PROJECT GOAL: To improve upon current metrology vector bar by implementing ergonomic features and decreasing errors due to human factors.

WHO IS SURVICE METROLOGY?
SURVICE Metrology is a division that is expanding upon the company’s use and expertise with high-end laser-based dimensional inspection equipment, and has established a substantial R&D capability, and is currently working a number of US Department of Defense research grants.

This is SURVICE METROLOGY’s current vector bar provided by METRIS (a partner of SURVICE).

WANTS:
- Ergonomic
- Ease of Use
- Manufacturability
- Aesthetics
- Cost
- Ability to Sell
- Portability

SUBSYSTEMS:
- Handle Grip
- Main Hollow Cylinder
- Tip Holder
- Sensors
- USB interface
- Ultrasonic Sensor (UT)
- Quick Tip Disconnects

Metrics | Target Values
--- | ---
Length of entire Vector Bar | Less than or equal to 12”
Diameter of Vector Bar | Less than 1.5”
Weight of Vector Bar | Less than or equal to 3 lbs
Number of Wire Ports | 1 wire port
Number of Mouse Buttons | 2 buttons
Length between sensors | Less than 6”
Stability of Object | Center of gravity located at the user’s hand
Alignment | 0
Complexity of device | Less than 5 components/subsystems
Assembly Time | Less than 1 minute
Rigidity | 1 mm
Stability | 10 Mpsi
Accuracy of measurement | Greater than 2mm
Cost of Prototype | $10,000

FINAL PROTOTYPE DESIGN DETAILS:
I. Subsystem 1: Handle Grip - Rapid Prototyped, includes holder for co-axial cable, sensor bar cable, USB chip/system, and LED lights for the side of the vector bar.
I. Subsystem 2: Main Hollow Cylinder - Machined out of aluminum, includes space for co-axial and sensor bar cables to be threaded through.
I. Subsystem 3: Tip Sensor Holder - Machined out of aluminum, includes interface for recognition of sensors and room for interchangeable sensor tips.
I. Subsystem 4: Metris’ Mini-Vector Sensor Bar - Purchased from Metris®.

THIS IS UDME’s TEAM 15 FINAL PROTOTYPE DESIGN for SURVICE METROLOGY:

Handle Iterations and Ergonomics

Handmade clay models of handle and button configurations
Converted CAD model to rapid prototyped shape
Modified previous shape and created a new one
Final handle made using fused deposition ABS plastic

Conclusion:
After multiple iterations to our handle and other parts of the design, we have developed a greatly improved vector metrology bar for SURVICE Engineering. The design incorporates new features such as: LED’s, multiple buttons, interchangeable tips, a USB interface, and a tip recognition system in order to make the vector bar more ergonomic and easier for the customer to use. All metrics capable of being measured by our team have been met including the weight. We initially projected the bar to weigh around 3 pounds but our final design is slightly under 1 pound. Having the vector bar weigh only 1 pound allows the user to work longer periods of time with little to no fatigue in their arm and wrist. More iterations may be made in future months after NAVAIR and SURVICE Engineering use our prototype in the field.