

# Computer Integrated Manufacturing

## Benefits and Application for the Roll Forming Industry

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AMS Controls



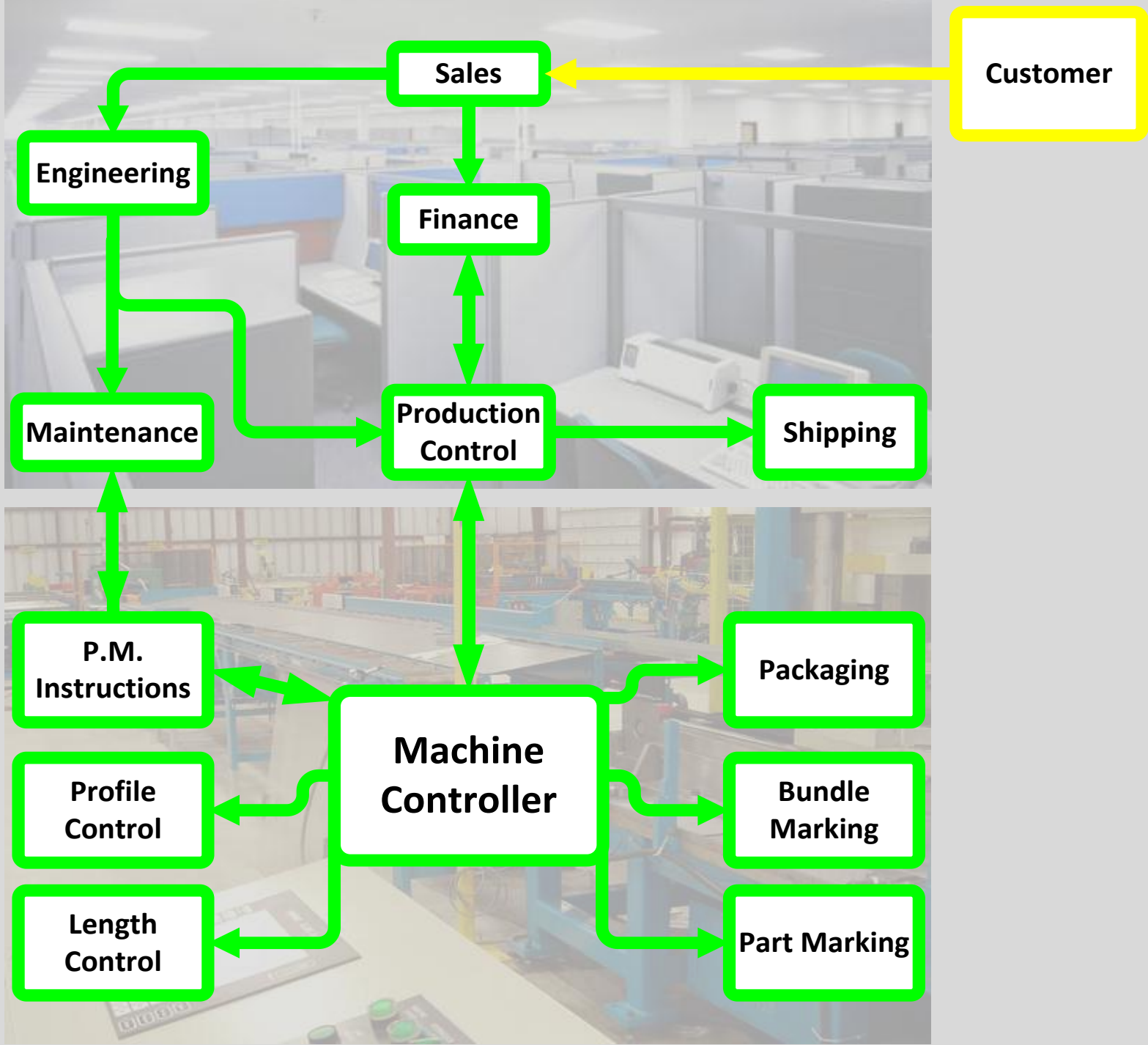
# Computer Integrated Manufacturing (CIM)

- 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

**Customer**

**THE OFFICE**

**THE SHOP FLOOR**



# 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



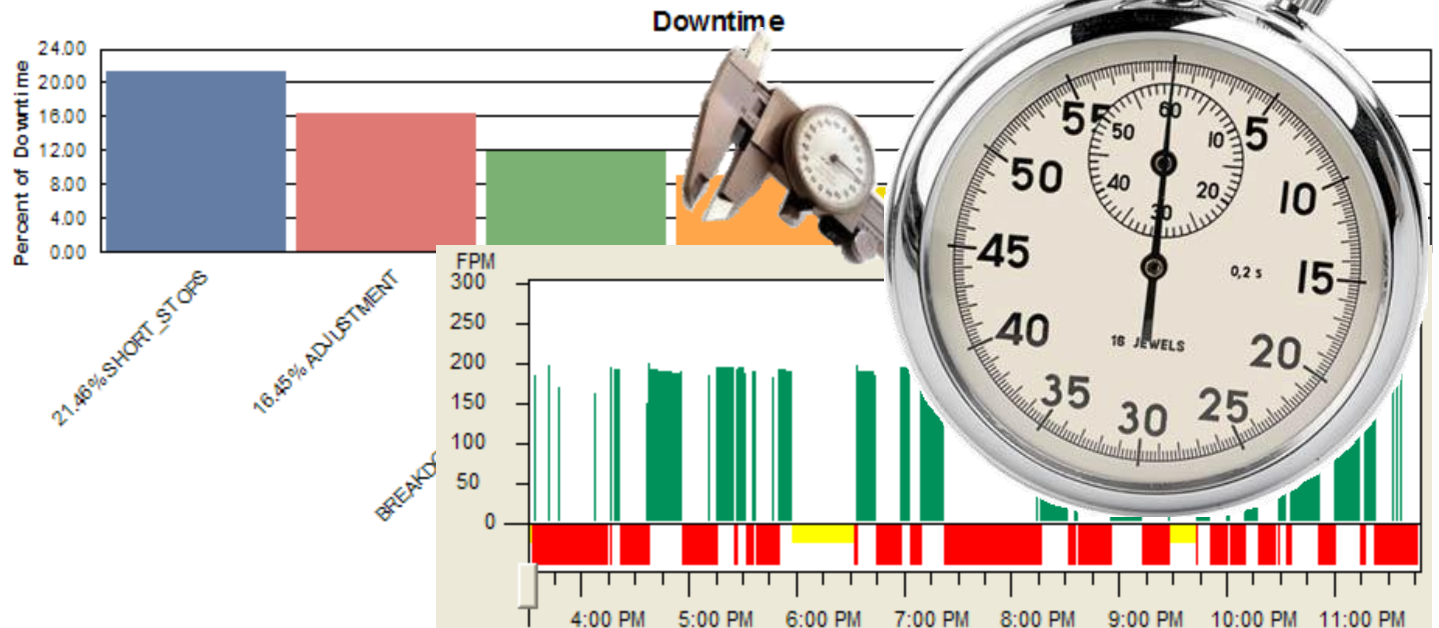
# Mistake-Proofing

## 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:

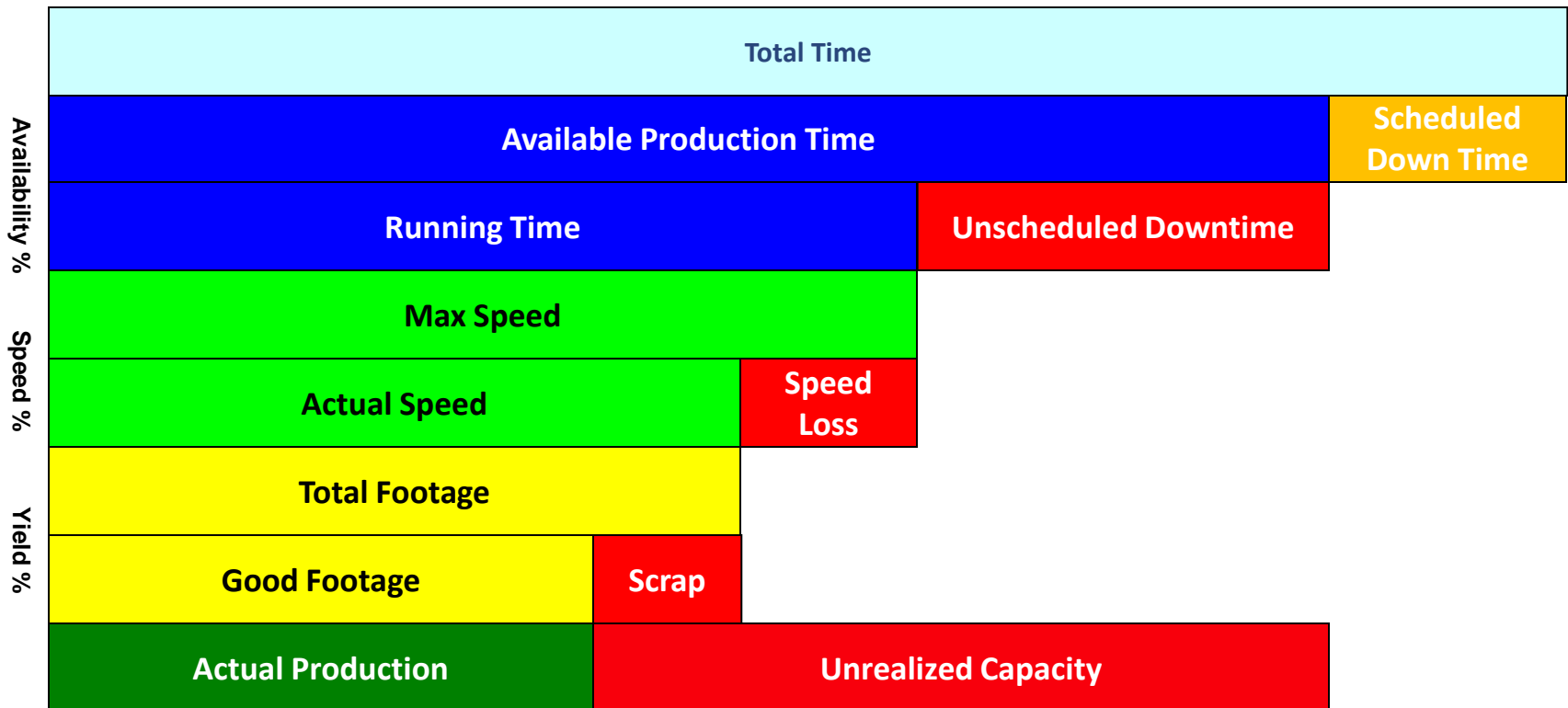
- Manage Operations Staff
- Make Capital Spending Decisions
- Direct Maintenance Efforts
- Improve Scheduling
- Evaluate Vendor Performance
- Support Continuous Improvement

***Management Buy-in is Critical!***



# Information Gathering

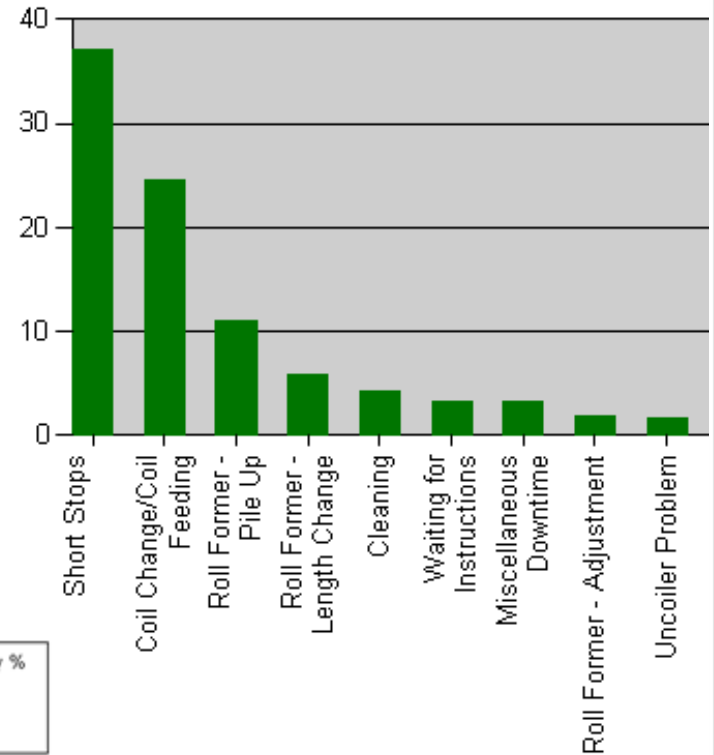
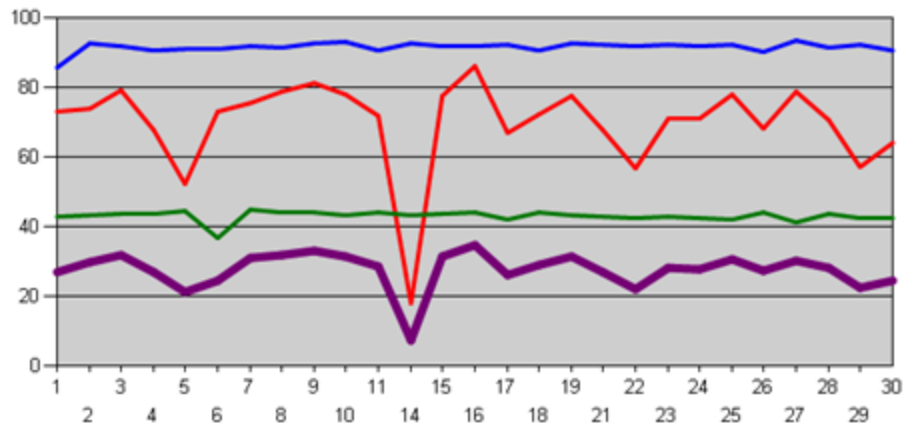
## OEE – Overall Equipment Effectiveness



# Information Gathering

## Best Practices to View & Analyze Data:

- Drill-Down Reports from Summarized to Detailed
- OEE Charting Over Time
- Pareto Analysis



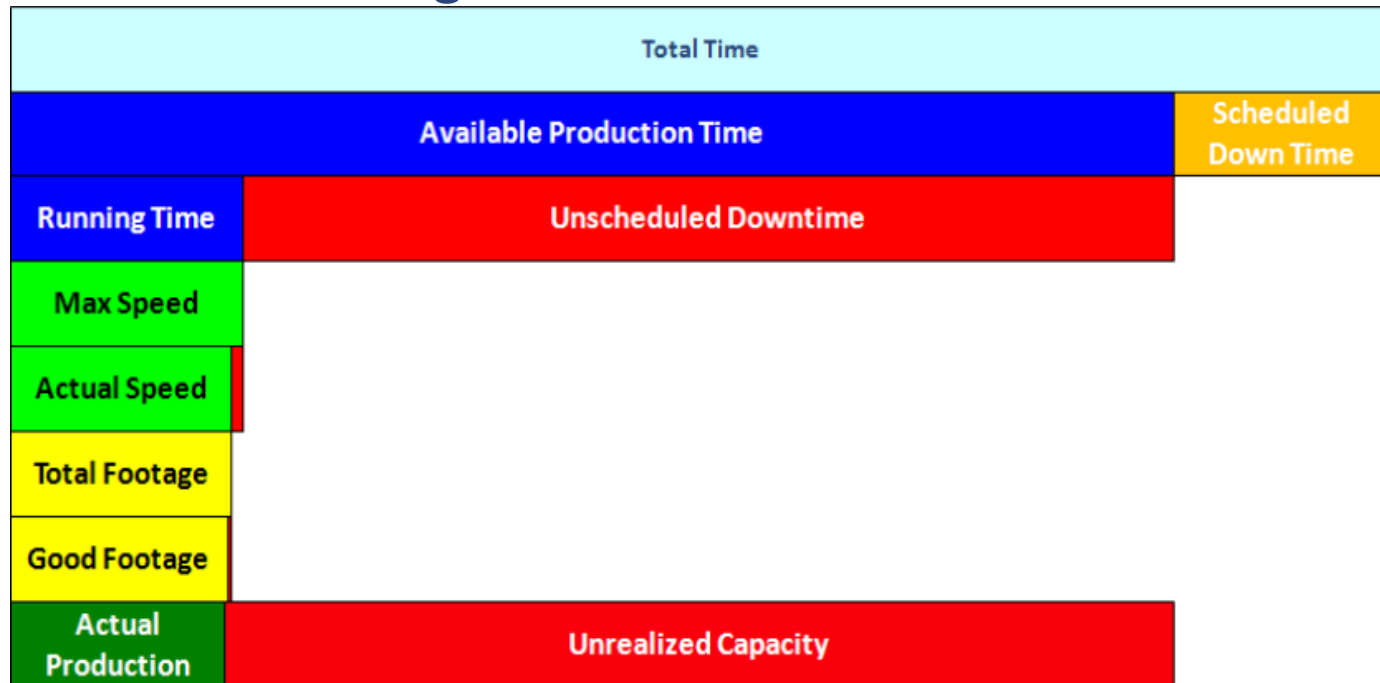
# Benefits of Integrated Manufacturing

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

$$\text{OEE} = .20 \times .95 \times .98 = 18.62\%$$

95% Speed

$$\text{Output} = 1680 \text{ hrs} \times 225 \text{ fpm} \times 60 \text{ mph} \times$$

98% Yield

$$18.62\% = 4.2 \text{ Million Feet of Good Product}$$

# Financial Impact of Capacity Increases

Before Improvement:

OEE = 18.62%

Output = 4.2 Million Feet

After 20% OEE Improvement:

Output Increase = 1.1 M Feet

Incremental Profit = \$660K

After Improvement:

OEE = 23.28%

Output = 5.3 Million Feet

25% Improvement via Availability = 21 min/shift

≈ 2 mins/coil change

# Benefits of Integrated Manufacturing

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

# Flexibility

## Low-Cost Customization

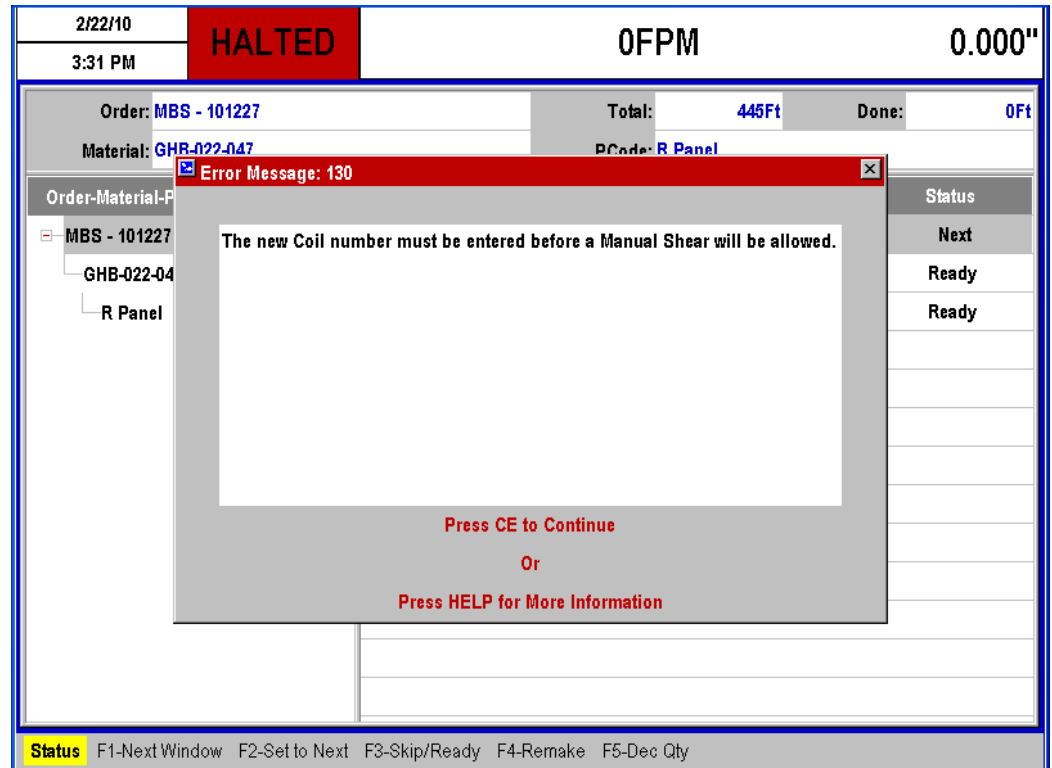
- Centralized Part Libraries
  - Punching Patterns
  - Trim Profiles
- Bundling
  - Tickets Printed Based on Actual Production
- Marking
  - Print Messages that Change Per Part

## 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

