Lean Manufacturing Cell Construction

Moog Contacts: Matt Carroll & Brandon Spangler
Faculty Advisor: Evandro Minato
Team Members: Kathline Langenfeld, Brent Schultz, Dylan Michaud, Kevin Shen

VIRGINIA TECH™
SPONSORED BY MOOG

Company

Virginia Tech
Grado Department of Industrial and Systems Engineering

Located in Blacksburg, VA
Durham Hall 197 Learning Factory

Sponsored by Moog

Moog's Radford, VA location
Financing the materials required to build the cell (~$10,000).
Assisted with design and lean concept implementation.

Project Description

Fully manual assembly cell to teach lean concepts.
80 of the same type of tool will be needed.
- Tool is disassembled to start and is assembled through the cell.
- Disassembled parts of the tool will be stored in an inventory warehouse.

Training begins with not optimal workstation layout and process.
- After training, trainees change the layout and process applying lean concepts.

Optimal Layout

U-line.
One piece flow.
Process is spread equally across the stations.

Value

Improve VT ISE Department: Students will be able to learn and apply lean manufacturing concepts in a hands on environment.

Research Opportunities: Faculty will be able to conduct research in a manufacturing facility. For example, using exoskeletons to research human factors or ergonomics.

External Organizations: The facility will be developed to host trainings for organizations to train employees on lean concepts. This can be a source of revenue as similar trainings bring in over $10,000 for a 8-hour training session.

Solution

The design of a Lean cell was created by a collaborative effort with Moog, VT ISE department, Volvo, and the HTW Berlin Learning Factory.

Workstations

Six total workstations: four 3-ft wide, two 5-ft wide.
Five-foot wide allows the possibility to add 2 people to the workstation.

Product

A tool was decided by an analysis of six alternatives.
A multi tool was determined best based on project constraints and needs.

Inventory Warehouse

The tools will be stores disassembled in an inventory warehouse.
The warehouse holds the volume of 80 multitools.

Inventory Carts

Four inventory carts.
Will be used in the suboptimal layout -- batch flow -- to move WIP from one station to the next.

Bins

Measured volume of each part of the disassembled tools.
Three different bin sizes were chosen to store at least 20 parts per bin.

Disassembly Station

Prototype design was too big (5 ft wide, 5 ft deep) for the decided tool.
Will be used as disassembly station.

Future

Cell designed with future improvements in mind.

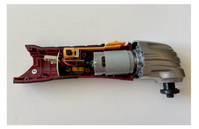
Mobile Robot (MiR 100) being implemented for material handling.

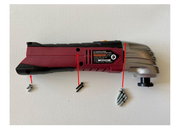
Potential improvements:
Industry 4.0, Automation, Digitized SOP

Standard Operating Procedure

An optimal and suboptimal standard operating procedure (SOP) for assembly of the multi tool was completed.

	Station	Duration
1	Apply tool head and screw motor to silver top	0:55
2	Place motor and switch, close casing	1:00
3	Screw 2 body screws and 1 head screws	0:50
4	Screw 2 body screws and 1 head screws	0:50
5	Screw 2 head screws, battery and test	0:45





Acknowledgements

Company Contacts: Matt Carroll and Brandon Spangler
Moog: Dan Arrington
Faculty Advisor: Evandro Minato
VT ISE Contacts: Dr. Jaime Camelio and Matt Earnest
HTW Berlin Learning Factory Contact: Ute Dietrich
Researchers: Robert Velasco, Ricardo Gonzalez, Divya Matthews, Felipe Matamoros