

Lean Manufacturing Improvement Project

Identify and remove motion, waiting, transportation, and over-processing waste from a workcell.

Customer Lockwood Aerospace Manufacturing	Department Lean Operations	Difficulty Advanced	Time 2-3 class periods
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Production Goal: Reduce waste and improve verified cycle time by 15%.

Background

Lockwood Aerospace Manufacturing meets quality requirements but uses more time and motion than necessary. Your team will complete a Lean observation, collect baseline data, and implement a software improvement supported by evidence.

Learning Objectives

- Recognize common forms of manufacturing waste
- Create current-state and future-state process maps
- Measure cycle time and value-added time
- Implement and verify an improvement

Equipment

- VEX CTE Workcell
- Current production program
- Stopwatch
- Process-map template or paper
- Spreadsheet
- Engineering notebook

Student Instructions

- 1 Observe five cycles without changing the program.
- 2 List examples of motion, waiting, transportation, defects, and over-processing.
- 3 Create a current-state process map with times for each step.
- 4 Mark which steps directly add value for the customer.
- 5 Select one software change that removes or reduces waste.
- 6 Predict the expected time savings.
- 7 Implement the change and run ten verification cycles.
- 8 Create a future-state map and calculate percent improvement.
- 9 Prepare a two-minute improvement presentation.

Engineering Requirements

- Identify at least four examples of waste
- Implement at least one software improvement
- Improve average cycle time by at least 15%
- Maintain product quality and safety

Constraints & Safety

- Do not remove required inspection or safety actions
- Change one major variable at a time
- Use measured data rather than opinion
- No hardware purchases

Deliverables

- Waste observation sheet
- Current/future process maps
- Updated code
- Before/after data and graph
- Improvement presentation
- Reflection

Reflection Questions

- 1 Which step added the least customer value?
- 2 Did removing a wait create a new risk?
- 3 How did the future-state map change?
- 4 What improvement would require hardware?

Engineering Support

Engineering Tip

Lean improvement removes non-value-added work while protecting quality, safety, and customer requirements.

Common Mistake

Treating every wait as waste can remove a wait that is actually required for sensor stability or safe motion.

Stretch Goal

Calculate estimated annual hours saved if the improvement runs 1,000 cycles per week.

Career Connection

Lean specialists and industrial engineers lead kaizen events that reduce waste and improve flow.

Before You Submit

- Notebook evidence included
- Requirements checked
- Testing documented
- Reflection completed