

Case Study

Retrofit and Rebuild of a Berthiez TMM 315 at Allied Mechanical

Industry/Sector: Aerospace, Oil & Gas

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Introduction

A customer in the United States owned a unique and crucial vertical turning machine from the 1970s, understood to be the largest capacity vertical turning machine on the West Coast of the U.S.A. This machine featured a large diameter rotary table and an additional milling axis. Due to its unique capabilities and size, finding a direct replacement would have been nearly impossible and prohibitively expensive, with estimates around £4-5 million.

The machine's condition raised concerns about its ability to maintain the necessary levels of accuracy and reliability for production. MTT were tasked with conducting a comprehensive assessment of the machine using the MPEOM service and providing a cost estimate for refurbishment of its mechanical and electrical systems and a complete electrical retrofit.

Challenge / Opportunity

The machine faced several significant issues. The control system was outdated and comprised of obsolete technology, while oil leaks were extensive across the machine. There was considerable mechanical wear, and numerous undocumented modifications had been made over the years, utilising a mix of imperial and metric components. Additionally, due to the machine's size, all refurbishment work needed to be performed on-site.

After a thorough evaluation, a detailed refurbishment and retrofit plan was proposed and accepted. The plan included a complete refurbishment of the X and Z axis mechanical drive and guiding systems, along with repairing the hydraulic anti-backlash system on the X axis gearbox. The crossrail gearbox would be refurbished, and the related drives replaced to ensure adequate load capacity. The hydraulic system would undergo a full refurbishment, including the replacement of tanks, valves, controls and pipework, and the counterbalance system would also be refurbished. The pneumatic system, along with all associated pipework, would be replaced, as would the lubrication system. A new oil chiller would be installed, and the machine would receive a cosmetic refit, including a new coat of paint and refurbishment of axis covers.

Electrically, the existing NUM 760 CNC control and Siemens axis/spindle drives would be replaced with a Siemens 840Dsl 720.3 CNC control system and Sinamics axis drives. All axis servo drives, spindle drives, and power switching devices would be replaced. A new operator control station with a pendant housing the new HMI and machine control panel would be installed, along with an HT2 hand pendant for hand-wheel and setting operations. The machine wiring would be completely replaced, including a new electrical cabinet with switchgear, relays, I/O, and wiring. Machine transducers and solenoids would be replaced, and axis measuring devices would be upgraded to absolute Endat encoder/scales to eliminate the need for axis referencing on power-up, reducing start-up times. The safety aspect of the machine would be controlled using the Siemens "Safety Integrated" (SI) option in the CNC control. MTT wrote, tested, installed and commissioned a full new machine software package including CNC control, HMI, I/O and integrated safety. Finally, new electrical schematic drawings would be provided, featuring updated device and wire numbers for easier maintenance and troubleshooting.

Results And Impact

The refurbishment and retrofit had significant positive impacts on the machine's performance and the customer's operations. The integration of modern mechanical and software safety systems ensured vastly improved operator safety. The refurbished and updated systems restored the machine's accuracy to within the required tolerance bands, while the mechanical and electrical updates significantly enhanced its reliability. The new control systems and ergonomic operator interfaces improved the machine's operability. By refurbishing the existing machine rather than replacing it, the project provided a cost-effective solution and reduced environmental impact.

This case study demonstrates the effectiveness of a comprehensive refurbishment and retrofit in extending the life and enhancing the performance of critical manufacturing equipment, offering significant operational, economic, and environmental benefits.

Services Or Tools Used In This Project?

MTT's expertise in machine tool metrology was essential in baselining the machine before and after the retrofit and rebuild project. The metrology led process realized significant improvements, demonstrating the potential to achieve state of the art results without the expense of purchasing new machinery. Given the machine's age, very few drawings were available, necessitating the reverse engineering of components and the production of a new suite of maintenance drawings.

MTT's unique specialist CNC project engineering team provided a full turnkey solution "under one roof" to design, procure, assemble, install and commission the retrofit. The project team comprised highly skilled electrical, controls and mechanical engineers working in conjunction with sophisticated project management, procurement, quality, logistics, installation and commissioning personnel to successfully deliver the £1M+ refurbishment program.





Speak to our professional team
about your next project.

MTT have an extensive certified nationwide team able to support, repair, build and maintain most machine types. We are able to undertake complex projects and retrofit ensuring an increase in profitability and efficient operation.

To talk with one of our engineers or
book a machine assessment

Contact us now on
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