

## CASE STUDY

### Capo Bar & Yoke



*A 2025 Award of Distinction Winner in the Hand Tools/Recreation category for metal additive manufactured components*

**Process:**

Metal Additive Manufacturing (AM)

**Material:**

MIM-17-4 PH stainless steel

**Density:**

99.5% of theoretical

**Hardness:**

38 HRC

**End Use and Function**

The capo is a device that temporarily shortens banjo strings, raising their pitch and allowing musicians to change the key of open-position chords easily.

**Fabrication**

Manufactured from MIM-17-4 PH stainless steel, the capo components are produced in their as-printed-and-sintered state with a relative density of 99.5% and a hardness of 38 HRC. Manufacturing tolerances are tight, with hole diameters held to less than 0.038 mm (0.0015 inch) and an overall yoke profile precision of 0.025 mm (0.001 inch). A slight bending operation shapes the parts, while polishing achieves the required finish. No secondary processing is involved.

**Results**

The capo delivers enhanced design flexibility and significant cost savings—50% compared to traditional machining. All critical components are sourced from a single manufacturing process, allowing for streamlined iterations. The additive manufacturing method also promotes material recyclability and reduces the carbon footprint, making it a more sustainable option for production.



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