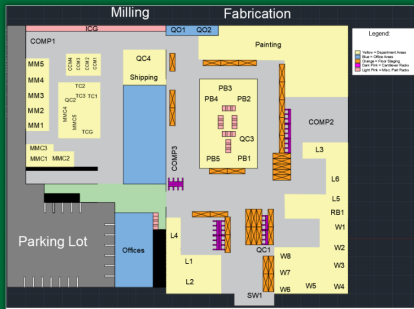


Introduction

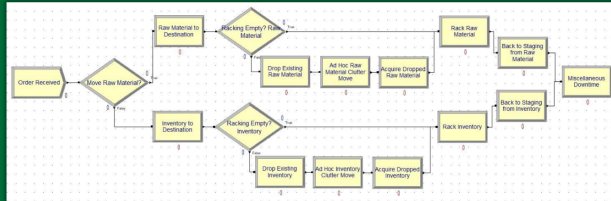
Last semester the team worked with J&L Machine and Fabrication to identify the key areas to improve in order to increase factory efficiency. These areas were determined to be Material Handling, Press Brake, and Welding. The team followed a DMAIC structure to define, measure and analyse time series data taken from observations on the factory floor in order to identify these areas. This semester the team focused on developing and suggesting improvements to help improve these areas.



Factory Floor CAD Model

Based on data analysis gave improvements to improve materials flow:

1. Initial Storage system
2. Color coding materials
3. Inventory Handling
4. Future Scalability



ARENA Materials Process Flow Chart

Materials

Replications: 100 Time Units: Hours

Key Performance Indicators

System Number Out	Average 322
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ARENA Output Before Improvements

Replications: 100 Time Units: Hours

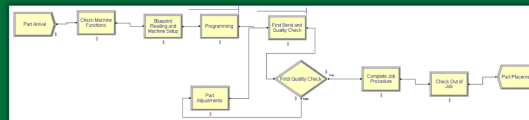
Key Performance Indicators

System Number Out	Average 338
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ARENA Output After Improvements

Month	Color
January	Maroon
February	Red
March	Orange
April	Yellow
May	Olive
June	Green
July	Purple
August	Lime
September	Teal
October	Blue
November	Black
December	Pink

Inventory Color Code



ARENA Press Brake Process Flow Chart

Step	Current Process Time(Minutes)	Process Time after Implementation(Minutes)
System Out(Jobs Completed)	18	27
Blueprint Reading and Machine Setup	48.122	32.246
Complete Job Procedure	46.42	32.844
First Bend and Quality Check	57.6	26.576
Part Adjustment	12.71	31.66
Programming	58.022	27.534

ARENA Output Results

Press Brake

Press Brake Operators - Training Journey Mapping

Area of Development	Training Period	Internal vs. External	Operator #1	Operator #2	Operator #3	Operator #4	Operator #5	Operator #6	Operator #7	Operator #8
Basic Math skills (addition, subtraction, multiplication, division, conversion metric to inches)	4 weeks	External	Done	Need	Need	Need	Done	Done	Done	Need
Proper use of Tools (cutters, files, etc.)	2 weeks	Internal	Done	Done	Done	Done	Done	Done	Done	Done
Basic machine operation (back gauges & RAM movement)	1 week	Internal	Done	Done	Done	Done	Done	Done	Done	Done
Print Reading	6 months	External	Level 2	Level 1	Level 1	Level 1	Level 2	Done	Done	Level 1
Tooling Selection (Top & Bottom Die)	4-11 months	Internal	Level 1	Level 0	Level 0	Level 0	Level 1	Done	Done	Level 0
Tooling installation	3-4 weeks	Internal	Done	Done	Done	Done	Done	Done	Done	Done
Controller operation (setting up the parameters)	3-8 months	Internal	Done	Need	Need	Need	Done	Done	Done	Need
Hands-on Coaching	10-24 months	Internal	Need	Need	Need	Need	Need	Need	Need	Need

Press Brake Operators - Training Journey Mapping

- Mapped out the Current Operator's Abilities to determine areas of improvement and possible training opportunities.
- Developed a Standard Operating Procedure to guide the Press Brake Operators through the process
- Created an Arena Simulation model to represent the process and show the improvements after the implementation.

The two main improvements recommended to the welding department were:

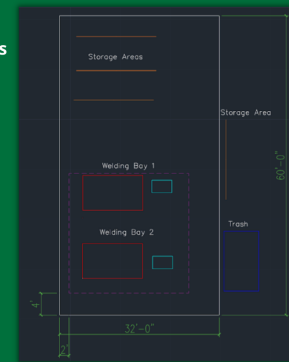
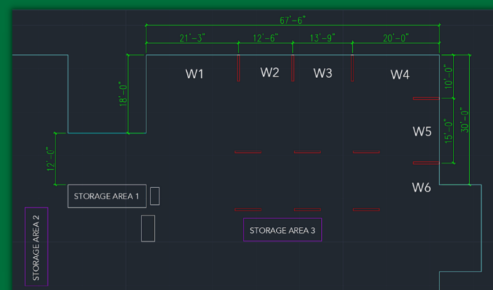
- 1 - Inventory taking
- 2 - Altering the layout

ROW	COLUMN	1	2
1	12/13	12/8	12/8
2	12/17	12/8	12/8
3	10/6	11/8	11/8
4	10/20	12/10	12/10
5	12/16	11/15	11/15
6	12/17	11/17	11/17

Sample inventory showing inconsistency of dates

Welding

Proposed New Welding Layouts



Conclusion

Overall, the team was able to accomplish the goal of identifying and correcting inefficiencies on the J&L factory floor. The next steps of this project would have been to monitor these changes as they're implemented and re-test to compare productivity rates.