

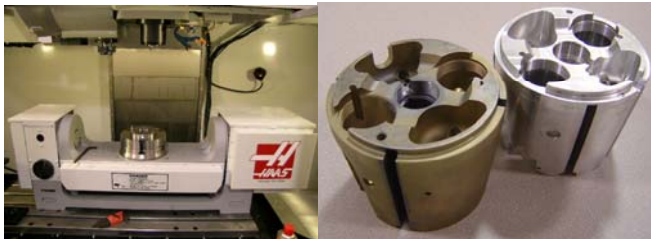
Excalibur Armament Actuator

(National Center for Defense Manufacturing & Machining)

PROBLEM / OBJECTIVE

Picatinny Arsenal's Armament Research, Development and Engineering Center's (ARDEC) Prototype Manufacturing Team was tasked with producing prototype parts and a representative production process for the Excalibur 155mm Artillery Projectile. ARDEC personnel began production utilizing existing equipment at their facility to produce these components. ARDEC's initial run time for the bottom plate was 7.5 hours with six (6) different setups resulting in unacceptable part quality. ARDEC consulted the National Center for Defense Manufacturing and Machining (NCDMM) regarding their assistance in establishing a more efficient manufacturing process for these components.

After reviewing the process and machine tools available, the NCDMM recommended the JUMPED™ (Joint Ultimate Manufacturing Process Evolution and Development) process. The JUMPED™ process is a collaborative initiative that leverages the use of the NCDMM Testing and Development Lab for the performance of complete turnkey projects. Through JUMPED™, comprehensive manufacturing processes are completely developed and verified in the NCDMM Lab by integrating advanced manufacturing technologies.



Haas VF-3 machine tool with rotary tilt table (left).
Processed bottom plate (right).

ACCOMPLISHMENTS / PAYOFF

Process Improvement:

Because of required tolerances and complex features, NCDMM determined 5-axis machining technologies would be required to process components efficiently. NCDMM designed modular fixturing to reduce setups and tailored form tooling with through coolant, to effectively machine special features. CNC programs were developed and optimized to minimize cycle times.

Implementation and Technology Transfer:

During process development, NCDMM engineers determined that a cell-type machine setup would be the most efficient production method. The cell method includes several machines placed in an efficient part-flow path. Each machine has a specific operation with each machine running under the control of one operator. Using three (3) machines to demonstrate the benefit of the cell method, the cell included the 5-axis mill already designated for the process, along with a 3-axis mill and 2-axis lathe already consigned to the NCDMM for testing and development purposes.

Following are the results of the NCDMM implemented JUMPED™ process:

- Reduced setups from six (6) to three (3)
- All required tolerances and critical feature characteristics were achieved
- Processing time reduced from 7.5 hours to 1.5 hours
- No disruption to daily ARDEC Prototype Lab activities

Expected Benefits:

This process is deployed at ARDEC and other DoD suppliers, which results in the rapid fielding of this critical system. The expected cost avoidance is:

- Prototype Build = \$90K
- Low Rate Initial Production = \$5.25M
- Planned Production = \$75M

TIME LINE / MILESTONE

Start Date	November 04
End Date	September 05

FUNDING

NCDMM / Picatinny Arsenal (Cost Share)	\$400K
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PARTICIPANTS

ChipBLASTER Inc.
 Kennametal Inc.
 Faro Technologies, Inc.
 CGTech / Vericut
 Fryer Machine Systems Inc.
 Seim Tool Company
 Haas Automation Inc.