Report Documentation Page					Form Approved OMB No. 0704-0188		
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.							
1. REPORT DATE		2. REPORT TYPE		3. DATES COVE	RED		
15 MAY 2008		Technical, Success	s Stories	24-09-2003	3 to 18-10-2003		
4. TITLE AND SUBTITLE Howitzer Test Firing Platform				5a. CONTRACT	NUMBER		
				5b. GRANT NUMBER			
				5c. PROGRAM E	c. PROGRAM ELEMENT NUMBER		
6. AUTHOR(S)			5d. PROJECT NUMBER 03-0007-09		JMBER		
				5e. TASK NUMBER			
				5f. WORK UNIT NUMBER			
7. PERFORMING ORGANI National Center for Technology Way,L	s,1600	8. PERFORMING ORGANIZATION REPORT NUMBER					
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)			
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)			
12. DISTRIBUTION/AVAIL Approved for publ	LABILITY STATEMENT ic release; distribut	ion unlimited					
13. SUPPLEMENTARY NO	TES						
weldments for How A36 steel Howitzer approximately 34,0 for Defense Manufa using the most efficient	vitzer. These weldm weldments are 72 i 000 lbs. each. Since t acturing and Machi cient and economica	recently given the ents are used for m nches wide, 173 incl this was a new appli ining (NCDMM) for al methods possible. 000 and a leadtime	ounting prototyp hes long and 47 ir ication for LEAD r proven solutions LEAD's estimate	e cannons for aches high. T , they asked t s for machini	test firing. The hey weigh the National Center ng these parts		
15. SUBJECT TERMS National Center for steel Howitzer weld		uring and Machinin	ng; NCDMM; Le	tterkenny Ar	my Depot; A36		
16. SECURITY CLASSIFIC	16. SECURITY CLASSIFICATION OF:			18. NUMBER	19a. NAME OF		
a. REPORT	b. ABSTRACT	c. THIS PAGE	- ABSTRACT <b>1</b>	OF PAGES 1	RESPONSIBLE PERSON		

						l
unclassified	unclassified	unclassified	-	-		ĺ
a. REPORT	b. ABSTRACT	c. THIS PAGE	1	1		ĺ
			ADSIKAUI	ULLER	RESPONSIBLE FERSON	4

Standard Form 298 (Rev. 8-98) Prescribed by ANSI Std Z39-18



# **Howitzer Test Firing Platform**

NCDMM Project No. 03-0007-09



## 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<sup>3</sup>
- 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