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14. ABSTRACT

Letterkenny Army Depot (LEAD) was recently given the responsibility to machine firing platform weldments for Howitzer. These weldments are used for mounting prototype cannons for test firing. The A36 steel Howitzer weldments are 72 inches wide, 173 inches long and 47 inches high. They weigh approximately 34,000 lbs. each. Since this was a new application for LEAD, they asked the National Center for Defense Manufacturing and Machining (NCDMM) for proven solutions for machining these parts using the most efficient and economical methods possible. LEAD's estimate cost for completing the project using conventional methods was $126,000 and a leadtime of 4-6 weeks.

15. SUBJECT TERMS
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Howitzer Test Firing Platform

NCDMM Project No. 03-0007-09

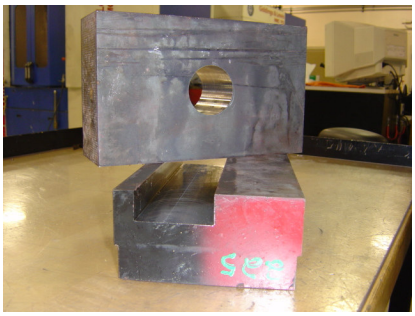
Technical Report

PROBLEM / OBJECTIVE

Letterkenny Army Depot (LEAD) was recently given the responsibility to machine firing platform weldments for Howitzer. These weldments are used for mounting prototype cannons for test firing. The A36 steel Howitzer weldments are 72 inches wide, 173 inches long and 47 inches high. They weigh approximately 34,000 lbs. each.

Each weldment has seven (7) slots machined into the top plate running the width of the platform and sixty-two (62) total holes drilled in to each of the weldments. Moving the parts multiple times during machining or using slow machining processes and technologies would not have been beneficial to the project…nor would scrapping a weldment.

Since this was a new application for LEAD, they asked the National Center for Defense Manufacturing and Machining (NCDMM) for proven solutions for machining these parts using the most efficient and economical methods possible. LEAD's estimate cost for completing the project using conventional methods was $126,000 and a lead-time of 4-6 weeks.



Proof-of-concept with a helical endmill and a DFT drill

ACCOMPLISHMENTS / PAYOFF

Process Improvement

For the slots, a 2-inch diameter indexable helical endmill achieved the rough slot size with only one pass per slot. This would have required 3 passes if machined using conventional methods. One wall of the slot required a finish that was completed with a solid carbide endmill.

For the holes, three different indexable inserted drills were used, a 2-inch Drill Fix Trigon (DFT) insert drill and a 5-inch and 6-inch Holemaking Tooling System (HTS) drills were used to drill through the 4-inch top and side plates of the weldments. This would have taken 3 to 4 times longer using conventional methods.

Implementation and Technology Transfer

The process and tool recommendations were made to LEAD. These types of process improvements are also being applied to other NCDMM projects. Optional cutting parameters were established and supplied to LEAD as well.

Expected Benefit

LEAD's benefits from this successful project include:

- Improved insert grades to allow for higher Surface Feet per Minute (SFM) (from ~130 to 500 SFM)
- Freer cutting tools reduce cutting forces on the machine spindle by 20-30%
- Reduced actual in-cut time for each weldment to less than 8 hours (estimate).
- Achieved a Metal Removal Rate (MRR) of 45-50 in^3
- Increased machine capacity by 16 hours a day (per set)

Based on improved manufacturing process development, application of state-of-the-market tooling solutions, verification of machine tool capacity and capability, and proof-of-concept demonstration of the proposed process, the overall cost of machining these weldments was reduced by $90,000 to $36,000 for a return on investment ratio of 6:1.

TIME LINE / MILESTONE

Start Date.....September 03
Recommendations Made.....October 03

PROJECT FUNDING

NCDMM funding $6K

PARTICIPANTS

NCDMM
Independent Quality Labs
Kennametal Inc.
Letterkenny Army Depot

For additional information concerning this project, contact the NCDMM at www.ncdmm.org