

| Report Documentation Page                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                    |                                                   |                                        | Form Approved<br>OMB No. 0704-0188                  |                                 |
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| 1. REPORT DATE<br><b>28 FEB 2007</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                    | 2. REPORT TYPE<br><b>Technical, Success Story</b> |                                        | 3. DATES COVERED<br><b>07-11-2006 to 28-02-2007</b> |                                 |
| 4. TITLE AND SUBTITLE<br><b>Night Vision Goggle Manufacturing Support</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                    |                                                   |                                        | 5a. CONTRACT NUMBER                                 |                                 |
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| 6. AUTHOR(S)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                    |                                                   |                                        | 5d. PROJECT NUMBER<br><b>06-0121-11</b>             |                                 |
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| 7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)<br><b>National Center for Defense Manufacturing &amp; Machining, 1600 Technology Way, Latrobe, PA, 15650</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                    |                                                   |                                        | 8. PERFORMING ORGANIZATION REPORT NUMBER            |                                 |
| 9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                    |                                                   |                                        | 10. SPONSOR/MONITOR'S ACRONYM(S)                    |                                 |
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| 12. DISTRIBUTION/AVAILABILITY STATEMENT<br><b>Approved for public release; distribution unlimited</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                    |                                                   |                                        |                                                     |                                 |
| 13. SUPPLEMENTARY NOTES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                    |                                                   |                                        |                                                     |                                 |
| 14. ABSTRACT<br><b>Letterkenny Army Depot (LEAD), located in Chambersburg PA, received an order to manufacture 12,000 night vision goggle (NVG) plates. These plates are used to mount the NVG to the Soldier's helmet. However, the quantities needed had increased over four fold from 12,000 to 52,000 (7,000 NVG plates per month) near the time of production. Based on these quantities, delivery dates, and current workload, LEAD requested the assistance of the National Center for Defense Manufacturing and Machining (NCDMM) to help optimize the NVG plate manufacturing process.</b>                                                                                                                                                                                                                                                    |                                    |                                                   |                                        |                                                     |                                 |
| 15. SUBJECT TERMS<br><b>National Center for Defense Manufacturing and Machining; NCDMM; Letterkenny Army Depot; Success Stories</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                    |                                                   |                                        |                                                     |                                 |
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| a. REPORT<br><b>unclassified</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | b. ABSTRACT<br><b>unclassified</b> | c. THIS PAGE<br><b>unclassified</b>               |                                        |                                                     |                                 |

## PROBLEM / OBJECTIVE

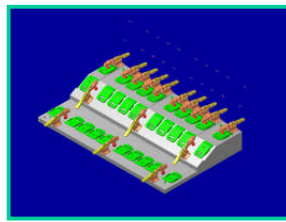
Letterkenny Army Depot (LEAD), located in Chambersburg PA, received an order to manufacture 12,000 night vision goggle (NVG) plates. These plates are used to mount the NVG to the Soldier's helmet. However, the quantities needed had increased over four fold from 12,000 to 52,000 (7,000 NVG plates per month) near the time of production. Based on these quantities, delivery dates, and current workload, LEAD requested the assistance of the National Center for Defense Manufacturing and Machining (NCDMM) to help optimize the NVG plate manufacturing process.

The NCDMM and LEAD determined that based on the expected run time of forty-six (46) minutes for every ten (10) parts, the required monthly volume would be unattainable under current operating methods. NCDMM and LEAD personnel determined that optimization of the current NVG tool path and tooling was necessary to improve the capability of the depot to meet the delivery schedule.

NCDMM engineers traveled to LEAD to assess the current machining operation used to produce the NVG plates. LEAD machining personnel were interviewed and the total machining process was evaluated. It was determined that the NCDMM would deliver and implement optimized tooling and tool paths as well as a Mastercam (CNC programming software for machine tools) part file allowing LEAD the ability to easily continue with future improvements.



NVG Helmet Assembly



Complete Fixture

## ACCOMPLISHMENTS / PAYOFF

### Process Improvement

NCDMM engineers developed a Mastercam file complete with all fixturing and part models. Tool

paths were developed and optimized through verification software. Key areas were then tested at the NCDMM Testing and Development Lab on NCDMM's Haas VF-6 machining center to prove out the tool path. Optimized tooling was selected and implemented with the new tool path. Tool holders were also selected and balanced to perform at the optimum speeds.

### Implementation and Technology Transfer

Once tooling was selected and the tool path optimization was completed, NCDMM engineers implemented the optimized process at the LEAD facility on their Haas VF-5 machining center.

### Expected Benefits

The optimized tooling and tool path resulted in a 30% reduction in cycle time compared to the original program. Implementing this solution enables LEAD to meet its increased production schedule of 52,000 plates. This improvement also reduces the estimated cost \$2.18 per NVG plate. This represents a savings of \$113,360 over the initial order of approximately 52,000 plates.

## TIME LINE / MILESTONE

Start Date..... November 06  
Implementation Date..... January 07  
End Date ..... February 07

## PROJECT FUNDING

This project was funded under the current engineering support contract between the NCDMM and Letterkenny Army Depot.

Letterkenny Army Depot Funding..... \$30K

## PARTICIPANTS

CGTech (Vericut)  
CNC Software, Inc. (Mastercam)  
COM1 Information Technologies, Inc. (Predator)  
Haas Automation Inc.  
Kennametal Inc.  
Letterkenny Army Depot (LEAD)  
NCDMM