A Case for CIM

Why Computer Integrated Manufacturing is Critical for your Operations
Who Should Care?
(can I leave now?)

Business Owners

People who work for Business Owners
Goals and Assumptions

Goals:
- Understand what an integrated manufacturing system does
- Understand how it changes daily operations
- Understand the financial and competitive impact

Assumptions:
- Roll forming is a big part of your operations
- Your roll forming machines produce finished products
- Make to order
What is CIM?

Sales  
Accounting  
Shipping  
Inventory  
Design Software  
Analytics  
Preventative Maintenance  
Quality Assurance

Production Management System

Machine Controls  
Bar Code Scanners  
Part Marking  
Label Printers  
Quality Measurement  
Information Displays  
Mobile Terminals
What is CIM good for?

- Mistake-proofing
- On-time deliveries
- Perfect accounting & inventory control
- Eliminating waste/growing capacity
- Flexibility
- Management focus and capital spending
- Continuous improvement
Step 3: Profit!

Goal: profit now and in the future

Simple model:

Gross Profit - Overhead = Operating Profit
Gross Profit

Gross profit = selling price – material cost

$2.50/ft

$2.00

$0.50
Speed vs. Throughput

Road trip: Chicago to St. Louis = 300 miles
Speed vs. Throughput

Road trip: Chicago to St. Louis = 300 miles

Good news: Bugatti Veyron

Speed = 265 mph
Trip time = 67 minutes!
Throughput = 265 mph

Bad news: Potty-training toddler

Must stop every 45 mi.
Each stop = 20 min.
Trip time = 187 min.
Throughput = 96 mph

More bad news: Antique-obsessed mother-in-law

Must stop at every flea market @ 60 min. ea.
Trip time = 307 minutes
Throughput = 58 mph
Machine Speed vs. Throughput

Back to Roll Forming…
Machine Speed vs. Throughput

Back to Roll Forming…

**Good news:**
Flying shear

- Speed = 135 fpm
- Throughput = 135 fpm

**Bad news:**
20 Coil changes/shift
- 12 minutes/change
- 240 minutes downtime
- Throughput = 58 fpm

**More bad news:**
2 Tooling changes/shift
- 35 minutes/change
- 310 minutes downtime
- Throughput = 35 fpm
How Roll Formers Make Money

Production / day =
(420-310) * 135 = 14,850’

Gross profit / year =
14,850 * $0.50 * 250 = $1.9M

Overhead / year = $800K

Operating profit = $1.1M*

* Assuming you can sell all production
Almost…
Additional downtime from data entry, etc: 35 min.

Production / day =
\( (420 - 310 - 35) \times 135 = 10,125' \)

Gross profit / year =
\( 10,125 \times $0.50 \times 250 = $1.3M \)

Operating profit = $466K*

* Assuming you can sell all production
How Roll Formers Make Money

Not so fast…
Problems with stacker limit speed to 120 fpm

Production / day =
(420-345) * 120 = 9,000’

Gross profit / year =
9,000 * $0.50 * 250 = $1.1M

Operating profit = $325K*

* Assuming you can sell all production
Oh, Scrap!
2% of parts have a problem and you scrap 10’ per coil change

Production/day = (420-345)*120*98% = 8,820’

Gross profit/year = 8,820 * $0.50 * 250 – (180+200) * $2.00 = $914K

Operating profit = $114K**

* Assuming you can sell all production
* Assuming you don’t ship any bad product to a customer!
OEE – Overall Equipment Effectiveness

OEE = Availability * Speed * Yield
= Good Production / (Available Production Time * Max speed)
OEE – Overall Equipment Effectiveness

OEE = 18% * 88% * 98% = 15.6%
Mistakes Happen!

- **Data entry**
  - 20 orders, 10 items each per day = 400 entries/day.
  - At 0.01% error rate, average 1 error every 25 days.
  - Trained data entry staff have 0.2-0.8% error rates (errors every 1.25 days or worse)

- **Wrong coil**
- **Wrong truck**
- **Wrong punch pattern or profile**
How Does CIM Help?

Mistake-proofing

- No more data entry errors
- Coil validation prevents incorrect material usage
- Automation can be used to ensure correct tooling is loaded
- Bar codes prevent data entry mistakes throughout the process
How Does CIM Help?

On-time deliveries

- Predict completions
- Smarter scheduling
- No “local optimization” by operator
- Fewer “fires” caused by mistakes
- Instantly detect material shortages
How Does CIM Help?

Perfect accounting & inventory control

- Exact coil inventories
  - Usage totals accurate to a fraction of an inch
  - No data logging errors if using bar-codes and coil ID validation
- Exact finished goods tracking
  - Know exactly what was produced in each bundle
  - Great tool for dealing with customer complaints
  - Traceability: what coil was used to produce each part
How Does CIM Help?

Less Waste/More Capacity

- Eliminate downtime
  - Data entry
  - Coil and production logging
  - Waiting for coils to arrive or finished goods to be removed
  - Coordinate help to minimize changeover time

- Minimize scrap
  - Optimize production schedule
  - Optimize cutting patterns for slitters or shears
  - Mistake-proofing!
  - Knowing causes leads to fixes
How Does CIM Help?

Flexibility

- Schedule
- Bundling
- Custom punching or profiles
- Bundle labeling and part marking
How Does CIM Help?

Management focus and capital spending

- Operator performance
- Supplier performance
- Equipment performance
How Does CIM Help?

Continuous Improvement

- Use Pareto charts to focus attention
- Correlate performance
- Use OEE and other metrics to monitor results & progress
Let’s Make More Money!

After implementing CIM…

1. No more data entry downtime
2. Fewer customer complaints & “yield loss”
3. Dialog with operators gets the stacker fixed
4. Smart capital spending on coil handling
5. OEE improves from 15.6% to 36%
6. Operating profit increase from $114K to $1.5M
Observations

- Operational excellence can be a competitive advantage.
- CIM is a tool that was “designed” to improve profit & ensure happy customers
- CIM = Good Results
- CIM + Good Managers = Great Results
Questions?