

Matters of Process

Introduction: In manufacturing and engineering, revision is constant and necessary in order to improve efficiency. Efficiency in machining, assembly, packing, and planning keep a company competitive in terms of price and able meet the market demands of the customer. In this project we will work to create an effective process to create a product for the consumer. Because the processes in manufacturing are iterative and endless with the need for constant improvement, we will complete the manufacture of the product initially as a test and again as an improved process.

Materials:

Lego Sets (one per group)
Design documents for manufacture
Part bins for individual Lego parts
Bags or boxes for shipping
Cellophane tape
Engineering Notebooks

Procedure:

The students will be working in teams of 3 or 4 per group in order to devise a method of creating and packaging a product for shipment to the customer. There is a competitive component to the project in order to see which team has the fastest production method. Upon completion of the activity, each group will present a formal document which will outline the process along with revisions made along with a diagram or flowchart that describes their methods.

Day 1

- 1) Form the groups in the class.
- 2) Set up work stations or tables for each group to organize around.
- 3) Each group should study the plans and write a draft of their ideas on how to accomplish the production task. (12 minutes)
- 4) Each group will be given one example of the final product to disassemble and reassemble in order to identify strategies and concerns for production. (5 minutes)
- 5) Groups will be given time to formalize a production process with a flowchart and procedural instructions for the assembly. (5 minutes)
- 6) Groups will organize their manufacturing space for the initial timed trial.
- 7) First trial. 7 minute time given for students to complete the production of the product. Students should count the number of completed products and document their number. Each group will then be given the opportunity to pull out any of the defective products as part of quality assurance. Then calculate the amount of time it took each group to produce a product that is ready for sale.
- 8) Each group may go around to inspect the other groups to call into question any of the products that may not pass quality standards. Any product called into question will be inspected by the

instructor. If a defect is found, the group will be penalized by 2 finished parts and will then need to recalculate their average part production time. (10 minutes)

Day 2

- 1) Each team will begin meeting and discussing the process from Day 1.
- 2) A revised production procedure should be developed and documented along with revisions to the flowchart or diagram of the production process. (15 minutes)
- 3) Set up the workspace for the Second Trial.
- 4) Second Trial. (7 minutes) Repeat the trial process from Day 1.
- 5) Upon completing the activity, the students will determine a winning process design based on production speed, product quality, and repeatability.
- 6) Each group should create a formal document which describes the process and its revisions along with a reflection on manufacturing process and process iteration.

Closure:

Regroup the students to change the team members and have each new group discuss the pros and cons of their teams work. Each student will then write a reflection integrating their understanding of manufacturing processes and try to identify an industry where this process is utilized.