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This document contains pictorial illustrations and word descriptions of MM&T project accomplishments. Each page lists a project title, funding, results obtained, and illustrates the process, equipment, or end item supported.
SUBJECT: MM&T Program Accomplishments

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2. This brochure describes recent accomplishments of the DARCOM Manufacturing Methods and Technology Program. The information is presented in three sections:

   Section I - A concise summary of the benefits for each project.

   Section II - Charts describing recently completed projects which have the potential to provide benefits.

   Section III - Charts describing projects which have been implemented and are providing benefits.

3. Further information on the projects can be obtained from the MM&T points of contact found on page 3.

FOR THE DIRECTOR:

[Signature]

JAMES W. CARSTENS
Chief, Manufacturing Technology Division
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INTRODUCTION

1. This brochure describes the results of recently completed projects funded by the Army Manufacturing Methods and Technology Program. The HMT Program is managed by the HQ DARCOM Directorate of Manufacturing Technology and the DARCOM major subordinate commands.

2. Project results which are depicted in this brochure are shown on one page charts. The charts are titled either Accomplishment or Implementation. Accomplishment charts describe projects that are a part of a multi-year effort which either has not yet been completed or has recently been completed but not yet surveyed for implementation. The implementation survey is made within one year after all the projects of an effort have been completed. The charts, titled Implementation, describe work efforts that have been surveyed for implementation. A comparison of these two types of charts is found on the following page.
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4300 Goodfellow Blvd.  
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AV: 993-4926  
C: 201 532-4035  
AV: 992-4035 |
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US Army Electronics R&D Command  
ATTN: DREDL-PO-SF, Mr. Robert Moore  
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AV: 290-3812 |
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| 4 or T       | TACOM  
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US Army Armament, Munitions and Chemical Command  
ATTN: NASHC-IRI-A (R), Ms. Geri Kopp  
Rock Island Arsenal  
Rock Island, IL 61299 | C: 309 794-3666/4398  
AV: 793-3666/4398 |
**MWT POINTS OF CONTACT**

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<td>$57,000/YR</td>
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<td>5 79,80 4322</td>
<td>MINIMIZE MOBILIZATION TIMES</td>
<td>$57,000/YR</td>
<td>ELECTRONICALLY CONTROLLED FACILITIES</td>
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<td>5 79 4335</td>
<td>95% SCRAP REDUCTION</td>
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<td>PROCESS UPDATES</td>
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<td>REDUCED COST</td>
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<td>5 77,78,79 4462</td>
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<td>5 80 4462</td>
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<td>5 76,78,79,79,80 6736</td>
<td>ENHANCED READINESS</td>
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<td>5 79 6736-02</td>
<td>20% COST REDUCTION</td>
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<td>5 80 6736-03</td>
<td>IMPROVED INFORMATION EXCHANGE</td>
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<td>6 77,78 7649</td>
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<td>6 79 7724</td>
<td>COMPUTER AIDED MANUFACTURE</td>
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<td>6 77,78,79 7726</td>
<td>34% MACHINING COST REDUCTION</td>
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<tr>
<td>6 78 7808</td>
<td>FASTER &amp; MORE SENSITIVE LEAK DETECTION</td>
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## ACCOMPLISHMENTS SUMMARY

<table>
<thead>
<tr>
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<tr>
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<td>REDUCE COST AND</td>
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<td>GROUP TECHNOLOGY AT ROCK ISLAND ARSENAL</td>
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<td>LEAD TIME</td>
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<td>IMPROVED PLATING</td>
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<td>ROTARY FORGE PREFORMS</td>
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<td>FURNACES &amp; HEAT TREAT LINES</td>
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<td>PROVIDE CAPABILITY TO</td>
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22
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<td>R 3140</td>
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## Implementation Summary

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<td>5 3104</td>
<td>$5.2 million/yr</td>
<td>$5 million/yr</td>
<td>Establish capability</td>
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<td>$2.5 million/yr</td>
<td>108 increments per minute rate</td>
<td>Milan AAP</td>
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<td>Radford AAP</td>
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<td>5 4163</td>
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<td>Increased yield</td>
<td>Milan AAP</td>
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<td>5 77 6200</td>
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<td>Anaconda, Olin &amp; Revere</td>
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<td>5 6682</td>
<td>$400,000</td>
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<td>Louisiana &amp; Mississippi AAP's</td>
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<td>Weapons</td>
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<td>6 7727</td>
<td>$716,000/yr (FYDP)</td>
<td>Material &amp; energy conservation</td>
<td>Artillery barrels</td>
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<td>$1 million/yr (MOB)</td>
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<tr>
<td>6 8043</td>
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<td>Reduce machining time &amp; errors</td>
<td>Dovetail machining</td>
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SECTION II
RECENTLY COMPLETED PROJECTS
DARCOM MMT ACCOMPLISHMENT
MOBILITY EQUIPMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO:  E 77.79 3592

TITLE: IMPROVED GRAPHITE FIBER REINFORCEMENT

COST: $513,000

GOAL: PRODUCE STRONGER, STIFFER FIBERS THAN CURRENTLY AVAILABLE

RESULTS

• AN ARC-PLASMA FIBER TREATMENT FACILITY WAS DEVELOPED THAT HEATS FIBER BUNDLES TO 3100° C AT PROCESS SPEEDS UP TO 100 FEET PER MINUTE.

• BORON TREATMENT WAS USED WHICH INCREASED THE TENSILE STRENGTH TO 450,000 PSI. THIS IS 12 PERCENT GREATER THAN THE UNTREATED COMMERCIAL FIBER.

• IMPLEMENTATION, AFTER COMPLETION OF THE FINAL FY OF WORK, WILL MAKE A SIGNIFICANTLY IMPROVED GRAPHITE FIBER COMMERCIALY AVAILABLE.
DARCOM MMT ACCOMPLISHMENT
DEPOT SYSTEM COMMAND

PROJECT NO: G 80 0001

TITLE: VOICE CONTROLLED PROGRAMMING OF COMPUTERS

COST: $82,000

GOAL: ESTABLISH A CAPABILITY FOR VOICE CONTROLLED PROGRAMMING

RESULTS

- Voice input hardware was procured and interfaced with a CAD/CAM graphic system.

- Vocabulary and operator's voice pattern can be stored in the graphic system and recalled on command.

- Voice commands can be used to generate APT source geometry, tool motion, cutter location, and tool information.

- NC machine tool tape preparation costs will be initially reduced by $45,000/year at Tobyhanna Army Depot.
DARCOM MMT ACCOMPLISHMENT
COMMUNICATIONS & ELECTRONICS COMMAND

PROJECT NO:  276 9776

TITLE: LOW COST HYBRID SILICON PHOTODETECTOR MODULES

COST: $446,000

GOAL: ESTABLISH MANUFACTURING TECHNIQUES FOR HYBRID PHOTODETECTOR MODULES

RESULTS

- THE PHOTODETECTOR MODULE MANUFACTURING TECHNIQUES WERE DEVELOPED AND ARE AVAILABLE.

- THERE HAS BEEN AN ESTIMATED COST REDUCTION BY A FACTOR OF TEN.

- DUE TO SYSTEM REQUIREMENTS CHANGES, THE MODULES ARE NOT CURRENTLY PRODUCED FOR THE ARMY. HOWEVER, THE PROCESSES DEVELOPED ARE USED TO PRODUCE A VARIETY OF COMMERCIAL RCA FIBER OPTIC COMMUNICATION RECEIVERS.
DARCOM MMT ACCOMPLISHMENT
ELECTRONICS RESEARCH & DEVELOPMENT COMMAND

PROJECT NO: H 77 9612

TITLE: SPLIT CYCLE STERLING COOLER

COST: $506,000

GOAL: DEVELOP MANUFACTURING TECHNIQUES FOR COOLERS USED WITH INFRARED VIEWING SYSTEMS

RESULTS

● MANUFACTURING TECHNOLOGY RESULTED IN A COOLER WHICH EXCEEDED ALL THE DESIGN SPECIFICATIONS EXCEPT FOR A SHORT 750 HOURS MEAN-TIME-BEFORE-FAILURE. THE DESIGN HAS BEEN FOUND TO BE SUSCEPTIBLE TO THIS PROBLEM.

● THE END OF PROJECT UNIT PRICE OF $4000 IS $400 LESS THAN ANTICIPATED AT THE OUTSET.

● THE RPV, XM21, XM32, AND LASER RANGE FINDER PROGRAMS HAVE USED THESE COOLERS.

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DARCOM MMT ACCOMPLISHMENT
AVIATION RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 1 76, 77 7114

TITLE: IMPROVED MANUFACTURING TECHNIQUES FOR INFRARED (IR) SUPPRESSION AIRCRAFT COMPONENTS

COST: $343,000

GOAL: REDUCE MANUFACTURING COSTS AND IMPROVE ENGINE OPERATING EFFICIENCY

RESULTS

• AN IMPROVED MANUFACTURING METHOD WAS ESTABLISHED FOR PREPARATION OF LOUVERS USED IN THE FILM-COOLED IR SUPPRESSOR

• DROP HAMMER FORMING AND BAND SAW CUTTING WERE REPLACED WITH SPIN FORMING AND LASER CUTTING
TITLE: TITANIUM POWDER METAL COMPRESSOR IMPELLER

COST: $306,000

GOAL: REDUCE MACHINING COSTS OF FORGED IMPELLERS

RESULTS

- TITANIUM PRE-ALLOYED POWDERS PRODUCED BY THE PLASMA ROTATING ELECTRODE PROCESS WERE CONSOLIDATED BY HOT FORGING.

- A FLUID DIE WAS USED IN THE PROCESS WHICH RESULTED IN A DENSITY OVER 99% OF THE THEORETICAL.

- UPON SUCCESSFUL COMPLETION AND IMPLEMENTATION OF THE EFFORT, IT IS ESTIMATED THAT OVER $1.6 MILLION WILL BE SAVED ON THE APACHE AUXILIARY POWER UNIT ALONE.
DARCOM MMT ACCOMPLISHMENT
AVIATION RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 1 79 7315

TITLE: LOW COST MANUFACTURE OF POISE GIMBAL COMPONENTS

COST: $302,000

GOAL: ESTABLISH A COST EFFECTIVE MANUFACTURING PROCESS FOR COMPOSITE GIMBALS

RESULTS

• A MANUFACTURING PROCESS WAS ESTABLISHED FOR PRODUCING GRAPHITE/EPOXY COMPOSITE GIMBALS

• THE COMPOSITE GIMBALS DEMONSTRATED 1/3 THE WEIGHT, 2X WEIGHT/STIFFNESS, AND 4X DAMPING IMPROVEMENTS COMPARED TO CURRENT ALUMINUM CONSTRUCTION

• THE MANUFACTURING PROCESS FOR COMPOSITE GIMBALS WILL RESULT IN LOWER COSTS BECAUSE OF ITS IMPROVED ADAPTABILITY TO THE DESIGN MODIFICATIONS REGULARLY EXPERIENCED WITH THIS TYPE OF COMPONENT
DARCOM MMT ACCOMPLISHMENT  
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 174 8008

TITLE: BROADGOODS LAYUP SYSTEM  
(CAM RELATED)

COST: $700,000

GOAL: REDUCE MANUFACTURING TIME AND  
DIRECT LABOR COST

RESULTS

- A 3 AXIS MILLING MACHINE WAS RETROFITTED  
WITH A COMPUTER NUMERICAL CONTROL  
MACHINE CONTROL UNIT, TAPE HEAD, AND  
MOTOR DRIVE SYSTEM.

- A SAMPLE PART WAS FABRICATED WITH  
3-INCH WIDE GRAPHITE/EPOXY PREPREG TAPE  
AT ARMY MATERIEL AND MECHANICS  
RESEARCH CENTER.

- PROTOTYPE FABRICATION CAPABILITY HAS  
BEEN ESTABLISHED.
DARCOM MMT ACCOMPLISHMENT
AVIATION RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 1 75,76 8148

TITLE: PROCESSING OF ADVANCED GEAR MATERIALS

COST: $345,000

GOAL: DEVELOP NON-PROPRIETARY CARBURIZING PROCESS FOR HIGH PERFORMANCE GEARS

RESULTS

• A VACUUM CARBURIZING HEAT TREATMENT WAS DEVELOPED FOR VASCO X2 MATERIAL IN A SPUR GEAR CONFIGURATION

• A TECHNIQUE FOR USING ROLLING CONTACT FATIGUE DATA TO PREDICT PITTING FATIGUE LIFE OF GEARS WAS DEVELOPED

• A FIBER OPTIC SYSTEM WAS DEVELOPED AND PROVEN SUCCESSFUL. THIS PERMITTED VIEWING THE GEAR TOOTH FACE WHILE STILL ASSEMBLED IN THE FOUR SQUARE DYNAMOMETER

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DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: R 81 1021

TITLE: COMPUTERIZED PRODUCTION PROCESS PLANNING FOR MACHINED CYLINDRICAL PARTS (CAM)

COST: $234,000

GOAL: UPGRADE A PILOT COMPUTER MANAGED PROCESS PLANNING (CMPP) SYSTEM

RESULTS

- THIS PROJECT COMPLETED DEVELOPMENT AND DOCUMENTATION OF A CMPP SYSTEM FOR MACHINED CYLINDRICAL PARTS.
- THE CMPP SYSTEM IS BEING USED BY THREE GOVERNMENT CONTRACTORS. IT HAS BEEN USED ON TWO MILITARY AIRCRAFT ENGINES AND HELICOPTER COMPONENTS.
- A NUMBER OF PRESENTATIONS AND AN END OF CONTRACT PRESENTATION WERE HELD; OVER 100 REQUESTS FOR THE FINAL REPORT AND 30 REQUESTS FOR THE SOFTWARE HAVE BEEN MADE.
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: R 79 1041

TITLE: LARGE SCALE INTEGRATION FABRICATION METHODOLOGY IMPROVEMENT

COST: $1,000,000

GOAL: REDUCE COST OF SELECTED CIRCUITS

RESULTS

• MARTIN MARIETTA AND HARRIS SEMICONDUCTOR INCREASED THE YIELD OF PREAMPLIFIER AND LIMIT-SUM CIRCUITS FROM 1-2 PERCENT TO 14-15 PERCENT.

• THIS WAS DONE THROUGH PROCESS MODIFICATION, PRODUCIBILITY IMPROVEMENT, TOPOLOGY MODIFICATION, TEST AUTOMATION AND THOROUGH DOCUMENTATION.

• CIRCUITS ARE USED IN COPPERHEAD, HELLFIRE LASER SEEKER, AND NAVY GUIDED PROJECTILE. UPON IMPLEMENTATION, SAVINGS CAN APPROXIMATE $4.5 MILLION OVER THREE YEARS AT PROJECTED RATES.
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: 3 81 1073

TITLE: REAL TIME ULTRASONIC IMAGING

COST: $200,000

GOAL: AUTOMATE ULTRASONIC INSPECTION OF MATERIEL

RESULTS

• This project demonstrated the capability to locate flaws in composite and metallic structures using a real time ultrasonic imaging system (RTUIS).

• The system consists of a real time ultrasonic imager, materiel manipulator, a special split camera, and selected video image processing equipment.

• These results will be used to fabricate a prototype RTUIS to inspect rocket launch tubes in a reduced time of potentially one minute or less.
DARCOM MMT ACCOMPLISHMENT
US ARMY MISSILE COMMAND

PROJECT NO: 3811086

TITLE: COBALT REPLACEMENT IN MARAGING STEEL FOR ROCKET MOTOR COMPONENTS

COST: $300,000

GOAL: CONSERVATION OF CRITICAL STRATEGIC MATERIAL

RESULTS

* A MANUFACTURING SEQUENCE FOR PRODUCING COBALT FREE (FREE-CO) TOW MISSILE BODIES WAS ESTABLISHED.

* 50 FREE-CO TOW ROCKET MOTOR CASES WERE PRODUCED FOR FURTHER EVALUATION BY MICOм.

* THE APPLICABILITY OF FREE-CO MANUFACTURING TECHNOLOGY TO LARGER SIZE ROCKETS WAS DEMONSTRATED.
PROJECT NO:  R 77,78 3133

TITLE: PRODUCTION OF LITHIUM FERRITE PHASE SHIFTER FOR PHASED ARRAY RADARS

COST: $530,000

GOAL: REDUCE COST BUT RETAIN PERFORMANCE OF TOROIDS

RESULTS

● METHODS FOR PRODUCTION OF LITHIUM FERRITE FOR PHASE SHIFTER TOROIDS HAVE BEEN DEMONSTRATED IN THE PILOT LINE.

● COST SAVINGS OF ABOUT $8 PER TOROID HAVE BEEN DEMONSTRATED WHICH EQUATES TO ABOUT $40,000 PER RADAR SET.

● THERE IS A HIGH POTENTIAL FOR IMPLEMENTATION IN THE ANTI-TACTICAL MISSILE.
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: R 793136

TITLE: IMPROVED MANUFACTURING PROCESSES FOR COMPLIANT BEARING GYROS

COST: $350,000

GOAL: IMPROVE AND AUTOMATE THE MANUFACTURING OF THIS LOW COST ALTERNATE GYRO

RESULTS

- A PILOT PRODUCTION LINE WAS ESTABLISHED THAT INCLUDES:
  - AUTOMATED DYNAMIC BALANCING OF THE ROTOR.
  - INEXPENSIVE MOLDED MAGNET ASSEMBLY.
  - MULTICAVITY MOLD FOR THE COMPLIANT LAYER THAT ALLOWS PART INTERCHANGEABILITY.
  - AUTOMATED FINAL TEST.

- GYRO COST CAN BE REDUCED FROM $1400 TO $434 IF IMPLEMENTED ON COPPERHEAD.
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: R 79 3146
TITLE: FINE LINE HYBRID SUBSTRATES
COST: $350,000
GOAL: REDUCE MANUFACTURING COSTS

RESULTS

- FINE LINE MULTILAYER SUBSTRATES HALVED MATERIAL COSTS AND ACHIEVED AN AREA REDUCTION OF 2:1.
- TOTAL AVERAGE YIELD IN EXCESS OF 71 PERCENT WAS ACHIEVED FOR HYBRIDS WITH THREE METALLIZATION LAYERS, ALL HAVING LINE WIDTHS OF 5 MILS OR LESS.
- TECHNOLOGY PROVIDED INCREASED PERFORMANCE AND RELIABILITY
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO:  R 77.78 3188

TITLE:  INFRARED IMAGING SEEKERS FOR THERMAL HOMING MISSILES

COST:  $960,000

GOAL:  REDUCE MANUFACTURING COST OF IR IMAGING SEEKERS

RESULTS

• PROCESSES WERE DEFINED WHICH ALLOWED THE REPLACEMENT OF MACHINED METAL PARTS WITH INJECTION MOLDED CARBON FIBER FILLED PLASTIC COMPONENTS.

• THE ADVANCED PROCESSES ENABLED A LARGE SCALE PRODUCTION UNIT COST OF $5417, VERY NEAR THE DESIGN-TO-COST TARGET OF $6160.

• A MODIFIED VERSION OF THIS DESIGN MAY ALSO BE IMPLEMENTED BY USAF.
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: R 77,79,80 3217

TITLE: AUTOMATIC PRODUCTION OF TRAVELING WAVE TUBES

COST: $1,761,000

GOAL: IMPROVE THE MANUFACTURING TECHNIQUES OF TRAVELING WAVE TUBES

RESULTS

● LOWER COST MANUFACTURING TECHNOLOGY HAS BEEN DEVELOPED FOR THE PRODUCTION OF TRAVELING WAVE TUBES.

● THE CURRENT COST OF THE TUBE IS ABOUT $20,000, LITTON'S COST ANALYSIS PROJECTS A UNIT COST OF $6,344 FOR THE 6000TH UNIT.

● THE PATRIOT PROGRAM IS CURRENTLY USING THESE TRAVELING WAVE TUBES.

CATHODE-HEATER ASSEMBLY
(METALLIC POTTING DESIGN)
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: R 79, 80 3219
TITLE: AUTOMATIC POLYMER DIE ATTACHMENT METHODS
COST: $400,000
GOAL: REDUCE MANUFACTURING COSTS BY INCREASING HYBRID BOND YIELDS

RESULTS

- AN AUTOMATIC CHIP RECOGNITION SYSTEM WITH IMAGE PROCESSING AND PATTERN RECOGNITION WAS DEVELOPED AND IMPLEMENTED ON AN AUTOMATIC DIE BONDER.
- SYSTEM HAS CAPABILITY OF PROCESSING 25 SUBSTRATES PER HOUR WITH 30 DIE PER SUBSTRATE.
- NEW ATTACHMENT TECHNIQUES INCREASED HYBRID BONDING YIELDS 25 PERCENT. KULICKE & SOFFA IS BUILDING THE PROTOTYPE SYSTEM UNDER MMT FOLLOW-ON PROJECT 3 82 1076.
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: 371,79 3287

TITLE: PRODUCTION METHODS FOR LOW COST STRIP LAMINATE MOTOR CASES

COST: $625,000

GOAL: ESTABLISH STRIP LAMINATE PROCESS FOR ROCKET MOTOR COMPONENTS

RESULTS

● THE PROJECT PROVED THAT LOW COST CONFIGURATIONS CAN BE ACHIEVED BY A STRIP LAMINATE PROCESS WITH NO PERFORMANCE PENALTIES.

● THE STRIP LAMINATE PROCESS PROVIDES A LOW COST ALTERNATIVE TO THE DESIGN ENGINEER.

● THE STRIP LAMINATE PROCESS COULD LOWER THE CASE COST OF THE CHAPARRAL BY 19 TO 30 PERCENT.
PROJECT NO: 3803294

TITLE: PRODUCTION PROCESS FOR ROTARY ROLL FORMING

COST: $300,000

GOAL: REDUCE MANUFACTURING COSTS

RESULTS

- THE PROJECT DEMONSTRATED THAT THE SPINNING PROCESS WITH FULLY AUTOMATIC CYCLE CONTROL IS THE BEST METHOD FOR MANUFACTURING ROCKET MOTOR CASES FROM MILL PRODUCTS.

- THE PROJECT DETERMINED THAT ELECTRICAL RESISTANCE WELDED MECHANICAL TUBING IS ESPECIALLY AMENABLE TO MOTOR CASE MANUFACTURE.

- THE PROJECT RESULTS FORM THE BASIS FOR THE PHASE II (FY81) FOLLOW-ON OF CONCEPT DEMONSTRATION, TESTING, AND THE PREPARATION OF DETAILED MANUFACTURING PROCEDURES.
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO:  R 78,80 3396

TITLE:  LOW COST - ONE PIECE NOZZLES

COST:  $360,000

GOAL:  REDUCE PRODUCTION COSTS WITH INJECTION MOLDING TECHNIQUES

RESULTS

• TOOLING FOR INJECTION MOLDING MISSILE NOZZLES WAS DESIGNED AND FABRICATED.

• TWENTY NOZZLES WERE MOLDED FROM PHENOLIC MATERIALS AND SUBJECTED TO LAB ANALYSIS AND SIMULATED ROCKET MOTOR ENVIRONMENTS.

• THE MOLDING PROCESS ESTABLISHED FOR THE NOZZLES ALLOWS 10 TIMES FASTER MOLDING RATES THAN THE TRADITIONAL PROCESS.

• UPON IMPLEMENTATION, MANUFACTURING COSTS AND PART RELIABILITY ARE EXPECTED TO SUBSTANTIALLY IMPROVE.
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: R 79 3410

TITLE: HEAT PIPES FOR HYBRID MICRO-CIRCUITS

COST: $250,000

GOAL: ESTABLISH A PRODUCTION CAPABILITY

RESULTS

• LOW COST PRODUCTION TECHNIQUES WERE DOCUMENTED FOR FABRICATING HEAT PIPE COOLED MICROCIRCUIT PACKAGES AT A RATE OF 15 PER HOUR.

• HEAT PIPE COOLED PACKAGES LOWERED TRANSISTOR CHIP JUNCTION TEMPERATURE 50 PERCENT COMPARED TO NON-HEAT VERSIONS OF THE SAME PACKAGE.

• TECHNOLOGY CAN BE USED TO INCREASE POWER DENSITIES, RESULTING IN FEWER CHIPS PER CIRCUIT.
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: R 80 3411

TITLE: MANUFACTURE OF NON-PLANAR PRINTED CIRCUIT BOARDS

COST: $220,000

GOAL: ESTABLISH COST EFFECTIVE PROCESSES FOR NON-PLANAR CIRCUIT BOARDS

RESULTS

PROCEDURES FOR MANUFACTURING THE REFLECTOR AND SPIRAL ELEMENT FOR A CASSEGRAIN TYPE ANTENNA WERE DEVELOPED.

A MULTILAYER CYLINDRICAL CIRCUIT BOARD INCLUDING A TEST PATTERN WAS PRODUCED.

THE SELECTED METHOD OF MANUFACTURE WAS TO PROCESS THE BOARD WHILE FLAT, THEN BEND AND CURE IT INTO THE FINAL CONFIGURATION.

COMPLETION OF THE EFFORT AND IMPLEMENTATION ON THE COPPERHEAD WOULD RESULT IN AN ESTIMATED SAVINGS OF $3 MILLION.
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: R 78, 80 3436
TITLE: LARGE SCALE HYBRID MICROCIRCUITS
COST: $1,000,000
GOAL: INCREASE HYBRID CIRCUIT YIELDS AND RELIABILITY

RESULTS

- MICROCIRCUITS WITH 10 MIL LINES AND 150-12.5 MIL DIAMETER VIAS FOR 4 TO 6 LAYERS CAN BE PRODUCED WITH 60 PERCENT INITIAL YIELDS.

- BUMPED TAPE CARRIERS WITH PLASTIC SLIDE TEST BEDS WERE DEMONSTRATED WITH IN-PROCESS FUNCTIONAL TESTING.

- USE OF KRYPTON-86 REDUCED THE LEAK TEST TIME FROM 28 HOURS TO 1-1/2 HOURS.

- A COST REDUCTION OF 20 PERCENT IS ANTICIPATED FOR PASSIVE OPTICAL SEEKER PRODUCTION.
PROJECT NO: R 79 3438

TITLE: DELIDDING AND RESEALING HYBRID MICROCIRCUIT PACKAGES

COST: $200,000

GOAL: REDUCE MATERIAL AND LABOR MANUFACTURING COSTS

RESULTS

- SAWING EQUIPMENT AND PROCESSES WERE DEVELOPED AND REFINED TO DELID AND RESEAL BOTH BUTTERFLY AND BATHTUB HYBRID MICROCIRCUIT PACKAGES.

- QUALIFICATION TESTING PER MIL-STD-883 VERIFIED THAT HYBRID PERFORMANCE WAS NOT DEGRADED AFTER REWORK AND RESEAL.

- THIS REWORK CAPABILITY WILL INCREASE WELDED HYBRID PACKAGE YIELD 30 PERCENT AND CAN PROVIDE POTENTIAL SAVINGS OF $2.5 MILLION PER YEAR.
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: R 79.80 3445

TITLE: PRECISION MACHINING OF OPTICAL COMPONENTS

COST: $700,000

GOAL: DEVELOP MASS PRODUCTION TECHNIQUES FOR OPTICAL COMPONENTS

RESULTS

- A SURVEY OF DOD APPLICATIONS FOR OPTICAL COMPONENTS WAS CONDUCTED.
- SPECIFICATIONS WERE DEVELOPED AND PERSONNEL WERE TRAINED IN THE OPERATION OF PRECISION DIAMOND TURNING EQUIPMENT.
- MANUFACTURING PROCESSES WERE ESTABLISHED AND PROOF PARTS WERE PRODUCED.
- WHEN IMPLEMENTED WITH SUPPORTING FACILITIES, IT IS ESTIMATED THAT $1.2 MILLION PER YEAR WILL BE SAVED.
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: R 78 3453

TITLE: IMPROVED PRODUCTION TECHNIQUES FOR GROUND LASER LOCATOR

COST: $211,000

GOAL: DEMONSTRATE HIGH PRODUCTION RATE MANUFACTURING METHODS FOR LASER Q-SWITCHES

RESULTS

• IMPROVED MANUFACTURING PROCESSES HAVE BEEN DEMONSTRATED IN A PRODUCTION FACILITY CAPABLE OF PRODUCING 250 LITHIUM NIOBATE Q-SWITCHES PER MONTH.

• COMPANIES SUCH AS HUGHES, ILS AND FERRANTI PURCHASE THESE Q-SWITCHES TO SUPPORT TRAM, A8, GLLD, GVLLD, MULE AND DIVAD.

• AS A MINIMUM, COST SAVINGS OF $150 PER Q-SWITCH FOR THE DIVAD PROGRAM AND $70 PER Q-SWITCH FOR THE GVLLD WILL BE EXPERIENCED.
DARCOM MMT ACCOMPLISHMENT
MISSILE COMMAND

PROJECT NO: 3783454

TITLE: LO C ST - HI VOLUME RADIOGRAPHIC INSPECTION

COST: $300,000

GOAL: DEVELOP A NONFILM RADIOLOGIC INSPECTION SYSTEM

RESULTS

• THIS PROJECT PRODUCED A NONFILM RADIOLOGIC INSPECTION SYSTEM FOR EVALUATING HIGH PRODUCTION VOLUME MISSILE COMPONENTS.

• THIS SYSTEM FEATURES REAL-TIME X-RAY, DIGITAL IMAGE ENHANCEMENT, REMOTE PART POSITIONING, AND COMPUTER AIDED OPERATIONS.

• THE ROLAND MISSILE FINAL ASSEMBLY INSPECTION WAS CHOSEN FOR IMPLEMENTATION. ONCE THIS TECHNOLOGY IS IMPLEMENTED, A POTENTIAL COST REDUCTION OF 8:1 AND TIME REDUCTION OF 5:1 IS ANTICIPATED IN THE INSPECTION OPERATION.
DARCOM MMT ACCOMPLISHMENT
TANK-AUTOMOTIVE COMMAND

PROJECT NO: 474.75.TT 4668

TITLE: TECHNICAL DATA/CONFIGURATION MANAGEMENT SYSTEM (TD/CMS)

COST: $820,000

GOAL: IMPROVE THE EFFECTIVENESS OF TACOM TD/CMS AND ESTABLISH DARCOM STANDARD TD/CMS

RESULTS

• THE TD/CMS WAS MANDATED AS A DARCOM STANDARD SYSTEM BY ALL MAJOR SUBORDINATE COMMANDS IN 1977.

• THE TECHNICAL DATA FOR 15 TRACKED COMBAT VEHICLE SYSTEMS WERE REVIEWED AND VALIDATED.

• AUTOMATIC GENERATION OF TECHNICAL DATA PACKAGES WAS ESTABLISHED TO SUPPORT PROCUREMENT ACTIONS.
PROJECT NO: T 77 5014

TITLE: IMPROVED FOUNDRY CASTING PROCESSES

COST: $560,000

GOAL: REDUCE COSTS FOR CASTINGS

RESULTS

- COMPUTER PROCEDURES WERE SUCCESSFULLY ESTABLISHED FOR SIMULATING THE CASTING SOLIDIFICATION PROCESS.

- TEST CASTINGS WERE FABRICATED AT BLAW-KNOX. SIMULATION RESULTS WERE FOUND TO BE IN GOOD AGREEMENT WITH TEST RESULTS.

- UPON IMPLEMENTATION, HIGHER QUALITY CASTINGS ARE EXPECTED AND AN ESTIMATED $1 MILLION PER YEAR WILL RESULT FROM A REDUCTION IN SCRAP.

DRAG PORTION OF STEPPED PLATE CASTING MODEL USED FOR MESH GENERATION
DARCOM MMT ACCOMPLISHMENT
TANK-AUTOMOTIVE COMMAND

PROJECT NO: T 78,81 5014
TITLE: IMPROVED FOUNDRY CASTING PROCESS
COST: $465,000
GOAL: REDUCE COSTS FOR CASTINGS

RESULTS

• COMPUTER PROCEDURES WERE ESTABLISHED TO SIMULATE CASTING SOLIDIFICATION IN THE NO-BAKE SAND AND GREEN SAND PROCESSES.

• TEST CASTINGS WERE FABRICATED AT TWO PRODUCTION FOUNDRIES. SIMULATION RESULTS WERE IN AGREEMENT WITH TEST RESULTS.

• UPON IMPLEMENTATION, HIGHER QUALITY CASTINGS ARE EXPECTED. AN ESTIMATED $1 MILLION PER YEAR WILL RESULT FROM A REDUCTION IN SCRAP.
DARCOM MMT ACCOMPLISHMENT
TANK-AUTOMOTIVE COMMAND

PROJECT NO: T 79 5045

TITLE: SPALL SUPPRESSIVE ARMOR FOR
COMBAT VEHICLES

COST: $150,000

GOAL: IMPROVE SAFETY OF COMBAT VEHICLES

RESULTS

• A METHOD OF ATTACHMENT FOR AN INTERNAL
SPALL LINER SYSTEM WAS DEVELOPED FOR
THE M113A1/A2 CARRIER.

• THREE LINER KITS WERE FABRICATED FOR
INSTALLATION IN TEST VEHICLES.

• AFTER EVALUATION OF THE SYSTEM DURING
THE SECOND YEAR OF THE PROGRAM,
IMPLEMENTATION WILL RESULT IN A CARRIER
LESS PRONE TO CASUALITIES FROM SPALLING
EFFECTS.
DARCOM MMT ACCOMPLISHMENT
TANK-AUTOMOTIVE COMMAND

PROJECT NO: T 79 5090

TITLE: IMPROVED AND COST EFFECTIVE MACHINING TECHNIQUES

COST: $446,000

GOAL: REDUCE MANUFACTURING COSTS

RESULTS

• A HANDBOOK OF RECOMMENDED STARTING POINTS FOR CUTTING CONDITIONS WAS DEVELOPED

• THE DATA ENABLES SELECTION OF THE MOST EFFICIENT AND LEAST EXPENSIVE TOOLING FOR MACHINING OPERATIONS

• LEAD TIME OF COMPONENTS WILL BE IMPROVED WHILE TOTAL COST IS REDUCED
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 77 1327
TITLE: IMPROVED GAS MASK LEAKAGE TESTING
COST: $306,000
GOAL: ESTABLISH A MORE RELIABLE, SENSITIVE, AND COMPACT GAS MASK TESTER

RESULTS

• A PROTOTYPE GAS MASK LEAKAGE TESTER WAS DEVELOPED WHICH EXHIBITED INCREASED RELIABILITY AND ACCURACY.

• FUTURE MASK TESTERS WILL BE DESIGNED BASED ON DATA GENERATED DURING THIS PROJECT.
DARCOM MMT ACCOMPLISHMENT  
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5781345

TITLE: MT FOR BIO-DETECTION AND WARNING SYSTEM (BDWS)

COST: $480,000

GOAL: ESTABLISH A PILOT FACILITY FOR MANUFACTURE OF TAPE FOR THE XM19 REFILL KIT

RESULTS

• THE MANUFACTURING METHODS AND PHYSICAL PROPERTIES OF TAPE COATING WERE DEVELOPED.

• THE PHYSICAL PROPERTIES AND SPECIFICATIONS DEVELOPED WERE USED AS A GUIDE TO SUCCESSFULLY PRODUCE TAPES ON A LARGER PILOT SCALE UNIT.
PROJECT NO: 579 1403

TITLE: SUBSTITUTION OF NON-TOXIC DYES IN SMOKE GRENADES

COST: $315,000

GOAL: SUBSTITUTE NON-CARCINOGENIC, NON-MUTAGENIC, AND MINIMALLY TOXIC DYES FOR USE IN SMOKE GRENADES

RESULTS

- NON-CARCINOGENIC DYES WERE SUCCESSFULLY SUBSTITUTED INTO YELLOW AND GREEN M18 GRENADES.

- PERFORMANCE AND HAZARDS TESTING INDICATED THAT THE NEW FORMULATIONS WERE SAFE AND EFFECTIVE.

- ADDITIONAL BENEFIT GAINED IN COST SAVINGS OF $293,680/YEAR DUE TO LOWER DYE COSTS.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT READINESS COMMAND

PROJECT NO: 5 79,80 1903

TITLE: DIE CAST TAIL CONE AND ONE-PIECE SKIN FOR BLU-96/B

COST: $1,626,000

GOAL: REDUCE MANUFACTURING COSTS

RESULTS

- The 92 pound trim weight tail cone was the largest part ever successfully die cast for a weapons system
- The 97 ton die set was the first to be designed with the aid of a computer
- A $47,000,000 savings is estimated on a production run of 100,000 components, if the BLU-96/B is placed into production
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 77.78 4000

TITLE: AUTOMATED M55 DETONATOR PRODUCTION EQUIPMENT

COST: $2,182,900

GOAL: DEVELOP FULLY AUTOMATED SYSTEM FOR M55 STAB DETONATORS

RESULTS

- AN AUTOMATIC INSPECTION MODULE FOR INSPECTING DETONATOR CUPS WAS BUILT.

- AN IMPROVED ASPIRATOR AND AUTOMATIC LACQUER DISPENSING SYSTEMS WERE ESTABLISHED.

- THE MULTI-TOOL LOADER AT IOWA AAP WAS IMPROVED AND REFINED.

- AUTOMATIC PACKOUT MODULE AND MATERIAL HANDLING SYSTEM CONCEPTS WERE ESTABLISHED.

- PARAMETERS FOR ULTRASONIC SEALING OF DETONATORS WERE ESTABLISHED.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 80 4033

TITLE: CAUSTIC RECOVERY FROM SODIUM NITRATE SLUDGE

COST: $153,000

GOAL: ESTABLISH OPTIMUM PROCESS FOR SODIUM NITRATE SLUDGE DISPOSAL

RESULTS

- THE USE OF AMMONIA FOR NEUTRALIZATION FOLLOWED BY CATALYTIC HYDROGENATION WAS SELECTED FOR FURTHER EVALUATION IN A FOLLOW-ON PROJECT.

- THE USE OF INCINERATION FOR DISPOSAL OF THE SPENT ACID SLUDGE WAS FOUND TO BE A VIABLE CONCEPT BUT REQUIRED A LARGER CAPITAL INVESTMENT.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 79 4059

TITLE: OPTIMIZATION OF NITROGUANIDINE IN M30 PROPELLANT

COST: $271,000

GOAL: PROVIDE ON-LINE PARTICLE SIZE ANALYSIS

RESULTS

- DRY POWDER AND SLURRY NITROGUANIDINE MONITORS WERE EVALUATED

- A CORRELATION BETWEEN THE SLURRY MONITOR AND THE CURRENTLY SPECIFIED METHOD OF PARTICLE SIZE ANALYSIS WAS ESTABLISHED

- APPLICABILITY OF THE SLURRY MONITOR FOR PROCESS CONTROL IN THE CRYSTALLIZING OPERATION WAS ESTABLISHED
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 79 4064

TITLE: AUTOMATED ASSEMBLY OF TANK CARTRIDGES

COST: $1,320,000

GOAL: REDUCE MANUFACTURING COSTS AND IMPROVE SAFETY

RESULTS

- A PRODUCTION SYSTEM FOR THE AUTOMATED LOAD AND ASSEMBLY OF A FAMILY OF 105MM TANK CARTRIDGES WAS DESIGNED.

- THE LINER-TO-CASE ASSEMBLY SUBSYSTEM WAS EXPERIMENTALLY MODELED. A DETAILED TECHNICAL DATA PACKAGE ON THIS SUBSYSTEM WAS PREPARED.

- FOLLOW-ON EFFORTS WILL IMPLEMENT THE RESULTS OF THIS PROJECT. AN ESTIMATED ANNUAL SAVINGS OF $4.5 MILLION CAN BE ACHIEVED THROUGH THE TOTAL SYSTEM UNDER PEACETIME PRODUCTION.
PROJECT NO: 579,804084

TITLE: OPACITY/MASS EMISSION CORRELATION STUDY

COST: $212,000

GOAL: ESTABLISH A CORRELATION UTILIZING INEXPENSIVE, COMMERCIALLY AVAILABLE MONITORING EQUIPMENT

RESULTS

- THE RELATIONSHIP BETWEEN PARTICLE CONCENTRATION AND OPACITY WAS ESTABLISHED.
- AN EMPIRICAL EQUATION WAS DEVELOPED FOR PREDICTING ESTIMATES OF PARTICLE CONCENTRATIONS.
- A LESS COSTLY ALTERNATIVE TO THE TRADITIONAL MASS EMISSIONS TESTING METHOD HAS BEEN DEMONSTRATED.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH & DEVELOPMENT COMMAND

PROJECT NO: 5 81 4145

TITLE: CONTROL DRYING FOR AUTOMATED SINGLE BASE PROPELLANT MFG

COST: $327,000

GOAL: DEVELOP ON-LINE MONITORING OF PROCESS DRYING STREAMS

RESULTS

* TO CONTROL MOISTURE AND VOLATILES CONTENT OF PROPELLANT, A GAS CHROMATOGRAPHIC SYSTEM WAS PROCURED FOR MONITORING SOLVENT RECOVERY AND WATER DRY OPERATIONS.

* LABORATORY EVALUATION OF 4 CONDENSATE FLOWMETERS WAS COMPLETED.

* IF FUTURE INSTALLATION AND PROVEOUT OF THE EQUIPMENT IS SUCCESSFUL, IT IS ESTIMATED THAT A YEARLY SAVINGS OF $250,000 CAN BE ACHIEVED.
PROJECT NO: 5744169

TITLE: ESTABLISHMENT OF AN IMPROVED PROCESS FOR THE MANUFACTURE OF NITROGUANIDINE

COST: $403,000

GOAL: PROVIDE DESIGN CRITERIA FOR DOMESTIC NITROGUANIDINE MANUFACTURING FACILITY

RESULTS

- ESTABLISHED TECHNOLOGY AND PILOT FACILITY FOR NITROGUANIDINE VIA THE UREA/AMMONIUM NITRATE PROCESS.

- UPDATED THE PROCESS ENGINEERING DESIGN FOR NITROGUANIDINE VIA THE BRITISH AQUEOUS FUSION PROCESS.

NITROGUANIDINE VIA THE UREA/AMMONIUM NITRATE PROCESS
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 79 4189

TITLE: HIGH FRAGMENTATION STEEL PRODUCTION PROCESS

COST: $633,000

GOAL: OPTIMIZE PRODUCTION PROCESS

RESULTS

- THE PURCHASE AND CHARACTERIZATION OF HF1 STEEL FOR FUTURE YEARS' PROCESS OPTIMIZATION INVESTIGATIONS WAS COMPLETED

- A FLUIDIC HIGH TEMPERATURE SENSOR AND PROBE WAS DEVELOPED FOR MORE ACCURATE FURNACE CONTROL
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 76,77,78 4228

TITLE: AUTOMATED BAG LOADING, CHARGE
ASSEMBLY AND PACKOUT FOR THE
155MM AND 8-INCH PROPELLING
CHARGES

COST: $2,721,400

GOAL: AUTOMATE LOAD, ASSEMBLY, AND
PACK OF PROPELLING CHARGES

RESULTS

- THE FOLLOWING MAJOR SUB-SYSTEMS OF THE
AUTOMATED SYSTEM WERE ESTABLISHED: BAG
LOADING CAROUSEL, CHARGE ASSEMBLY
MACHINE, PACKOUT LINE, BULK-FILL SCALE,
CONTROL CONSOLE, AND CONVEYOR SYSTEM.

- OPERATION OF THE CHARGE ASSEMBLY
MACHINE, PACKOUT LINE, AND CANISTER
PRINTER WERE SATISFACTORY AND RECOMMENDED FOR INSTALLATION.
PROJECT NO: 575.7T 4252

TITLE: IMPROVE PRESENT PROCESS FOR THE MANUFACTURE OF RDX AND HMX

COST: $940,000

GOAL: ESTABLISH PROCESS IMPROVEMENTS IN THE MANUFACTURE OF RDX AND HMX

RESULTS


*THE IMPROVEMENTS CITED ABOVE WERE IMPLEMENTED AT HOLSTON AAP IN 1982.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 577,784267

TITLE: CONTINUOUS PROCESS FOR GRANULAR COMPOSITION B

COST: $712,000

GOAL: DESIGN, PROCURE, INSTALL, AND OPERATE EQUIPMENT FOR PRODUCING GRANULAR COMPOSITION B

RESULTS

• A ROTATING CUP TECHNOLOGY WAS SELECTED FOR THE PRILLING OF COMPOSITION B.

• GRANULAR COMPOSITION B PRESENTS NO IMPACT HAZARD WHEN DROPPED FROM A PRILLING TOWER.

• PROTOTYPE EQUIPMENT WILL BE PROCURED AND EVALUATED IN A FOLLOW-ON PROJECT.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 79 4281-A02

TITLE: OPTIMIZED INSULATION

COST: $193,000

GOAL: REDUCE ENERGY CONSUMPTION

RESULTS

- SEVERAL INSULATING MATERIALS WERE EVALUATED WITH FOAMGLASS BEING THE ONLY ONE TO MEET ALL REQUIREMENTS.

- ONE STAINLESS STEEL NITROCELLULOSE Boiling TUB WAS INSULATED FOR EVALUATION OF ENERGY SAVINGS DURING BOILING AND POACHING OPERATIONS.

- INSULATING THE TUB SIDES REDUCED STEAM USAGE BY 344 LB/HR OVER THE UNINSULATED TUB.

- WITH DUAL TEMPERATURE SENSOR AUTOMATIC EQUIPMENT, STEAM USAGE WAS REDUCED BY 120 LB/HR OVER THE UNINSULATED MANUALLY CONTROLLED TUB.

- ANNUAL SAVINGS OF $67,000 CAN BE ACHIEVED AT CURRENT PRODUCT LEVELS.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 77,78 4281-A08

TITLE: CAVITATIONAL REMOVAL OF EXPLOSIVES

COST: $694,800

GOAL: APPLY CAVITATING WATER JET TECHNOLOGY TO EXPLOSIVE REMOVAL

RESULTS

- THE CAVIJET PROCESS PARAMETERS FOR THE REMOVAL OF EXPLOSIVES FROM PROJECTILES WERE DEFINED

- THE CAVIJET PROCESS SUCCESSFULLY REMOVED TNT AND COMPOSITION B FROM 105MM PROJECTILES

- PLANS FOR THE MODIFICATION OF THE HIGH PRESSURE WATER WASHOUT FACILITY AT IOWA AAP WERE COMPLETED

- THE CAVIJET PROCESS OFFERS A 27 PERCENT POTENTIAL COST SAVINGS OVER THE HIGH PRESSURE WASHOUT METHOD WITH A GREATER DEGREE OF VERSATILITY
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 78, 79 4285

TITLE: TNT EQUIVALENCY TESTING FOR SAFETY ENGINEERING

COST: $807,100

GOAL: DEVELOP DESIGN STANDARDS FOR HARDENING PROTECTIVE STRUCTURES

RESULTS

• THE TNT EQUIVALENCIES FOR NITROCELLULOSE, COMPOSITION C-4/A-3, BALL POWDER WC844, LX14, 155-MM M483 PROJECTILE, M42 GRENADE TRAY, AND HMX WERE DETERMINED.

• THE EQUIVALENCY RESULTS WERE USED TO CALCULATE LOADS ON PROTECTIVE WALLS FOR THESE ENERGETIC MATERIALS.

• THIS DATA, WHEN USED WITH DARCOM 385-100 AND TM5-1300, ENABLES THE DESIGN OF WALLS WHICH WILL RESIST BLAST EFFECTS.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 580 4285
TITLE: TNT EQUIVALENCY TESTING FOR SAFETY ENGINEERING
COST: $407,600
GOAL: DEVELOP DESIGN STANDARDS FOR HARDENING PROTECTIVE STRUCTURES

RESULTS

• THE TNT EQUIVALENCIES FOR DIGL-RP PROPELLANT, JA-2 PROPELLANT, CYCLOTOL 70/30, RDX, AND PBX C-203 WERE DETERMINED.

• THE EQUIVALENCY RESULTS WERE USED TO CALCULATE LOADS ON PROTECTIVE WALLS FOR THE ENERGETIC MATERIALS.

• THIS DATA WHEN USED WITH DRMCR 385-100 AND TM5-1300 ENABLES THE DESIGN OF WALLS WHICH WILL RESIST BLAST EFFECTS.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5794288

TITLE: EXPLOSIVE SAFE SEPARATION AND SENSITIVITY CRITERIA

COST: $637,500

GOAL: IMPROVE SAFETY BY DETERMINING SAFE SEPARATION CRITERIA

RESULTS

● THE SAFE SEPARATION DISTANCES FOR 155-MM M795 HE AND M549 HE ROCKET ASSISTED PROJECTILES AND BLU BOMBLETS WERE DETERMINED.

● SAFETY CRITERIA WERE INTEGRATED INTO DARCOM 385-100 DOCUMENT.

● THESE SAFETY CRITERIA WERE APPLIED TO THE DESIGN OF THE LAP LINE AT MISSISSIPPI AAP AND EXISTING LAP LINES AT MILAN AAP, LONE STAR AAP, AND KANSAS AAP.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 576, 7T 4289

TITLE: HAZARDS CLASSIFICATION STUDIES OF EXPLOSIVES AND PROPELLANTS

COST: $315,000

GOAL: ESTABLISH A HAZARDS CLASSIFICATION PROCEDURE FOR EXPLOSIVES AND PROPELLANTS

RESULTS

- Friction, impact, electrostatic discharge, and heat were identified as the most common causative accident stimuli.
- Small scale tests were used to establish sensitivity criteria for four materials.
- The hazard classification procedures were integrated into existing safety documents.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 79 4291

TITLE: BLAST EFFECTS IN THE MUNITION PLANT ENVIRONMENT

COST: $235,000

GOAL: ESTABLISH DESIGN STANDARDS FOR STEEL PANELS TO WITHSTAND EXPLOSIVE BLASTS

RESULTS

○ THE BLAST CAPACITY OF COLD-FORMED STEEL PANELS WAS DETERMINED.

○ THE STEEL PANELS EXHIBITED GREATER BLAST CAPACITY THAN PREDICTED BY PREVIOUS CRITERIA.

○ THIS DATA WAS USED TO UPDATE THE SAFETY DOCUMENT TM 5-1300.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH & DEVELOPMENT COMMAND
PROJECT NO: 5 79.80 4322

TITLE: SYSTEM CHARACTERIZATION OF ELECTRONICALLY CONTROLLED FACILITIES

COST: $1,121,000

GOAL: ESTABLISH CRITERIA FOR REACTIVATING ELECTRONIC COMPONENTS

RESULTS

- Reactivation documentation was prepared for industrial electronic control systems at Indiana, Sunflower, and volunteer AAP's.

- The reactivation methodology at Volunteer was established so a third party operational procedure is practical.

- Upon total implementation, the established methods will minimize mobilization times through the application of user adapted procedures.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 79 4335

TITLE: ALTERNATIVE PROCESS FOR TITANIUM GYROSCOPES

COST: $451,000

GOAL: REDUCE MACHINING COSTS

RESULTS

- A HOT ISOSTATIC PRESSING TECHNIQUE WAS DEVELOPED AND TESTED TO PRODUCE THE FIVE GYRO PARTS
- A TECHNICAL DATA PACKAGE IS AVAILABLE IN CASE OF A STEEP RISE IN WROUGHT TITANIUM BAR STOCK COSTS
- SCRAP WAS REDUCED BY 95 PERCENT OVER CONVENTIONAL METHODS
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 77.78 4343

TITLE: IMPROVED NITROCELLULOSE PROCESS CONTROLS

COST: $315,300

GOAL: UPDATE EXISTING PROCESS CONTROLS

RESULTS

- THE WOODPULP VARIABLES WHICH AFFECT THE CHARACTERISTICS OF THE NITROCELLULOSE WERE DETERMINED
- THE CONTINUOUS NITRATION PROCESS WAS EVALUATED
- NO SIGNIFICANT DIFFERENCES IN THE FINAL NITROCELLULOSE RESULTED FROM THE USE OF DIFFERENT WOODPULPS
DARCOM MMT ACCOMPLISHMENT
ARMAMENT READINESS COMMAND

PROJECT NO: 5774362

TITLE: CONTINUOUS AUTOMATED POST CYCLIC CONDITIONING FACILITY FOR LARGE CALIBER COMP B LOADED PROJECTILES

COST: $490,000

GOAL: REDUCE MANUFACTURING COSTS

RESULTS

• THE IMPROVED PROCESS RESULTS IN 50% IN PROCESS TIME SAVINGS.

• THE CAST QUALITY WAS GREATLY IMPROVED.

• THE LAP COST WAS REDUCED BY ONE OPERATION AND BY ONE PERSON.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5784449

TITLE: PROCESS IMPROVEMENT FOR
COMPOSITION C-4

COST: $120,000

GOAL: REDUCE THE COST OF PRODUCING
COMPOSITION C-4

RESULTS

• NOMINAL CLASS 1/CLASS 5 RDX COULD BE USED
IN LIEU OF A SPECIFIC GRANULATION CLASS
1/CLASS 5 RDX IN THE MANUFACTURE OF CLASS
3 COMPOSITION C-4.

• THE SPECIFICATION FOR COMPOSITION C-4 WAS
AMENDED TO INCLUDE USE OF NOMINAL RDX.

• A COST SAVINGS OF $55,000/YEAR (1981
DOLLARS) WAS REALIZED AT HOLSTON AAP.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 77,78,79 4462

TITLE: MODERNIZED FORCED AIR DRYER (FAD) FOR MULTI-BASE PROPELLANTS

COST: $1,297,000

GOAL: ESTABLISH PROTOTYPE AND DESIGN CRITERIA FOR MODERNIZED FAD

RESULTS

- A SCRUBBING SYSTEM FOR REMOVAL OF NITROGLYCERIN AND SOLVENT VAPORS WAS COMPLETED.

- A PROTOTYPE MODERNIZED FAD HOUSE WAS CONSTRUCTED.

- PROPELLANT DRYING MAY NOW BE DONE IN LARGER QUANTITIES AT A LOWER AIR FLOW RATE.

- PROJECT 5 80 4462 WILL DEBUG AND EVALUATE THE FINAL DESIGN.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 580 4462

TITLE: MODERNIZED FORCED AIR DRYING (FAD) FOR MULTI-BASE PROPELLANTS

COST: $908,600

GOAL: INSTALL, DEBUG AND EVALUATE THE MODERNIZED FORCED AIR DRYING SYSTEM

RESULTS

- THE ABILITY OF THE MODERNIZED FAD TO DRY MULTI-BASE PROPELLANTS WAS DEMONSTRATED
- THE AMOUNT OF STEAM REQUIRED WAS REDUCED BY 59 PERCENT
- A 95 PERCENT REMOVAL EFFICIENCY FOR THE SOLVENT ABSORBER WAS ACHIEVED
- A 99 PERCENT REMOVAL EFFICIENCY FOR THE NITROGLYCERIN CAUSTIC SCRUBBER WAS ACHIEVED
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 78,79 4466

TITLE: EVALUATION OF TNT, CYCLOTOL, OCTOL WITH ARRADCOM MELT-POUR FACILITY

COST: $881,500

GOAL: APPLY MELT-POUR TECHNOLOGY TO ALTERNATE FILL EXPLOSIVES

RESULTS

- AN AUTOMATED TNT MIXER SYSTEM WAS BUILT WHICH IS COMPATIBLE WITH THE CONTINUOUS MELT-POUR FACILITY.

- THE TNT MIXER SYSTEM IS CAPABLE OF A SOLIDS-TO-LIQUID RATIO TNT SLURRY OF 30%.

- THE TNT MIXER SYSTEM ELIMINATED THE NEED FOR CAST PROBING.

- THE TNT MIXER SYSTEM REDUCED TNT SLURRY PREPARATION TIME.
MANUFACTURING METHODS AND TECHNOLOGY PROGRAM
ACCOMPLISHMENTS
ARMY INDUSTRIAL BASE ENGINEERING ACTIVITY ROCK ISLAND IL OCT 83

UNCLASSIFIED

END
DATE
11-83

F/G 13/8
NL
PROJECT NO: 5784472

TITLE: DEVELOPMENT OF EQUIPMENT FOR AUTOMATIC/MECHANIZED FABRICATION OF CENTER CORE PROPELLANT BAGS

COST: $208,100

GOAL: IMPROVE MANUFACTURING PROCESS FOR CENTER CORE PROPELLANT BAGS

RESULTS

- A detailed and theoretical design analysis of the body and liner assembly system was conducted.

- The Novatronics approach to axially align and concentrically load body and liner assemblies over end assemblies was demonstrated.

- Web handling techniques for the assembly system were proven feasible and conversion to an automated operation offers a 98% ROI.

- The mechanization of the web, body and liner assembly process offers a ROI of 54% under peacetime production requirements.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5784498

TITLE: AUTOMATED ASSEMBLY OF SMALL MINES

COST: $325,000

GOAL: REDUCE MANUFACTURING TIME AND DIRECT LABOR COSTS

RESULTS

- ENGINEERING ANALYSIS INDICATED THAT AUTOMATION OF SELECTED OPERATIONS WOULD BE MORE COST EFFECTIVE THAN A TOTALLY AUTOMATED PRODUCTION LINE.

- REQUIREMENTS WERE DETERMINED FOR ELECTRONIC LENS TESTER, AUTOMATED SOLDERING MACHINE, AND ASSEMBLY AID FIXTURES. PROTOTYPE EQUIPMENT WILL BE BUILT AND DEMONSTRATED THROUGH FOLLOW-ON MMT PROJECTS.

- WHEN IMPLEMENTED, SAFETY WILL BE IMPROVED FOR EXPLOSIVE LOADING AND SAFETY AND ARMING ASSEMBLY SOLDERING.
PROJECT NO: 5766689

TITLE: ELECTRO-OPTICAL INSPECTION OF ARTILLERY PROJECTILE CAVITIES

COST: $198,000

GOAL: IMPROVE ARTILLERY METAL PARTS INTERNAL CAVITY INSPECTION

RESULTS

- This project produced an automated electro-optical artillery metal parts internal cavity inspection system.

- The system scans the fiber optic illuminated artillery metal part cavity with a TV camera. Light contrast changes are detected and computer analyzed, and the part is either accepted or rejected.

- Once this system is implemented, the inspection reliability is anticipated to increase from 80% to 95%.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH & DEVELOPMENT COMMAND

PROJECT NO: 576.78.79.80 6736

TITLE: TECHNICAL READINESS ACCELERATION THRU COMPUTER INTEGRATED MANUFACTURE

COST: $907,000

GOAL: IMPROVE LEAD TIMES AND REDUCE COST BY USE OF MANUFACTURING DATA BASE

RESULTS

- AN ARCHITECTURE OF MANUFACTURING FOR 2 CONVENTIONAL AMMUNITION ITEMS WAS ESTABLISHED

- A DATA BASE MANAGEMENT SYSTEM WAS ESTABLISHED AND COMPUTER INPUT REQUIREMENTS FOR MANUFACTURING OPERATIONS WERE DETERMINED. THE CAPABILITY OF THE MODULAR DESIGNED COMPUTER SYSTEM WAS DEMONSTRATED.

- WHEN IMPLEMENTED UNDER ARRCOM CAD/CAM SYSTEMS PROCUREMENT PROGRAMS, READINESS WILL BE ENHANCED THROUGH THE ABILITY TO RAPIDLY RETRIEVE AND USE PRODUCTION INFORMATION.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5796736-02

TITLE: DATA ACQUISITION FEASIBILITY STUDY

COST: $166,000

GOAL: UTILIZE MANUFACTURING CONTROL SYSTEM TO REDUCE COSTS

RESULTS

• PROTOTYPE MANUFACTURING CONTROL SYSTEM UTILIZING DATA ACQUISITION TECHNIQUES WAS EVALUATED.

• DATA WAS ANALYZED FOR DOWNTIME, REJECT TRENDS, DAILY PRODUCTION RATES, AND MACHINE UTILIZATION.

• RECOMMENDATIONS WERE FORMULATED FOR THE IMPLEMENTATION OF A MANUFACTURING CONTROL SYSTEM AND RELATIONAL DATA BASE MANAGEMENT SYSTEM.

• POTENTIAL COST SAVINGS OF 20% REDUCTION IN MANUFACTURING COSTS WERE IDENTIFIED.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH & DEVELOPMENT COMMAND

PROJECT NO: 5 80 6736-03
TITLE: INITIAL GRAPHICS EXCHANGE SPECIFICATION
COST: $50,000

GOAL: FACILITATE INFORMATION EXCHANGE BETWEEN DISSIMILAR CAD/CAM SYSTEMS

RESULTS

- THE ARMY, NAVY, AIR FORCE AND NASA ALL PROVIDED FUNDING TO SUPPORT IGES.
- DEMONSTRATIONS WITH AS MANY AS 5 VENDOR SYSTEMS ILLUSTRATED THE CAPABILITY OF THE IGES FORMAT TO SUCCESSFULLY EXCHANGE AND MODIFY DATA AMONG SYSTEMS.
- ANSI HAS APPROVED THE STANDARD AND IS PROMOTING ITS ADOPTION INTERNATIONALLY.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT MATERIAL READINESS COMMAND

PROJECT NO: 6 77.78 7649
TITLE: COMPUTERIZED POWDER METALLURGY FORGING DESIGN
COST: $202,000
GOAL: REDUCE COSTS FOR DESIGN OF POWDER METAL PREFORMS

RESULTS

- A COMPUTER AIDED PREFORM DESIGN TECHNIQUE HAS BEEN DEVELOPED AND APPLIED TO OBTAIN A PREFORM FOR A WEAPON COMPONENT.

- THE TECHNIQUE WAS SUCCESSFULLY DEMONSTRATED BY FABRICATING COMPONENT PREFORMS AND FORGING DIES AND BY FORGING COMPONENTS AT A PRODUCTION FACILITY.

- THE TEST COMPONENTS SUCCESSFULLY MET THE QUALITY STANDARDS. TRW, BORG-WARNER AND OTHERS HAVE MADE USE OF THE DEVELOPED COMPUTER PROGRAM IN DESIGNING FORGING DIES FOR PM PARTS.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT MATERIAL READINESS COMMAND

PROJECT NO: 6 79 7724

TITLE: GROUP TECHNOLOGY OF WEAPON SYSTEMS

COST: $83,000

GOAL: REDUCE COSTS THROUGH PART-FAMILY MANUFACTURE

RESULTS

- THE FEASIBILITY OF APPLYING A CLASSIFICATION AND CODING/GROUP TECHNOLOGY SYSTEM AT WATERVERLEI ARSENAL WAS DEMONSTRATED. 474 ROTATIONAL PARTS WERE CODED.

- WHEN THE TOTAL EFFORT IS COMPLETED AND IMPLEMENTED, IT IS ESTIMATED THAT
  - SET-UP TIME WILL BE DECREASED 20-35%
  - THROUGH PUT TIME WILL BE REDUCED 15-20%
  - COSTLY VARIATION IN PROCESS PLANS WILL BE ELIMINATED
PROJECT NO: 677.78.79 7726

TITLE: APPLICATION OF COLD AND WARM ROTARY FORGING

COST: $810,000

GOAL: REDUCE MANUFACTURING COST

RESULTS

- The capability to cold forge thin-walled rifled tubes, such as the 106-MM recoilless rifle, was established.

- The machining cost of the cold forged 106-MM recoilless rifle can be reduced by 34 percent using this method.

- The feasibility of cold forging the 105-MM M68 tube to the pre-auto-frettaged configuration was demonstrated.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 6 76 7608

TITLE: LEAK DETECTION TECHNIQUES FOR SMALL SEALED FIRE CONTROL ASSEMBLIES

COST: $86,000

GOAL: IDENTIFY MORE ACCURATE AND LESS COSTLY LEAK DETECTION TECHNIQUES

RESULTS

● THE PROJECT DEMONSTRATED APPLICABILITY OF MASS SPECTROMETER PROBE TEST, MASS SPECTROMETER VACUUM TEST, AND ACOUSTIC LEAK DETECTION SYSTEMS.

● A COMBINATION OF INSPECTION TECHNIQUES RESULTED WHICH ALLOWS FOR FASTER AND MORE SENSITIVE LEAK DETECTION MEASUREMENTS.

● ALTERNATIVE METHODS FOR LEAK LOCATION AND SIZE WERE ESTABLISHED.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT MATERIEL READINESS COMMAND

PROJECT NO: 6 80 7926

TITLE: HOT ISOSTATIC PRESSING (HIP) OF LARGE ORDNANCE COMPONENTS

COST: $216,000

GOAL: REDUCE MANUFACTURING COSTS

RESULTS

• THIS EFFORT ACHIEVED BREECH BLOCK PREFORMS IN NEAR-NET SHAPE CONFIGURATIONS BY HIP.
• HIP IS CAPABLE OF FULLY DENSIFYING ALLOY STEEL POWDER TO SATISFACTORY LEVELS OF STRENGTH AND TOUGHNESS.
• COMPLETION AND IMPLEMENTATION OF THIS EFFORT WILL RESULT IN AN ESTIMATED SAVINGS OF $432 PER LARGE BREECH BLOCK.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT MATERIAL READINESS COMMAND

PROJECT NO: 6 77.78 7943

TITLE: ANALYSIS FOR MODERNIZATION OF INDUSTRIAL OPERATIONS

COST: $1,020,000

GOAL: ESTABLISH MODERNIZATION MASTER PLAN

RESULTS

• A MASTER PLAN FOR TECHNOLOGY UPGRADE AND MODERNIZATION OF ROCK ISLAND ARSENAL WAS DEVELOPED.

• THE PLAN RESULTED IN RECOMMENDATIONS ON PROCESS IMPROVEMENTS, SAFETY AND POLLUTION CONTROLS, MATERIAL HANDLING, ENERGY USE, PLANT REARRANGEMENT AND FACILITY IMPROVEMENTS.

• IMPLEMENTATION OF THE MASTER PLAN IS ESTIMATED TO RESULT IN COST SAVINGS OF $18 MILLION PER YEAR.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT MATERIAL READINESS COMMAND

PROJECT NO: 6797949

TITLE: APPLICATION OF GROUP TECHNOLOGY AT ROCK ISLAND ARSENAL

COST: $123,000

GOAL: REDUCE MANUFACTURING COSTS AND LEAD TIMES

RESULTS

- A CLASSIFICATION AND CODING/GROUP TECHNOLOGY SYSTEM WAS INSTALLED AND DE-BUGGED. 76% OF THE MAJOR PARTS AT RIA WERE CODED.

- INTER-DEPARTMENT PART MOVEMENT HAS BEEN REDUCED 20%.

- ONCE FULLY IMPLEMENTED, ADDITIONAL PRODUCTIVITY GAINS WILL RESULT FROM:
  - STANDARD PROCESS PLANS.
  - REDUCED SET-UP.
  - DECREASED MATERIAL HANDLING.
  - IMPROVED SCHEDULING.

GROUP TECHNOLOGY BENEFITS

- Formation of groups of parts (part families) and machine groups
- Quick retrieval of designs, drawings, and production plans
- Design rationalization and reduction of design costs
- Reliable workpiece statistics
- Accurate estimation of machine tool requirements, rationalized machine loading, and optimized capital expenditure
- Rationalization of tooling setup and reduction of setup time and overall production time
- Rationalization and improvement of tool design and reduction of tool design and fabrication times and costs
- Rationalization of production planning procedures and scheduling
- Accurate cost accounting and cost estimation
- Better utilization of machine tools, workholding devices, and manpower
- Improvement in numerical control (NC) programming and effective uses of NC machines.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 681 8001

TITLE: RAPID FLOW PLATING OF SMALL CALIBER GUN TUBES

COST: $132,000

GOAL: REDUCE MANUFACTURING COST

RESULTS

• SMOOTH, ADHERENT CHROMIUM WAS ELECTROPLATED INSIDE THE BORE OF 50-CALIBER GUN TUBES

• A DEPOSITION RATE 15 TIMES FASTER THAN CONVENTIONAL PLATING WAS DEMONSTRATED

• CHROMIUM WAS DEPOSITED UNIFORMLY AT A RATE EXCEEDING 0.015 INCH PER HOUR PER GUN TUBE

DIAGRAM OF THE ELECTROLYTE FLOW SYSTEM
PROJECT NO: 6 79,90 8004

TITLE: CO-DEPOSITION OF SOLID LUBRICANTS DURING ANODIZING

COST: $241,000

GOAL: REDUCE COSTS BY SALVAGING WORN COMPONENTS AND EXTENDING THE SERVICE LIFE

RESULTS

- ANODIZED COATING WITH MoS₂ REDUCES GALLING, SEIZING, AND WEAR; AND IMPROVES CORROSION RESISTANCE.

- SERVICE LIFE IS EXTENDED RESULTING IN COST SAVINGS.

- MIL-A-8626, TYPE III WAS REVISED WITH NEW SPECIFICATIONS.
ESTABLISHMENT OF THE MECHANICAL PLATING PROCESS

THE MECHANICAL PLATING PROCESS WAS ESTABLISHED AS AN ALTERNATIVE TO THE ELECTROPLATING PROCESS.

THE MECHANICAL PLATING PROCESS DOES NOT PRESENT HYDROGEN EMBRITTLEMENT AND POLLUTION PROBLEMS THAT ARE ASSOCIATED WITH ELECTROPLATING.

THE PROJECT VERIFIED THAT MECHANICAL PLATING COSTS ARE 25 PERCENT LOWER THAN ELECTROPLATING COSTS.

MIL SPEC C-81562A WILL BE CHANGED BY THE NAVAL AIR ENGINEERING CENTER, LAKEHURST, NJ.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 678.79.8017

TITLE: POLLUTION ABATEMENT PROGRAM

COST: $143,000

GOAL: ELIMINATE CYANIDE-BASED PLATING AND DERUSING BATHS

RESULTS

- NON-CYANIDE BASED CHEMICALS TO REPLACE CYANIDE BASED ELECTROPLATING SOLUTIONS WERE EVALUATED
- CADMIUM AND COPPER CYANIDE BASED BATHS WERE ELIMINATED
- THE CYANIDE CONTENT OF THE PLATING FACILITY WASTE STREAMS WAS REDUCED
DARCOM MMT ACCOMPLISHMENT
ARMAMENT MATERIEL READINESS COMMAND

PROJECT NO: 6 78 8048

TITLE: IMPROVED INSPECTION TECHNIQUES FOR INGOTS AND PREFORMS FOR ROTARY FORGING

COST: $154,000

GOAL: IMPROVE ROTARY FORGE PREFORMS INSPECTION

RESULTS

○ THIS PROJECT PRODUCED AN AUTOMATIC ULTRASONIC ROTARY FORGE PREFORMS INSPECTION SYSTEM.

○ THE SYSTEM UTILIZES AN ULTRASONIC PULSE-ECHO TECHNIQUE. THE ENERGY TRANSFER IS ACCOMPLISHED BY A COUPLANT-COLUMN DISPENSER/CHAMBER WHICH USES WATER AS THE SONIC TRANSFER MEDIUM.

○ ONCE THIS SYSTEM IS IMPLEMENTED, A 20-25 PERCENT REDUCTION IN INSPECTION TIME WITH A CORRESPONDING SAVINGS IS ANTICIPATED.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 6 78 8049

TITLE: MANUFACTURING PROCESSES ENERGY CONSERVATION PROGRAM

COST: $104,000

GOAL: REDUCE ENERGY CONSUMPTION AT WATERVLIET ARSENAL

RESULTS

• AN ENERGY ANALYSIS OF THE ROTARY FORGE FACILITIES USED IN THE MANUFACTURE OF GUN BARRELS WAS CONDUCTED.

• THE ANALYSIS IDENTIFIED POTENTIAL ENERGY RECOVERY SOURCES FOR THE FURNACES AND THE HEAT TREAT LINE.

• POTENTIAL BENEFIT OF A 50% REDUCTION IN FUEL CONSUMPTION FOR THE HEAT TREAT OPERATION IS ESTIMATED.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT MATERIAL READINESS COMMAND

PROJECT NO: 6 79 8104
TITLE: IMPROVED BREECH BLOCK MANUFACTURING
COST: $40,000
GOAL: REDUCE BREECH BLOCK MANUFACTURING COSTS

RESULTS

• A STUDY WAS COMPLETED WHICH RECOMMENDED FLEXIBLE MANUFACTURING SYSTEM TECHNOLOGY BE USED TO REPLACE THE CURRENT INEFFICIENT METHOD OF HANDLING AND MACHINING BREECH BLOCKS.

• A PRESOLICITATION CONFERENCE WAS HELD AND THE PURCHASE OF THE FMS. ESTABLISHED AT $12-15 MILLION. IS UNDER NEGOTIATION.

• A PAYBACK OF 8 YEARS ON THE FMS IS ESTIMATED.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT MATERIEL READINESS COMMAND

PROJECT NO: 6 81 8120

TITLE: ADAPTIVE CONTROL TECHNOLOGY (CAM)

COST: $60,000

GOAL: EVALUATE A CYLINDRICAL GRINDING CONTROL PROCESS

RESULTS

• A COLD GRINDING PROCESS KNOWN AS ENERGY ADAPTIVE GRINDING WAS EVALUATED.

• THIS PROCESS REDUCES THE GRINDING "ART" TO MORE OF A SCIENCE BY BRINGING THE IMPORTANT GRINDING PARAMETERS UNDER CONTROL.

• METAL REMOVAL RATE REDUCTION FROM 10-40 H.P./IN² TO 3 H.P./IN² WAS DEMONSTRATED. UPON IMPLEMENTATION AN ESTIMATED 3 HOURS PER TUBE CAN BE SAVED IN PROCESSING. ENERGY CONSUMPTION WILL ALSO BE REDUCED.
DARCOM MMT ACCOMPLISHMENT
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 6 80 6209

TITLE: PILOT PRODUCTION OF GRADIENT INDEX OPTICS

COST: $213,000

GOAL: DEVELOP LOW COST EYEPIECE USING GRADIENT INDEX LENSES

RESULTS

● THE EYEPIECE FOR THE M1 TANK GUNNERS SIGHT HAS BEEN REDESIGNED USING 3 GRADIENT INDEX LENSES TO REPLACE THE CURRENT 6 LENS DESIGN. THE RAY TRACE ANALYSIS HAS BEEN COMPLETED AND VERIFIED.

● EQUIPMENT FOR PURCHASE HAS BEEN SELECTED. MMT 6 81 6209 WILL CONTINUE THE EFFORT BY PROCESSING THE GLASS AND FABRICATING THE LENSES.

● THE END BENEFITS UPON IMPLEMENTATION WILL BE A LOWER EYEPIECE COST, RUGGEDIZATION, SMALLER VOLUME AND LIGHTER WEIGHT.
SECTION III

IMPLEMENTED EFFORTS
DARCOM MMT IMPLEMENTATION
ELECTRONICS RESEARCH & DEVELOPMENT COMMAND

EFFORT NO: H 5094

TITLE: 8K BIT BORAM

COST: $80,000

GOAL: ESTABLISH PRODUCTION TECHNIQUES FOR 8K BIT BORAM

BENEFITS

- WESTINGHOUSE PRODUCTION ENGINEERED THE 8K BIT MEMORY FOR MILITARY APPLICATIONS.
- THE 8K NON-VOLATILE BORAM DEVICE IS NOW IN PRODUCTION AT WESTINGHOUSE FOR SEVERAL MILITARY SYSTEMS SUCH AS MIFASS.
- INTERNAL MARKETING BY WESTINGHOUSE AND DEVELOPMENT OF SECOND SOURCE EFFORTS IS UNDERWAY.
- IT IS ESTIMATED THAT AT MOB RATES, $13 MILLION WILL BE SAVED OVER 5 YEARS.
EFFORT NO: 2 9751

TITLE: FABRICATION OF YAG LASER RODS

COST: $142,000

GOAL: REDUCE LASER ROD PROCESSING TIME AND COST

BENEFITS

- BATCH PROCESSING METHODS FOR GRINDING AND POLISHING ND: YAG LASER RODS WERE ESTABLISHED.

- ECONOMICAL MASS PRODUCTION OF 150 RODS/MONTH WAS ESTABLISHED THROUGH THE DESIGN AND USE OF A 16 ROD POLISHING BLOCK.

- THESE BATCH PROCESSING METHODS ARE BEING USED FOR FABRICATING LASER RODS USED IN THE LASER RANGE FINDER. AT FYDP RATES, SAVINGS ARE ESTIMATED AT $2.7 MILLION.
DARCOM MMT IMPLEMENTATION
COMMUNICATIONS & ELECTRONICS COMMAND

EFFORT NO: 29778

TITLE: PRODUCTION OF LONG LIFE EMITTERS FOR FIBER OPTICS

COST: $466,000

GOAL: OPTIMIZE PRODUCTION PROCESSES FOR INJECTION LASER DIODES AND LIGHT EMITTING DIODES

BENEFITS

- HIGH YIELD PRODUCTION PROCESSES HAVE BEEN DEVELOPED FOR GaAlAs INJECTION LASERS AND LIGHT EMITTING DIODES (LED) WHICH OPERATE AT .82 MICRONS.

- SELF-ALIGNING DIFFUSION MASKS, PREFERENTIAL ETCHING AND MIL PACKAGING WERE DEVELOPED. THE LED'S ARE BEING USED IN THE AN/TYC-39 AUTOMATIC MESSAGE SWITCH CENTRAL STORE AND FORWARD MODULE.

- THE LED UNIT COST WAS REDUCED $500 AND A $325K COST SAVINGS WAS REALIZED IN FY81-82 PRODUCTION.
EFFORT NO: 2 9834

TITLE: SERIES TRANSDUCER DELAY LINES

COST: $271,000

GOAL: TO ESTABLISH A PRODUCTION CAPABILITY

BENEFITS

- LOW COST PRODUCTION TECHNIQUES WERE DETERMINED FOR FABRICATING MICROWAVE INTEGRATED CIRCUIT DELAY LINES AT A RATE OF 600 PER MONTH.

- PRODUCTION MAN-HOURS PER DELAY LINE WERE REDUCED FROM 10 TO 2.5. A METAL MASK DELINEATION PROCESS WAS INTRODUCED TO ELIMINATE WET PHOTO-PROCESSING. HAND TUNING WAS ELIMINATED.

- EFFORT RESULTED IN THE ESTABLISHMENT AND USE OF A COMPETITIVE SECOND SOURCE FOR DELAY LINES.
DARCOM MMT IMPLEMENTATION
ELECTRONICS RESEARCH & DEVELOPMENT COMMAND

EFFORT NO: H 9841

TITLE: ZINC SELENIDE WINDOWS AND OPTICAL ELEMENTS

COST: $156,000

GOAL: REDUCE PRODUCTION COST OF ZINC SELENIDE WINDOWS BY AUTOMATION

BENEFITS

- AUTOMATED LARGE BATCH PRODUCTION TECHNIQUES WERE DEVELOPED TO PRODUCE INFRARED WINDOWS BY CHEMICAL VAPOR DEPOSITION.
- THE PRODUCTION RATE OF THE EQUIPMENT CAN REACH 800/MONTH WITH A YIELD OF 98%.
- DUE TO THIS PROJECT, UNIT COSTS WENT FROM $600 TO $275. TO DATE, A TOTAL SAVINGS OF $646,000 HAS BEEN REALIZED. WITH ON-GOING PROCUREMENTS, SAVINGS OVER $2 MILLION ARE ESTIMATED.

ZINC SELENIDE INFRARED WINDOW
DEVELOPMENT OF RELIABLE METHOD FOR EVALUATION OF AGENT PERMEATION

AN AUTOMATED EVALUATION PROCEDURE TO QUANTITATIVELY DETERMINE THE CHEMICAL AGENT PENETRATION RESISTANCE OF BUTYL COATED CLOTH WAS DEVELOPED.

THE MANUAL METHOD WHICH UTILIZED CONGO RED PAPER AND FRUIT FLIES WAS REPLACED.

THIS PROCEDURE IMPROVED THE PRODUCT QUALITY AND RELIABILITY. THE FYDP COST SAVING IS ESTIMATED TO BE $270,000.
DARCOM MMT IMPLEMENTATION
MATERIALS AND MECHANICS RESEARCH CENTER
MATERIALS TESTING TECHNOLOGY (MTT) PROGRAM

EFFORT NO: M6350-1802 (ERADCOM/HDL)

TITLE: RANDOM TRANSPORTATION VIBRATION (RTV) FUZE MECHANISM TESTING

COST: $155,000

GOAL: IMPROVE RTV FUZE MECHANISM TEST METHODS

BENEFITS

• THIS EFFORT PRODUCED AN IMPROVED RTV FUZE MECHANISM TEST SYSTEM THAT REPLACED THE SINUSOIDAL METHOD.

• THE SYSTEM USES A COMPUTER TO TRANSMIT SIMULATED RANDOM VIBRATION WAVE FORMS TO A FUZE VIBRATION TABLE.

• WITH THIS IMPROVED RTV TEST SYSTEM, THE FYDP SAVINGS FOR THE M732 FUZE ARE ANTICIPATED TO BE $250,000. WITH MINOR MODIFICATIONS, THIS SYSTEM MAY BE USED TO TEST SIMILAR FUZES.
DARCOM MMT IMPLEMENTATION
MATERIALS AND MECHANICS RESEARCH CENTER
MATERIALS TESTING TECHNOLOGY (MTT) PROGRAM

EFFORT NO: M 6350-2032

TITLE: INFRARED TEST FOR PRINTED CIRCUIT BOARDS (PCB)

COST: $165,000

GOAL: IMPROVE PCB TESTING

BENEFITS

• THIS EFFORT RESULTED IN COMPUTER METHODOLOGY AND RAPID SCAN TEST EQUIPMENT WHICH CAN ISOLATE PCB FLAWS THAT WERE PREVIOUSLY UNDETECTABLE.

• THE SYSTEM WAS INSTALLED AT HUGHES AIRCRAFT AND HAS SAVED $120,000 BY MAKING UNNECESSARY A PROPOSED REDESIGN OF AMRAAM ELECTRONICS.

• SAVINGS OF $10,000 PER DAY ARE ANTICIPATED WHEN A MODIFICATION OF THIS EQUIPMENT IS INSTALLED FOR AIR FORCE DEPOT INSPECTION.
EFFORT NO: M 6350-2225

TITLE: 3-D SHOCK/VIBRATION TEST FOR FUZES

COST: $70,000

GOAL: IMPROVE VIBRATION TEST SYSTEM

BENEFITS

- A PRELIMINARY TDP FOR THE 3-D VIBRATION PROTOTYPE WAS ESTABLISHED. TDP FINALIZATION WILL OCCUR UNDER 5 79,80,81 3961.

- IN CONTRAST TO CONVENTIONAL SINGLE INPUT, UNIDIRECTIONAL TESTING, THIS SYSTEM PERMITS 3 SIMULTANEOUS INPUTS.

- WITH THE NEW TEST SYSTEM, FYDP SAVINGS ON THE PATRIOT, MLRS, AND M724/M732 WEAPONS FUZES ARE EXPECTED TO BE $1,800,000.
EFFORT NO: M 6350-2227

TITLE: SETBACK-DRAG TESTER FOR S&A DEVICES

COST: $86,000

GOAL: REDUCE NEED FOR LIVE FIRING FUZE TESTS

BENEFITS

• THIS EFFORT PRODUCED A SIMULATION TESTING CAPABILITY FOR FUZE SAFETY AND ARMING DEVICES.

• THIS TEST CAPABILITY, WHICH DID NOT PREVIOUSLY EXIST, ENHANCES FUZE/MISSILE RELIABILITY AND SAFETY.

• THE TEST EQUIPMENT HAS BEEN INSTALLED AT BULOVA AND HAS RESULTED IN A FYDP SAVINGS OF $2,000,000 ON THE VIPER. SIMILAR SYSTEMS WILL BE USED FOR TANK FUZES.
DARCOM MMT IMPLEMENTATION
MATERIALS AND MECHANICS RESEARCH CENTER
MATERIALS TESTING TECHNOLOGY (MTT) PROGRAM

EFFORT NO: M 6350-2233 (TACOM)
TITLE: TRACK BUSHING TEST MACHINE
COST: $125,000
GOAL: IMPROVE TRACK BUSHING TESTING

BENEFITS

- THIS EFFORT PRODUCED TRACK BUSHING TESTING MACHINE WHICH REPLACED 1940 VINTAGE EQUIPMENT.

- TWO TRACK BUSHING TEST MACHINES ARE BEING USED AT TACOM FOR QUALIFICATION TESTING. IMPLEMENTATION PLANS ARE BEING FORMULATED FOR PRODUCTION TESTING.

- THIS EQUIPMENT HAS REDUCED THE QUALIFICATION TESTING TIME 87%. THE ANTICIPATED FYDP SAVINGS IS $175,000.
DARCOM MMT IMPLEMENTATION
MATERIALS AND MECHANICS RESEARCH CENTER
MATERIALS TESTING TECHNOLOGY (MTT) PROGRAM

EFFORT NO: M 6350-2403 (TECOM)

TITLE: IMPROVED STANDARDIZED WEAPON CHAMBER PRESSURE

COST: $100,000

GOAL: IMPROVE WEAPON CHAMBER PRESSURE MEASUREMENT

BENEFITS

- THIS EFFORT PRODUCED A STANDARDIZED WEAPON CHAMBER MEASUREMENT METHOD.

- THIS IMPROVED METHOD IS MORE ACCURATE, RELIABLE AND INSURES BOTH THE SAFETY AND COMBAT EFFECTIVENESS OF LARGE CALIBER WEAPONS.

- THE DATA RELIABILITY OF THE PREVIOUS METHOD OFTEN WAS CHALLENGED WHICH NECESSITATED RETESTING AT $10,000 TO $300,000 PER TEST. THE ELIMINATION OF RETESTING WILL HAVE A FYDP SAVINGS OF $1,500,000 TO $2,500,000.
DARCOM MMT IMPLEMENTATION
MATERIALS AND MECHANICS RESEARCH CENTER
MATERIALS TESTING TECHNOLOGY (MTT) PROGRAM

EFFORT NO: M 6350-2426 (ERADCOM/NVL)

TITLE: CRYOGENIC COOLER HELIUM LEAK RATE TEST SET

COST: $120,000

GOAL: ESTABLISH CRYOGENIC COOLER HELIUM LEAK TEST CAPABILITY

BENEFITS

- THIS EFFORT PRODUCED A HELIUM LEAK TEST SET AND PROCEDURES FOR EVALUATING CRYOGENIC COOLER LEAK RATES.

- THE TEST SET WILL DETECT POROUS CASTINGS, LEAKY SEALS AND HELIUM CONTAINMENTS.

- THE RESULTS OF THIS EFFORT ARE BEING USED FOR THE HD-1033/UA CRYOGENIC COOLER PRODUCTION TESTING. THE ANTICIPATED FYDP SAVINGS IS $3,150,000.
DARCOM MMT IMPLEMENTATION
MATERIALS AND MECHANICS RESEARCH CENTER
MATERIALS TESTING TECHNOLOGY (MTT) PROGRAM

EFFORT NO: M 6350-2430 (MICOM)

TITLE: ACCEPTANCE TESTER FOR COMMON MODULE SCANNER PERFORMANCE

COST: $100,000

GOAL: IMPROVE COMMON MODULE ACCEPTANCE TESTING

BENEFITS

- THE EFFORT PRODUCED A PRODUCTION PROTOTYPE SCAN MIRROR INTERFERENCE PATTERN ANALYZER (SMIPA) TEST SYSTEM FOR COMMON MODULE ACCEPTANCE TESTING.

- THE SMIPA TEST SYSTEM HAS THE CAPABILITY TO MEASURE DELETERIOUS FLAWS SUCH AS WARPAGE. THIS SYSTEM REPLACES COSTLY OPTICAL BENCH TESTING.

- ONE COMMON MODULE CONTRACTOR IS COMMITTED TO IMPLEMENT SMIPA TEST SYSTEM. THE ANICIPATED FYDP SAVING IS $750,000 PER CONTRACTOR.
DARCOM MMT IMPLEMENTATION
MATERIALS AND MECHANICS RESEARCH CENTER
MATERIALS TESTING TECHNOLOGY (MTT) PROGRAM

EFFORT NO: M 6350-2431 (NLABS)

TITLE: COMPUTERIZED COLOR-MATCHING SYSTEM

COST: $606,000

GOAL: IMPROVE MILITARY FABRIC INSPECTION METHOD

BENEFITS

- THIS EFFORT PRODUCED A COMPUTERIZED COLOR-MATCHING SYSTEM THAT WILL REPLACE THE CURRENT VISUAL METHOD USED TO DETERMINE ACCEPTABILITY OF MILITARY FABRIC COLORS AND SHADES.

- THIS SYSTEM UTILIZES A SPECTROPHOTOMETRIC TECHNIQUE TO PERFORM THE COLOR EVALUATIONS. THE SYSTEM IS A STAND-ALONE UNIT WITH A MINI/MICRO PROCESSOR.

- WITH THIS IMPROVED METHOD, THE FYDP SAVINGS ARE ANTICIPATED TO BE $2,500,000.
DARCOM MMT IMPLEMENTATION
MATERIALS AND MECHANICS RESEARCH CENTER
MATERIALS TESTING TECHNOLOGY (MTT) PROGRAM

EFFORT NO: M 6350-2434 (ERADCOM/NVL)

TITLE: RAPID NDT FOR DETERMINING LASER DOPANT DENSITY AND DISTRIBUTION.

COST: $90,000

GOAL: PRODUCE A LASER ROD INSPECTION TECHNIQUE

BENEFITS

- A METHOD WAS PRODUCED FOR DETERMINING NEODYMIUM DOPANT DENSITY AND DISTRIBUTION IN LASER RODS.

- THIS NEW METHOD ALLOWS LASER ROD TO BE EVALUATED PRIOR TO ASSEMBLING THE HAND HELD LASER RANGE FINDER AN/GVS-5.

- SINCE THE RESULTS OF THIS EFFORT WERE IMPLEMENTED, APPROXIMATELY $200,000 SAVINGS HAS BEEN REALIZED. THE FYDP SAVINGS IS ANTICIPATED TO BE $390,000.
TITLE: ACOUSTIC MEASUREMENTS FOR ELECTROMAGNETIC COMPONENTS

COST: $120,000

GOAL: IMPROVE RELIABILITY OF PHASE SHIFTERS

BENEFITS

- AUTOMATED THICKNESS TESTING METHODS WERE DEVELOPED FOR TOROIDS USED IN PATRIOT RADAR PHASE SHIFTERS.

- THE IMPROVED RELIABILITY PREVENTS COSTLY ASSEMBLY OF BAD TOROIDS INTO THE PHASE SHIFTERS.

- THE SYSTEM WAS INSTALLED AT A CONTRACTOR’S PLANT FOR INCOMING INSPECTION. FYDP SAVINGS OF $605,000 ARE ANTICIPATED.
DARCOM MMT IMPLEMENTATION
MATERIALS AND MECHANICS RESEARCH CENTER
MATERIALS TESTING TECHNOLOGY (MTT) PROGRAM

EFFORT NO: M 6350-2440 (MICOM)

TITLE: GAS CHROMATOGRAPHY OF NITROCELLULOSE-BASE PROPELLANTS

COST: $165,000

GOAL: IMPROVE NITROCELLULOSE-BASE PROPELLANTS EVALUATION

BENEFITS

• A GAS CHROMATOGRAPHIC PRODUCTION TEST WAS PRODUCED BY THIS EFFORT.

• THIS TECHNIQUE HAS TRI-SERVICE GENERIC APPLICABILITY FOR ALL MISSILES WITH NITROCELLULOSE-BASE PROPELLANTS.

• THIS TECHNIQUE, WHICH REPLACES SOME 30 CONVENTIONAL METHODS, IS BEING USED FOR THE CHAPARRAL AND HELLFIRE MISSILE SYSTEMS. MIL-STD-286B IS BEING REVISED TO INCORPORATE THIS TECHNIQUE. THE ANTICIPATED FYDP COST SAVINGS IS $1,500,000.
DARCOM MMT IMPLEMENTATION
MATERIALS AND MECHANICS RESEARCH CENTER
MATERIALS TESTING TECHNOLOGY (MTT) PROGRAM

EFFORT NO: M 6350-2447 (ARRADCOM/CSL)

TITLE: AEROSOL TEST APPARATUS FOR BIOLOGICAL DETECTION AND WARNING SYSTEM

COST: $455,000

GOAL: IMPROVE BIOLOGICAL DETECTION AND WARNING SYSTEM EVALUATION

BENEFITS

- A PORTABLE PROTOTYPE AEROSOL TESTER FOR EVALUATING BIOLOGICAL DETECTION AND WARNING SYSTEMS WAS PRODUCED.

- ALSO, A STANDARDIZED REPRODUCIBLE BIOLOGICAL AEROSOL CHALLENGE AGENT TEST WAS ESTABLISHED FOR EVALUATING BIO-ALARMS

- THIS EQUIPMENT HAS REDUCED THE TESTING TIME BY 83%. THE ANTICIPATED FYDP SAVING IS $720,000.
DARCOM MMT IMPLEMENTATION
MATERIALS AND MECHANICS RESEARCH CENTER
MATERIALS TESTING TECHNOLOGY (MTT) PROGRAM

EFFORT NO: M 6350-2455 (ARRCOM/WATERVERLIEIT)

TITLE: DETERMINATION OF QUENCH CRACKS AFTER HEAT TREATMENT

COST: $125,000

GOAL: DEVELOP QUENCH CRACK INSPECTION TECHNIQUE

BENEFITS

- THIS EFFORT PRODUCED AN ULTRASONIC TESTING TECHNIQUE FOR DETECTING GUN TUBE QUENCH CRACKS AFTER HEAT TREATMENT.

- THIS NEW METHOD HAS ALLOWED WATERVLIET TO DETECT CRACKS IMMEDIATELY AFTER QUENCHING WHICH HAS ELIMINATED UNNECESSARY TEMPERING AND MACHINING OF GUN TUBE FORGING.

- THE FYDP SAVINGS FOR THE 105MM AND 155MM GUN TUBES IS ANTICIPATED TO BE $843,000.
TITLE: IMPROVED METHOD FOR DETERMINATION OF PURITY OF DYES

COST: $14,000

GOAL: IMPROVE DYE PURITY DETERMINATION METHOD

BENEFITS

- AN IMPROVED METHOD FOR DETERMINING PURITY OF SIGNAL SMOKE DYES WAS PRODUCED.

- THIS NEW AUTOMATED METHOD IS USED TO PROVIDE ANALYTICAL DYE PURITY REFERENCE STANDARDS. THIS METHOD HAS REDUCED HUMAN CONTACT WITH HAZARDOUS DYES AND HAS IMPROVED ACCURACY.

- THE ANTICIPATED FYDP COST SAVING IS $115,000.
DARCOM MMT IMPLEMENTATION
MATERIALS AND MECHANICS RESEARCH CENTER
MATERIALS TESTING TECHNOLOGY (MTT) PROGRAM

EFFORT NO: M 6350-2621 (ERADCOM/NVL)

TITLE: THERMOELECTRIC MATERIALS EVALUATION

COST: $95,000

GOAL: IMPROVE THERMOELECTRIC MATERIALS EVALUATION

BENEFITS

○ THIS EFFORT DEVELOPED A COMPUTERIZED THERMOELECTRIC MATERIALS’ MEASUREMENT SYSTEM.

○ THE SYSTEM HAS CAPABILITY TO EVALUATE AC/DC RESISTIVITY, THERMAL CONDUCTIVITY AND SEEBECK COEFFICIENT OF THERMOELECTRIC COOLER MATERIAL.

○ THE RESULTS OF THIS EFFORT ARE BEING USED TO EVALUATE THERMOELECTRIC MATERIALS FOR PREPRODUCTION PROTOTYPE THERMAL WEAPON SIGHTS. ONCE PRODUCTION COMMENCES, A FYDP SAVINGS OF $1,725,000 IS ANTICIPATED.
DARCOM MMT IMPLEMENTATION
MATERIALS AND MECHANICS RESEARCH CENTER
MATERIALS TESTING TECHNOLOGY (MTT) PROGRAM

EFFORT NO: M 6350-2825 (MICOM)

TITLE: MISSILE PROPELLANT BALLISTIC MODIFIERS IMPROVED TEST METHOD

COST: $70,000

GOAL: IMPROVE PROPELLANT BALLISTIC MODIFIER TEST METHOD

BENEFITS

- IMPROVED GC, UV, AA, DTA, TGA, AND X-RAY DIFFRACTION METHODS WERE DEVELOPED FOR TESTING PROPELLANT BALLISTIC MODIFIERS.

- THESE METHODS WILL DETERMINE THE RATIO OF ACIDS IN A PARTICULAR BALLISTIC MODIFIER.

- BALLISTIC MODIFIER SPECIFICATIONS ARE BEING PREPARED INCORPORATING THESE TEST METHODS FOR THE 2.75 INCH ROCKET AND DRAGON BALLISTIC MODIFIERS. THE FYDP SAVINGS ARE ESTIMATED TO BE $3,315,000.
DARCOM MMT IMPLEMENTATION
MISSILE COMMAND

EFFECT NO: R 3116

TITLE: ROSETTE AIR DEFENSE SEEKER OPTICS AND DETECTORS

COST: $1,154,000

GOAL: IMPROVE PRODUCTION METHODS FOR AIR DEFENSE SEEKER

BENEFITS

• IMPROVED PRODUCTION METHODS FOR THE STINGER-POST MISSILE SEEKER HAVE BEEN ESTABLISHED. IMPLEMENTATION OF 9 OF THE METHODS IS TAKING PLACE THROUGH THE TDP FOR THE MISSILE.

• COST REDUCTION, LEAD TIME REDUCTION, AND IMPROVED MATERIEL WILL RESULT FROM THIS EFFORT.

• AN ESTIMATED MOBILIZATION SAVINGS OF $9.5 MILLION WILL ACCRUE FROM THIS IMPLEMENTATION.
TITLE: IMPROVED MANUFACTURING PROCESSES FOR SILICON VIDICONS

GOAL: DEVELOP MANUFACTURING PROCESSES FOR SILICON VIDICONS

**BENEFITS**

- Manufacturing techniques to produce a ruggedized, high performance silicon target vidicon were developed.

- The yield was increased to 52 percent at the end of the 40 tube production run. The dark current and susceptibility to "blooming" have been reduced.

- The tube cost was reduced from $5000 to $625 in quantities of 2,500. Tubes were used on ruggedized instrumentation for M1 tank testing.
DARCOM MMT IMPLEMENTATION
MISSILE COMMAND

EFFORT NO: R 3167

TITLE: CRACK FREE PLATED-THROUGH-HOLES (PTH) IN PRINTED CIRCUIT BOARDS

COST: $223,000

GOAL: ELIMINATE PLATED-THROUGH-HOLE CRACKING IN CIRCUIT BOARDS

BENEFITS

- PROCESSES, CONTROLS AND EQUIPMENT NEEDED TO INSURE CRACK FREE PTH'S WERE DETERMINED.

- THE OPTIMUM COMBINATION INCLUDED A POLYIMIDE-GLASS BOARD PLATED IN EITHER A SEL-REX ACID SULFATE OR AN M&T PYRO-PHOSPHATE COPPER PLATING BATH.

- HUGHES HAS IMPLEMENTED THE TECHNOLOGY IN BOARD PRODUCTION. BELL, LOCKHEED, AND MOTOROLA ARE ALSO USING THE TECHNOLOGY.

- ONE FIRM HAS ESTIMATED A $36K/YR SAVINGS ON BATH OPERATIONS. OTHER SAVINGS WILL RESULT FROM THE OTHER IMPLEMENTATIONS.

FIGURE 1 - MULTILAYER BOARD FABRICATION
DARCOM MMT IMPLEMENTATION
MISSILE COMMAND

EFFORT NO: R 3183

TITLE: INERTIAL QUARTZ FLEXURE ACCELEROMETER

COST: $345,000

GOAL: INCREASE YIELDS AND REDUCE MANUFACTURING COSTS

BENEFITS

- A NEW TOOLING AND VACUUM DEPOSITION SYSTEM COMBINATION WAS DEVELOPED WHICH INCREASED CAPACITIES FOR METALIZING PROOF MASS QUARTZ SURFACES.

- CHROME/GOLD DEPOSITION PROCESS WAS IMPROVED BY ENHANCED QUARTZ CLEANING.

- ACCELEROMETER IS USED IN ASSAULT BREAKER T-22 PROGRAM AND HAS APPLICATION FOR THE LANCE, SIG-D, NAVY HARPOON MISSILE AND BOEING 767 AIRCRAFT.

- ESTIMATED FYDP SAVINGS RESULTING FROM THIS WORK TOTAL $40 MILLION.

FIGURE 1 - SUNDSTRAND QA 2000 QUARTZ FLEXURE ACCELEROMETER
DARCOM MMT IMPLEMENTATION
MISSILE COMMAND

EFFORT NO: 3 3227

TITLE: HYBRID CHIP HANDLING VIA TAPE CARRIER
LEAD FRAME

COST: $573,000

GOAL: DECREASE PRODUCTION COSTS FOR HANDLING HYBRID CHIPS

BENEFITS

- HONEYWELL AVIONICS ESTABLISHED METHODS FOR BONDING SEMICONDUCTOR CHIPS TO TAPE CARRIERS, FOR TESTING CHIP CARRIERS, AND FOR BONDING CHIPS TO HYBRID CIRCUIT SUBSTRATES.

- EQUIPMENT DEVELOPED IN THE PROGRAM INCLUDED
  - CONTINUOUS TAPE PLATER
  - INNER AND OUTER LEAD BONDERS
  - LEAD FRAME CUTTING MACHINE
  - AUTOMATIC TEST HANDLER

- HONEYWELL HAS INCORPORATED THIS TECHNOLOGY INTO THEIR PRODUCTION. YIELDS WERE ESTIMATED TO IMPROVE 40%.
DARCOM MMT IMPLEMENTATION
MISSILE COMMAND

EFFORT NO: R 3272

TITLE: FLEXIBLE PRINTED CIRCUITS WITH INTEGRAL MOLDED CONNECTORS (FLEXICON)

COST: $217,000

GOAL: REDUCE MANUFACTURING COSTS

BENEFITS

- HIGH SPEED LASER ABLATION, LASER WELDING, AND LIQUID INJECTION MOLDING WERE ESTABLISHED FOR TERMINATING FLEXIBLE PRINTED WIRING TO CONNECTORS.

- FLEXIBLE PRINTED WIRING SAVES 80% OF THE WEIGHT, 20% OF THE VOLUME AND 30% TO 50% OF THE COST OF INTERCONNECTION IN MILITARY ASSEMBLIES.

- TECHNIQUES WERE IMPLEMENTED IN AN/ALQ-131(V) AND E3A-AWACS RADAR. F16 RADAR AND AQUILA ARE TWO OTHER APPLICATIONS.

- TOTAL SAVINGS PROJECTED OVER 10 YEARS IS ESTIMATED AT $5.9 MILLION.
DARCOM MMT IMPLEMENTATION
MISSILE COMMAND

EFFORT NO: R 3372

TITLE: MANUFACTURING METHODS FOR MAGNETIC COMPONENTS

COST: $1,200,000

GOAL: REDUCED COST AND INCREASED RELIABILITY

BENEFITS

- MAGNETIC COMPONENT MANUFACTURING PROCESSES WERE INVESTIGATED FOR IMPROVEMENTS. THE MOST SIGNIFICANT CHANGES WERE:
  - REPLACING THE MYLAR TACKING TAPE WITH A QUICK SETTING ADHESIVE.
  - IMPROVING THE BANDING DESIGN TO REPLACE THE CLIP AND SOLDERING OPERATIONS.
  - IMPROVING THE BOBBIN DESIGN TO REDUCE VOLTAGE GRADIENTS.

- THESE TECHNIQUES ARE BEING IMPLEMENTED AT HUGHES AIRCRAFT WITH OTHER COMPANIES SHOWING AN INTEREST. SAVINGS ARE ESTIMATED AT $2 MILLION/YEAR.
DARCOM MMT IMPLEMENTATION
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

EFFORT NO: 5 1316

TITLE: ADVANCED TECHNOLOGY FOR PROCESSING SMOKE GRENADES

COST: $600,000

GOAL: REDUCE COST AND HEALTH HAZARDS

BENEFITS

● A SIMPLIFIED PRODUCTION SYSTEM THAT REDUCES THE NUMBER OF OPERATORS FROM
  45 TO 18 WAS DEVELOPED.

● THE NEED FOR REAMING PRESSED GRENADES WAS ELIMINATED.

● THE NEW PROCESS IS SAFE, EFFICIENT AND ENVIRONMENTALLY ACCEPTABLE.

● IMPLEMENTATION OF THIS EFFORT AT PINE BLUFF ARSENAL WILL RESULT IN AN
  ESTIMATED 10 YEAR SAVINGS OF $4.2 MILLION.

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DARCOM MMT IMPLEMENTATION
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 1320

TITLE: PILOT STATIONS FOR FILLING AND CLOSING WHITE PHOSPHORUS (WP) MUNITIONS

COST: $749,000

GOAL: ESTABLISH AN INITIAL PRODUCTION CAPABILITY FOR WP MUNITIONS

BENEFITS

- EQUIPMENT WAS ASSEMBLED FOR THE FILLING, CLOSING, LOADING, AND PACKING OF THE M259 2.75 INCH WP ROCKET.

- THE EXISTING WP DRY FILL LINE AT PINE BLUFF ARSENAL (PBA) WAS MODIFIED AND NEW EQUIPMENT INSTALLED.

- APPROXIMATELY 30,000 ROCKETS WERE SUCCESSFULLY PRODUCED AT PBA.
DARCOM MMT IMPLEMENTATION
ARMAMENT RESEARCH & DEVELOPMENT COMMAND

EFFORT NO: 5 3104

TITLE: COPPER AMPULES FOR FUZE POWER SUPPLIES

COST: $350,000

GOAL: IMPROVE MANUFACTURING TECHNIQUES FOR COPPER AMPULES

BENEFITS

- PRODUCTION PROCESSES WERE ESTABLISHED AND EQUIPMENT WAS DEVELOPED FOR FABRICATING COPPER AMPULES. TIG WELDING WAS ESTABLISHED FOR THE THIN COPPER PARTS.

- THIS SUCCESSFUL MMT WORK RESULTED IN AN IPF WITH UNION CARBIDE WHERE ASSEMBLY EQUIPMENT FOR COPPER AMPULES WAS FABRICATED.

- TO DATE, THIS EQUIPMENT HAS BEEN USED TO PRODUCE OVER 3 MILLION AMPULES.
DARCOM MMT IMPLEMENTATION
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

EFFORT NO: 54041

TITLE: AUTOMATED EQUIPMENT FOR MORTAR COMPONENTS

COST: $2,845,000

GOAL: REDUCE COSTS TO LOAD, ASSEMBLE AND INSPECT MORTAR PROPELLING CHARGES

BENEFITS

• A non-synchronous production system for loading, assembling and inspecting 61mm and 81mm propelling charges was developed.

• Rapid start-up, ease of tool change and flexibility of tooling were design goals.

• A production rate of 106 increments per minute can now be achieved.

• Implementation of this system at Milan AAP is expected to result in a ten year savings of $5.2 million.
DARCOM MMT IMPLEMENTATION
ARMAMENT RESEARCH & DEVELOPMENT COMMAND

EFFORT NO: 5 4147

TITLE: COMPUTER CONTROL APPLICATION TO CONTINUOUS TNT MANUFACTURE

COST: $2,120,000

GOAL: IMPROVE SAFETY AND EFFICIENCY OF CONTINUOUS TNT PROCESS

BENEFITS

- A prototype computer controlled system installed at Volunteer AAP demonstrated the desirability of automated control and operation of TNT lines.

- Production rates were increased 16% with fewer operators.

- An electronic analog control system was subsequently installed on a TNT line at Radford AAP. Mobilization savings from this MMT are estimated at $2.5 million per year.
DARCOM MMT IMPLEMENTATION
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 5 4163

TITLE: CONTROLLED PRODUCTION LOADING SYSTEM FOR 105MM HEAT-T M456A1

COST: $491,000

GOAL: MINIMIZE DEFECTS AND REDUCE REJECTS IN CAST LOADING

BENIFITS

- A REDUCTION OF NONWET CAVITIES IN THE C-SEGMENT OF THE PROJECTILE WAS OBTAINED.
- A 95% ACCEPTANCE LEVEL FOR PROJECTILES WAS ACHIEVED.
- SAVINGS OF $5M/yr BASED ON A 100K ROUNDS/YR PRODUCTION RATE HAVE BEEN VALIDATED.
DARCOM MMT IMPLEMENTATION
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

EFFORT NO: 5 4215

TITLE: AUTOMATING THE CONTINUOUS TNT PRODUCTION FACILITY PROCESS CONTROLS

COST: $607,000

GOAL: IMPROVE PROCESS CONTROL

BENEFITS

• A NUCLEAR DENSITY GAUGE WAS SELECTED TO MEASURE AND CONTROL MASS FLOW RATES.

• MAGNETIC FLOWMETERS WERE CONFIRMED TO BE BEST FOR MEASURING STREAM FLOW RATES.

• SAFETY WAS IMPROVED BY REDUCING PERSONNEL EXPOSURE TO HAZARDOUS OPERATIONS.

• THE IMPROVED PROCESS CONTROL REDUCED SAMPLING AND TESTING TIMES.

• THE PROJECT RESULTS HAVE BEEN IMPLEMENTED IN FACILITY PROJECT 5 75 5901.

TNT NITRATION FLOW SCHEME
DARCOM MMT IMPLEMENTATION
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 54281-B02
TITLE: REDUCED FORGING TEMPERATURE
COST: $163,000
GOAL: ENERGY CONSERVATION

BENEFITS

- ELECTRICITY CONSUMPTION FOR THE FURNACE WAS DECREASED BY 30%.
- NATURAL GAS CONSUMPTION FOR THE FURNACE WAS DECREASED BY 26%.
- BASED ON A PRODUCTION RATE OF 50,000 PROJECTILES PER MONTH, A SAVINGS OF OVER $100,000 PER YEAR IS PROJECTED AT SCRANTON AAP.
DARCOM MMT IMPLEMENTATION
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

EFFORT NO: 5 77 6200

TITLE: SMALL CALIBER AMMUNITION PROCESS IMPROVEMENT PROGRAM

COST: $1,259,000

GOAL: REDUCE COST AND IMPROVE QUALITY

BENEFITS

• A MODERN MULTI-TOOLED PRESS FOR PRODUCING 5.56MM CARTRIDGE CUPS WAS DESIGNED, TESTED, AND A TECH DATA PACKAGE WRITTEN.

• THE PRESS OPERATES AT A RATE OF 1300 CUPS PER MINUTE AND PRODUCES A HIGH QUALITY CUP.

• THREE MACHINES WERE PURCHASED (FACILITIES PROJECT 5 79 3002) AND ONE EACH WAS INSTALLED AT ANACONDA, OLIN. AND REVERE.
DARCOM MMT IMPLEMENTATION
ARMAMENT RESEARCH & DEVELOPMENT COMMAND

EFFORT NO: 56682

TITLE: SIMULATION OF AMMUNITION PRODUCTION LINES

COST: $170,000

GOAL: DEVELOP COMPUTER MODELS TO OPTIMIZE EQUIPMENT DESIGN

BENEFITS

- SOFTWARE WAS DEVELOPED UTILIZING THE BINOMIAL DISTRIBUTION TO SIMULATE STORAGE BUFFERS FOR IN-PROCESS INVENTORY OF MATERIAL HANDLING SYSTEMS.
- A ONE-TIME SAVINGS OF $400,000 WAS REALIZED IN THE EQUIPMENT DESIGN FOR LOUISIANA AND MISSISSIPPI ARMY AMMUNITION PLANTS.
- ADDITIONAL SAVINGS WILL LIKELY ACCRUE IN EQUIPMENT DESIGN FOR FACILITIES SUPPORTING THE 120MM PROJECTILE.
DARCOM MMT IMPLEMENTATION
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

PROJECT NO: 67727

TITLE: RECYCLING OF SCRAP GUN TUBES BY ROTARY FORGING

COST: $461,000

GOAL: MATERIAL COST AVOIDANCE

BENEFITS

A COMPUTER PROGRAM WAS DEVELOPED WHICH GENERATES OPTIMUM END PRODUCT MIXES AND PREFORM DIMENSIONS.

CRITICAL MATERIALS, E.G., ALLOY GUN STEEL, AND ENERGY ARE CONSERVED.

THIS NEW RECYCLING TECHNIQUE PROVIDES MATERIAL COST SAVINGS OF $1287 PER 106 MM M88, AND $2367 PER 155 MM M185. ESTIMATED ANNUAL SAVINGS BASED ON THE FYDP ARE $718,000; OR $9,966,000 BASED ON THE MOB RATE.
DARCOM MMT IMPLEMENTATION
ARMAMENT RESEARCH AND DEVELOPMENT COMMAND

EFFORT NO:  6 8043

TITLE:  IMPROVED MACHINING FOR DOVETAILS

COST:  $88,000

GOAL:  MINIMIZE MACHINING ERRORS WHILE REDUCING COSTS

BENEFITS

- A CNC CONTROLLED, CROSS AXIAL MILLING MACHINE SPECIFICATION WAS DEVELOPED TO ALLOW SIMULTANEOUS MACHINING OF BOTH SIDES OF THE DOVETAIL

- THIS DESIGN REPLACES NO LESS THAN FIVE INGERSOLL MILLING MACHINES PREVIOUSLY USED

- THE TIME STANDARD WAS REDUCED FROM 33.41 HOURS TO APPROXIMATELY 5 HOURS PER PIECE
DRXIB-MT

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