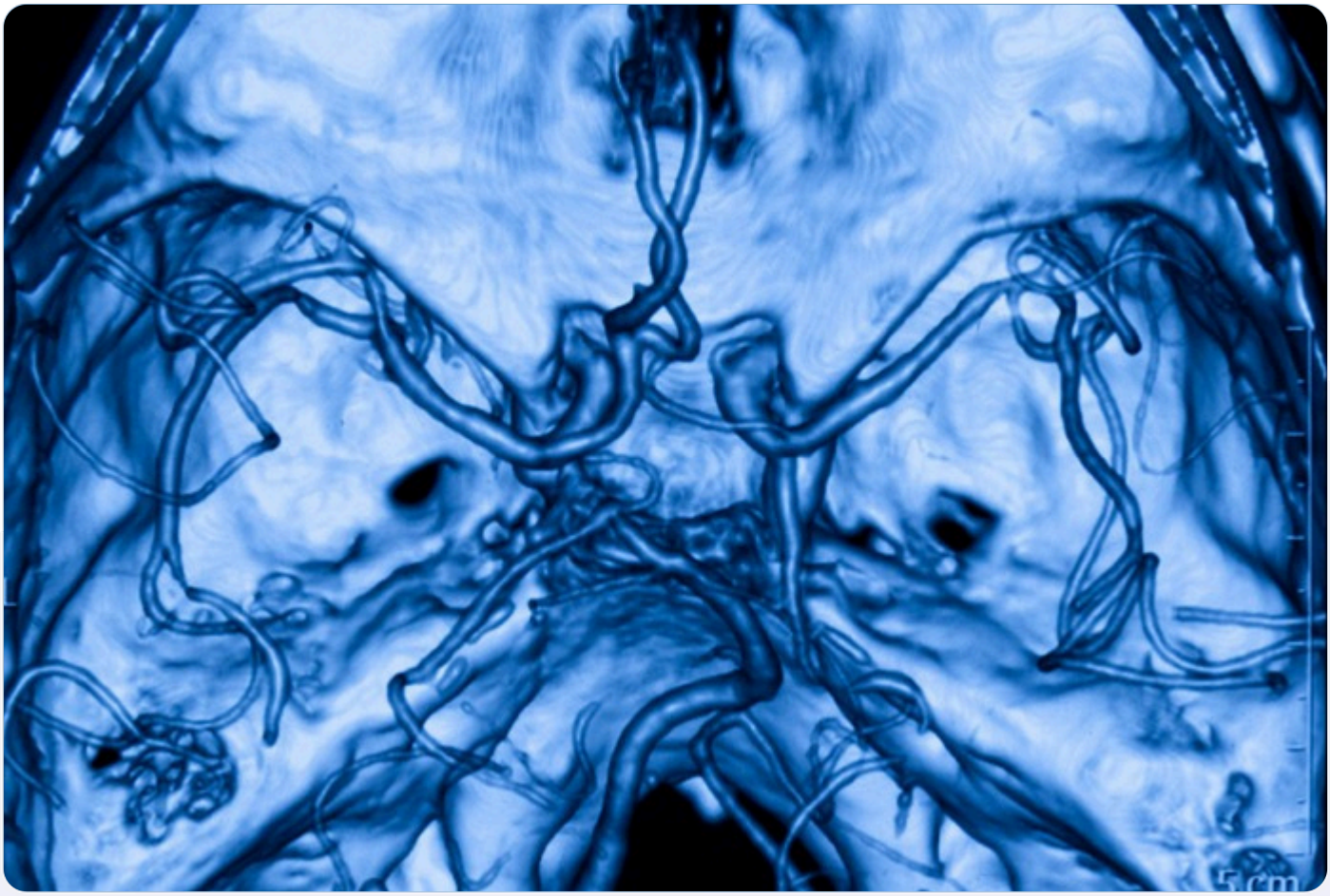
KMM GROUP LTD.

Case Study

Ultra-Precision Machining Speeds High-Tech Medical Innovation



BACKGROUND

A Los Angeles-based healthcare equipment manufacturer opened its doors in 2013 with a brand-new technology that allows providers to access a patient's cerebral blood flow data in real-time, changing the game in the fields of cardiology, neurology, pulmonology, and sonography. Applying robotics and artificial intelligence, the company developed an intelligent cerebral ultrasound device designed to guide diagnosis and treatment, whether in an ambulance or other healthcare applications.

Having worked with this high-tech company in its infancy stages, we knew they struggled to find competent and cost-effective vendors to manufacture the components in this advanced cerebral ultrasound instrument. Ultimately, they decided to partner with an offshore manufacturer for the straightforward parts, reserving the more complex designs for us, a domestic high-tech component manufacturer specializing in ultra-precision machining.

CHALLENGE

Each of the cerebral ultrasound instrument's components featured some degree of complexity, with the tightest tolerance reaching less than 0.001". However, meeting the individual tolerances wasn't our primary challenge – it was achieving the stacking tolerance, or the cumulation of individual tolerances of this multi-component device. If we missed the mark on any parts, the components wouldn't fit together appropriately, compromising the instrument's assembly.

A complex aluminum plate component presented additional challenges because of its intricate design and protruding features. At just over 1/16" thickness, this mini tablet-like component required us to mill much of the material away, stressing and thinning the part. In addition, the material moved during machining, so we needed to devise a solution to achieve correct parallelism and flatness.

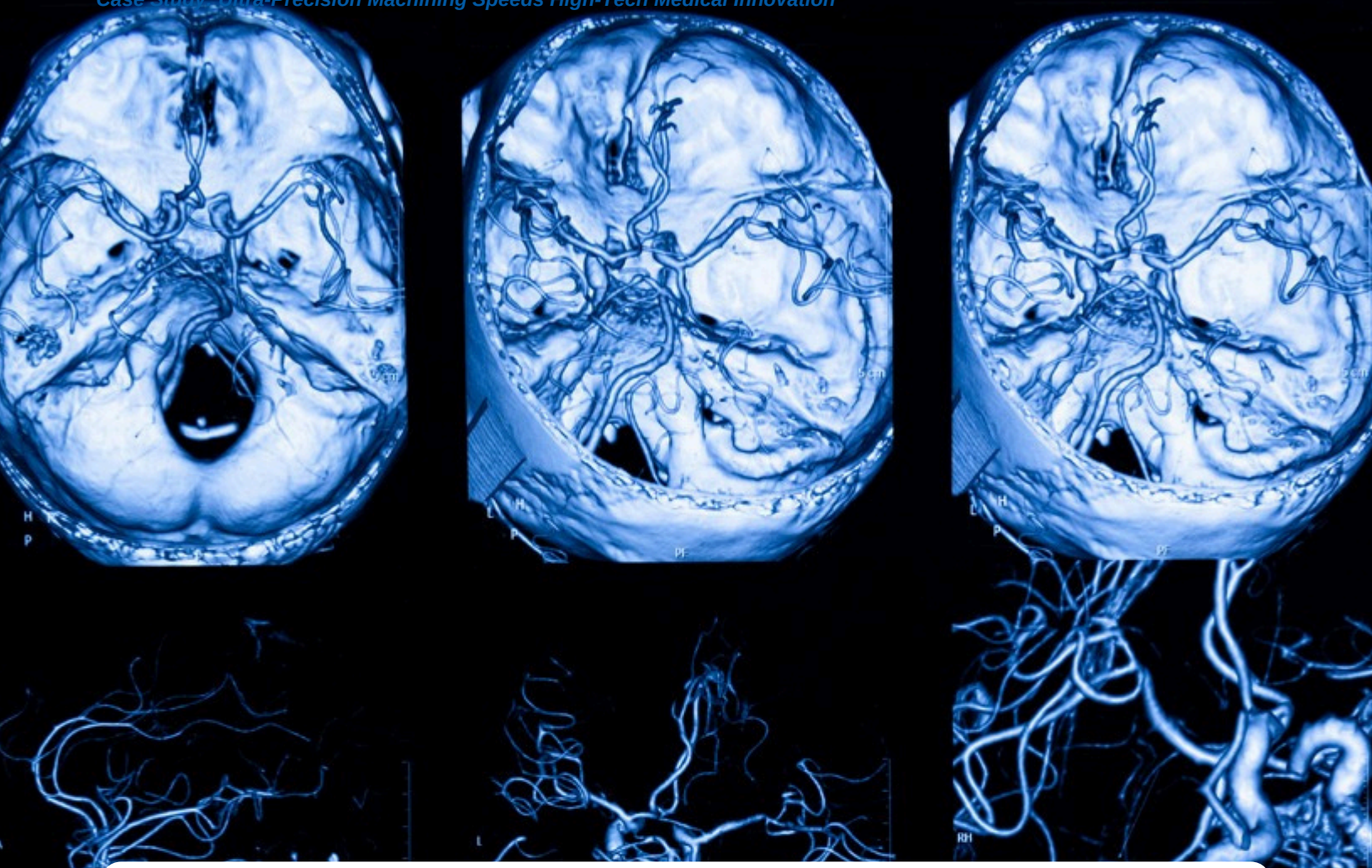
With multiple challenges to solve, this project required in-depth expertise and understanding to develop an effective machining strategy to manufacture our customer's order of 100 units of each component.

SOLUTION

To ensure that all the parts of the cerebral ultrasound instrument would fit together securely and meet our customer's specs, our manufacturing engineering team and shopfloor craftspeople worked full-time for weeks to devise the best approach. Using our design for manufacturing (DFM) skillset, we worked with our customer on flipping a part in the print to its mirror image. This critical design revision would help define the ultimate success of this project.

With our due diligence completed, we determined the secret sauce required to produce the parts, dedicating much of our time to strategizing for the flatness of the plate component, which turned out to require multiple operations on each side while ensuring both were relative. Finally, we deployed our 5-axis milling capabilities, the most complicated ultra-precision vertical milling technique, to achieve highly accurate results on parts with tight tolerances.

Throughout the production process, our customer experience team provided frequent and detailed updates on the component's manufacturing progress, the challenges we faced, and what to expect as the part transitioned from short to long production runs.



RESULTS

After developing a relationship with this healthcare equipment manufacturer in 2018, we successfully produced the components per our customer's timeline, delivering half in early summer 2021 and the other half in winter 2021. Today, approximately 60-80 second-generation cerebral ultrasound instruments featuring the components we machined are hard at work in the field, capturing critical blood flow data in many other healthcare environments.

Thanks to our thorough communication process with direct and frequent access to critical members of our team, we've earned a loyal ultra-precision machining customer that we're proud to call our partners.

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