MACHINE TOOL TECHNOLOGIES

Case Study

MTC Turning Centre Concept

Industry/Sector: Research & Development

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Introduction

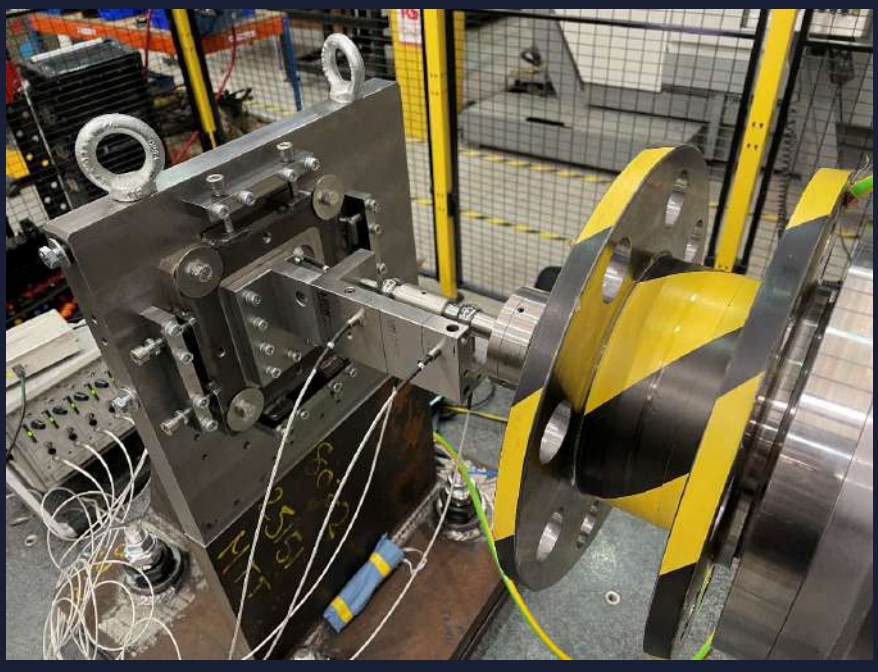
MTT was challenged to design and develop a machining centre with very unusual requirements and a unique architecture. The desired solution was a very high accuracy, 2+2 axis cantilever spindle, with a specified keepout zone.

Challenge / Opportunity

The customer initially challenged MTT to determine if the solution was actually achievable - could this system function to the high accuracy with an extended cantilever spindle?

The customers proposed 2+2 axis arrangement was unconventional, necessitating an extended spindle which introduces a range of interdependent technical challenges.

Following this, a proof of principle and test rig was requested to validate the simulation results and further prove the viability of the proposed solution.



Results And Impact

The solution was proved to be achievable in the virtual world after several design iterations and FEA analysis. The design was then developed and a test rig manufactured to precisely measure the accuracy and repeatability of the machine. The results proved to be significantly better than expected. MTT's design achieved <1 micron level run out, repeatability and spindle droop, tested with above required capacity loads. The project proved that the unique architecture and tight tolerance of the system would be achievable.

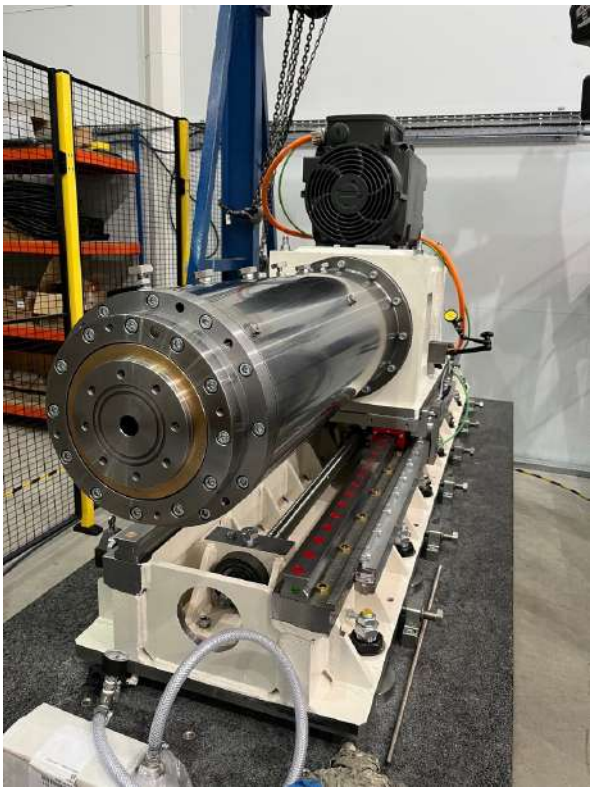
This paved the way for a much larger project for the end customer, allowing them to progress with what was previously viewed as very difficult operation/production process. This solution would not only increase product quality, but greatly increase operator safety and maintainability, whilst significantly increasing the cleanability and material recovery of precious materials.

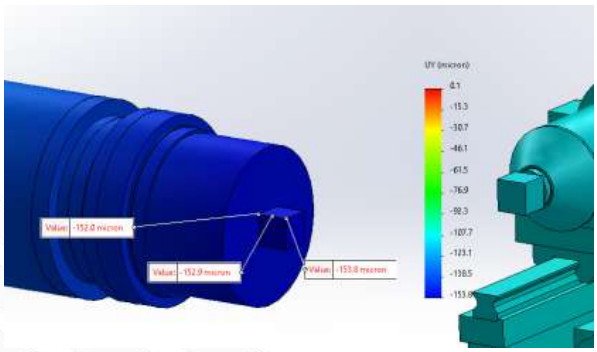
Services or Tools Used in this Project?

MTT deployed a specialist CNC machine tool Design & Engineering Team, including members from multiple electrical, mechanical, controls, manufacturing and specialist spindle design disciplines.

MTT's team worked in close collaboration with the University of Huddersfield's industry leading machine tool research department, who deployed simulation and advanced FEA tools to interrogate the design. Throughout the process MTT's engineering team utilised cutting edge Digital Twin simulation software (Siemens Sinumerik 1), in conjunction with MTT's own M.M.P.S. simulation software, to test design iterations in the virtual environment leading to a "right first time" manufacturing design.

MTT's in house manufacturing & metrology teams procured, assembled, commissioned and conducted the validation testing on the rig, at MTT's dedicated facility in Preston, Lancashire.





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