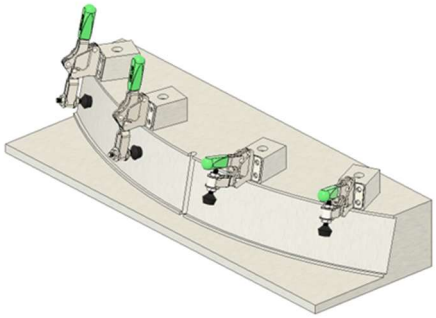
CENTER FOR MANUFACTURING SUPPORT
JACKSONVILLE STATE UNIVERSITY

Success Story: Hybrid Manufacturing Fixture for TIG Welding

Customer Challenge



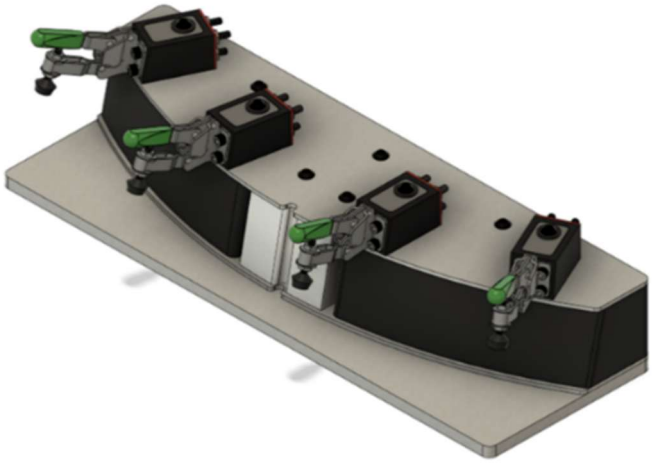
Alabama Specialty Products contacted the CMS to produce an aluminum fixture used to TIG weld flat rings tapered at a complex angle. The part was large, about 20 inches long, 8 inches wide, and 5 inches thick. Traditionally, this would require purchasing a thick aluminum blank and CNC machining it, but this approach posed significant challenges:

- **High Cost:** Material, tooling, and work holding expenses would have been prohibitive for manufacturing just one part.
- **Manufacturing Risks:** Machining such a large block of material carried a high risk of errors, wasted time, and scrap.

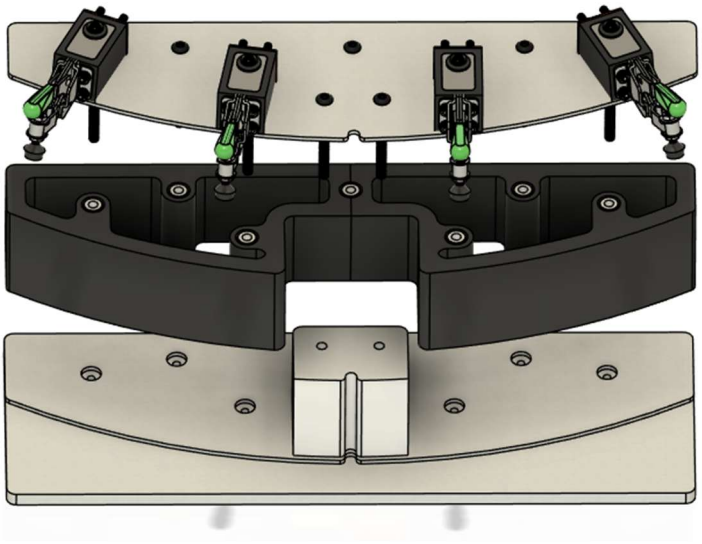
This is a common issue in manufacturing, companies often request full CNC solutions without realizing that modern hybrid approaches can reduce cost, material waste, and risk.

CMS Solution

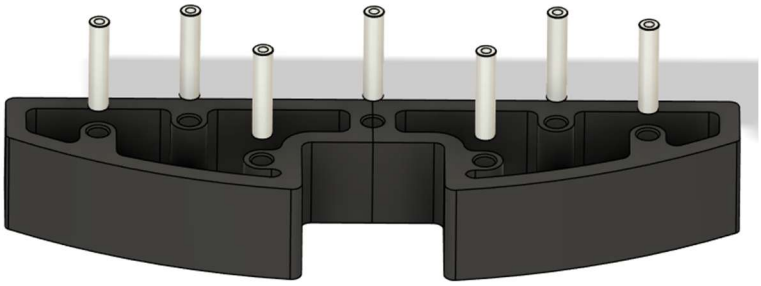
The CMS redesigned the fixture design to combine additive and subtractive manufacturing, resulting in a cost-effective and reliable hybrid solution.



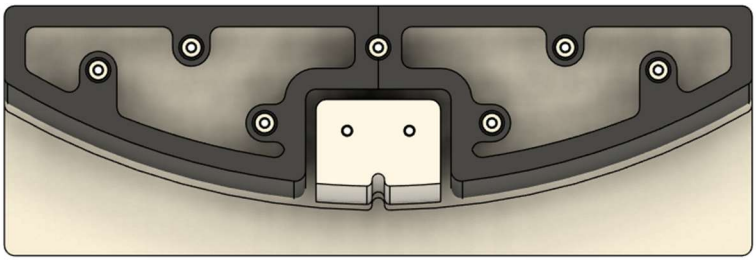
- **Hybrid Structure:** Used easy-to-cut aluminum plates to capture a Markforged Onyx FR Additively Manufactured component.



- **Built-In Rigidity:** Incorporated standoffs within the print for added structural strength.



- **Thermal Protection:** Designed a smaller, machined aluminum insert at the weld point to absorb heat and protect the thermoplastic. An air gap was also incorporated to further reduce the heat affected zone of the Onyx FR.



Results & Impact

- **Cost Savings:** Final fixture cost was **$1,331**, compared to double or triple the cost with a traditional CNC-only method.
- **Lower Risk:** Avoided tooling and work holding challenges, while reducing the chances of expensive machining errors.
- **Efficiency:** Combined processes allowed for quicker production and reduced material waste.
- **Innovation Showcase:** Demonstrated CMS's ability to apply modern hybrid manufacturing solutions where traditional methods fall short.

Student Engagement

Under the direction of CMS Engineer's, student workers from Jax State's Department of Applied Engineering played a hands-on role in this project, including:

- Redesigned the fixture for a Hybrid Manufacturing method using Markforged DfAM framework.
- Used Markforged' s manufacturing workflow to produce industry ready components on their state-of-the-art FX20 system.

This collaboration gave students exposure to real-world hybrid manufacturing applications while providing Alabama Specialty Products with a cutting-edge solution.

Customer Feedback

ALSPI

"The CMS helped us rethink our approach. Instead of a costly, high-risk CNC job, they delivered a smart hybrid fixture that saved us time and money while still meeting our needs. The involvement of students shows the future of manufacturing is in good hands." – Alabama Specialty Products Representative

Ready to upskill your workforce?

For companies interested in expanding their workforce skills, the CMS also provides Markforged composites and metals certification training.

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