Computer Integrated Manufacturing
Benefits and Application for the Roll Forming Industry

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Computer Integrated Manufacturing (CIM)

- CIM “integrates production, administrative, and support functions in a manufacturing firm by tying together separate automated systems and minimizing administrative and manual functions.”
- ERP and CRM
- Electronic Flow of Information Related to All Aspects of the Manufacturing Process
Benefits of Integrated Manufacturing

1. Mistake-proofing
Mistake Proofing

Example:
10 orders/shift
5 cutlist items/order
10 keystrokes/item
= 500 keystrokes/shift

99.9% data-entry accuracy rate
= 1 error every 2 days
Mistake-Proofing

Order Fulfillment

• Ensure Correct Profile, Material, Length, Quantity, etc. Delivered to the Customer When Promised
• Best Practice: Single Point for Data Entry & Verification
Benefits of Integrated Manufacturing

1. Mistake-proofing
2. Information Gathering
Information Gathering

What information is important?

- Order Completions
- Material Consumption
- Runtime and Downtime
- Good and Scrap Production
- Production Rate
- Data “Dimensions”:
  - Machine
  - Shift
  - Operator
  - Order
  - Material
  - Profile
  - Punching
  - Coil
Information Gathering

Productivity Information Used to:
• Manage Operations Staff
• Make Capital Spending Decisions
• Direct Maintenance Efforts
• Improve Scheduling
• Evaluate Vendor Performance
• Support Continuous Improvement

Management Buy-in is Critical!
Information Gathering

OEE – Overall Equipment Effectiveness

- Total Time
  - Available Production Time
    - Running Time
      - Max Speed
        - Actual Speed
          - Speed Loss
            - Total Footage
              - Good Footage
                - Scrap
                  - Actual Production
                    - Unrealized Capacity
  - Scheduled Down Time
    - Unscheduled Downtime

- Availability %
- Speed %
- Yield %
Information Gathering

Best Practices to View & Analyze Data:

- Drill-Down Reports from Summarized to Detailed
- OEE Charting Over Time
- Pareto Analysis
Benefits of Integrated Manufacturing

1. Mistake-proofing
2. Information Gathering
3. Increased Capacity
Increased Capacity

- Metal Buildings Industry
  - Runtime Percentages between 20-30%
Increased Capacity

7 Hrs (420 min) x 20% Runtime = 84 min
   84 min x 225 fpm = 18,900 ft

25% Runtime Increase = 21 min
   105 min x 225 fpm = 23,625 ft

20 sec per 10 keystrokes (500 keystrokes/shift) = 1000 sec
   1000 sec / 60 sec = 17 min

Downloading Orders = Potential 20% Runtime Increase
Financial Impact of Capacity Increases

7 hrs/day, 240 Working Days = 1680 hrs
225 fpm Throughput Rate
2% Scrap
$1.00/ft Material Cost, $1.60/ft Net Selling Price
$15/hr Total Labor Cost (fixed regardless of output)

20% Availability
95% Speed
98% Yield

OEE = .20 x .95 x .98 = 18.62%
Output = 1680 hrs x 225 fpm x 60 mph x 18.62% = 4.2 Million Feet of Good Product
Financial Impact of Capacity Increases

Before Improvement:
OEE = 18.62%
Output = 4.2 Million Feet

After Improvement:
OEE = 23.28%
Output = 5.3 Million Feet

25% Improvement via Availability = 21 min/shift
≈ 2 mins/coil change

After 20% OEE Improvement:
Output Increase = 1.1 M Feet
Incremental Profit = $660K
Benefits of Integrated Manufacturing

1. Mistake-proofing
2. Information Gathering
3. Increased Capacity
4. Flexibility
Flexibility

**Low-Cost Customization**
- Centralized Part Libraries
  - Punching Patterns
  - Trim Profiles
- Bundling
  - Tickets Printed Based on Actual Production
- Marking
  - Print Messages that Change Per Part

**Dynamic Scheduling**
- Push or pull
- Easy, On-The-Fly Adjustments
- Anticipate Problems While Time Exists to Make Corrections
Benefits of Integrated Manufacturing

1. Mistake-proofing
2. Information Gathering
3. Increased Capacity
4. Flexibility
5. Policy Enforcement
Policy Enforcement

• Procedures Set by Software and Machine Events
  – Automatic Prompts for Data
  – Sequence of Events Enforced by Software

• Inventory Management
  – Material-to-Job Validation Based on Coil Number
  – Tight Control and Auditing Reduces Theft

• Quality Audits
  – User-defined Audits Triggered by Time, Runtime, Coil Changes, Part Count, etc.
  – Machine Shutdown if Not Completed
## Scope of CIM for Roll Forming Production:

- Download Production
- Upload Completions
- Manage Part Specifications
- Track Coil Usage
- Enforce Material Selection
- Record Scrap Generation
- Record Downtime
- Track Machine & Operator Performance

- Coordinate Related Equipment
  - Machine Setup
  - Part and Bundle Printing
  - Packaging Equipment
  - Barcode Data Entry
  - Preventative Maintenance
  - PLC Communication
Summary

• Direct Benefits
  – Fewer Mistakes, Higher Output, Greater Flexibility

• Indirect Benefits
  – Use Data to Direct Cap Ex & Management Focus

• Competitiveness
  – Customer Retention
  – Expanded Capacity and Faster Turn Around to Attract New Customers

• Slow Times are Ideal to Implement Integration
AMS and CIM

- Over 20 Years Experience Integrating Roll Forming Operations
- XL200 Series Controller for Roll Forming Machines
- Pathfinder Controller for Folding Machines
- Eclipse Production Management System