

Achieving “e”-Locity (The Min/Max Story)

A case study on the use of Lean and IT to create and implement a web-enabled, pull based inventory control methodology.

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Disclaimer

!!!WARNING !!!

The story you are about to see depicts real life events pertaining to an early application of lean principles and IT technologies to severe and chronic, traditional procurement processes problems that were preventing us from making scheduled 737 deliveries in the early 2000's.

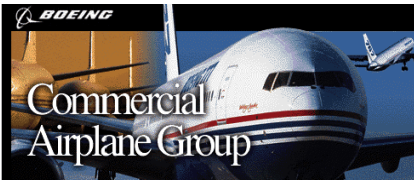
These materials are designed to recount factual historical events and data that may not be suitable for haters of process improvement methodologies, uninspired or apathetic individuals, or folks who find stories about collaboration, risk taking, trust and perseverance disturbing.

VIEWER DISCRETION IS ADVISED!



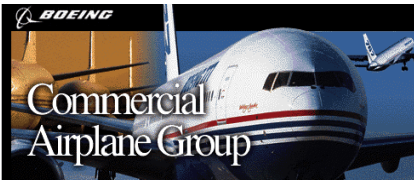
Agenda

- Min/Max Definition
- Business Dilemma and Re-engineering processes for:
 - Manufacturing = Lean Manufacturing
 - Procurement = Lean Procurement
 - Communication = Lean Business Communication
- Combined Benefits
- e-Business Tips
- Summary



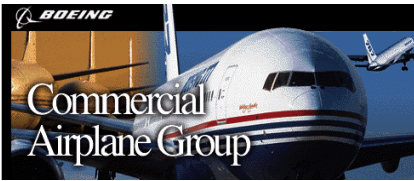
What is Min/Max

- Min/Max is a *lean, web-enabled, pull method of inventory control*. Using Min/Max gives our suppliers the responsibility of assuring that we don't violate our agreed upon **MIN**imum and **MAX**imum levels of inventory.
- Shared information includes
 - Projected forecast
 - Current inventory position
 - Agreed upon Min/Max quantities of inventory
 - Supplier Metrics
- Allows us to manage by exception
- Enables suppliers to better manage their business.
- Facilitates anytime access to business information



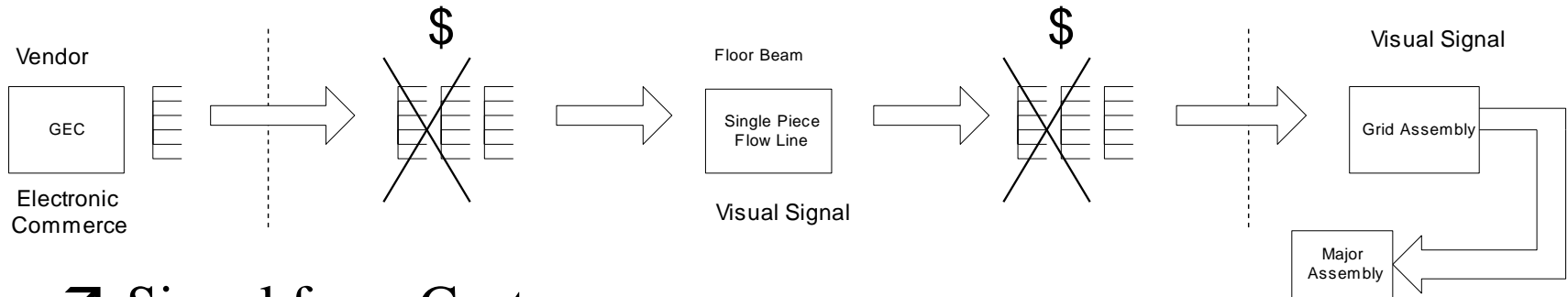
Production Dilemma

- Batch & Queue Production in a Functional Layout
- Push Scheduling
- Highest Inventory & Highest Shortages
- Many Expedite Lists with Many Expeditors
- Slow Incorporation of Production Changes
- High Cost Supplier Compared to Budget & Competitors
- Everybody Working Hard Doing the Wrong Things
- Our Supply Chain was Broken



737NG Floor Beam

Production Process: Old -vs- New



➤ Signal from Customer

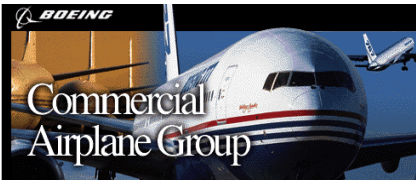
- Empty Dolly (TME)

➤ Signal within One-Piece Flow Line

- Visual Station Rack

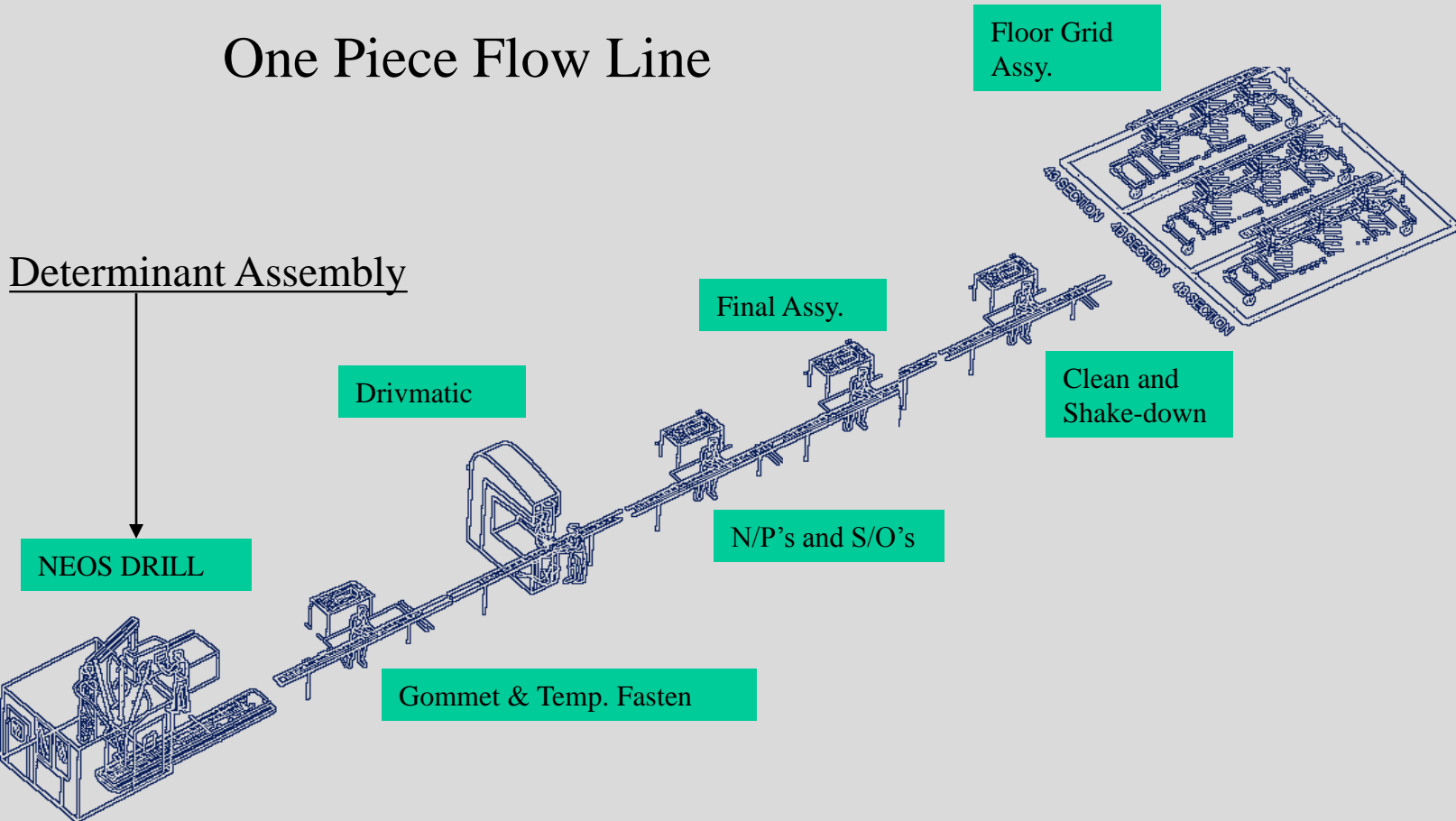
➤ Signals to Supplier

- MIN/MAX, Production Forecast and Supplier Metrics transmitted via Web using Boeing Partners Network (BPN).



737 NG Floor Beam Line

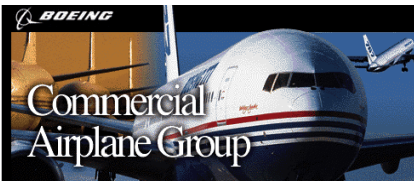
One Piece Flow Line





Procurement Dilemma

- The implementation of ERP increased inventory transactions.
- The current Logistical Company Alignment strategy increases the inventory transactions between customers & suppliers.
- The implementation of Lean Ordering Methodologies increases inventory transactions between customers & suppliers.



Legacy POP Procurement Dilemma

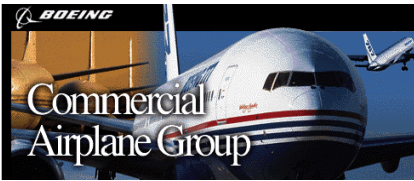
➤ Push Scheduling

- Receives whatever comes into the plant
- Fixed POs - Erratic Demand
- High PO maintenance

➤ Supplier Performance

- Excessive Inventory
- Numerous Stockouts
- 50% on time delivery





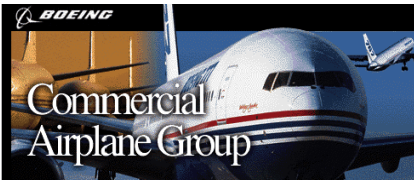
Procurement Process: Old -vs- New

- Paradigm Shifts
 - Shifting from Business processes where information passing media is changing from paper to electronic
 - **Buyers & Sellers** become **Partners**
 - **Transactions** become **Relationships**
- We must re-engineer our business processes to eliminate costly transactions and support our Lean Supply Chain Management



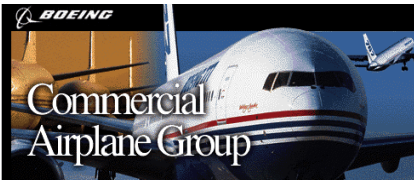
Re-engineered Procurement

- Create Partnership with External POP Suppliers
 - Negotiated Min/Max Quantities
 - Better visibility of Current Inventory Position
 - Established Open PO's
 - Revised Contracts
 - Supplier Training
 - Revised Supplier Metrics



Communication Dilemma

- Shared information is often outdated
- Method of sharing is manually intensive
- Information from multiple sources, can be confusing.
- Security issues
- Information channels can be unclear
- Punitive in nature
- Reactive instead of proactive
- Micro-management of supplier's processes



Communication Processes

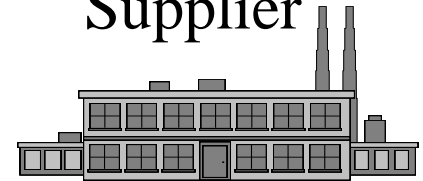
Customer



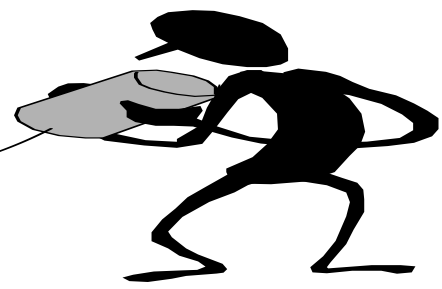
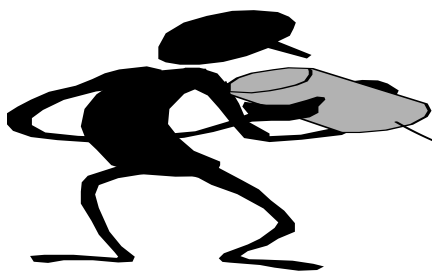
OLD

Mail, Phone, Fax, e-Mail, EDI

Supplier

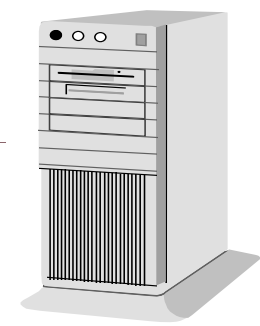
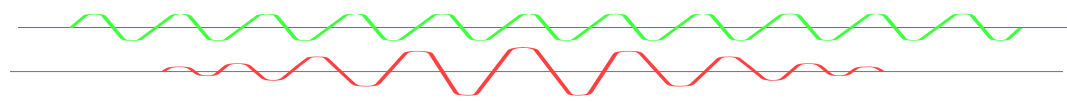
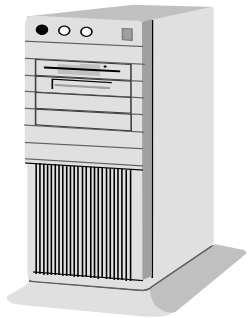


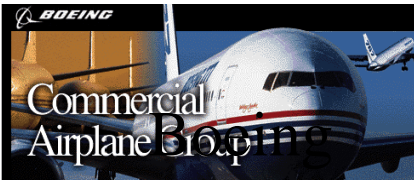
Vs.



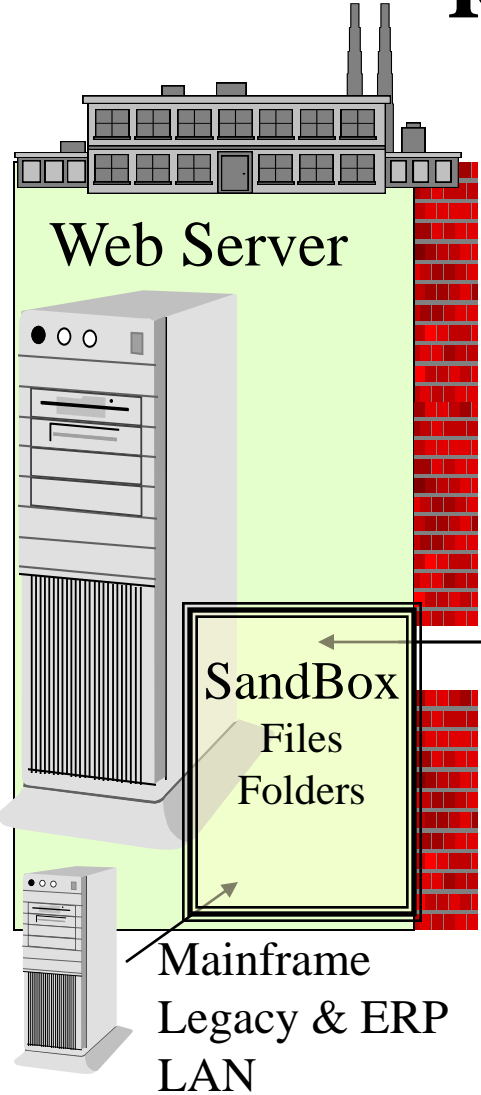
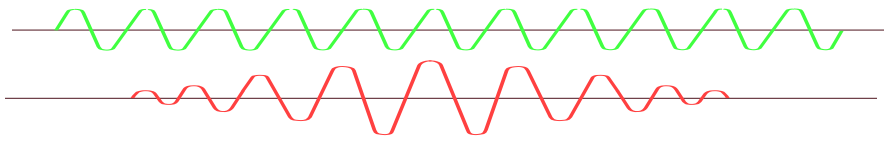
NEW

Web Browser, e-Mail, EDI





Re-engineered Communication



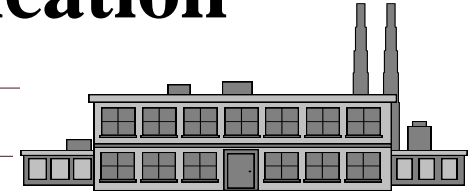
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Security via:

- Authentication- password, cookies
- Encryption
- Secured Sockets Layer (SSL)
- Time Out
- Aliasing
- Extensive logging
- Address blocking

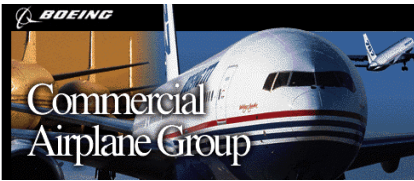
Information Exchange (thru Reverse Proxy)

The **Reverse Proxy** translates a request from a browser on an external network over an encrypted channel, through a hole in the firewall, to a specified Interior Web Server (IWS), located on the Boeing internal network.



External Supplier





Re-engineered Communication

BOEING

Boeing Commercial Airplanes

Wichita Portal
Reporting Questions
Technical Questions
Seattle Portal
Log Off

Supplier Common Resource

- **Wichita Applications**
- [BradyRate](#)
- [Electronic Accommodation](#)
- [Sales](#)
- [Forms](#)
- [M-Date Calendar](#)
- [News & Info Archive](#)
- [Supplier Communication Archive](#)
- [ISSUE_49_AUGUST_2001.PDF](#)
- [Tipsheets](#)

- **Seattle Applications**
- [MinMax Pilot](#)

- **Links To Other Web-Sites**
- [Doing Business with Boeing](#)
- [TMX Web-Site](#)
- [Track Your Shipments](#)

Acme Airplane Parts
Supplier Partners Information

Reports

Current Inventory	9/4/2001 9:24:20 AM
Forecast	9/4/2001 9:24:43 AM
MinMax Levels	9/4/2001 9:23:45 AM
Supplier Metrics	9/4/2001 9:24:58 AM

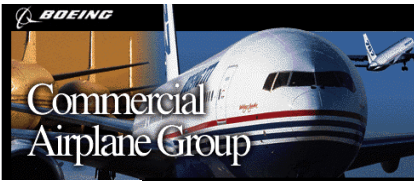
to Acme Airplane Parts

ANYFILE	8/28/2001 3:14:44 PM
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to Wichita SM&P

File to send to supplier:

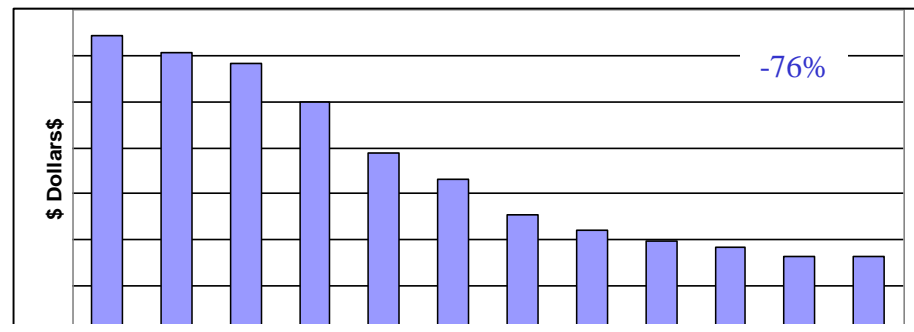
Wichita Portal
Reporting Questions
Technical Questions
Seattle Portal
Log Off



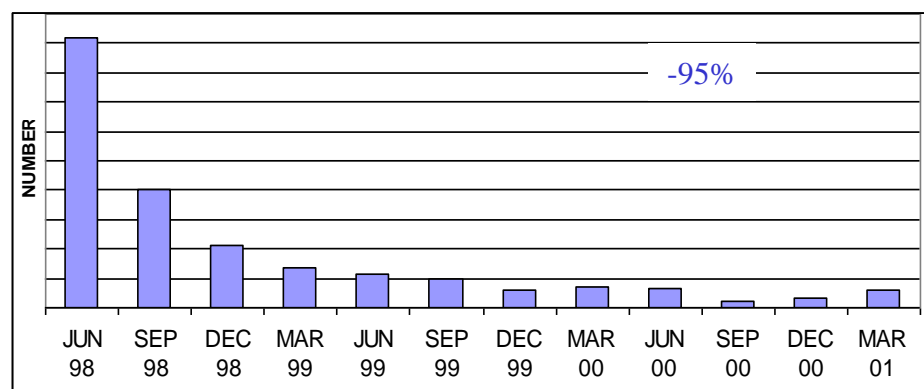
Process Improvement Results (Min/Max)

	Planning Processes	PO Processes	Validation Issues	Supplier Follow-Up	Total Reduction
Previous Process (1998)	Schedule Development	Multiple Positions	NVR Balancing	Status Management	220 parts per buyer
	Inventory Analysis	Schedule Driven	PO Exceptions	Change Orders	
	Validate Quantities				
New Process (2001)	Schedule Development	Multiple Positions	NVR Balancing	Status Management	Time cut ~ in half
	Inventory Analysis	Schedule Driven	PO Exceptions	Change Orders	Parts per buyer increased to 372
	Validate Quantities				

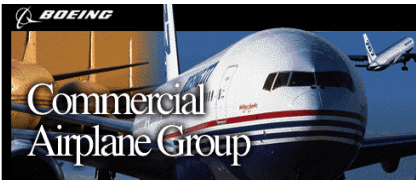
POP Inventory Reduction (per quarter)



POP Shortages (per quarter)

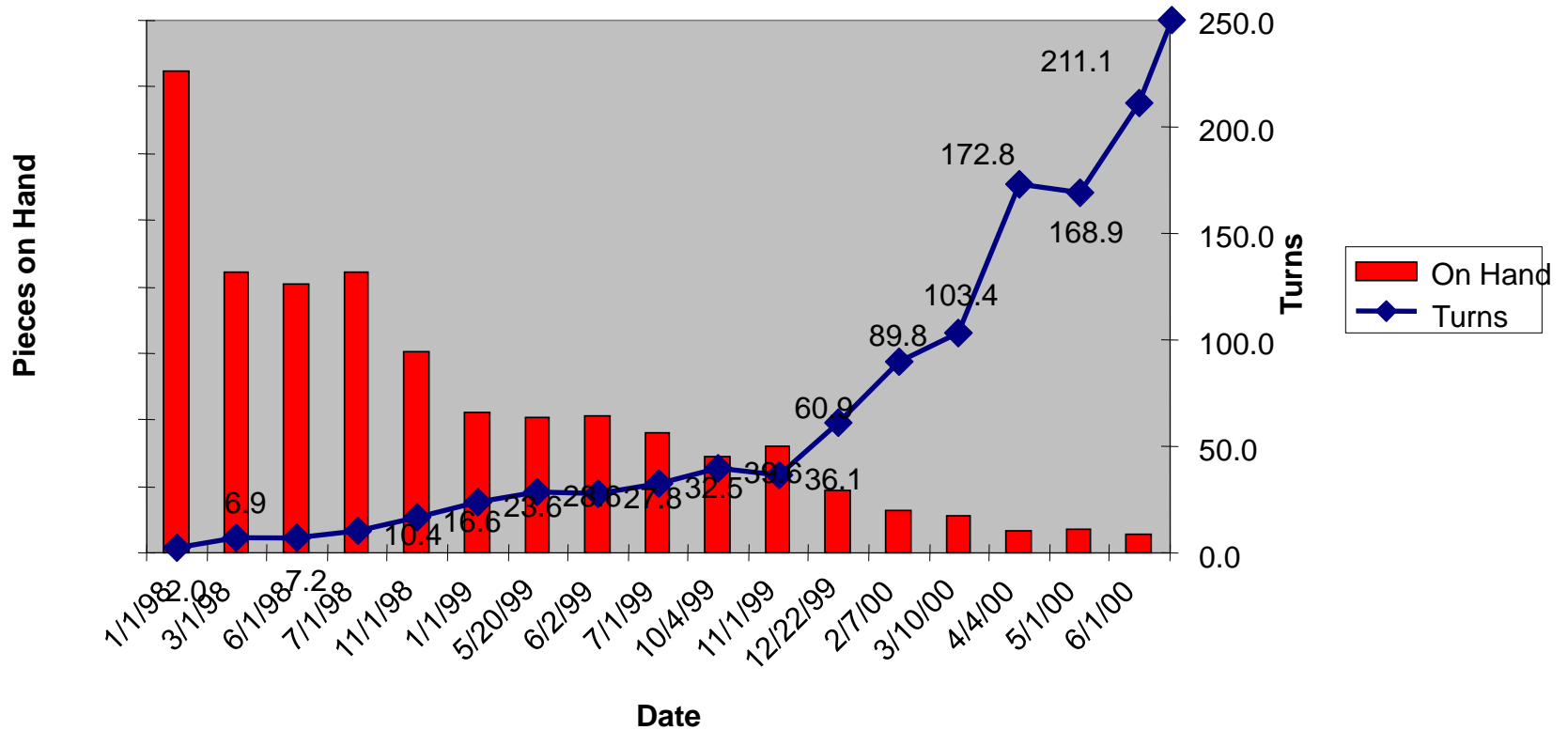


Implementation was smoothly incorporated with all other recovery initiatives



Inventory Decrease/ Turn Increase

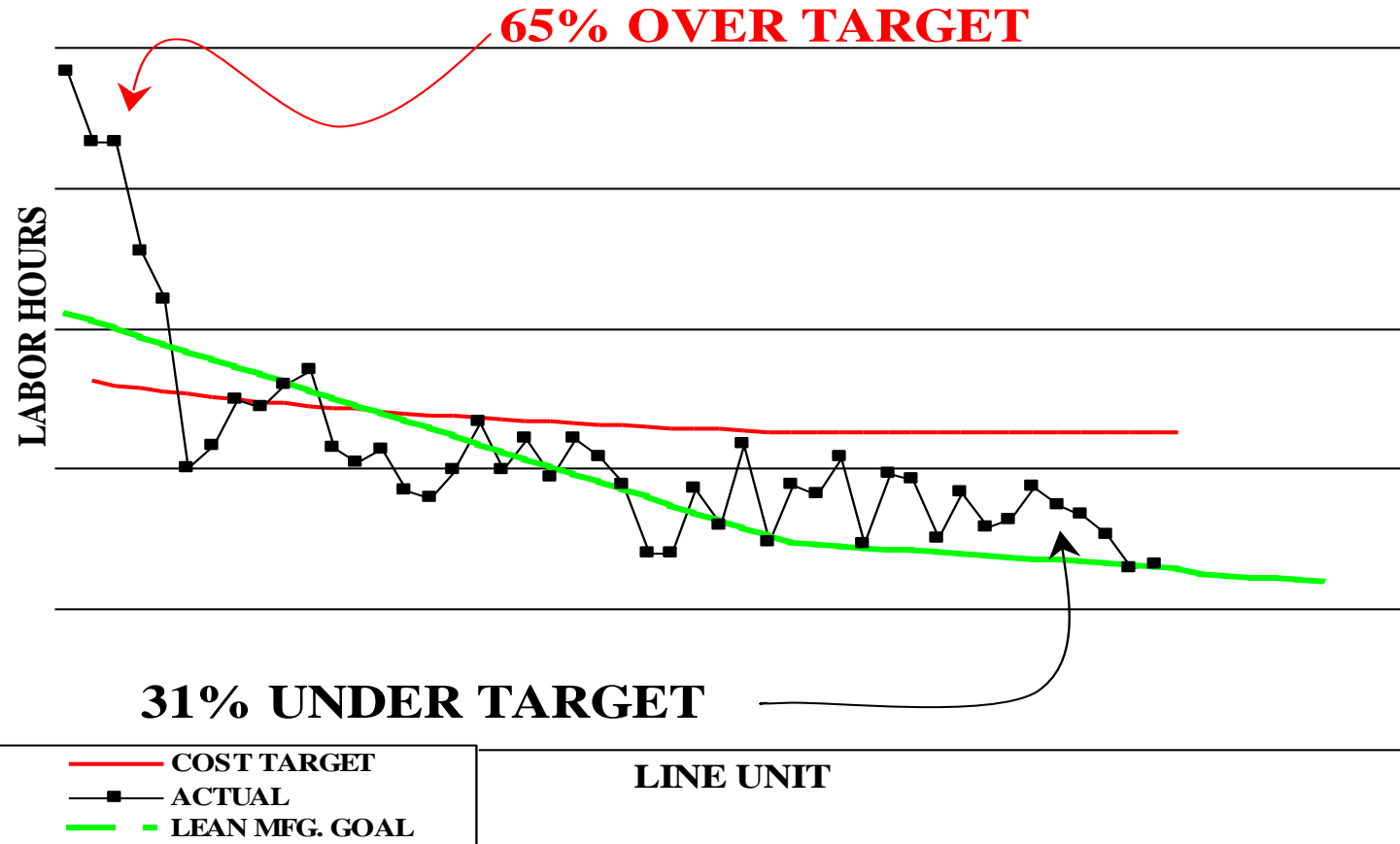
737 Next Generation Floor Beams

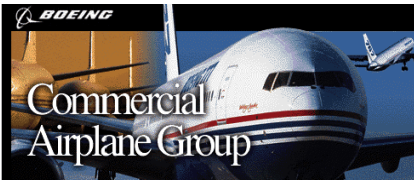




Cost reduction

737 Floor Beams (Budget vs. Actual)





Other Benefits

- Labor hours reduced by over 74%
- Cycle time reduction
- In Line WIP - Has been Reduced by 70%
- Floor Space - Requirements have been reduced by over 1,800 ft².
- Hard tooling eliminated, specialized, standardized workstations
- Linear Flow- Reduced people, part and tool travel
- Last stage customization
- Ergonomic Improvements
- Assembly line is currently operating with 100% on time delivery.
- Zero stock outs
- Faster Incorporation of Engineering Changes
- Reduced Obsolete and Surplus
- Improved IRA
- Morale improvement

Acme Airplane Parts Co.

ACME AIRPLANE PARTS COMPANY
PO Box, 123 - 4567Supply Chain Ave
Hometown, Kansas 99999
Phone: (316) 111-2222
Fax: (316) 333-4444

Subject: Min-Max Pilot

Acme has enjoyed the partnership formed with Boeing in implementing the min/max ordering process. This pilot program has been beneficial to both parties involved and we feel it will continue to be a success in the future. We have went through growing pains, but now have a system in place which allows a smooth transition from purchase order requirements to consumption based requirements.

The benefits we have experienced are:

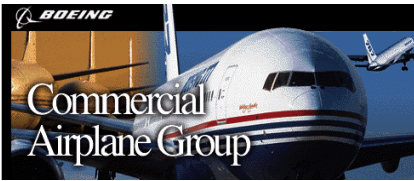
- Know exactly what parts are needed and when they are needed.
- Experience less change orders than with purchase order requirements.
- Delivery performance has increased dramatically.
- Can schedule machines more effectively.
- Have access to Boeing's forecasted requirements anytime.
- Have access to our current performance metrics anytime.
- More than one AcmeCo employee has access to the EC Boeing WebPages in case someone is absent.

Many lessons have been learned through our implementation process. It was evident from the start we would need storage for finished goods, which we now have. Another important lesson learned is everyone in an organization needs to be aware of what consumption-based orders really are. This goes for everyone from raw material purchasing to the shipping personnel. In the past we ordered our raw material based on purchase order dates, but now order using the forecast tool Boeing provides. This also helps to control our raw material inventory.

Eventually, I would like to see all of our programs rolling to the min/max inventory system. Acme feels it would be beneficial not only to us, but Boeing as well if all of our part numbers could go to the min/max program.

Thank you for the opportunity to participate.

Program Administrator



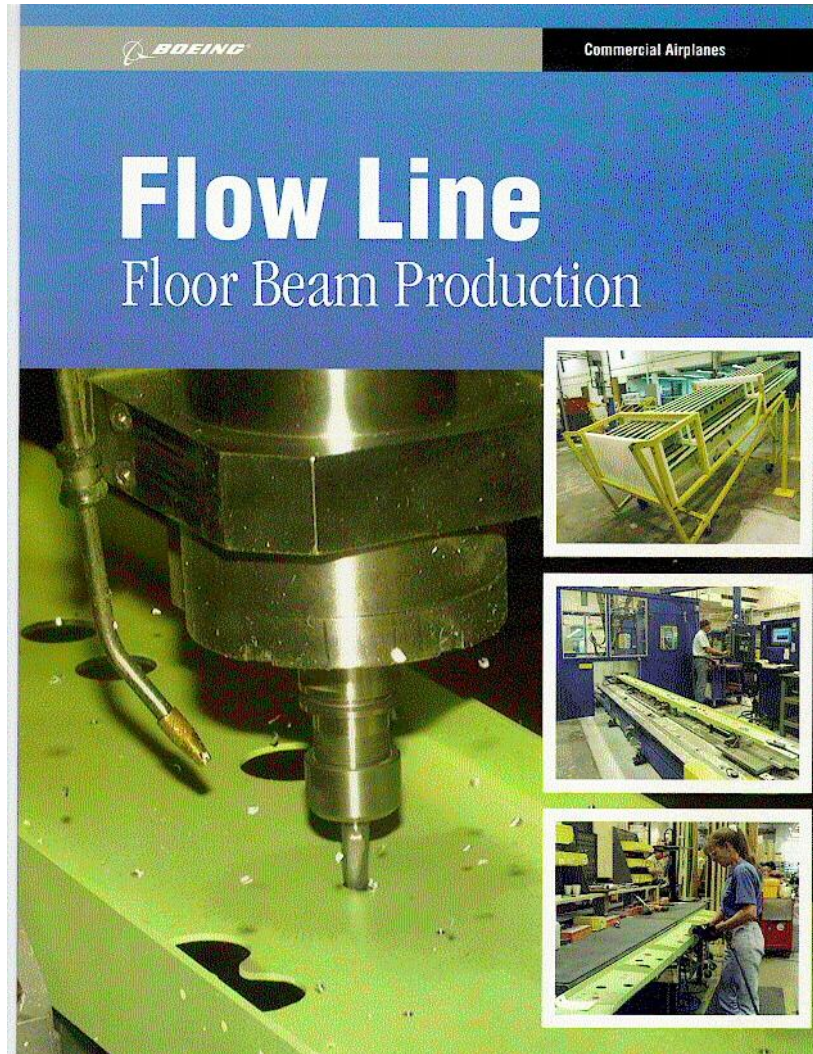
World Class Beam Supplier

- Benchmark Against the Competition
 - Results:
 - **Reduction of production costs by over 75%**
 - **Over 80% reduction of material holding costs.**
 - **Can now build for 1/2 to 1/3 cost of competitors.**
 - **Additional acquisition for the beam line**



Market our LEAN Process

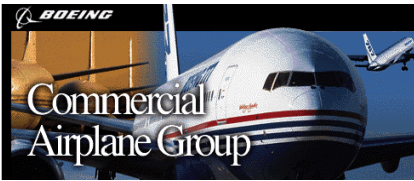
- Contacted Airline Logistics Support (Boeing Airplane Services) for marketing and issuing contracts.
- Marketing our process required us to generate a brochure that advertises our capabilities (*See Brochure*).
- Marketing of our processes and working the details of bidding on potential work packages was kicked-off with visit to BAS January 13, 2000.





World Class Supply Chain

- Development of consumption-based lean procurement process (Min/Max)
- Implemented across the supply chain with over 300 suppliers including:
 - Different commodities
 - POP, Raw Material, Standards, Purchased Equipment
 - Interdivisional Work
 - Different locations within the company
 - Different external companies
 - All sizes of companies
 - Foreign & Domestic



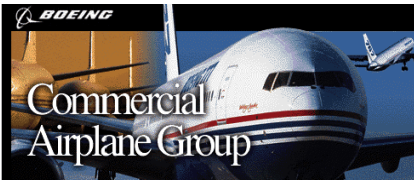
E-Business Success Tips

- **Determine critical business path/s:** Know your primary current business objectives, parties and processes involved. Critically evaluate each step (5Y’s)
- **Re-engineer before you e-engineer:** Build a solid business model, re-engineer your processes, then e-engineer to create an integrated digital environment.
- **Target high pain/impact area first-** Everyone is focused and ready to find a solution.
- **Focus on process, not product-** Usually “how”, rather than “what” is the problem
- **Follow the Value Stream-** Value Flows across organizations, not within



E-Business Success tips

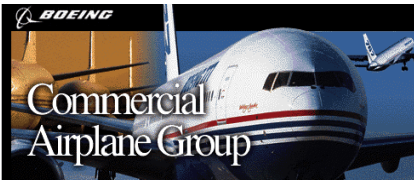
- **Controlled Phased implementation-** Start out small, expand incrementally, iterate, iterate, iterate.
- **Design/Plan for Obsolescence:** Making systems, software and processes modular allows for easier replacement of obsolete systems.
- **Treat your assets as liabilities:** Inventory is not your friend.
- **Cannibalize yourself:** Be your own best competitor, Proactive not reactive.
- **Eliminate the interface:** Relegate mundane, monotonous jobs to automated computer processes. "Eliminate information seams" .



Summary

- We re-engineered:
 - Our Manufacturing Processes
 - Our Procurement Processes
 - Our Communications Processes
- *Then* e-Engineered Our Lean Business
- ...and finally,

Achieved e-Locity!



One Final Thought...

Never underestimate the ability of a *small group of thoughtful, dedicated individuals to change the world.*

Indeed...

it is the only thing that ever has.

Thanks for your Participation!