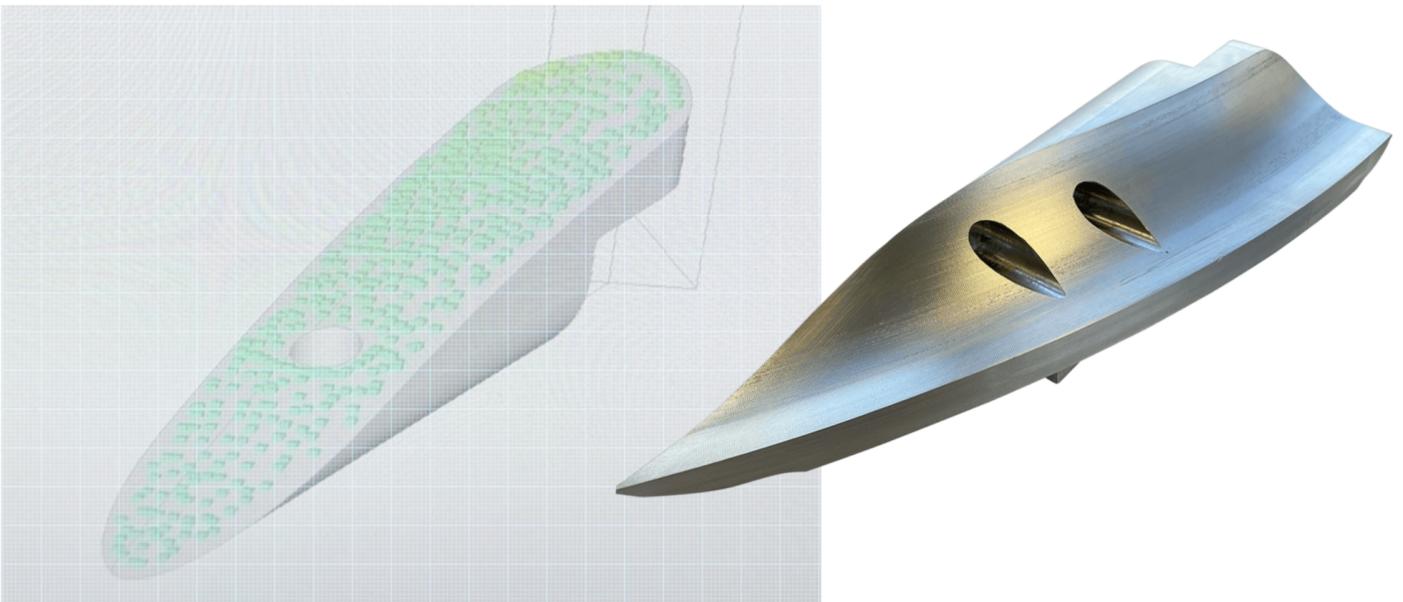


CASE STUDY: CMM CHALLENGE

- **High precision requirement. Tolerance: $\pm 0.05\text{mm}$. Surface finish: 1.6Ra**
- **High-stress environment component**
- **Freeform geometry**
- **Complex design**



Problem

A complex design.

Our client had designed and specified a series of parts that would link together to create a loop; each part needed to be programmed separately. The complex geometry of the parts meant we couldn't use standard CMM or hand measuring to inspect the parts and the high precision requirements necessitated a very tight tolerance.

The complex designs created a further problem for the eventual machining – it would be difficult to grip the billet in the correct place to allow for accurate machining.

Solution

Committed to delivering right first time.

We sourced a CMM add-on (CAD comparison software module) that would allow us to compare measured points to the CAD model which allow us to measure components with complex machine features. The CMM takes a series of probe points on the machined geometry and compares the exact same points on the CAD Model. It then calculates the accuracy of the machining. When complete, the program creates reports to prove the machined surfaces are within specified tolerances.

We planned the production with great care. A programmer, the works manager and inspector viewed the drawing together to assess how to machine the part. We produced a part program using CAD/CAM software (EdgeCam). We then machined the parts on a 5-axis milling machine centre. The items were an awkward shape and we needed to find a way to grip the parts while machining the features. To deal with this, we machined a strip on the billet which we then gripped in a vice. Once the part was near completion, we removed the strip.

The specified material – a high strength, anti-corrosion martensitic stainless steel – was difficult to source, which added to the complexity of the production planning. Due to its scarcity, we ordered a surplus of the material. This allowed us to run a trial before committing to the final manufacture. It also gave us sufficient spare material in case of problems, protecting the client from the possibility of delays.

Result

Once completed and assembled, the client was delighted with the accuracy of the parts and how well they fitted together on the first production.