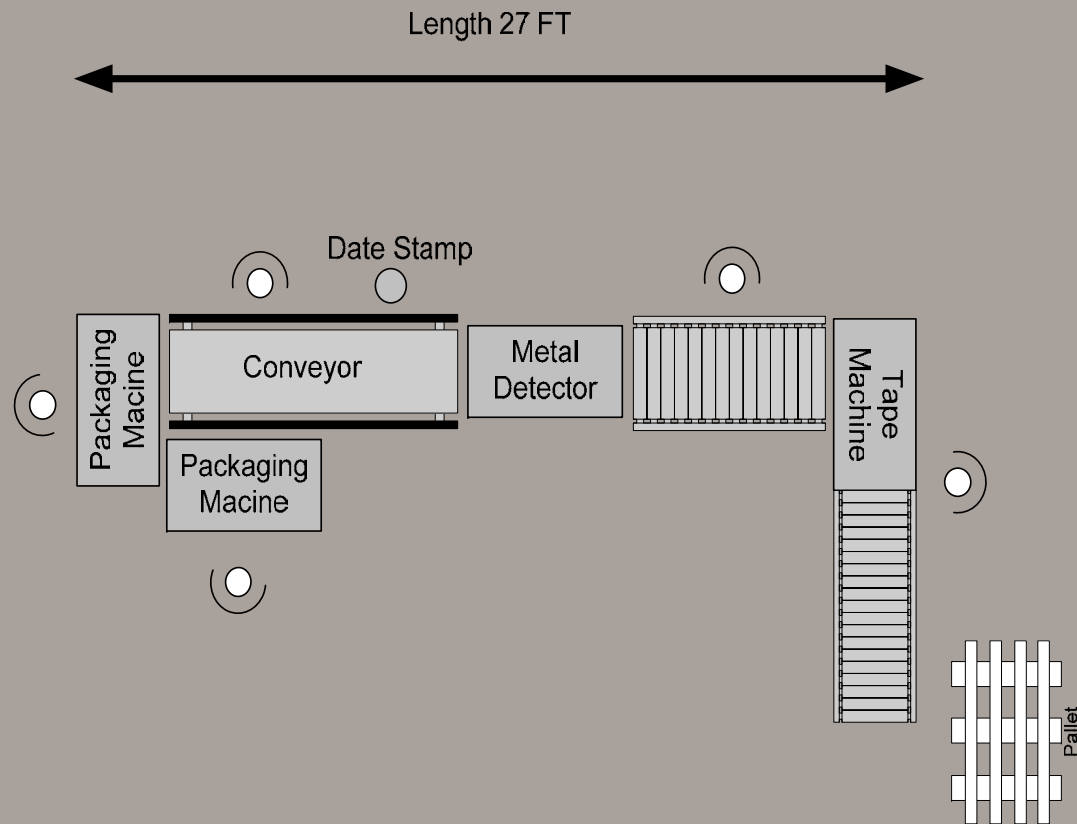


Before

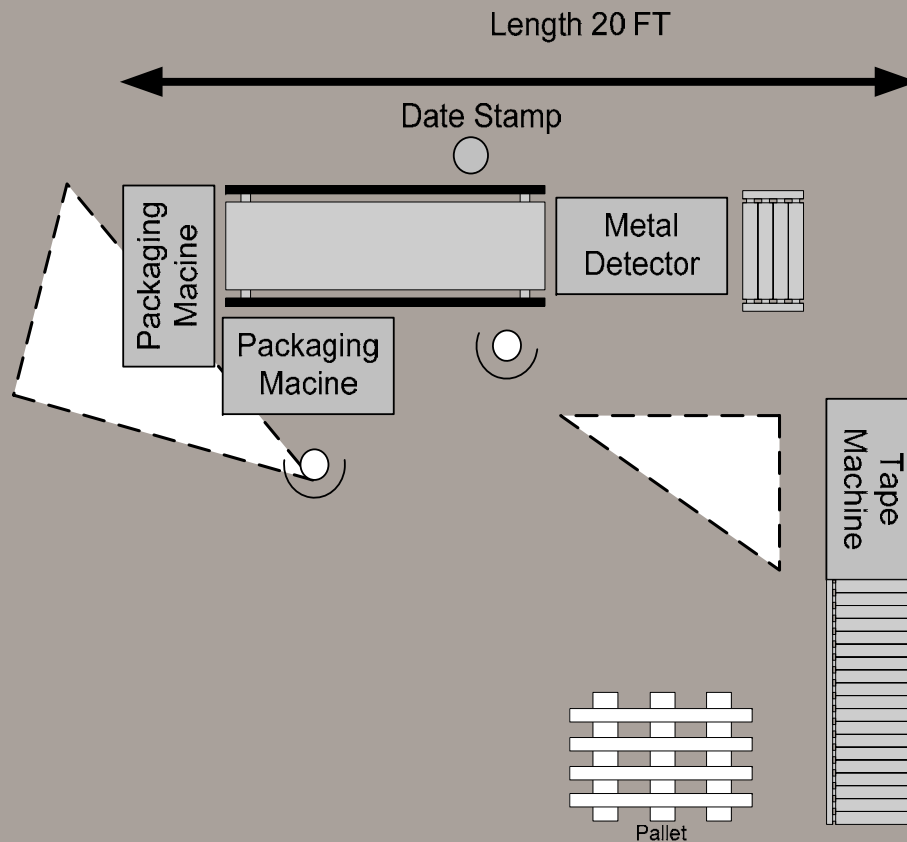


After

Focal Point: Current State Croissants Line



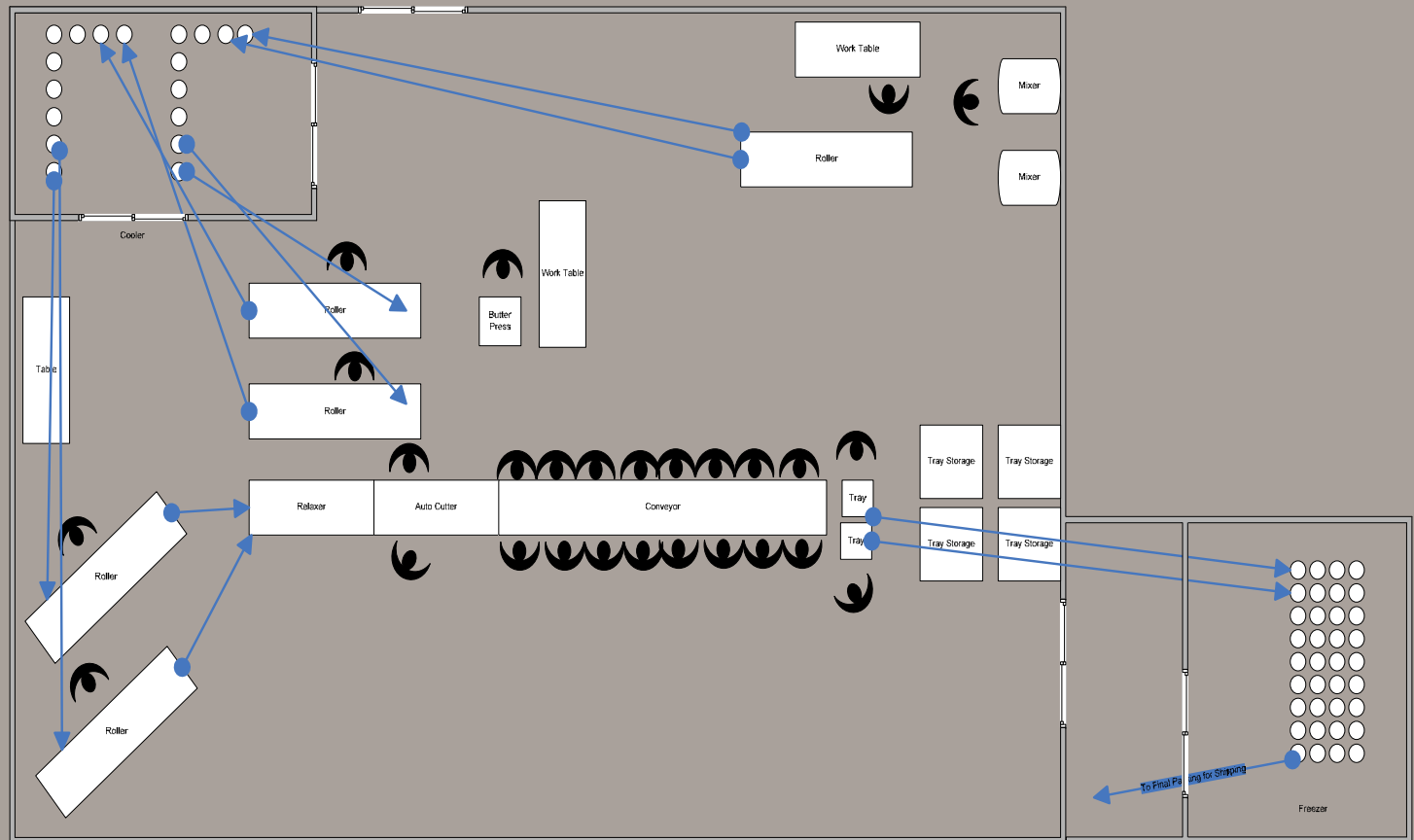
Future State Croissant Line with Improvements



Summary:

- 2-3 less people
- 7 ft smaller
- Same productivity

Future State Layout: From Three to One Line, Reducing Costs



"Lean is Visual" and is common sense



Organization and order lead to:

1. Less errors, leading to
2. Less waste, which results in
3. Less scrap, resulting in
4. Less motion, which leads to
5. Less energy consumption, and
6. Less toxins and
7. Reduced waste streams, to attain
8. Less pollution, all the while
9. Increasing marketability, to
10. Maximize performance, and finally
11. Greater sales and profitability

Vehicle Operations - Assembly
2001 Plant Scorecard
Wayne Stamping & Assembly Plant

Category	Metric	Target	Actual	Status
SAFETY	Lost Time Incidents	0	0	OK
	Recordable Incidents	0	0	OK
	First Aid Incidents	0	0	OK
	Property Damage	0	0	OK
QUALITY	Customer Complaints	0	0	OK
	Internal Defects	0	0	OK
	Scrap Rate	0.1%	0.1%	OK
	Re-work Rate	0.1%	0.1%	OK
DELIVERY	On-Time Delivery	98%	98%	OK
	Inventory Turns	10	10	OK
	Order Accuracy	99%	99%	OK
	Customer Satisfaction	90%	90%	OK
COST	Material Cost	100%	100%	OK
	Energy Cost	100%	100%	OK
	Overhead Cost	100%	100%	OK
	Total Cost	100%	100%	OK
MORALE	Employee Turnover	5%	5%	OK
	Absenteeism	5%	5%	OK
	Quality Score	90%	90%	OK
	Customer Satisfaction	90%	90%	OK



Benefits from Lean Initiatives

- Creates a **safer** work environment
- **Improves morale** and employee satisfaction
- **Removes obstacles** and frustrations from the workplace
- Creates **easier communication** with everyone
- Creates a **sense of ownership** and empowerment
- **Improves productivity, efficiency, and maintenance**
- **Helps meet deadlines**
- **Improves quality**
- Reduces waste which **lowers costs**
- Becomes the **foundation** for other improvement activities
- Lean **applies to all aspects of your business** – not just the manufacturing floor

How Do We Get Started?

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 - ✓ Six Sigma and Quality Improvements
 - ✓ Overall Equipment Effectiveness (OEE)
 - ✓ Dashboard Example: COGS affected by Poor OEE

The Need for Continuous Improvement

Six Sigma and Quality: Always Strive for Perfection

- **Six Sigma: To obtain the metric of “Six Sigma” a business must attain a level of 3.4 defects per million opportunities (DPMO)**
- **Six Sigma (DPMO) is a metric that is often used by organizations to measure quality and is used to reduce variation in processes**
- **You must have good metrics to use 6 Sigma**



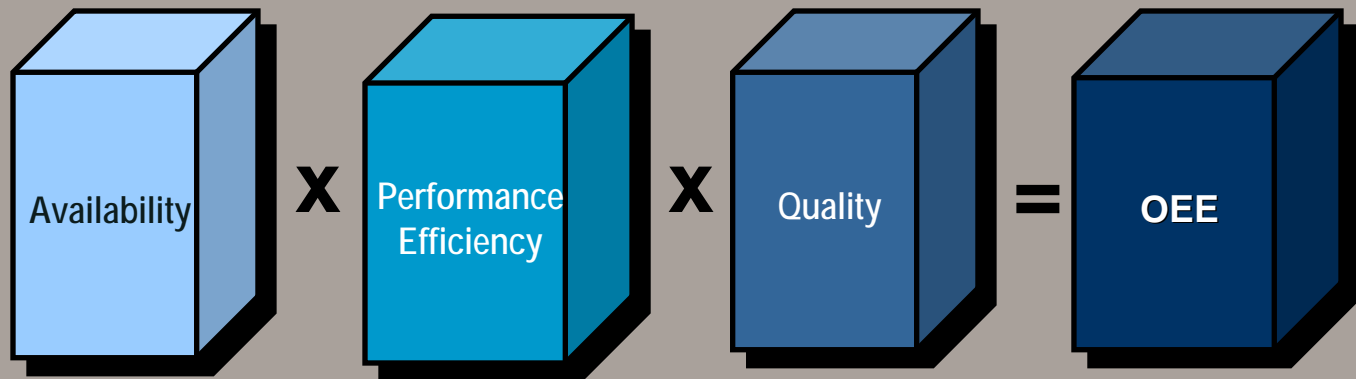
Importance of Being at 6 σ

Type	At 4 σ (95.46%)	At 6 σ (99.73%)
Postal delivery in US	20,000 lost mails per hour	7 lost mails per hour
Surgical operations in US	5,000 incorrect surgical operations per week	1.7 incorrect surgical operations per week
Flight landings in US	Two short or long landings at most major airports daily	One short or long landing at major airports each year
Drug prescriptions in US	200,000 incorrect drug prescriptions each year	68 incorrect drug prescriptions each year

What is Your Quality Level?

A Key Lean Tool: Overall Equipment Effectiveness (OEE)

- How effectively does your equipment run when you plan to run it?
- A good Total Preventative Maintenance program* will improve OEE



**A tool used to calculate and track the OEE of your equipment.*

95% x 95% x 95% = 85.73% min for acceptability

Ex: Financial Dashboard: Why is COGS so High?



Operational Metrics Explain High COGS

Income Statement	
Revenue	\$26.2M
COGS	\$16.8M
Gross Profit	\$9.4M
Operating Expenses	\$5.5M
Net Income	\$3.9M

Enterprise KPI	
OTD	96%
OEE	73%
Inventory TO	25

Operational Metrics	
Availability	95%
Performance	90%
Quality	85%

$$\text{OEE} = \text{Availability} \times \text{Performance} \times \text{Quality}$$

$$\text{Quality} = \frac{(\text{Total parts} - \text{Defects})}{\text{Total parts}} = \frac{(5000 - 750)}{5000}$$

Conclusion: High defect rate (due to rework, reject, returns, etc.) causes COGS to rise. Hence, problem lies in the practices/processes governing the quality of products.

ADVANCED CONCEPTS

BENCHMARK ASSESSMENT

Good Data vs. Great Data

Know Where You Stand

- **Good data is hard to find, great data requires “mining”**
- **Use this information to set goals and targets, not just for your organization, but for departments and individuals**
- **Target the “best in class,” not the average**

	Best in Class	Average	YOU
Sales Per FTE	\$150k	\$133k	\$125k
Comp per FTE	124%	98%	100%
Quality Rate	99.6%	98%	95%

	Best in Class	Average	YOU
Margins	31%	29%	21%
Profitability	14%	11%	8%

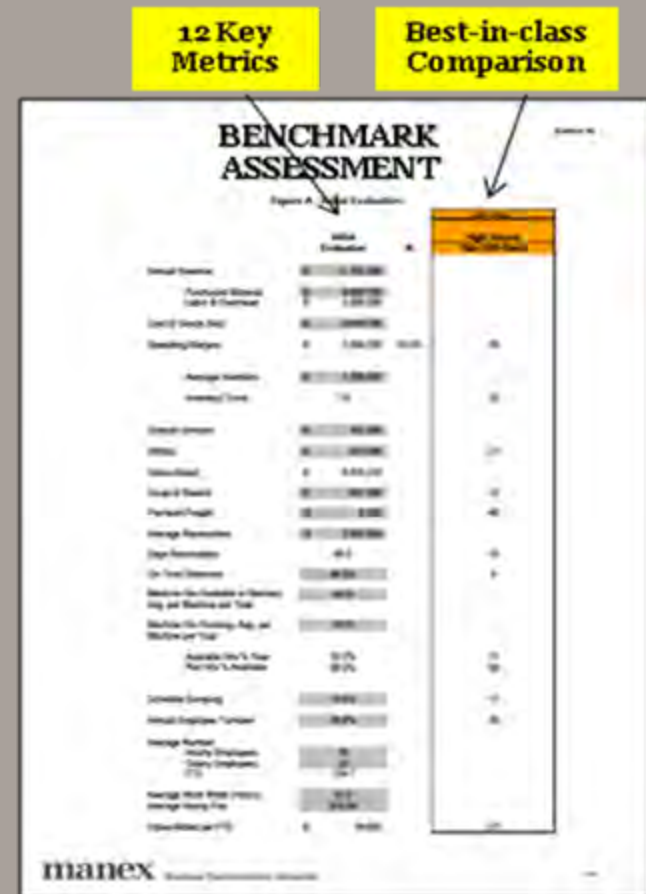
Where to get the information?

Analysis of 12 key operating metrics and percentile ranking within peer group:

- Operating margins (as a % of sales)
- Inventory turns
- Scrap and freight
- Equipment run hours
- Equipment availability & utilization
- Employee turnover
- Value-add (output) per employee

Output includes the value of each improvement, in this case more than \$1.4 million per year

Database is comprised of more than 11,000 companies. Each analysis includes a peer (comparables) base of 25 – 65 companies.

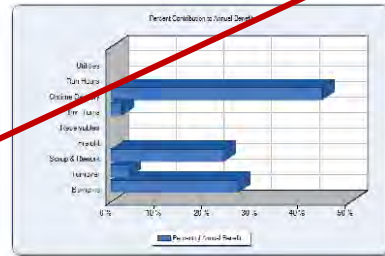


Example: Benchmark Results



Payoff Analysis

Performance Metric	Current		Proposed		Final Target		Annual Benefit	One-Time Cash Conv.
	Value	Percentile	Value	Percentile	Value	Percentile		
Utilities	\$48,000	90%	\$37,500	85%	\$48,000	90%	\$0.00	\$0.00
Run Hours as % of Available	75.00%	59%	90.33%	84%	75.00%	60%	\$0.00	\$0.00
On-Time Deliveries	63.00%	5%	81.60%	30%	85.00%	41%	\$20,000	\$0.00
Inventory Turns	12.55	76%	27.21	90%	20	83%	\$11,730	\$78,250
Days Receivables	14.76	95%	33	95%	14.76	95%	\$0.00	\$0.00
Premium Freight	\$4,000	41%	\$1,106	66%	\$4,000	41%	\$0.00	\$0.00
Scrap and Rework	7.59%	5%	2.93%	30%	3.00%	28%	\$120,950	\$0.00
Employee Turnover	17.19%	49%	4.10%	74%	10.00%	63%	\$18,360	\$0.00
Schedule Bumping	95.00%	5%	22.00%	30%	25.00%	25%	\$136,150	\$0.00
Total:							\$514,347	\$78,250



One-time savings of \$78K for inventory turns

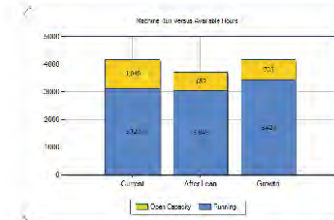
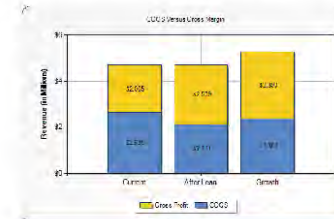
Over \$535k in annual savings when targets are achieved



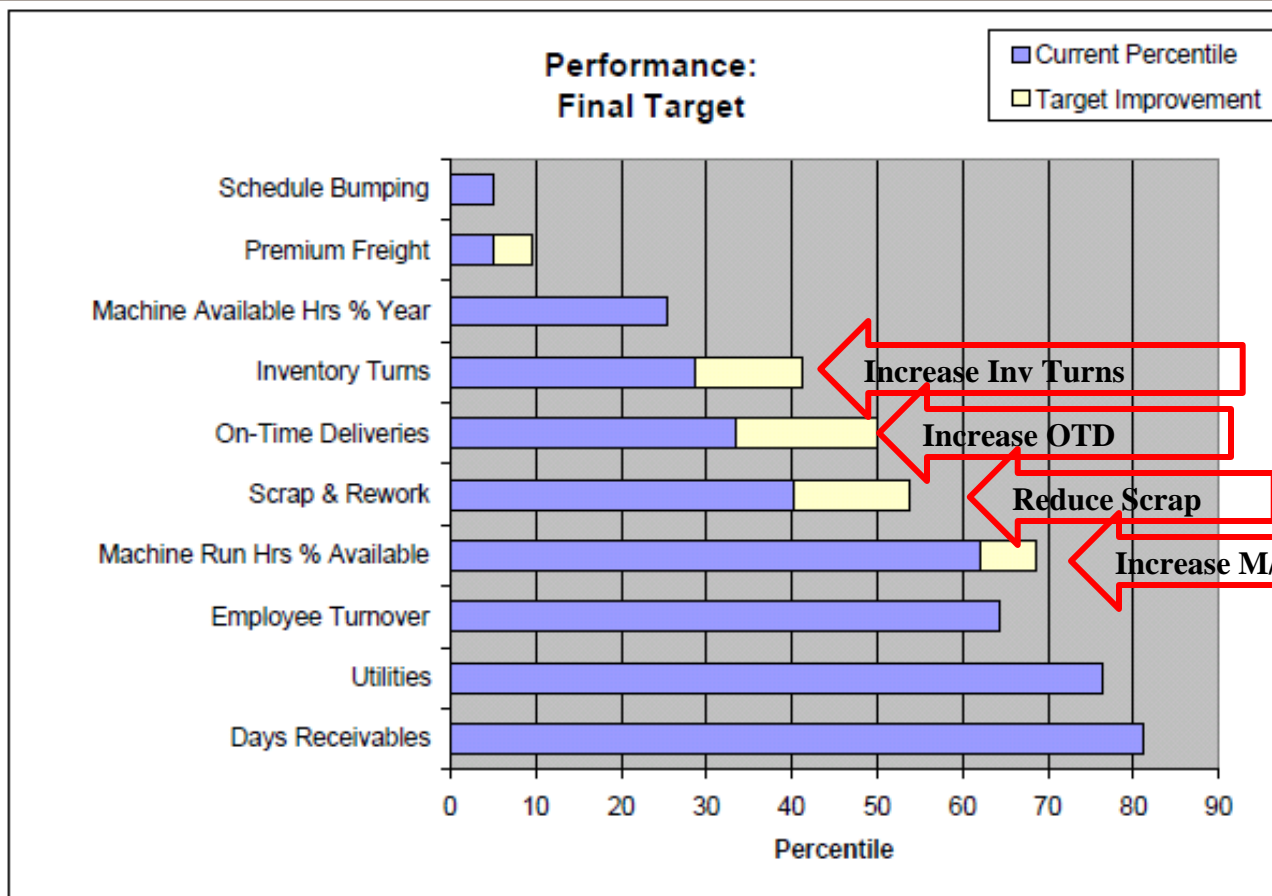
Growth Evaluation

Implementing Lean Improvements will free existing labor and machines to do more work

Filling Capacity Created by Lean Improvements:
Keeping your shop open 4160 hours per year and achieving the final targets for machine run time, scrap, rework and schedule bumping, your company could fulfill additional orders of \$581,918



Key Objectives for Action



Proof That Lean Systems Work

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 is growing **sales 80% over 2008**
2. Accessories manufacturer increased **net income** more than **20%**
3. Contract manufacturer **doubled their market share and increased prices by 8%**
4. Food company achieves over **\$400k in sales** per employee, best in class
5. Division of aerospace company **increased sales by 700%** over past 24 months
6. Local premier construction firm succeeding in entering new markets and **increasing close ratios to 70% of new leads**
7. Automotive Supplier achieves **38% EBITDA**
8. **OEM supplier awarded a \$5M contract due to Lean Implementation**

Waste in the Food Processing Industry

- For 80% of food companies, between 12% – 50% of raw materials are wasted
- In San Joaquin County, waste stream related costs are more than 200% what they were just 7 years ago
- Food & Beverage companies are estimated to spend 30% more on freight and transportation than necessary for the same shipments
- Recent findings from an evaluation at a Central CA food packing plant:

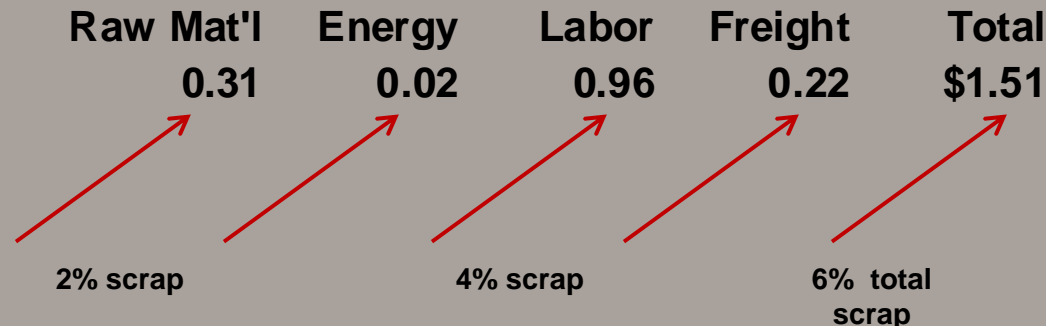
Single Unit Asian Food Product (\$2.99 retail)

Raw Mat'l	Energy	Labor	Freight	Total
0.31	0.02	0.96	0.22	\$1.51

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Single Unit Asian Food Product (\$2.99 retail)



Quantifying the Benefits

Real-life example: this client went from marginally profitable to highly profitable. The focus was on lean improvements across all aspects of the company.

	Old	New
Total Lead Time	21 days	15 days
Total Processing Time	6 days	5 days
Sales Levels	\$240 million	\$290 million
Pre-tax Earnings	2.67%	5.51%
Valuation	\$109 million	\$167.5 million

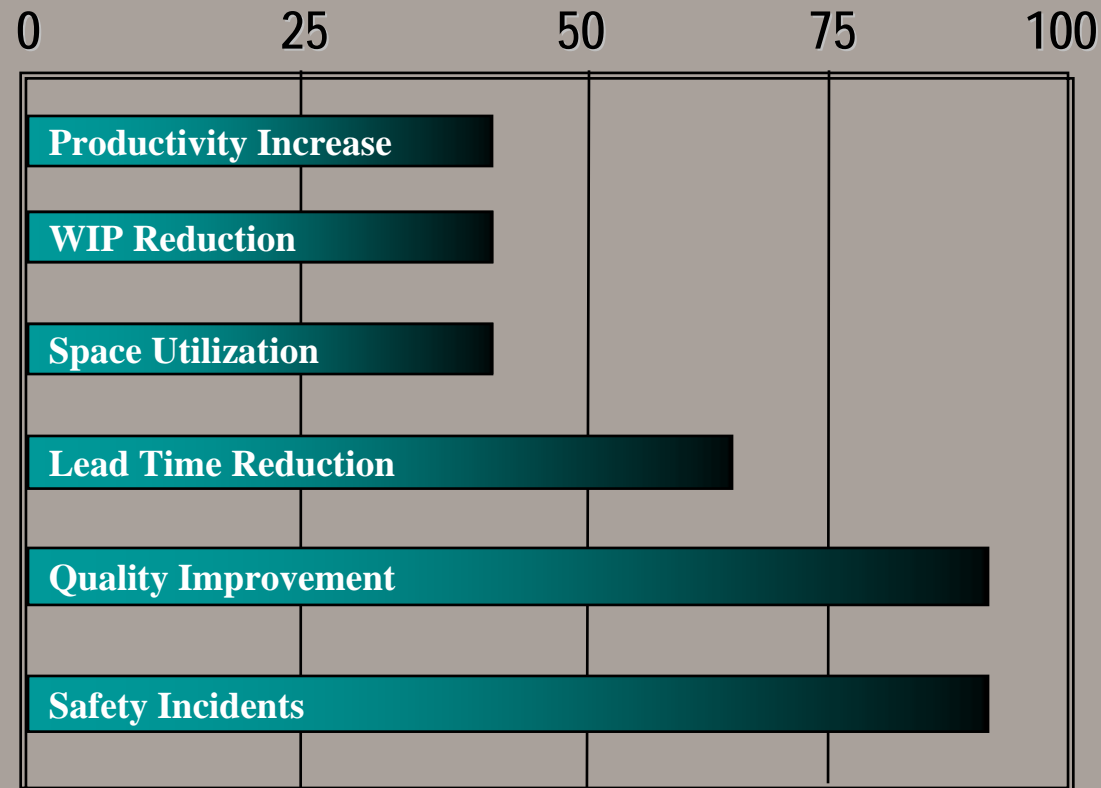
Becoming lean reduced the total effort, scrap, waste, conveyance/transportation, motion and energy. It also reduced the time to ship finished goods.

The competitive edge increased the sales of its product and the prices they charge, decreased the cost of manufacturing and their defect rate. They didn't even market the fact that they reduced the impact on the environment.

These improvements increased the value of the company by \$58 million.

Economic Benefits from a Lean Process with Engaged Employees

Percent of Improvements Achieved



Start Small – But Start Now!

Start Small, but Start Now

- **Start on Project #1**
- **Pick A Single Area for a Quick Win (Low Hanging Fruit)**
 - Eliminate a bottleneck; long and cumbersome order entry process
 - Workplace organization; QA is far from manufacturing or shipping
 - Compelling and/or simpler marketing message
 - Quick Change Over programs for increased productivity
- **Implement a Successful Change: Sell the program!**
 - Remove the bottleneck
 - Improve your messaging and/or marketing
 - Identify support programs and ask for help
- **Reinvest Some of the Savings or Extra Profit Into Project #2**
 - Develop your own **self-funding model**
 - Invest no less than 35% of the extra money back into the company
- **Start on Project #2**
- **Create a Success Landscape!**

Solutions, Tools & Methodologies for a Success Landscape

Strategy

- Corporate Strategy & Business Planning
- Supply Chain Strategy
- Marketing Strategy
- Organizational & Operational Design
- Mergers & Acquisitions Advisory; Post M&A Integration; Valuation
- New Product Development and Innovation
- Product Line Extensions/Rationalization
- Manufacturing, Distribution & Channel Strategy
- Customer Satisfaction, Loyalty & Retention

People

- Management Leadership Training
- LEAN Operations & Six Sigma Training
- ISO 9001-2008 Implementation & Certification
- State Training Funds

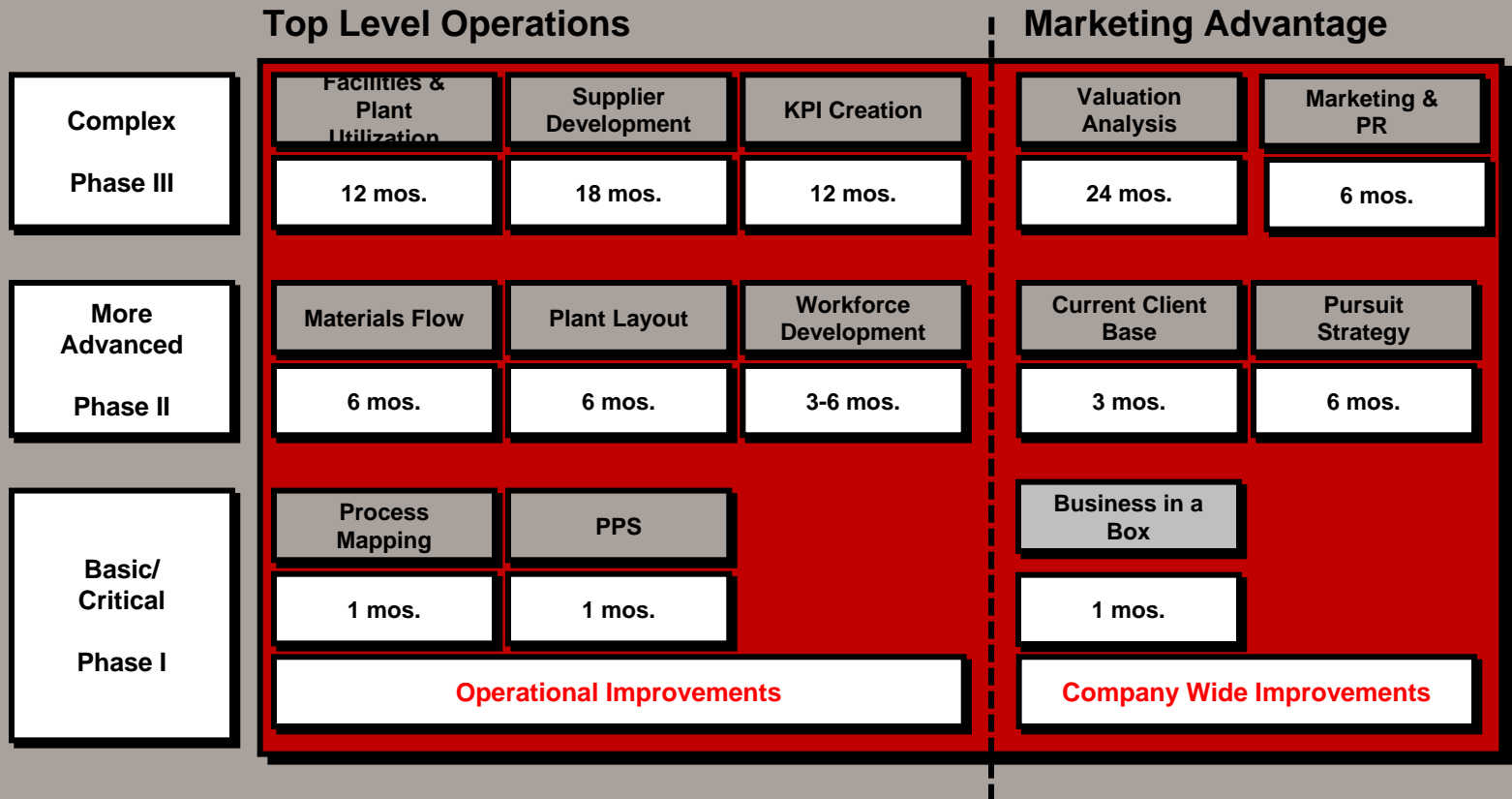
Process

- LEAN Operations
- Six Sigma Quality Management
- Activity Based Management
- Process Design
- Supply Chain Management
- Procurement
- Quality Management Systems
- RCA, TQM, HACCP and cGMP

Performance

- Executive Decision Support Systems
- Internal/External Benchmarking
- Management Dashboards & Scorecards
- Activity Based Cost/Profit Management
- Key Performance Indicators (KPIs)
- Profit Optimization

Success Landscape



KEY TAKE-AWAYS

In Summary: Key Take-Away Points

- **Successful companies have a strategy and a plan**
- **Successful companies use good data. Avoid the gut feel approach to making business decisions**
- **Successful companies engage their employees**
- **Successful companies utilize Lean Manufacturing Principles for continuous improvement and to reduce waste**
- **Start now on small projects. You do not need to have all the pieces in place to begin**
- **Use all the resources that are available to you**

QUESTIONS

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