

Lean Manufacturing Brings Products Back from China

A Case Study in Lean Manufacturing & Hidden Costs

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**Prepared for the IIE, South Jersey
Senior Chapter No. 132
September 20, 2006**

Current Paradigm

- ☞ **All Manufacturing Must Move Off Shore to be profitable or competitive**
- ☞ **Current country of choice is China**
- ☞ **Move to China or Die**

July 4, 2004: Consultant Urges Firms to Export Jobs!

- ☞ American firms risk extinction if they hesitate to shift facilities to countries with lower costs.**
- ☞ Senior executives conveyed low opinions of American employees compared with labor available abroad.**
- ☞ Mid-level engineers in lower cost countries tend to be more motivated than in the West.**

Is this Paradigm True?

- 👉 **Does this make intuitive sense?**
- 👉 **What do the hard numbers say?**

Intuitive Sense

- ☞ **Take your case to an extreme. Where is the best place to manufacture something if I sell to a customer across the street?**
- ☞ **In my town?**
- ☞ **In this County?**
- ☞ **In this region?**

Hard Numbers

- ☞ **What is the most attractive thing about Off shore manufacturing (the present darling being China)?**

Labor Rates

- ☞ **Is this too good to be true?**
- ☞ **If this is true, how long might this be true for?**
- ☞ **Is this enough?**

China or USA?

- ✎ **Discrepancy in labor rates are significant enough to make this an attractive option for many companies in many different industries**

Case Study

Toys in China

Case Study

Toy Parts Bagging Lines

The Original Challenge

- Inefficient operation in the US.
- Good equipment, poor implementation and poor operation.
- Large manual component in the final pack out.
- More and more components being sourced in China.
- More and more packaging being sourced in China.



The move to China

- ✎ **Many locations domestic and overseas were considered. China offered the greatest cost savings.**
- ✎ **Cost savings was two-fold: Labor and components. The inexpensive toy components that were used in the retail construction toys were best sourced in China as well as the attractive multi-colored retail packaging.**
- ✎ **Corporate partner allowed access to their already established Chinese network allowing a more efficient start-up without a difficult learning and break-in period.**

China or USA?

The current paradigm

- ✎ **Going to China is the future. Improving or shoring up a domestic operation is just putting a band-aide on a dying patient.**
- ✎ **This is what all the big companies are doing, so who am I to buck that trend. My initial numbers seem very convincing and all these big companies must have analyzed this already. This must be the right decision.**

China - Is this as good as it gets?

- ✎ Labor differential is already beginning to erode. Fully loaded costs were typically \$0.50/hour as recently as five years ago. Current fully loaded rates vary anywhere from \$0.90/hour to \$1.50/hour.
- ✎ Chinese Govt. revalued the Renminbi by 2.1% in July 2005 to forestall pressure by the U.S. to open their currency.
- ✎ Labor laws have been put in place over the last 10 years but have been virtually ignored until recently and are still largely ignored.
- ✎ Environmental laws are beginning to take effect as China begins to recognize the scale and effect of industrial pollution throughout the country

What to Bring to China

Potential Product Lines to bring

- ☞ **Retail Products - High Volume, products defined well in advance of the selling year. Difficult to predict usage requirements.**

Products considered for China continued

- ☞ **Promotional items: Large volumes, need to be very inexpensive, marketing campaigns planned well in advance; Sign off on art work and final copy not done until the eleventh hour.**

Products considered for China

continued

- 👉 **Educational Items: Low Volume, High Variety, High product complexity; Long lead times acceptable.**

Plan for China, Plan for USA

- ☞ **Retail products - all for China, cost savings far to great for USA operation to ever compete.**
- ☞ **Promotional items - all for China, cost pressure will dictate a Chinese operation. These are give-aways.**
- ☞ **Educational Items - all for US. Even if China is less, the volume is so low, margin for error too great to move this component of the operation to China. Additionally the domestic operation would provide an emergency back-up the Chinese Operation.**

China: The Anti-Lean

Lean Manufacturing

Fundamental Principle of Lean Manufacturing

Any activity or action which does not add value to the product is a form of waste and must be eliminated or minimized.

The EIGHT Wastes

- ☞ Inventory (more than one piece flow)
- ☞ Overproduction (more or sooner than needed)
- ☞ Correction (inspection and rework)
- ☞ Material Movement
- ☞ Waiting
- ☞ Motion
- ☞ Non-Value Added Processing
- ☞ Underutilized People

China: The Anti-Lean

- ☞ **Production in China is most efficient for larger unit runs with little to no variety.**
- ☞ **Every market is moving to shorter runs and greater variety. Average Order size continues to shrink.**

China: The Anti-Lean

- ☞ **China works best with long lead times**
- ☞ **Manufacturers, distributors, and retailers want increasingly shorter lead times. The top item on every sales manager's wish list is either shorter lead times or lower costs, preferably both. Shorter lead times tend to mean more efficient operations and lower costs.**
- ☞ **Lean operations continue to shorten lead times. Transportation from China mandates long lead times.**

China: The Anti-Lean

- ☞ **We have built in a long, unresponsive lead time in taking production to China**
- ☞ **This long lead time requires working to a forecast rather than building to customer order. Operating in China is a return to the past. A lean operation builds to order.**

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China: The Anti-Lean response to manufacturing in the early 21st Century

Worst candidates for a China Move

- 👉 **New manufacturing operations for new companies.**
- 👉 **Seemingly the most enticing prospects - we have not yet set-up, there is nothing to move. Let's start-out in the optimal manufacturing environment.**

Death Knell for New Venture

- ✎ **Setting up remote manufacturing operations is difficult enough for established companies. Adding the burden of setting up a new company, introducing a new product, with new sales and distribution is a recipe for failure.**
- ✎ **Evolution of this new product as the needs of the marketplace are better understood will require tremendous flexibility. Flexibility that China can not offer.**

Candidates for relocating to China

- ✎ **Established Manufacturing Operations with mature companies**
- ✎ **Costs are well understood and the products are well understood. Largest product lines can be moved with great success. Cost benefits seem to be a slam dunk.**

Or are they?

**Have we looked at all of the costs
and have we considered the entire
operation?**

Issues with initial plan

- ✎ **Trying to create a viable (profitable) US operation out of the lowest volume, lowest margin product line was virtually impossible. Running the lines better, and leaner eventually made these lines profitable in and of themselves, but an initial business plan based only on these lines was not viable.**
- ✎ **One set of bulk retail products with no Chinese components was carved out to supplement this operation and make the operation viable. Cost justification was the insurance this domestic operation provided.**

Challenges for the domestic operation

Create a leaner more efficient operation that can compete with China across the board in all product lines.

Approach to creating this competitive operation

- ☞ **Improve the domestic operation**
- ☞ **Understand the true costs of operating in China and the unique opportunities afforded a local, flexible manufacturing operation as opposed to an inflexible, but highly efficient competitor in China.**

Putting our house in order

- ➡ **Value Stream Map**
- ➡ **Lean Automation**
- ➡ **Quality Systems**






Lean Manufacturing

Concepts & Techniques Used

- ☞ **Value Stream Map ***
- ☞ **Flow: Setup Reduction, Cellular Manufacturing, Batch Size Reduction, Visual Workplace, Layout ***
- ☞ **Pull: Kanban Systems, Supply Chain Management, Point of Use ***
- ☞ **Others: Quality Improvement & Analysis *, Total Productive Maintenance, Training ***

** Used most frequently prior to Automation*

Lean Techniques Used Before Automation

-  **Process Flow Diagrams**
-  **Setup Time Reduction**
-  **Cycle Time Reduction to Produce Smaller Orders**
-  **Quality improvement**
-  **Visual Workplace**

SETUP TIME REDUCTION

SETUP TIME REDUCTION TEAM MEETING

PROPOSED SETUP REDUCTION STEPS

1. Separate the work that must be done while the press is stopped (Internal Functions) from the work that can be done while the press is running (External Functions)
2. Create operating tables for external functions
3. Pre-arrange dies, jigs, tools, fixtures, materials, etc.
4. Pre-stage dies, jigs, tools, fixtures, materials, etc.
5. Perform parallel operations – have more than one person working on the setup at the same time.
6. Maintain dies in good operating order
7. Maintain a clean, well-organized storage for detached dies and fixtures
8. Standardize dies to eliminate adjustments
9. Revolving car concept – Use a die cart with a turntable to unload the used die from the press then rotate the table to load the new die.
10. Use fewer fasteners to attach the die to the press.
11. Use quick-type fasteners to attach the die to the press.
12. Do methods and time analysis on all elements of the setup. Then review for possible element elimination, combining or shortening.
13. Standardize external setup functions.
Operations for preparing dies, tool and materials should be made into routines and documented as procedures.
14. Standardize internal setup functions.
Operations for removing and installing dies, as well as making machine adjustments should be made into routines and documented as procedures.
15. Keep records and use them.
For every setup records should be kept, by machine number and die number, of any irregularities in the process and the timing. These records should then be reviewed by the team to determine if a change should be made to the standard procedures.



Moving Product Back From China

The New Challenge

- ☞ **Product cost less than delivered cost from China**
- ☞ **Logistical problems of production in China**
- ☞ **Lead time issues**
- ☞ **Inventory problems**



Hidden Costs

- 👉 **Vulnerability of the supply chain. SARS; Longshoreman's strike; political volatility**
- 👉 **Market place reaction time - soft cost - what is this worth?**
- 👉 **Ability to make design changes**

Hidden Costs

- ☞ **Management trips to China. If meetings are once a quarter this is one month out of the office**
- ☞ **Typically the manager does not travel alone.**
- ☞ **Illness resulting from travel**

Hidden Costs

- ☞ **Quality issues caught sooner in USA and are significantly less expensive to react to.**
- ☞ **More stateside overhead needs to be allocated to China operation.**
- ☞ **Loading and Unloading of hand stacked containers.**
- ☞ **Allocation of State Side “Back-up” System Costs (Operational or Air Freight) vs. Cost of Lost Sales**

New Cost Comparisons

- 👉 **Educational Products. Profitable to run in the USA. Lead times have been reduced considerably. Costs per unit are down for educational items compared to previous domestic operation and initial set-up at Advent.**

New Cost Comparisons

- 👉 **Promotional Items.** This was the first success story. The more efficient bagging operation could compete with China, especially when transportation was added into the equation. Domestic was not always the least expensive option but the costs were very close. More importantly, China was never able to meet the schedules demanded by the promotional customers.

New Cost Comparisons

- ☞ **Retail Products. This took longer. Operations were improved. Quality systems installed, overhauled, re-evaluated and overhauled again. Equipment upgraded to meet tighter operational demands. Using only hard costs only the domestic operation was able to get to within 10 to 15% of China on most products. Using soft costs, the first two large retail items were awarded to the domestic facility over China earlier this year.**

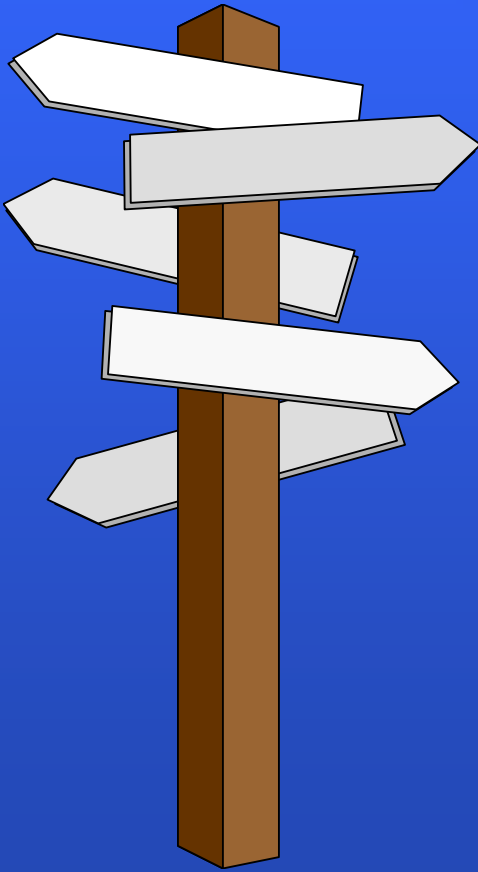
Where Do We Go From Here?

✎ Establishing a cycle of continuous improvement

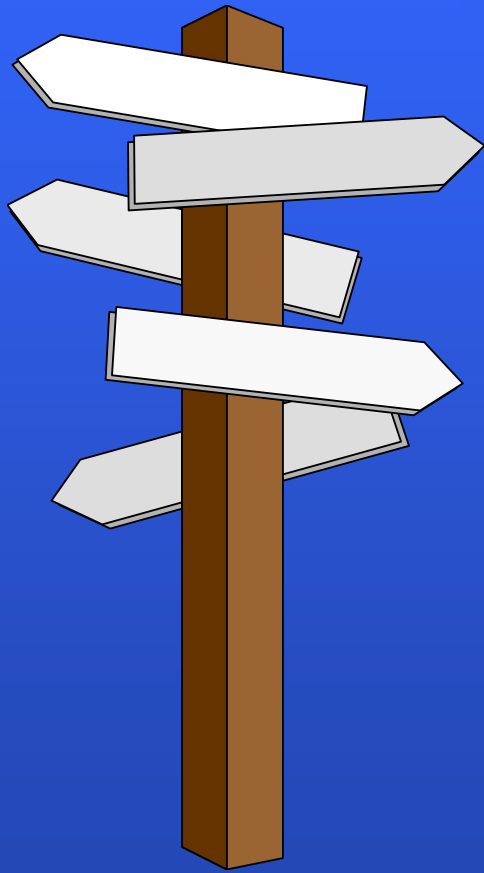
✎ Automated bag counting and weighing

✎ Reducing lead times and quality errors

✎ The challenge for the future is to better identify and quantify the soft costs and compete across the board on all products.



Where Do You Go From Here?

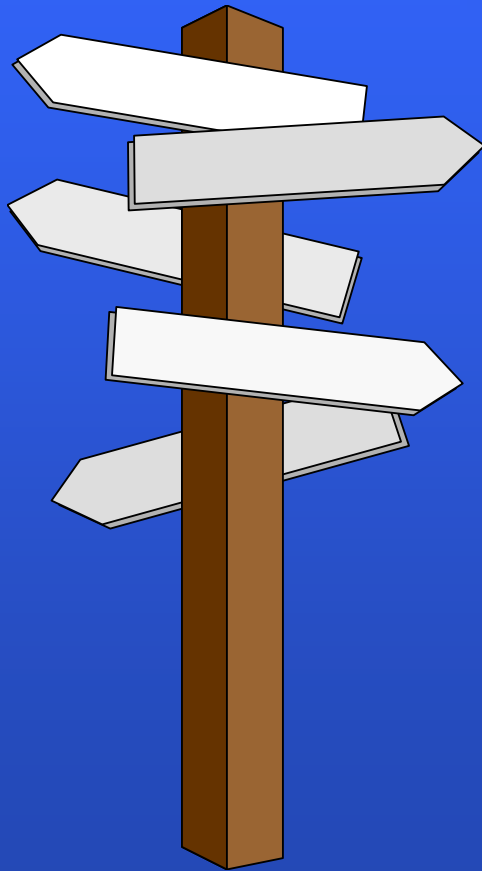


- **Develop a Financial Model that incorporates all of the hard costs and as many of the “soft” costs as possible**
- **Determine the cost of “insurance”.**

March 2005: Outsourcing study of Senior Manufacturing Executives

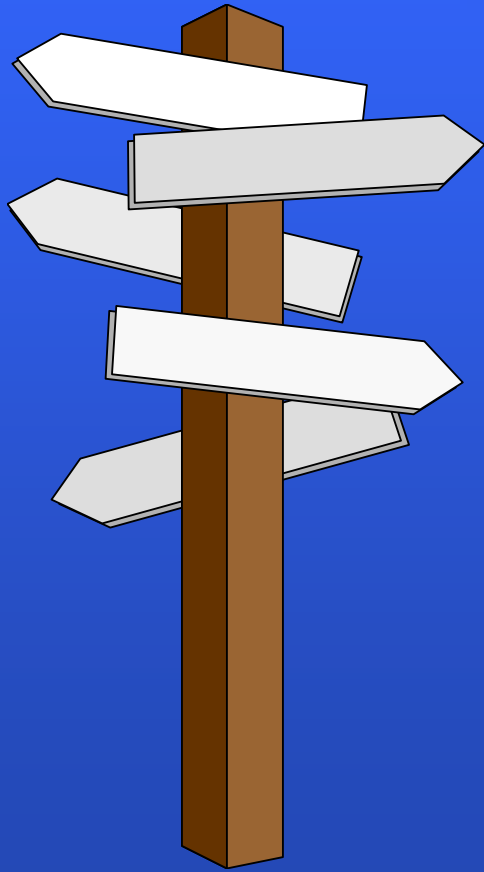
- ☞ At one year into their China outsourcing program 4% of companies rated themselves as “very satisfied”.
- ☞ For those that continued to invest in their China operation the satisfaction rate increased to only 9% of companies after 5 years.
- ☞ Only those investing for longer than the 5 years finally showed a satisfaction survey of 23%.
Needless to say, the cost savings were not what was expected for the first 5 years, and for most even after that time the savings were far less than expected.

Questions to Ask as you develop your model?



- ☞ Do we need to be even or just within 10%? 15%? 20%?
- ☞ What is the cost of Supply Chain interruption?
- ☞ What is the cost of lost sales?
- ☞ How many more sales could be made with shorter lead times?
- ☞ What is the cost of excess inventory (too much of the wrong thing and not enough of the right thing)?
- ☞ Where and when does Automation fit into my plan?
- ☞ How do I grow from here?
- ☞ How does the Snapper/Wal-Mart story fit my company?

Most Important Question to Answer as you try to determine where best to manufacture your product.....



☞ Which path gives the greatest potential for long term viability and success, not just short term profit?

Like any good teacher - answer yourself with a question - or better yet, two questions....

☞ Where is the product used?

☞ Where can I control the product features and the product quality the best?

Q&A



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