

Addressing Electronic Test / Burn-in Fixture Challenges with 3D Printing

Executive Summary

Established in 1951 and located in Southern California, TRAK Machine Tools (TMT) sells/supports industrial 3D printers and designs/manufactures CNC machine tools. Recently, they introduced a new line of Toolroom Vertical Machining Centers (VMCs) to the machine tool market.

Manufacturing complex machine tools typically requires special tooling and fixturing. So, in order for TMT to build their Toolroom VMCs, they had to first design and build a relatively small number of custom electronic test/burn-in fixtures. These fixtures would be used to hold VMC control display panels during “burn-in” and VMC control sub-assemblies during electrical test.

In the past, TMT would design and build these types of fixtures in their machine shop. On occasion, this would consume valuable machining resources and/or produce heavy fixtures that could also damage machine tool control electronic panels. In order to eliminate these potential issues with the VMC fixtures, TMT decided to fabricate them using 3D printers.

3D printing allowed TMT to:

- Produce multiple fixtures and fixture types in a “lights out” environment
- Considerably reduce the weight of the fixtures making them easier to lift resulting in fewer dropped electronic assemblies
- Practically eliminate re-work of scratched electronic panels by using scratch free 3D printer materials



VMC Control Unit

Challenges

Because TMT has a very capable machine shop, its initial plan was to machine the fixtures in-house. Fixture weight and panel scratching issues could be reduced by machining the fixtures from a non-metallic material such as Delrin. However, it soon became apparent that the fixture designs, whether they be complex single piece designs or designs consisting of multiple assembled parts, would mandate multiple machines and/or multiple machine set-ups that would consume an unacceptable amount of machine shop resources.

Another alternative would have been for TMT to farm the work out. This alternative was turned-down because it would:

- cost more than machining the fixtures in-house using expensive overtime labor
- result in longer lead times
- increase Engineering support costs

TMT's final option was to turn to their in-house 3D printing and service department to see if they could produce the fixtures at an acceptable cost and in a timely manner. This option proved to be the winning ticket.



VMC Control Display Panel Burn-In Fixture



VMC Control Display Panel Burn-In Fixture With Display Panel



VMC Control Combination Burn-In / Test Fixture



VMC Control Combination Burn-In / Test Fixture with Display Panel and Sub-Assembly

How 3D Printing Helped

Fabricating complex holding fixtures for TMT's new line of VMCs proved to be a natural fit for its 3D printing capabilities. As the fixture designs resided in CAD, it was a simple matter to export those CAD files, generate G-code files using 3D printer Slicer software, and print the fixtures. Only one set-up was required per fixture and the printer ran lights-out so minimal labor was consumed. Valuable machine-shop resources were not consumed, and the fixtures were printed from light-weight, low-cost, no-scratch materials.

Conclusion

Although 3D printing is most commonly associated with creating R&D prototypes, it can play a major role in increasing the efficiency of companies that require fixturing and tooling for their operations. TRAK Machine Tools sells, services, and supports 3D printers and therefore has the necessary expertise that you may need to fill your manufacturing needs.

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