

## PROBLEM / OBJECTIVE

Rock Island Arsenal (RIA) is responsible for refurbishing the M119A1 Howitzer. There are a total of two trunnion hubs, one on each side of the cradle ordnance. The cradle ordnance supports the barrel while the trunnion acts as the pivot point to raise and lower the barrel. An issue has developed with the trunnion area of the M119A1 that has led to a design change from a two-piece style trunnion to a one-piece style trunnion.

The initial two-piece trunnion design was a relatively easy manufacturing process that involved turning and roller burnishing. The move to the one-piece trunnion design requires the use of custom-built tooling. Due to the new trunnion design, there are several manufacturing challenges that need to be addressed. The required tolerances eliminate conventional milling as an option. The recommended method to achieve the required round tolerance is turning. The trunnion has several larger diameters in front of the bearing surface diameter. The custom tool needed for this application would provide clearance for these larger diameters allowing the smaller bearing diameter surface to be cut.

RIA designed a tool to achieve the required clearances. During testing, it was determined that this tool would not achieve the required geometric tolerances. RIA requested the help of the National Center for Defense Manufacturing and Machining (NCDMM) to assess the current process and to recommend improvements.

## ACCOMPLISHMENTS / PAYOFF

### Process Improvement

The NCDMM and the RIA team decided to take a phased approach to this project that would allow production to continue on the machine during the development work for the M119 trunnion tool. Phase I involved optimizing the current tooling and processes. Phase II involved developing an entirely new tooling system for the one-piece trunnion component.

With a Phase I solution in place, the NCDMM and RIA personnel enlisted the help of Wohlhaupter Corporation, an industry-leading builder of close

tolerance digital boring heads. Working together, the team developed a completely new tooling solution that addressed all the issues and achieved all required manufacturing tolerances.



M119A1 Howitzer



Trunnion Tool

### Implementation and Technology Transfer

Early in the M119A1 project there were concerns that the new one-piece design could not be implemented due to the complexity of the manufacturing process. Alternate designs were being considered which would delay delivery of the refurbished M119A1. Collaboration between NCDMM, RIA, and Wohlhaupter personnel eliminated those concerns and provided a solution that allowed RIA to provide a higher quality M119A1 Howitzer to the warfighter.

### Expected Benefits

- Eliminated need to change design due to manufacturing issues
- Improved M119A1 reliability
- Provided a new manufacturing process that will reduce costs, improve accuracy and enabled the manufacturing of a stronger one-piece trunnion over the previous two-piece design.

## TIME LINE / MILESTONE

Start Date.....October 06  
End Date ..... August 07

## PROJECT FUNDING

Rock Island Arsenal funding..... \$48K

## PARTICIPANTS

CNC Software, Mastercam\*  
Haas Automation, Inc.\*  
Kennametal Inc.\*  
Wohlhaupter Corporation

\*NCDMM Alliance Partner

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