

Group M1.02 – Athena Tooling Team

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 Bill Johnson - Sponsor



Project Background

- Athena Manufacturing provides precision machining, fabrication and mechanical assembly services for a wide variety of products and industries.
- Many of Athena's products are cumbersome welded tubular frames presenting work holding and employee safety challenges during product realization, especially during final assembly.

Problem Statement

- Athena needs a **tooling system** for welded tubular frame assembly to remove safety challenges while boosting flow and efficiency in their continuous improvement lean manufacturing environment.
- The frames moving through Athena's factory vary widely in size, weight and complexity.
- Manufacturing rates also vary widely ranging from a few a week to over 100 per week.
- Athena has never implemented a proper **tooling system** to aid assembly efforts – technicians often work on the floor.

Deliverables

- Conduct time/motion studies of existing assembly operations.
- Evaluate current frames moving through Athena's assembly work centers.
- Conduct manufacturing engineering analysis with goal of 20% reduction in direct labor frame assembly cost while eliminating all safety-related challenges;
- Prepare design schedule with costs to evaluate **tooling system** feasibility, such as prototype proof-of-concept followed by formal design, documentation and critical review in front of Athena upper management.

Chamber Lower Frame (CLF) Tooling System



CLF Assembly Tool:
Current



CLF Assembly Tooling System:
Proposed

- The Current CLF assembly labor: 60 minutes with workplace safety challenges.
- Expected CLF assembly labor with new **tooling system**: 45 minutes without safety challenges – 25% improvement.
- Expected labor cost savings with **tooling system**: \$580/week at current CLF production rate; \$1,650/week at historical max rate.
- With same direct labor, potential CLF revenue increase with **tooling system**: \$16k/week; \$48k/week at historical max rate.
- The suggested **tooling system** provides vertical mobility and rotational movement along the horizontal axis for tubular frames mounted on the universal stand.
- Interchangeable head pieces enable effortless adaptation for use with various frames.

Tooling System Features:

- Safe and rigid workpiece manipulation – Universal Stand features up/down vertical movement and horizontal axis rotation – quickly adjust workpiece orientation to maximize product flow and quality in Athena's lean & continuous improvement environment.
 - Super-rigid Rotating Head locks in position offering safe and easy access to all sides and features on the workpiece.
- Quick interchangeability between different products with easily switched Mounting Spiders.
 - Safe and rigid work holding while offering optimal manipulation during assembly.

Team Members



Athen Tooling Team

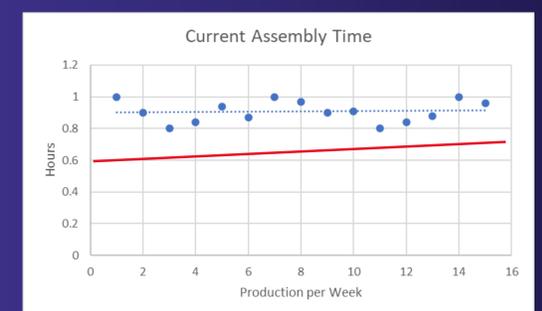
Team ~ Benicia Cooper, Tracy Hall, Samuel Alvarez, Brandon Noria.

Sponsor ~ Bill Johnson.

Subsequent Tasks

- Objectives include finalizing dimensions, initiating fabrication, and conducting testing.
- Focus on evaluating the **tooling system's** impact on assembly time, costs, and ergonomics.
- Initiate Lean Manufacturing Principles.

Engineering Economics



A 25% enhancement will reduce labor time from 60 to 45 minutes, resulting in a weekly savings of \$580 in labor costs. This introduces a new outlook projection at the Red Line.