



CAM Touches Everything at NCDMM



“We don’t just hand them a program and tell them to push the ‘Go’ button. We show them what we did to create the process, why the various components of it are needed, and we give them training. So maybe next time they won’t need to come to us for something similar. They will be able to do it themselves.”

- Glenn Sheffler, Business Development Manager, NCDMM

The National Center for Defense Manufacturing and Machining (NCDMM), located in Latrobe, PA, has proven time and again that better utilization of existing manufacturing technology dramatically lowers defense-related manufacturing expenses, by improving productivity, reliability, and development cycles.

The Challenge

National Center for Defense Manufacturing and Machining (NCDMM) develops advanced manufacturing strategies to improve the performance of diverse, critical defense-related components, as well as their total cost and lead times.

The Solution

To develop setups and machining sequences for evaluation and refinement, NCDMM relies on Mastercam CAD/CAM software to efficiently generate programs for 2- through 5-axis milling, turning, wire EDM, lasers, plasma cutting, surface/solid machining, and more.

Benefits

- Versatility and ease of use
- Reliable code generation
- Feature rich program reduces need for manual programming
- Many standard tool paths to address advanced manufacturing approaches



- Ready transferability of processes to shops of all sizes

Project Details

The DOD-funded National Center for Defense Manufacturing and Machining (NCDMM), located in Latrobe, Pennsylvania relies on equipment and technology solutions provided by dozens of U.S.-based alliance partners, as well as a proprietary methodology called JUMPED (Joint Ultimate Manufacturing Process & Development), to develop and transfer state-of-the-market and state-of-the-art solutions to specific project objectives. Improved manufacturing processes based on this work have resulted in an estimated savings of \$435 million--a benefit-to-investment ratio of 40:1.

Robust Mastercam software is important to the Center's work for two reasons. First, the software creates fast, accurate, and appropriate machining sequences and toolpaths for the manufacturing task. Second, the feature-rich software eliminates or reduces the need for manual programming or for outsourcing to specialists. These software qualities reduce development costs and shave weeks or months from process development cycles. In addition, CNC software has continually upgraded its product over the years to meet the requirements of the new and emerging machining technologies, which are used in almost every project NCDMM undertakes. Some examples include:

Excalibur Armament Actuator

Picatinny Arsenal's Armament Research, Development and Engineering Center's (ARDEC) Prototype Manufacturing Team asked NCDMM to develop a manufacturing process to improve productivity and reduce the manufacturing costs of Excalibur 155mm Artillery Projectile armament actuators. This project relied on Mastercam software to create programs for manufacturing the fixtures and refining manufacturing processes, particularly on the 5-axis mill. Dozens of standard Mastercam features trim minutes off various steps throughout the process.

Mini Cruise Missile

A new Mini Cruise Missile design requires improved fuel efficiency to increase the weapon's range and/or payload capacity. Much improvement relies on replacing a standard compressor with a new, custom-designed compressor. NCDMM developed a manufacturing process for this small, intricate, single-piece component. Manufacturing the compressor requires very complicated 5-axis programming. Just following each of the 26 delicate (0.020" thick), closely spaced vanes without nicking others is a challenge. Mastercam provided toolpath engines ideally suited to such tasks.



Monolithic Air Frames

Monolithic airframe sections can eliminate stresses produced by conventional manufacturing processes, which require the drilling of aluminum sheet and angle stock for the insertion of rivets. NCDMM manufactured single-piece airframe sections from 2' x 4' blocks of 7050 aluminum weighing about 400 lbs each. When machining was completed, the finished pieces weighed just 6 lbs. Three advanced Mastercam techniques--Thin Wall Machining, High Speed Machining and Thin Floor Machining--were used to dramatically minimize the tendency for thin-walled components to curl during the manufacturing process. These procedures resulted in less than .010" corner-to-corner distortion in the airframe sections.

Once NCDMM has developed a viable advanced manufacturing process, the organization goes on to install it in their customers' shops. The customers can then replicate the process and make ongoing improvements as part requirements change and/or manufacturing technology improves. The Mastercam software used in these advance processes gives small- to medium-sized shops access to CAM programming capabilities typically available only in much more expensive software. This affordability is important to NCDMM because more and more second and third tier suppliers now manufacture defense components previously supplied by large, primary contractors.