PROGRAM ACCOMPLISHMENTS
MANUFACTURING METHODS & TECHNOLOGY
PREPARED BY
OCT 80
MANUFACTURING TECHNOLOGY DIVISION
U.S. ARMY INDUSTRIAL BASE ENGINEERING ACTIVITY
ROCK ISLAND, ILLINOIS 61299
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SUBJECT: MM&T Program Accomplishments

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2. This brochure illustrates some of DACC's MM&T Program Accomplishments. It presents the achievements by Major Subordinate Commands with emphasis on illustration of the types of projects pursued. The format of this brochure has been somewhat modified for this issue in accordance with the increased emphasis on implementation. Projects that have anticipated benefits and implemented efforts with actual benefits have been placed in separate sections to provide a clear distinction between them. A summary has been provided as the first section of the document to provide an overview.

3. Further information on the projects illustrated in this brochure should be obtained from the MM&T representatives, project officers shown, or from Mr. James Carstens, Chief, Manufacturing Technology Division, AV 799-5113.

J. R. GALLAUGHER
Director
Industrial Base Engineering Activity
<table>
<thead>
<tr>
<th>TABLE OF CONTENTS</th>
<th>PAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>INTRODUCTION</td>
<td>1</td>
</tr>
<tr>
<td>MMT POINTS OF CONTACT.</td>
<td>2</td>
</tr>
<tr>
<td>MMT PROJECT INDEX.</td>
<td>4</td>
</tr>
<tr>
<td>SECTION I - SUMMARY OF BENEFITS.</td>
<td>9</td>
</tr>
<tr>
<td>SECTION II - RECENTLY COMPLETED PROJECTS</td>
<td>15</td>
</tr>
<tr>
<td>SECTION III - IMPLEMENTED EFFORTS.</td>
<td>77</td>
</tr>
</tbody>
</table>
INTRODUCTION

The Army Manufacturing Methods and Technology (M.T) Program was begun in 1964. The purpose of the program is to develop new manufacturing processes that can be applied to the production of Army items. Over the years hundreds of these projects have been funded and used to develop new technology. This brochure records the results of some of those projects.

Much literature has been written concerning the transfer of technology from the “laboratory” to actual production. It is often difficult to make this transition; however, the full benefits of new technology can be obtained only if this transition has been made. The Army is placing more emphasis on technology transfer to attain greater project benefits. This brochure is widely distributed throughout the Army in order to publicize the results and disseminate knowledge to potential users. Other methods of accomplishing this transfer are through end of project demonstrations, preparation of technical reports, project summary reports, and technical notes; and, through inclusion of technology information in bulletins and journals. All of these techniques, however, serve only to disseminate the information. Real benefits can only accrue once the new technology is implemented.
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<td>1</td>
<td>Mr. Robert Vollmer</td>
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# MMT Points of Contact

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<td>Mr. Joseph Tagliarino</td>
<td>AV 880 6708 (201) 328 6708</td>
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<td>Mr. August Zahatko</td>
<td>AV 793 4485/3730 (309) 794 4485/3730</td>
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<tr>
<td>7 or E</td>
<td>Mr. Sydney Newman</td>
<td>AV 354 5530 (703) 664 5530</td>
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<td>Mr. Grover Shelton</td>
<td>AV 283 3677 (301) 278 3677</td>
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US Army Armament R&D Command
Attn: DRDAR-PML
Dover, NJ 07801

US Army Munitions Production
Base Modernization Agency
Attn: SARPM-PBM
Dover, NJ 07801

US Army Armament Materiel Readiness Command
Attn: DRSAR-IRB
Rock Island Arsenal
Rock Island, IL 61299

US Army Mobility Equipment R&D Command
Attn: DRUME-UPE
Ft. Belvoir, VA 22060

US Army Test & Evaluation Command
Attn: DRSTE-AD-M
Aberdeen Proving Ground, MD 21005
<table>
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<th>PROJECT TITLE</th>
<th>PAGE</th>
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<td>16</td>
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<td>Modular Synthetic Light Weight Camouflage Screens</td>
<td>78</td>
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<td>17</td>
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<td>Computer Aid F/REP of Auto Analog Circuit Prodn Test Prog</td>
<td>18</td>
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<td>274 9523</td>
<td>Production of Infrared Filters</td>
<td>19</td>
</tr>
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<td>Hot Pressing Piezo-Ceramic Elements for HV Transformers</td>
<td>20</td>
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<tr>
<td>275 9665</td>
<td>Measurement of Electrical Components Under Dynamic Stress</td>
<td>21</td>
</tr>
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<td>Epitaxial + Metallization Processes for Impatt Diodes</td>
<td>22</td>
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<td>CAD/CAM Auto Production Engineering Drawing Symbol Library</td>
<td>23</td>
</tr>
<tr>
<td>274 9744</td>
<td>Fabrication of Universal Detector Modules</td>
<td>79</td>
</tr>
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<td>Fabrication of 18mm Image Intensifier Tubes by Batch Techniques</td>
<td>80</td>
</tr>
<tr>
<td>275 9836</td>
<td>QC for Fabrication of 18mm + 25mm Etched Core Microchannel Plates</td>
<td>81</td>
</tr>
<tr>
<td>T7x 4329</td>
<td>Joining of Steel Armor Intermix</td>
<td>82</td>
</tr>
<tr>
<td>475 4561</td>
<td>Closed Die Forging of Track Shoes and Links</td>
<td>24</td>
</tr>
<tr>
<td>T77 4589</td>
<td>Metrcation</td>
<td>25</td>
</tr>
<tr>
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<td>Tactical Vehicle Storage Battery</td>
<td>26</td>
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(CONTINUED)

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<td></td>
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<tr>
<td>176 7055</td>
<td>Ultrasonic Welding of Helicopter Fuselage Structures</td>
<td>27</td>
</tr>
<tr>
<td>1xx 7103</td>
<td>Blisk and Impeller NFG by Automatic Multi Spindle Machining</td>
<td>83</td>
</tr>
<tr>
<td>177 7112</td>
<td>Composite Improved Main Rotor Blades</td>
<td>84</td>
</tr>
<tr>
<td>172 8036</td>
<td>Control Grain Size in Thin Walled Turbine Blades</td>
<td>28</td>
</tr>
<tr>
<td>17x 8046</td>
<td>Axial Turbine Blade Disk/Cooling Plate Fabrication</td>
<td>85</td>
</tr>
<tr>
<td>174 8001</td>
<td>Advanced Adhesives for Transparent Armor</td>
<td>29</td>
</tr>
<tr>
<td>174,75,76,809</td>
<td>Fluidic Devices for Aircraft Stability Augmentation Systems</td>
<td>30</td>
</tr>
<tr>
<td>175 8154</td>
<td>Cadam for Extrusion of Aluminum, Ti and Steel Structural Parts</td>
<td>86</td>
</tr>
<tr>
<td>MICON</td>
<td></td>
<td></td>
</tr>
<tr>
<td>376 3147</td>
<td>Additive Process of Processing Printed Circuits</td>
<td>31</td>
</tr>
<tr>
<td>375 3157</td>
<td>QTY Prod Technology for Diode Phase Shifter Elements</td>
<td>87</td>
</tr>
<tr>
<td>R77 3168</td>
<td>Production of Circuit Board Heat Pipes</td>
<td>32</td>
</tr>
<tr>
<td>R7x 3170</td>
<td>Replacement of TPH-8156 and TPH-8159 Propellant</td>
<td>88</td>
</tr>
<tr>
<td>376 3224</td>
<td>Screening of Electronic Components</td>
<td>33</td>
</tr>
<tr>
<td>376 3225</td>
<td>Prod Method for Mounting Non-Axial Lead Components</td>
<td>34</td>
</tr>
<tr>
<td>37667x 3228</td>
<td>Production Methods for Extrudable HTPB Propellant</td>
<td>35</td>
</tr>
<tr>
<td>37x 3232</td>
<td>Computerized Production Process Planning</td>
<td>89</td>
</tr>
<tr>
<td>ARRADCOM/ARRCOM AMPD</td>
<td></td>
<td></td>
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<tr>
<td>573 1139</td>
<td>Appl of Fluid Logic Control Circuitry to Pyrotechnic Loading</td>
<td>36</td>
</tr>
<tr>
<td>PROJECT NO</td>
<td>PROJECT TITLE</td>
<td>PAGE</td>
</tr>
<tr>
<td>-------------</td>
<td>-------------------------------------------------------------------------------</td>
<td>------</td>
</tr>
<tr>
<td>573675 1248</td>
<td>Evaluation of Exhaust Filter Systems</td>
<td>37</td>
</tr>
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<td>57x 1248</td>
<td>Evaluation of Exhaust Filter Systems</td>
<td>90</td>
</tr>
<tr>
<td>57x 1260</td>
<td>Prototype Equipment for Forming and Filling Grenade Starter</td>
<td>91</td>
</tr>
<tr>
<td>574 1261</td>
<td>Prototype Equipment for Level Determination of WP in Tanks</td>
<td>38</td>
</tr>
<tr>
<td>57x 1277</td>
<td>Fast Response Contaminant Monitors for Industrial Operations</td>
<td>92</td>
</tr>
<tr>
<td>577677 1337</td>
<td>Adapt Transfer of UK Technology - LCHR + RP BUTYL Grenade</td>
<td>39</td>
</tr>
<tr>
<td>574 3049,376 3141</td>
<td>Fluidic Manufacture and Assembly Process</td>
<td>40</td>
</tr>
<tr>
<td>573 3051</td>
<td>Proximity Fuse Test Equipment</td>
<td>41</td>
</tr>
<tr>
<td>57x 4032</td>
<td>Automated Equipment for Fuse Assembly</td>
<td>93</td>
</tr>
<tr>
<td>571674 4041</td>
<td>Automated Equipment for Assay of Mortar Ammunition</td>
<td>42</td>
</tr>
<tr>
<td>5xx 4114 406</td>
<td>Methods to Minimize Environmental Contamination</td>
<td>94</td>
</tr>
<tr>
<td>57x 4134</td>
<td>Development of Detonation Traps for Improved Safety</td>
<td>95</td>
</tr>
<tr>
<td>573,76,77,78,4139</td>
<td>Appl of Radar to Ballistic ACC Test of Ammo (ARBAT)</td>
<td>43</td>
</tr>
<tr>
<td>574 4162</td>
<td>Automated Line for Melt-Pour Process of High Explosives</td>
<td>44</td>
</tr>
<tr>
<td>571,72 4171</td>
<td>Investigation of Parameters Affecting Nitrolysis of Hexamine</td>
<td>45</td>
</tr>
<tr>
<td>574 4205</td>
<td>Proc Spent Acid from RDX/HMX for Recovery of Explosive + Acid</td>
<td>96</td>
</tr>
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<td>572,73 4220</td>
<td>Continuous RDX Recrystallization Prototype Facility</td>
<td>46</td>
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<tr>
<td>574 4255</td>
<td>Proto Eruip for Production Control of Accel Sensing Devices</td>
<td>47</td>
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<tr>
<td>576,77 4280</td>
<td>Auto Zero Setting Prototype Equipment for M577 Fuse</td>
<td>48</td>
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<tr>
<td>PROJECT NO</td>
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<td>Explosive Safe Separation and Sensitivity Criteria</td>
<td>49</td>
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<td>51</td>
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<tr>
<td>576 4291</td>
<td>Blast Effects in the Munitions Plant Environment</td>
<td>52</td>
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<td>577 4241</td>
<td>Improved Nitrocellulose Purification</td>
<td>53</td>
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<td>MFG of Safe + Arming Device Housing for GEMSS Mines</td>
<td>54</td>
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<td>Multi-Tooled Iowa Detonator Loading Machine</td>
<td>55</td>
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<td>High Strength Aluminum Alloy Shapes by Powder Metallurgy</td>
<td>56</td>
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<td>High Density Tungsten Preforms for Warheads</td>
<td>57</td>
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<td>Computer Monitor of Artillery Shell Band Welding</td>
<td>97</td>
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<td>Engineering in Support of Artillery Metal Parts MOD Program</td>
<td>58</td>
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<td>Auto of Gun Barrel Bore Chromium Plating Process</td>
<td>60</td>
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<td>MFG Simplification and Cost Reduct Non-Metal Components</td>
<td>61</td>
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<td>Dewar Materials and Manufacture</td>
<td>62</td>
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<td>Effect of Electroless Nickel Process VAR on Qual RQMTS</td>
<td>63</td>
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<td>Gen Purpose Nach Tool Mini-Computer Directed NC</td>
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<td>Gun Tube Manufacture by Automation</td>
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<td>Improved MFG Control Through Data Automation-CAM</td>
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<td>68</td>
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<td>Computer Control in Engraving Optical R.-ticles</td>
<td>69</td>
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<td>70</td>
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<td>Low-Cost Reciprocating Screw Molding of Thermosetting Plastic</td>
<td>71</td>
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<td>Horizontal Spray Quench to Heat Treat of Gun Tub.-s</td>
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<td>Application of Automatic Drafting Machine</td>
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<td>Closed Die Forging of Powder Metal Preforms</td>
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<td>Ultra Hard Boride Coating to Reduce Tool Wear</td>
<td>73</td>
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<td>Prototype of Production Electro-Slag Refining Facilities</td>
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<td>Shock Test Simulation for Fire Control Instruments</td>
<td>75</td>
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<td>3-Axis DYN. SIM. of Helicopter Angular Motion for Testing FC</td>
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SECTION I

SUMMARY OF BENEFITS
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<th>PROJECT NUMBER</th>
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<td>FOLLOW-ON PROJECT IS COMPLETING THIS EFFORT</td>
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<td>376 3147</td>
<td>REDUCED UNDESIRABLE CHEMICAL DISCHARGES</td>
<td>$4.7 MILLION</td>
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<td>377 3168</td>
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<td>$10 MILLION</td>
<td>PRODUCTION RATE OF 50/HOUR ACHIEVED</td>
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<td>376 3224</td>
<td>REDUCED FIELD FAILURES</td>
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<td>376 3225</td>
<td>$760,000/YEAR</td>
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<td>FOLLOW-ON EFFORTS ARE REQUIRED</td>
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<td>376,77 3228</td>
<td>ELIMINATES BATCH OPERATIONS</td>
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<td>PROJECT NUMBER</td>
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<tr>
<td>5 73 1139</td>
<td>REDUCED EXPLOSIVE HAZARD</td>
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<td>TWO MACHINES WERE FITTED WITH FLUIDIC CONTROLS</td>
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<td>5 73,75 1268</td>
<td>SAFETY ENHANCEMENT</td>
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<td>AIR VENTILATION SYSTEMS DESIGN CRITERIA</td>
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<tr>
<td>5 74 1261</td>
<td>INCREASED CAPABILITY</td>
<td></td>
<td>PROTOTYPE SYSTEMS ARE IN USE</td>
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<td>5 77,77 1337</td>
<td>PROVIDED PRODUCTION CAPABILITY</td>
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<td>PILOT PLANT WAS CONSTRUCTED</td>
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<tr>
<td>5 74 3049 &amp; 3 76 1141</td>
<td>$200,000/YEAR</td>
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<td>LAMINATED FLUIDIC DEVICE</td>
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<td>$250,000/YEAR</td>
<td>INCREASED TESTING CAPABILITY</td>
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<td>5 71,74 4041</td>
<td>AUTOMATED LINE</td>
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<tr>
<td>5 73,74,77,78 4139</td>
<td>$2.9 MILLION/YR</td>
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<td>FOLLOW-ON PROJECTS ARE ENHANCING CAPABILITIES</td>
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<td>5 74 4160</td>
<td>$1.29 MILLION/YR</td>
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<td>CONTINUOUS AUTOMATED PROCESSING</td>
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<td>5 71,72 4171</td>
<td>$2.0 MILLION/YEAR</td>
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<tr>
<td>5 72,73 4220</td>
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<td>AUTOMATED BATCH EQUIPMENT WAS CONSTRUCTED</td>
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<td>5 74 4255</td>
<td>INCREASED PRODUCTION &amp; TEST CAPABILITY</td>
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<td>INSUFFICIENT PRODUCTION REQUIREMENTS</td>
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<td>5 76,77 4280</td>
<td>AUTOMATED FINAL ASSY &amp; CALIBRATION</td>
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<td>MACHINES ARE BEING INTEGRATED INTO PRODUCTION</td>
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<td>SAFETY STANDARDS</td>
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<td>WILL BE INCORPORATED INTO SAFETY REGULATIONS</td>
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<tr>
<td>5 76 4291</td>
<td>EXPLOSION RESISTANT STRUCTURES</td>
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<td>CONTINUOUS PURIFICATION PROCESS</td>
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<td>5 77 4341</td>
<td>$1.2 MILLION/YR</td>
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<td>SIMPLER AND LESS EXPENSIVE FABRICATION</td>
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<tr>
<td>5 77 4416</td>
<td>$2.6 MILLION/YR</td>
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### ACCOMPLISHMENTS SUMMARY (CONT)

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<tr>
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<tr>
<td>5 72 4457</td>
<td>$1.5 MILLION/YEAR</td>
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<td>INCREASED THE CAPABILITY OF EXISTING HARDWARE</td>
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<td>5 72 6235</td>
<td>IMPROVED MATERIAL PROPERTIES</td>
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<td>PURCHASE DESCRIPTION</td>
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<td>REDUCED PERSONNEL &amp; ELECTRICAL POWER REQUIREMENTS</td>
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<td>6 72,74 6681</td>
<td>LIGHTER CANNON TUBE</td>
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<td>6 72 6705</td>
<td>$450,000/100K BILL REDUCED OPERATOR REQUIREMENTS</td>
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<td>6 72 6830</td>
<td>IMPROVED PROPERTIES &amp; DECREASED COST</td>
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<td>IMPLEMENTATION WILL BE UNDER PROJECTS 6 XX 7419</td>
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<td>6 73 7056</td>
<td>DOUBLED THE OPERATIONAL LIFE</td>
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<td>UNIT IS NOW A REPAIRABLE ITEM</td>
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<td>6 73 7124</td>
<td>IMPROVED &amp; MORE CONSISTENT PROPERTIES</td>
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<td>PROCESS SPECIFICATIONS ARE AVAILABLE</td>
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<td>6 72 7220</td>
<td>REDUCED TAPE PREPARATION COSTS</td>
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<td>USED PRIMARILY FOR PROTOTYPING</td>
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<td>6 72 7226</td>
<td>INCREASED MEASURING CAPABILITY</td>
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<td>LASER OPTICAL SYSTEM</td>
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<tr>
<td>6 76 7236</td>
<td>REDUCED FURNACE TIME FROM 70 TO 20 HOURS</td>
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<td>6 73 7242</td>
<td>LOW COST MIRRORS</td>
<td>$110,000/YEAR</td>
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<td>ADDITIONAL IMPLEMENTATION IN PROCESS</td>
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<td>6 73 7363</td>
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<td>INSUFFICIENT REQUIREMENTS</td>
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<td>INCREASE PERFORMANCE UNIFORMITY</td>
<td>$85,000/YEAR</td>
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<td>6 74 7495</td>
<td>PROCESS INFORMATION</td>
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<td>END ITEM NO LONGER IN PRODUCTION</td>
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<td>6 74 7524</td>
<td>74 SAVINGS IN LABOR &amp; TOOL COST</td>
<td>$500/TUBE</td>
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<td>BORIDE COATED TOOLS</td>
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<td>6 75 7571</td>
<td>50% REDUCTION IN REQUIRED TESTS</td>
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<td>SHOCK TEST METHODS &amp; SPECIFICATIONS</td>
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<td>50% REDUCTION IN PRODUCTION TESTS</td>
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<td>7 TX 3524</td>
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<td>$13.28 MILLION/YR</td>
<td>IMPLEMENTED AT USE IN TWO FACILITIES</td>
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<td>$3.2 MILLION</td>
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<td>PRODUCT QUALITY IMPROVEMENT</td>
<td>QUALITY ASSURANCE POLICIES AND PROCEDURES</td>
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<td>5 TX 4529</td>
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<td>NEW PRODUCTION CAPABILITY</td>
<td>JOINING OF DIFFERENT TYPES &amp; HARDNESSES OF ARMOR</td>
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<tr>
<td>1 XX 7150</td>
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<td>560 MILLION</td>
<td>TURBINE ENGINE MACHINING</td>
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<td>1 TX 7112</td>
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<td>IMPROVED PERFORMANCE</td>
<td>KAMAN AEROSPACE CORP IS IMPLEMENTING</td>
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<td>1 TX 8046</td>
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<td>$2.0 MILLION/YR</td>
<td>IMPLEMENTED AT GE</td>
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<td>$10,000/YR (AIR FORCE APPLICATION)</td>
<td>INTERACTIVE COMPUTER SYSTEM</td>
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<td>9 TX 3515</td>
<td>$10.54 MILLION</td>
<td>REDUCED WT &amp; INCR RELIABILITY</td>
<td>HIGH RATE PRODUCTION CAPABILITY</td>
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<td>8 TX 3370</td>
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<td>IMPLEMENTED AT LONCHON</td>
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<td>3 TX 3232</td>
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<td>394 REDUCTION IN PROCESS PLANNING</td>
<td>COMPUTERIZED PROCESS PLANNING</td>
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<td>REDUCED EMISSIONS</td>
<td>INSTALLED AT SEVERAL LOCATIONS</td>
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<td>$0.056/GRENDA</td>
<td>IMPLEMENTATION AT PINE BLUFF ARSENAL</td>
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<td>IMPLEMENTED AT TOOLE ARMY DEPOT</td>
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<td>5 TX 4032</td>
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<td>TWO MILLION FUSES PRODUCED</td>
<td>IMPLEMENTED AT HONEYWELL FOR THE M739</td>
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<td>5 XX 4114-966</td>
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<td>REDUCES POLLUTANTS</td>
<td>INSTALLED AT RIMLY, OTHERS PLANNED</td>
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<td>5 XX 4305</td>
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<td>PROCESS IMPROVEMENT</td>
<td>IMPLEMENTED AT HOLLTON</td>
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<td>5 TX 6522</td>
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<td>INCREASED YIELD &amp; REDUCED OPERATOR REQUIREMENTS</td>
<td>SEVERAL APPLICATIONS</td>
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<td>6 TX 7248</td>
<td>$176,000/YEAR</td>
<td>INCREASED EFFICIENCY</td>
<td>IMPLEMENTED AT WATERSLIFT ARSENAL</td>
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<tr>
<td>6 TX 7265</td>
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<td></td>
<td>IMPLEMENTED AT ROCK ISLAND ARSENAL</td>
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<td>ACTUAL BENEFITS</td>
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<td>674 7481</td>
<td>$898,432</td>
<td>$1.3 MILLION</td>
<td>FASTER &amp; LESS EXPENSIVE B/C TAPE VERIFICATION</td>
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<td>674 7484</td>
<td>$8,234</td>
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<td>IMPLEMENTED AT WATERVLIETArsenal</td>
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SECTION II

RECENTLY COMPLETED OR ACTIVE PROJECTS
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT

RESIDUAL STRESS MEASUREMENT

PROJECT NO: 772 3501

TITLE: DEVELOP TECHNOLOGY TO NON-DESTRUCTIVELY MEASURE RESIDUAL STRESSES IN LARGE COMPLEX STEEL WELDMENTS VIA THE MOSS BAUER EFFECT.

COST: $161,000

RESULTS

RESIDUAL STRESS MEASURING EQUIPMENT FOR USE IN TESTING RIBBON BRIDGE COMPONENTS WAS FABRICATED. A PRECISION LEVEL OF ± 5 KSI WAS ACHIEVED WHICH IS ACCEPTABLE AND EXCEEDS THE CAPABILITIES OF OTHER TECHNIQUES.

THE EQUIPMENT DESIGN IS AVAILABLE FOR APPLICATION.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
MINE DETECTOR TEST SET

PROJECT NO: 7 74 3567

TITLE: TEST EQUIPMENT, AN/PRS-7 MINE DETECTOR

COST: $180,000

RESULTS

TWO PROTOTYPE TEST SIMULATORS WERE DESIGNED AND FABRICATED. A CYLINDRICAL SECTION CONTAINS THE TARGET AND INCORPORATES CONTROLS FOR PRECISE ADJUSTMENT OF THE TARGET POSITION RELATIVE TO THE MINE DETECTOR UNDER TEST.

USE OF THIS EQUIPMENT PROVIDES ACCURATE AND REPRODUCIBLE TESTING. IMPLEMENTATION OF THIS METHODOLOGY IS ESTIMATED TO REDUCE TEST TIME FROM ONE HOUR TO 20 MINUTES.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
AUTOMATED TEST EQUIPMENT

PROJECT NO: 2769773
TITLE: MMT COMPUTER PROGRAM AID FOR PREPARATION OF AUTOMATIC ANALOG CIRCUIT PRODUCTION TEST PROGRAM

RESULTS
AN OVERALL SOFTWARE SYSTEM WAS DESIGNED FOR AUTOMATICALLY GENERATING TEST PROGRAMS FOR LINEAR ANALOG CIRCUITS. THE SOFTWARE WAS PROVEN BY GENERATING PROGRAMS FOR TWELVE CIRCUIT CHARACTERISTICS AND DEMONSTRATED ON THE AUTOMATIC TEST EQUIPMENT.

ESTIMATED SAVINGS UPON IMPLEMENTATION OF THIS PROJECT ARE $2 MILLION.
INFRARED FILTER
FOR AN/VSS 3A
SEARCHLIGHT

PROJECT NO: 274 9523
TITLE: MANUFACTURING METHODS
FOR THE PRODUCTION OF
INFRARED FILTERS
COST: $43,552

RESULTS

THE CONTRACTOR, METAVAC,
DEVELOPED A MANUFACTURING
PROCESS THAT SUBSTANTIALLY
REDUCED THE NUMBER OF PINHOLES
IN THE FILTER COATING FOR
SEARCHLIGHTS. REDUCTION IN PIN-
HOLES REDUCES THE CHANCE OF
DETECTION BY THE ENEMY.

PRODUCTION YIELD WAS INCREASED
CONSIDERABLY AND FILTER LIFE
WAS INCREASED FROM 300 TO
800 HOURS.

UNIT PRICE WAS REDUCED FROM
$400 TO $225.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT

PIEZOELECTRIC TRANSFORMERS

PROJECT NO: 2 75 9525

TITLE: HOT PRESSING OF PIEZOELECTRIC ELEMENTS FOR HIGH VOLTAGE TRANSFORMERS

COST: $229,000

RESULTS

- HONEYWELL INC. ESTABLISHED IMPROVED PRODUCTION TECHNIQUES FOR PIEZOELECTRIC TRANSFORMERS (PET) USED IN OPERATING 18MM NIGHT VISION IMAGE INTENSIFIER TUBES.

- A DOUBLE ACTION HOT PRESS DIE PRODUCED SLUGS THREE TIMES THE INITIAL LENGTH, REDUCED HOT PRESSING LABOR BY 60 PERCENT AND INCREASED SLICED ELEMENT YIELD FROM 90 PERCENT TO 96 PERCENT.

- SEMIAUTOMATIC SILK SCREENING OF DISK ELECTRODES, SEMIAUTOMATIC DISK POLARIZATION AND INJECTION MOLDING OF DISK PACKAGE WERE OPTIMIZED.

- A PRODUCTION LINE RATE OF 200 PER MONTH WAS ACHIEVED.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
AUTOMATED TESTING

PROJECT NO: H 75 9665

TITLE: MANUFACTURING METHODS
FOR THE PRODUCTION OF
ELECTRONIC COMPONENTS
UNDER DYNAMIC STRESS

COST: $735K

RESULTS

THIS PROJECT DEVELOPED A PRO-
CESS FOR LASER TRIMMING OF
COMPONENTS FOR FINAL TUNING
OF FUZES.

LASER TRIMMING IS PRESENTLY
BEING USED ON THE THICK FILM
RATIOMETER IN THE M732 AND ON
THE AMPLIFIER SECTION OF THE
M734.

ESTIMATED YEARLY SAVINGS AS A
RESULT OF IMPLEMENTATION OF
THIS PROJECT ARE $700,000 PER
YEAR.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
GALLIUM ARSENIDE (Ga As) IMPATT DIODES

PROJECT NO: 275 9738

TITLE: EPITAXIAL AND METALLIZATION PROCESS FOR Ga As READ IMPATT DIODE.

COST: $503,000

RESULTS

READ WAFERS WERE PRODUCED BY EPITAXIAL DEPOSITION OF SUITABLY DOPED Ga As LAYERS ON A HIGHLY CONDUCTIVE SINGLE CRYSTAL Ga As SUBSTRATE.

THE SCHOTTKY METALLIZATION BARRIER WAS CREATED BY SEQUENTIALLY SPUTTERING PLATINUM, TITANIUM, AND GOLD.

IMPLEMENTATION OF THIS PROJECT WILL RESULT IN AN ESTIMATED SAVINGS OF $1.7 MILLION.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
COMPUTER AIDED ELECTRONICS DESIGN

PROJECT NO: 273 9741
TITLE: MMT ENGINEERING MEASURE FOR CAD/CAM SYSTEM: DRAWING SYMBOL LIBRARY
COST: $167,794

RESULTS
THIS SOFTWARE WAS DEVELOPED FOR DESIGN VERIFICATION OF AN INTEGRATED PRINTED CIRCUIT SYSTEM AND VALIDATION OF MASTER PLATES FOR SEVERAL PRINTED CIRCUIT BOARDS. THE SYSTEM WAS DESIGNED AS A LOW COST ALTERNATIVE TO A STAND-ALONE CAD/CAM SYSTEM.
THE SOFTWARE IS AVAILABLE FOR USE IN A DESIGN SYMBOL LIBRARY.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
COMPUTER AIDED DIE DESIGN

PROJECT NO: 4 75 4561

TITLE: COMPUTER AIDED DIE DESIGN AND COMPUTER AIDED MANUFACTURING FOR FORGING OF TRACK SHOES AND LINKS

COST: $135,000

RESULTS
A COMPUTERIZED SYSTEM FOR DESIGNING AND MANUFACTURING TRACK SHOE DIES. THIS SYSTEM, KNOWN AS "TRACKS," IS A TOTALLY INTERACTIVE SYSTEM TO ASSIST DYE DESIGNERS.

THE SYSTEM CALCULATES GEOMETRIC PROPERTIES, PERFORMS STRESS CALCULATIONS, AND PREPARES AN NC TAPE FOR MACHINING A MODEL OR EDM ELECTRODE. IMPLEMENTATION OF THIS PROJECT WILL SPEED UP THE DIE MANUFACTURING PROCESS AND ENSURE REPRODUCIBILITY.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT

METRICATION

PROJECT NO: T77 4589

TITLE: METRICATION

COST: $271,000

RESULTS

THIS PROJECT PREPARED PRODUCTION AND PROCUREMENT PLANS TO ASSURE INTEGRITY OF COMPONENTS AND VEHICLE HARDWARE SYSTEMS UNDER INTERNATIONAL METRIC STANDARDS.

A METRICATION ENGINEERING/DESIGN GUIDE MANUAL AND AN EXPERIMENTAL FABRICATION CONVERSION PLAN WAS PUBLISHED. THIS PROJECT WILL BE IMPLEMENTED AS PART OF THE TOTAL COMMAND CONVERSION PLAN.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
LOW MAINTENANCE BATTERY

PROJECT NO: 477 5019

TITLE: STORAGE BATTERY, MAINTENANCE FREE (DRY-CHARGED, CALCIUM ALLOY GRID, PLASTIC CONTAINER)

COST: $139,000

RESULTS

A CALCIUM ALLOY GRID BATTERY WAS DEVELOPED AS A LOW MAINTENANCE REPLACEMENT FOR THE STANDARD LEAD-ANTIMONY GRID BATTERY.

THE BATTERY PROVIDED SOME OF THE FEATURES NECESSARY TO MEET MIL REQUIREMENTS AND A FOLLOW-ON PROJECT WILL COMPLETE THE EFFORT.

COMPLETION AND IMPLEMENTATION OF THIS EFFORT WILL RESULT IN AN ESTIMATED $3.0 MILLION SAVINGS.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
ULTRASONIC WELDING

PROJECT NO: 1767055
TITLE: ULTRASONIC WELDING OF HELICOPTER SECONDARY FUSELAGE STRUCTURE
COST: $180,000

RESULTS

- TENSILE SHEAR STRENGTH OF SAMPLE ULTRASONIC SPOT WELDS WERE 2.5 TIMES THOSE OF RESISTANCE SPOT WELDS AND ABOUT 4 TIMES THE MINIMUM AVERAGE REQUIRED.
- FOUR PORT SIDE ELECTRONICS ACCESS DOORS WERE ULTRASONICALLY WELDED RESULTING IN A LIGHTER AND LESS EXPENSIVE UNIT.
- IMPLEMENTATION OF THIS PROJECT WILL RESULT IN AN ESTIMATED SAVINGS OF $225,000.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
CONTROLLED GRAIN TURBINE BLADES

PROJECT NO: 172 8036
TITLE: PROCESS FOR CONTROLLED GRAIN SIZE IN THIN WALLED TURBINE BLADES
COST: $185,000

RESULTS

CHANGES WERE MADE IN THE CASTING PROCESS FOR TURBINE ROTORS IN ORDER TO ALTER THE GRAIN REFINEMENT. THE GRAIN REFINED ROTORS SHOWED SUPERIOR FATIGUE PROPERTIES AND RETAINED ADEQUATE STRESS PROPERTIES; HOWEVER, THE YIELD AND CREEP STRENGTH WERE DEGRADED AND PROCESSING TIME WAS INCREASED.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
IMPROVED PERFORMANCE WINDSHIELD

PROJECT NO: 1748091
TITLE: ADVANCED ADHESIVES FOR TRANSPARENT ARMOR FOR ARMY AIRCRAFT
COST: $202,000

RESULTS

This project developed a method of producing transparent armor using film adhesives rather than the currently used cast-in-place adhesives. The LRP-366 interlayer provided light transmission that was well within the requirements for glass/plastic composites.

Implementation of this technique will result in an estimated 80% reduction in the processing cost of transparent armor.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
FLUIDIC DEVICE

PROJECT NO: 174 8109, 175 8109 & 176 8109
TITLE: FLUIDIC DEVICES FOR AIRCRAFT STABILITY AUGMENTATION SYSTEM
COST: $574,000

RESULTS
- YAW CONTROLLERS WERE SUCCESSFULLY PRODUCED USING THE ELECTROFORM CONDUCTIVE WAX (ECW) PROCESS IN CONJUNCTION WITH CONVENTIONAL PROCESSING.
- A PILOT PRODUCTION LINE USING THE ECW PROCESS WAS DEFINED.
- PRODUCTION YIELDS OF 95% SHOULD BE POSSIBLE IN LARGE QUANTITIES.
- IMPLEMENTATION OF THIS PROJECT WILL RESULT IN AN ESTIMATED COST SAVINGS OF $14 MILLION.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
PRINTED WIRING BOARD ADDITIVE PROCESS

PROJECT NO: 376 3147

TITLE: ADDITIVE PROCESS FOR
FABRICATION OF PRINTED
CIRCUIT BOARDS.

COST: $250,000

RESULTS
DEVELOPED THE DESIGN FOR AN AUTOMATED
PRODUCTION LINE USING THE ADDITIVE
PROCESS FOR FABRICATION OF PRINTED
CIRCUIT BOARDS. THE PROCESS WAS
VERIFIED IN A PILOT PRODUCTION LINE BY
FABRICATING 90 BOARDS USING THE ULTRA
THIN COPPER CLAD PROCESS.

WHEN IMPLEMENTED, AN ESTIMATED
SAVINGS OF $2.7 MILLION WILL RESULT.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT

HEAT PIPES FOR CIRCUIT CARDS

PROJECT NO: R77 3168

TITLE: METHODS FOR MANUFACTURING HEAT PIPES FOR CIRCUIT CARDS

COST: $172,000

RESULTS

A PRODUCTION TECHNIQUE WAS DEVELOPED FOR FABRICATING INTEGRATED HEAT PIPES FOR PRINTED CIRCUIT BOARDS. A RATE OF 50 PER HOUR WAS ACHIEVED. THE TECHNIQUE IS APPLICABLE TO A VARIETY OF HEAT PIPE CONFIGURATIONS.

IMPLEMENTATION OF THIS PROJECT COULD RESULT IN ESTIMATED BENEFITS OF OVER $10 MILLION.
RESULTS

MIL-STD-883 SCREENING TESTS ARE INADEQUATE TO DETECT MARGINAL BONDING. THREE NEW TESTS WERE IDENTIFIED AND EVALUATED.

NO CORRELATION WAS FOUND BETWEEN DEVICE FAILURES AND MOISTURE CONTENT WITHIN THE DEVICE. ADDITIONAL EFFORT IS REQUIRED TO EXPLAIN THIS UNEXPECTED RESULT.

SEVERAL OTHER SCREENING TESTS WERE DEVELOPED FOR MOS/LSI DEVICES. IMPLEMENTATION OF THIS PROJECT WILL RESULT IN ESTIMATED SAVINGS OF $1.5 MILLION.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT

LOCASERTS

PROJECT NO: 3763225

TITLE: PRODUCTION METHODS FOR MOUNTING NON-AXIAL LEAD COMPONENTS

COST: $195,000

RESULTS

- MARTIN-MARIETTA CORP. ENHANCED AUTOMATIC INSERTION METHODS FOR NON-AXIAL LEAD ELECTRONIC PACKAGES: DUAL-IN-LINE (DIP), PIN THROUGH HYBRIDS, AND TO-TYPE CANS.

- THEY DEVELOPED A PLASTIC, INJECTION MOLDED, LOCATOR-INSERTER (LOCASERT) PAD AND A COMPONENT INSERTION MACHINE TO POSITION THIS PAD.

- LOCASERTS REDUCE PRINTED CIRCUIT BOARD (PCB) ASSEMBLY TIME AND COST ON ALL LEVELS FROM MANUAL TO COMPLETE AUTOMATION.

- IMPLEMENTATION OF THIS PROJECT WILL RESULT IN AN ESTIMATED SAVINGS OF $760,000 PER YEAR.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
EXTRUSION OF PROPELLANTS

PROJECT NO: 376 3228 AND 37T 3228
TITLE: PRODUCTION METHODS FOR EXTRUDABLE HTPB PROPELLANT
COST: $95,000

RESULTS
AN AUTOMATED MISSILE PROPELLANT LOADING AND ASSEMBLY SYSTEM WAS DEVELOPED. TEMPERATURE AND CATALYST LEVELS WERE DETERMINED TO OPTIMIZE THE PROPELLANT QUICK CURE. NO PRODUCT QUALITY DEGRADATION WAS NOTED.

ANTICIPATED BENEFITS INCLUDE LOWER PRODUCTION COSTS THROUGH THE ELIMINATION OF BATCH OPERATIONS. A FOLLOW-ON PROJECT WILL LOAD 50 VIPER MOTORS BY THE NEW MANUFACTURING METHODS.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
FLUIDIC CONTROLS

PROJECT NO: 5 73 1139

TITLE: APPLICATION OF FLUID LOGIC CONTROL CIRCUITRY TO PYROTECHNIC LOADING

COST: $100,000

RESULTS

TWO MACHINES WERE SUCCESSFULLY INSTRUMENTED WITH THE FLUIDIC LOGIC CONTROL CIRCUITRY. THEY WERE THE BINARY FILLING AND CLOSING MACHINE AND THE NOSE CLOSURE REMOVAL AND BURSTER SENSING MACHINE.

THE PRIMARY ADVANTAGE OF FLUIDIC DEVICES IS THAT THEY DO NOT PRODUCE SPARKS THAT ARE HAZARDOUS IN AN EXPLOSIVE ENVIRONMENT.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT

GAS FILTERING

PROJECT NO: 573 1248 AND 575 1248

TITLE: EVALUATION OF EXHAUST FILTER SYSTEMS TO ESTABLISH DESIGN CRITERIA TO MEET AIR POLLUTION STANDARDS

COST: $444,000

RESULTS

A TEST APPARATUS FOR DETERMINING THE PERFORMANCES OF GAS FILTERS WAS DEVELOPED.

SIX GAS FILTERS WERE TESTED AND ALL WERE DETERMINED TO PERFORM SATISFACTORILY WHEN USED TO FILTER NERVE GAS SIMULANT, NERVE AGENT, PHOSGENE AND CYANOGEN CHLORIDE.

SAFETY WILL BE ENHANCED WITH THE APPLICATION OF THIS EFFORT IN ENGINEERING DESIGN REQUIREMENTS FOR FUTURE AIR VENTILATION SYSTEMS.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
LEVEL AND FLOW MEASUREMENTS

PROJECT NO: 5741261

TITLE: PROVISION OF PROTOTYPE EQUIPMENT FOR DETERMINATION OF LEVEL IN WHITE PHOSPHORUS STORAGE TANKS

COST: $40,000

RESULTS

TWO PROTOTYPE SYSTEMS WERE DEVELOPED TO SOLVE THE WHITE PHOSPHORUS MEASURING PROBLEMS. ONE SYSTEM MEASURES THE LEVEL IN THE TANKS AND THE OTHER MEASURES THE FLOW RATE AND TOTAL PUMPAGE.

THE LEVEL MEASURING SYSTEM UTILIZES MAGNETIC COUPLING BETWEEN THE FLOAT AND THE REACTANT TO MINIMIZE CONTACT WITH THE CORROSIVE MATERIALS.

THE FLOWMETER UTILIZES ULTRASONIC WAVES AGAIN MINIMIZING THE AMOUNT OF EQUIPMENT IN CONTACT WITH THE CORROSIVE MATERIALS.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
RED PHOSPHOROUS GRENADES

PROJECT NO: 57T 1337 & 577 1337

TITLE: ENGINEERING STUDIES FOR
ADAPTIVE TRANSFER OF
UNITED KINGDOM TECHNOLOGY:
RP/BUTYL GRENADES

COST: $604,000

RESULTS

THIS PROJECT PROVIDED THE
TECHNOLOGY REQUIRED TO PRODUCE
THE UNITED KINGDOM'S RED
PHOSPHOROUS GRENADE IN THE US.
A PILOT PLANT WAS CONSTRUCTED
AND THE PROCESSES WERE
DEVELOPED. GRENADES WERE
PRODUCED AND FIELD TESTED
SUCCESSFULLY, THEREBY VERIFYING
THE PROCESSES. THE TECHNICAL
DATA PACKAGE WAS COMPLETED;
THE FACILITIES PROJECT TO
IMPLEMENT THIS EFFORT IS PENDING.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
FLUIDICS

PROJECT NO: 574 3049 AND 376 3141
TITLE: FLUIDIC MANUFACTURING AND ASSEMBLY PROCESSES
COST: $440,000

RESULTS

FLUIDIC PULSE DURATION MODULATORS (PDM) WERE FABRICATED USING AN ALUMINUM STRUCTURE.

THE ETCHING PROCESS PRODUCED HIGH QUALITY LAMINATES WITH CONSISTENT REPRODUCIBLE RESULTS FOR STOCK THICKNESSES TO 15 MILS.

DIFFUSION BONDING OF UNCOATED ALUMINUM ALLOY SHIMS WAS OBTAINED WITH HIGHLY CONSISTENT RESULTS.

IMPLEMENTATION OF THIS PROJECT WOULD RESULT IN ESTIMATED SAVINGS OF $200,000 PER YEAR.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
AUTOMATED FUZE TESTING

PROJECT NO: 573 3051

TITLE: ENGINEERING AND FABRICATION
OF ELECTRONIC AND ELECTRO-
MECHANICAL INSPECTION TEST
EQUIPMENT FOR FUZE
PROCUREMENT PROGRAMS

COST: $250,000

RESULTS

THE FUZE ACCEPTANCE TESTER WAS
MODERNIZED WITH THE LATEST
CIRCUITRY FOR HIGH VOLUME
PRODUCTION OF M732 FUZES.

THE USABLE LIFE OF THE TARGET
SIGNAL SIMULATOR WAS INCREASED
BY TEN YEARS.

THE IMPROVED POWER SUPPLY
TELEMETRY SYSTEM IS BEING USED IN
SUPPORT OF THE M728 AND M732
PROGRAM.

COST SAVINGS ARE ESTIMATED TO
BE $250,000 PER YEAR.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
AUTOMATED ASSEMBLY

PROJECT NO: 5 71 4041 & 5 74 4041

TITLE: DEVELOPMENT OF AUTOMATED EQUIPMENT FOR ASSEMBLY OF MORTAR COMPONENTS

COST: $260,000

RESULTS

THESE PROJECT YEARS OF EFFORT ESTABLISHED THE OPTIMUM SEQUENCE OF OPERATIONS FOR THE AUTOMATED EQUIPMENT REQUIRED TO LOAD, ASSEMBLE, AND PACK THE 60MM AND 81MM PROPELLING CHARGES AND IGNITION CARTRIDGES. THE FINAL PLANS FROM THESE PROJECTS WERE USED FOR THE FOLLOW-ON PROJECTS.

UPON COMPLETION AND IMPLEMENTATION OF THE ENTIRE EFFORT, AN AUTOMATED LINE WILL BE AVAILABLE.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
ARTILLERY ACCEPTANCE TESTING

PROJECT NO: 573 4139, 574 4139, 577 4139, 
AND 578 4139

TITLE: APPLICATION OF RADAR TO BALLISTIC 
TESTING OF AMMUNITION (ARBAT)

COST: $3,022,000

RESULTS

A PHASED ARRAY RADAR SYSTEM WAS 
DEVELOPED AND CONSTRUCTED THAT CAN 
ACCURATELY TRACK ARTILLERY ROUNDS, 
MORTAR ROUNDS, AND ROCKETS FROM 
LAUNCH TO IMPACT. VITAL 
CHARACTERISTICS SUCH AS SPACE 
POSITION, TRUE VELOCITY, ACCELERATION, 
DRAG, AND RADAR CROSS SECTION IS 
NOW AVAILABLE IN REAL OR NEAR REAL 
TIME. FURTHER ENHANCEMENTS 
OF THIS SYSTEM ARE BEING DEVELOPED 
UNDER FOLLOW-ON PROJECTS.

COMPLETION AND IMPLEMENTATION OF 
THESE PROJECTS WILL RESULT IN 
ESTIMATED ANNUAL SAVINGS OF 
$2.9 MILLION.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
MELT POUR OF HIGH EXPLOSIVES

PROJECT NO: 574 4162
TITLE: AUTOMATED LINE FOR THE MELT-POUR PROCESSING OF HIGH EXPLOSIVES
COST: $1,759,400

RESULTS

• A MELT METHOD CAPABLE OF SUSTAINING CONTINUOUS OPERATION WAS DEMONSTRATED.
• A 1/10th SCALE AUTOMATED CONTINUOUS MELT POUR PILOT PLANT WAS CONSTRUCTED.
• AN AUTOMATED EXPLOSIVE INSPECTION SYSTEM WAS FABRICATED AND TESTED. IMPLEMENTATION OF THIS PROJECT WILL RESULT IN ESTIMATED ANNUAL SAVINGS OF $1,290,000.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT

NITROLYSIS OF HEXAMINE

PROJECT NO: 5 71 4171 & 5 72 4171

TITLE: INVESTIGATION OF PARAMETERS AFFECTING THE NITROLYSIS OF HEXAMINE

COST: $348,907

RESULTS

A MINI PILOT PLANT WAS CONSTRUCTED FOR THE CONTINUOUS PRODUCTION OF HMX.

FEATURES OF THE PLANT INCLUDED:

A VARIABLE FEED SYSTEM.

TEMPERATURE CONTROLS FOR EACH REACTOR.

SMALL REACTORS THAT MAINTAINED THE PROPER HEAT TRANSFER RATES.

FEED RATES ADEQUATE TO CONDUCT MATERIAL BALANCES AND DETERMINE YIELDS.

IMPLEMENTATION OF THIS PROJECT WILL RESULT IN AN ESTIMATED SAVINGS OF $2 MILLION PER YEAR.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
RECRYSTALLIZATION

PROJECT NO: 572 4220 & 573 4220

TITLE: CONTINUOUS RDX
RECRYSTALLIZATION
PROTOTYPE FACILITY

COST: $1,560,000

RESULTS

THE CONTINUOUS RDX RECRYSTALLIZATION
PROCESS THAT WAS DEVELOPED AT THE
START OF THIS PROJECT WAS FOUND TO
PRODUCE SMALL AMOUNTS OF ALPHA HMX.
THIS MATERIAL IS TOO SENSITIVE TO
SAFELY HANDLE; THEREFORE, THE PROJECT
WAS REDIRECTED TO AUTOMATE THE
BATCH PROCESS. THE AUTOMATED BATCH
EQUIPMENT WAS DESIGNED, INSTALLED,
AND PROVEN OUT.

IMPLEMENTATION OF THIS PROCESS WILL
RESULT IN AN ESTIMATED PRODUCTION
CAPABILITY OF 7.5 MILLION POUNDS OF
COMP B PER MONTH.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
COMPUTER AIDED MANUFACTURING

PROJECT NO: 574 4255

TITLE: MMT PRODUCTION CONTROL OF ACCELERATION SENSING DEVICES (CAM RELATED)

COST: $50,000

RESULTS
A CONCEPT WAS DEVELOPED FOR LINKING A CENTRIFUGE TEST WITH THE SPRING WINDER IN FUZES. THE NEXT STEP WILL BE FABRICATION OF A FULLY AUTOMATIC LOAD TESTER AND A MINICOMPUTER CONTROLLED SPRING WINDER.

ECONOMIC FEASIBILITY OF THIS CONCEPT IS DEPENDENT ON PRODUCTION REQUIREMENTS, AND DESIGN CONSIDERATIONS FOR FUZES, SPRINGS AND AUTOMATIC FUZE ASSEMBLY EQUIPMENT.
**DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT**

**FUZE ASSEMBLY**

**PROJECT NO:** 576 4280 & 577 4280

**TITLE:** M577 FUZE AUTOMATIC PROCESS CONTROL PROTOTYPE EQUIPMENT

**COST:** $1,108,000

**RESULTS**

TWO MACHINES WERE DEVELOPED UNDER THESE PROJECTS THAT AUTOMATICALLY BALANCE THE BALANCE WHEEL ASSEMBLY AND ADJUST THE BEAT RATE OF THE TIMER.

THE BALANCING MACHINE AUTOMATICALLY DETERMINES THE POINT OF UNBALANCE AND, BY MEANS OF A LASER, REMOVES MATERIAL.

THE BEAT RATE IS AUTOMATICALLY ADJUSTED BY SEQUENTIALLY SHORTENING THE HAIR SPRING (USING ULTRASONIC WELDING) UNTIL SPECIFICATIONS ARE MET. THE MACHINES HAVE BEEN FURNISHED A SUPPLIER FOR INTEGRATION INTO THE FUZE MANUFACTURING.
EXPLOSIVES SAFE SEPARATION

PROJECT NO: 57T 4288
TITLE: EXPLOSIVE SAFE SEPARATION AND SENSITIVITY CRITERIA
COST: $139,261

RESULTS
A MINIMUM NON-PROPAGATING DISTANCE FOR 8-INCH M106 HE PROJECTILES IS ONE FOOT IF 3 INCH DIAMETER ALUMINUM SHIELDING RODS THE SAME HEIGHT AS THE PROJECTILES ARE POSITIONED VERTICALLY BETWEEN THE PROJECTILES.

THIS INFORMATION WILL BE INCORPORATED INTO SAFETY REGULATORY DOCUMENTS.

SHIELDED CONFIRMATORY TEST SET-UP
RESULTS

The project analyzed and identified appropriate separation distance for safe loading and handling of ammunition. A variety of projectiles were considered. As an example, the safe distance for loading separate 81mm projectiles was 18 inches and for a pallet of loaded 81mm projectiles was 30 feet.

The results will be incorporated into the appropriate safety regulations.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
SAFETY

PROJECT NO: 5774288
TITLE: EXPLOSIVE SAFE
SEPARATION AND SENSITIVITY
CRITERIA
COST: $566,669

RESULTS
• THIS PROJECT DETERMINED
THE SAFE SEPARATION DIS-
TANCES BETWEEN 105MM M1
PROJECTILE COMPOSITION B
RISER SCRAP.

• TEST SERIES WERE PERFORMED
WITH THE ZAMAC FUNNELS
AND WITHOUT THE FUNNELS
FOR TWO AND FOUR RISER
UNITS.

• RESULTS OF THIS PROJECT
WERE APPLIED TO THE MOD-
ERNIZATION OF THE LONE
STAR ARMY AMMUNITION
PLANT.

TEST SET-UP FOR CONVEYOR
RISER SCRAP PROGRAM
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
BLAST EFFECTS

PROJECT NO: 5 76 4291

TITLE: BLAST EFFECTS IN THE MUNITION PLANT ENVIRONMENT

COST: $699,619

RESULTS
SEVERAL AREAS OF CONCERN WERE COVERED BY THIS PROJECT. THEY INCLUDED BLAST CAPACITY EVALUATION OF BARRICADES, EFFECTS OF SIMULTANEOUS DETONATIONS, BLAST CAPACITY OF WINDOWS AND FRAMES, GROUND SHOCK EFFECTS FROM EXPLOSIONS, AND A COMPUTER PROGRAM THAT CAN SIMULATE THE EFFECTS OF BLAST OVERPRESSURES ON FRAME STRUCTURES.

THE RESULTS OF THIS PROJECT WILL BE INTEGRATED INTO SAFETY REGULATORY DOCUMENTS.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
NITROCELLULOSE (NC) PURIFICATION

PROJECT NO: 5 77 4341
TITLE: IMPROVED NITROCELLULOSE PURIFICATION PROCESS
COST: $165,000

RESULTS

THIS PROJECT INVESTIGATED EXISTING METHODS FOR APPLICATION TO NITROCELLULOSE PURIFICATION. THE "CONICELL" SYSTEM MANUFACTURED BY MOSER PROCESSING WAS SELECTED FOR THE CONTINUOUS PURIFICATION DESIGN. THE DESIGN ALLOWS FOR ACID BOILING FOLLOWED BY SODA-ASH INJECTION AND POACHING. THE UNIT WILL CARRY A 10% NC SLURRY WITH A RESIDENCE TIME OF 45 MINUTES AT A RATE OF 2000 POUNDS PER HOUR. COMPLETION AND IMPLEMENTATION OF THIS PROCESS CAN RESULT IN ESTIMATED SAVINGS OF UP TO $1.2 MILLION PER YEAR.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
DIE CAST HOUSINGS

PROJECT NO: 5 77 4416

TITLE: DEVELOP AND PROVEOUT OF ALTERNATE MANUFACTURING PROCESSES FOR S + A

COST: $120,000

RESULTS

THIS PROJECT PROVIDED THE FABRICATION AND VERIFICATION TESTING OF AN ALTERNATE SAFE AND ARMING HOUSING FOR USE IN THE GEMSS MINE SYSTEM. OTHER APPLICATIONS OF THIS HOUSING ARE GATOR AND MOPMS.

THIS DIE CAST PART IS CONSIDERABLY SIMPLER AND LESS EXPENSIVE THAN THE BAR STOCK FABRICATED PART.

IMPLEMENTATION OF THIS PROJECT WILL RESULT IN ESTIMATED SAVINGS OF $1.6 MILLION PER YEAR.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
DETONATOR LOADING

PROJECT NO: 57T 4457
TITLE: MULTI-TOOLED IOWA DETONATOR LOADING MACHINE
COST: $332,000

RESULTS
THE OBJECTIVE OF THIS PROJECT WAS TO INCREASE THE OUTPUT OF AN IOWA DETONATOR LOADER TO 150 UNITS/MINUTE. THE GOAL WAS ACCOMPLISHED BY RETROFITTING AN EXISTING LOADER WITH A SET OF MULTIPLE LEVEL TOOLING. QUAD TOOLING WAS DETERMINED TO BE OPTIMUM.
IMPLEMENTATION OF THIS PROJECT WILL RESULT IN AN ESTIMATED COST SAVINGS OF $1.5 MILLION DOLLARS AT THE PEACETIME RATE.

X4 SERIES IOWA LOADER
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
ALUMINUM ALLOY POWDER METALLURGY

PROJECT NO: 572 6335
TITLE: HIGH STRENGTH ALUMINUM ALLOY SHAPES BY POWDER METALLURGY
COST: $440,000

RESULTS
POWDERED METAL PLATE WAS PRODUCED AND SHOWED HIGHER TENSILE STRENGTH AND NOTCHED FATIGUE STRENGTH, SUPERIOR CORROSION CRACKING RESISTANCE, AND TOUGHNESS EQUAL TO COMMERCIAL INGOT METALLURGY ALLOYS.

POWDERED METAL EXTRUSIONS AND DIE FORGINGS EXPERIENCED SIMILAR IMPROVEMENTS IN PROPERTIES.

THE IMPROVEMENT IN PROPERTIES FROM THIS PROCESS HAS RESULTED IN SEVERAL COMMERCIAL EFFORTS BEING UNDER TAKEN TO MORE FULLY EXPLOIT THE DEVELOPMENT.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
TUNGSTEN FRAGMENTS

PROJECT NO: 571 6388

TITLE: PRODUCTION OF HIGH DENSITY TUNGSTEN BASE PREFORMED FRAGMENTS

COST: $88,000

RESULTS

THIS PROJECT RESULTED IN A PURCHASE DESCRIPTION FOR THE MANUFACTURE OF TUNGSTEN BASED PREFORMED FRAGMENTS. THE DESCRIPTION WAS VERIFIED BY PROCURING 250,000 CUBE PENETRATORS. THE INITIAL PURCHASE POINTED OUT A NEED FOR MORE TECHNICAL GUIDANCE TO OBTAIN ACCEPTABLE FRAGMENTS.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
METAL PARTS

PROJECT NO: 5 73 6550

TITLE: ENGINEERING IN SUPPORT OF
ARTILLERY METAL PARTS
MODERNIZATION PROGRAM

COST: $480,187

RESULTS

AMMUNITION METAL PARTS PLANTS
WERE SURVEYED FOR MANUFACTURING
IMPROVEMENTS. TYPICAL FINDINGS
RESULTED IN:

DEVELOPING AN AUTOMATIC LOADER
FOR FORGING PRESSES, THEREBY
REDUCING PERSONNEL REQUIREMENTS
FROM 8 TO 1.5.

DEVELOPING INDIVIDUAL HYDRAULIC
TRANSFER UNITS TO REPLACE A
CONSTANT HEAD SYSTEM THEREBY
REDUCING THE HORSEPOWER
REQUIREMENT BY 1650.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
FILAMENT WOUND CANNON TUBE

PROJECT NO: 672 6681 AND 673 6681

TITLE: APPLICATION OF FILAMENT WINDING TO CANNON AND CANNON COMPONENTS

COST: $200,000

RESULTS
A FILAMENT WINDING MACHINE WAS PURCHASED THAT HAS THE FLEXIBILITY FOR HANDLING A VARIETY OF GEOMETRIC SHAPES.

Numerous liners for 106mm test cylinders were fabricated and then wound with a steel filament/epoxy jacket.

The composite tube 30% lighter than a conventional tube.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
BARREL PLATING

PROJECT NO: 672 6786

TITLE: AUTOMATION OF GUN BARREL BORE CHROMIUM PLATING PROCESS

COST: $70,000

RESULTS

• AN AUTOMATED PLATING SYSTEM WAS PURCHASED AND THE PROCESSES TO PLATE 5.56MM BARRELS WERE DEVELOPED. A ROTATING ELECTRODE IS USED IN THE PLATING PROCESS TO ELIMINATE THE REQUIREMENT FOR OPERATOR ALIGNMENT.

• THE EQUIPMENT CAN BE SWITCHED TO A MANUAL MODE OF OPERATION FOR SPECIAL PROCESSING.

• IMPLEMENTATION OF THIS PROCESS WILL RESULT IN AN ESTIMATED $250,000 SAVINGS FOR EACH 100,000 BARRELS.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
SMALL ARMS PARTS MOLDING

PROJECT NO: 6 72 6838

Louis Armand (AMTEC) reports that manufacturing simplification and cost reduction in the manufacture of plastic components of small arms and aircraft armament.

COST: $50,000

RESULTS
THE PROCESSES DEVELOPED UNDER THIS PROJECT WILL SIMPLIFY MANUFACTURING TECHNIQUES, LOWER COSTS, AND IMPROVE THE PROPERTIES OF SMALL ARMS NON-METALLIC PARTS. INJECTION MOLDING IS APPROXIMATELY SIX TIMES FASTER THAN COMPRESSION MOLDING.

THIS PROJECT WILL BE IMPLEMENTED UNDER PROJECT'S 6XX 7419.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
DEWAR PROCESS IMPROVEMENTS

PROJECT NO: 6 73 7056

TITLE: DEWAR MATERIALS AND MANUFACTURE

COST: $195,000

RESULTS

A METAL DEWAR THAT CAN BE REPAIRED AND RESEALED WAS DESIGNED TO HOUSE THE LINEAR ARRAY.

A HIGH VACUUM CAN NOW BE MAINTAINED FOR OVER A YEAR WITHOUT ACTIVE PUMPING.

THIS DESIGN DOUBLED THE OPERATIONAL LIFE OF THE ASSEMBLY.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
ELECTROLESS NICKEL PLATING

PROJECT NO: 673 7124

TITLE: EFFECT OF ELECTROLESS NICKEL PROCESS VARIABLES ON QUALITY REQUIREMENTS

COST: $40,000

RESULTS

PROCEDURES FOR PLATING GUN BORES WITH ELECTROLESS NICKEL WERE DETERMINED. A RANGE OF HARDNESSES CAN BE PREDICTED BY TAKING INTO CONSIDERATION THE PHOSPHORUS CONTENT AND USING THE PROPER THERMAL TREATMENT ON THE ITEM.

FOR HEAVY BUILDUP, CONSTANT MONITORING OF THE BATH PARAMETERS IS NECESSARY. PROCESS SPECIFICATIONS ARE AVAILABLE.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
NUMERICAL CONTROL PART PROGRAMMING

PROJECT NO: 6 72 7220
TITLE: MMT APPLICATION AND UTILIZATION OF MINI-COMPUTERS TO DIRECT NUMERICAL CONTROL FOR GENERAL PURPOSE MACHINE TOOLS
COST: $140,000

RESULTS
A "UNIAPT" MINICOMPUTER BASED PART PROGRAMMING SYSTEM WITH 3-DIMENSIONAL CONTOURING WAS OBTAINED FOR NC LATHES AND MACHINING CENTERS. THE NC TAPE PREPARATION SYSTEM WAS INTERFACED WITH THE "TRIDEA" DRAFTING AND DIGITIZING SYSTEM FOR CUTTER LOCATION PATH DISPLAY AND VERIFICATION. A COMPUTER NUMERICAL CONTROL "WADELL" LATHE WAS LINKED WITH THE COMPUTER SYSTEM TO ALLOW DIRECT TRANSMISSION OF PART PROGRAMS. LABOR SAVINGS IN TAPE PREPARATION AND INCREASE IN THE WORKLOAD HANDLING CAPABILITY OF THE NC MACHINE TOOLS WERE ACHIEVED.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT

INSPECTION USING LASERS

PROJECT NO: 672 7226

TITLE: DEVELOPMENT AND PREPARATION OF MULTI-PURPOSE ULTRA-HIGH PRECISION LASER QUALITY INSPECTION APPLICATIONS

COST: $150,000

RESULTS

A LASER THREAD MEASURING SYSTEM WAS DEVELOPED TO INSPECT THREAD PITCH, LEAD, AND DEVIATION FROM TRUE HELICAL PATH OF LARGE THREAD PLUG GAGES.

A LASER OPTICAL MEASURING SYSTEM WAS DEVELOPED WITH THE CAPABILITY TO DETERMINE OPTICAL GLASS DENSITY, GRADE, CURVATURE, FLATNESS, AND SCRATCH AND DIG CHARACTERISTICS.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
CANNON TUBE PROCESSING

PROJECT NO: 676 7236
TITLE: APPLICATION OF RAPID HEAT TREATING TO CANNON TUBES
COST: $190,000

RESULTS
EIGHT CANNON TUBES WERE SUBJECTED TO SHORTENED AUSTENITIZING CYCLES. TESTING OF TENSILE AND CHARPY IMPACT SAMPLES DEMONSTRATED THAT ACCEPTABLE PROPERTIES COULD BE OBTAINED.

FURNACE TIME HAS BEEN REDUCED FROM 70 TO 20 HOURS WITH SAVINGS AVERAGING $57 PER TUBE. USE OF FOSSIL FUEL HAS ALSO BEEN REDUCED.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT

GUN TUBE IMPROVEMENTS

PROJECT NO: 673 7242
TITLE: GUN TUBE MANUFACTURE BY AUTOMATION
COST: $195,000

RESULTS

SEVERAL IMPROVEMENTS TO THE MACHINING OPERATIONS WERE MADE INCLUDING:

- CONSOLIDATING THE M68 AND M185 PROCESSING.
- APPLYING A 3-AXIS N/C MACHINING CENTER TO THE BREECH FACE EXTRACTOR DETAIL.
- GRINDING THE POWDER CHAMBER FOR THE M68 TUBE.

IMPLEMENTATION OF THIS PROJECT HAS RESULTED IN ESTIMATED SAVINGS OF $130,000 PER YEAR.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
OPTICAL REPLICATION

PROJECT NO: 6 73 7261
TITLE: THE IMPROVEMENT OF PROCESSES INVOLVED IN PLASTIC REPLICA COMPONENT MANUFACTURE
COST: $79,718

RESULTS
AN IMPROVED PROCEDURE FOR THE MANUFACTURE OF SPHERICAL AND ASPHERIC MIRRORS BY THE DOUBLE REPLICATION PROCESS USING THIN FILM CAST EPOXY RESINS AS THE REPLICA WAS DEVELOPED.

WHILE THE PROCESS WILL NOT PROVIDE MIRRORS OF THE SAME OPTICAL QUALITY AS PRECISION GLASS MIRRORS, IT WILL PRODUCE LOW COST MIRRORS OF ACCEPTABLE QUALITY FOR MANY APPLICATIONS. IMPLEMENTATION IS DEPENDENT UPON SUFFICIENT QUANTITY REQUIREMENTS TO JUSTIFY SET UP OF A REPLICATION FACILITY.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
NUMERICAL CONTROL

PROJECT NO: 6 73 7265
TITLE: COMPUTER CONTROLLED RETICLE ENGRAVING
COST: $150,000

RESULTS
A COMPUTER CONTROLLED SCRIBING MACHINE WAS DEVELOPED THAT CAN SCRIBE 10 RETICLES AT ONCE.
SCRIBING TIME WAS REDUCED BY 60% AND SCRIBING DEFECTS REDUCED. THE NEW METHOD WAS IMPLEMENTED AT FRANKFORD ARSENAL AND HAD ACCUMULATED $19,000 IN SAVINGS WHEN THE FACILITY WAS CLOSED. NO FURTHER PRODUCTION WORK IS PLANNED FOR THIS MACHINE.

TEN-POSITION COMPUTER CONTROLLED OPTICAL SCRIBING MACHINE
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
HEAT SETTING SPRINGS

PROJECT NO: 6747411

TITLE: HEAT SETTING PROCEDURES FOR HELICAL COILED SPRINGS

COST: $50,000

RESULTS

THIS PROJECT INVESTIGATED A SERIES OF HEAT SETTING PARAMETERS FOR USE IN SMALL ARMS APPLICATIONS. HOT SETTING OF SPRINGS WILL RESULT IN MORE REPEATABLE PERFORMANCE WHERE THE OPERATING TEMPERATURE IS ELEVATED SUCH AS SPRINGS LOCATED ON OR NEAR THE BARREL OR BOLT OF AN AUTOMATIC WEAPON.

THE THREE MATERIALS TESTED WERE MUSIC WIRE, STAINLESS STEEL, AND CHROME VANADIUM WHICH ARE THE MATERIALS SPECIFIED IN 95% OF WEAPON APPLICATIONS.

PROCESS DATA IS NOW AVAILABLE TO SMALL ARMS DESIGNERS.

HEAT SET SPRING INSTALLED ON ENDURANCE TESTER.
MOLDED M16 HANDGUARD
PROJECT NO: 6747419 & 6757419

TITLE: LOW COST RECIPROCATING SCREW MOLDING OF THERMOSETTING PLASTIC WEAPONS COMPONENTS

COST: $110,000

RESULTS

A RECIPROCATING SCREW INJECTION MOLDING MACHINE WAS PURCHASED TO PRODUCE LOW-COST THERMOSETTING PLASTIC HANDGUARDS FOR THE M16 RIFLE.

A HOT RUNNER MOLDING PROCESS WAS CHOSEN FOR THIS ITEM SINCE THE MOLD FABRICATION AND DEBUG TIME ARE CONSIDERABLY LESS THAN FOR THE WARM MANIFOLD METHOD. FIFTY HANDGUARDS WERE PRODUCED AND SUBMITTED FOR EVALUATION TESTING.

IMPLEMENTATION OF THIS PROJECT WILL RESULT IN ESTIMATED COST SAVINGS OF $85,000 PER YEAR.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT

POWDER METAL PARTS

PROJECT NO: 6 74 7495

TITLE: CLOSED DIE FORGING OF POWDER METAL PREFORMS

COST: $115,000

RESULTS

THIS PROJECT ESTABLISHED THE POTENTIAL USEFULNESS OF EXISTING FORGE SHOP EQUIPMENT FOR PRODUCING PRECISION POWDER METAL FORGINGS.

THE MECHANICAL PRESS WAS FOUND TO BE SUPERIOR TO EITHER THE HYDRAULIC PRESS OR DROP HAMMER.

MILITARY WEAPON DESIGNERS HAVE MORE INFORMATION WITH WHICH TO SPECIFY P/M FORGED PARTS.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
BORIDE COATED TOOLS

PROJECT NO: 674 7524

TITLE: ULTRA HARD BORIDE COATING TO REDUCE TOOL WEAR

COST: $105,000

RESULTS
A 0.3 MIL LAYER OF TiB2 COATING WAS APPLIED TO STEEL TO FORM A TOUGH, VERY HARD, ADHERENT LAYER THAT IS RESISTANT TO SPALLING AND SURFACE WEAR.

THE COATING INCREASED TOOL LIFE, PARTICULARLY WHEN DRILLING FIBERGLASS. UP TO A 7% LABOR AND TOOL COST SAVINGS CAN BE ACHIEVED.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
ARTILLERY TUBE PRODUCTION

PROJECT NO: 674 7550 & 675 7550
TITLE: DEVELOPMENT OF PROTOTYPE PRODUCTION ESR FACILITIES.
COST: $670,000

RESULTS
HOLLOW ELECTRO-SLAG REMELT INGOTS WERE PRODUCED BY CABOT CORPORATION. THE HOLLOWS WERE THEN SATISFACTORILY FORGED INTO GUN TUBES.

THE USE OF HOLLOWS ELIMINATED TREPANNING AS A PRODUCTION OPERATION. UPON IMPLEMENTATION, SAVINGS OF $500 OR MORE PER TUBE IS ANTICIPATED.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT

SIMULATED SHOCK TESTS

PROJECT NO: 675 7571

TITLE: SHOCK TEST SIMULATION FOR

FIRE CONTROL INSTRUMENTS

COST: $148,000

RESULTS

ACCEPTABLE SIMULATED PRODUCTION
TESTS WERE DEVELOPED FROM VALIDA-
TION TEST PROCEDURES. THESE TESTS
WERE PERFORMED ON COMMERCIAL-
LY AVAILABLE SHOCK MACHINES WHICH DID
NOT REQUIRE EXOTIC PREPARATION.

THE WORK RESULTED IN IMPROVED
SHOCK TEST METHODS AND SPECS.
UPON IMPLEMENTATION IT IS ESTIMATED
THAT THE NUMBER OF SHOCK TESTS
REQUIRED FOR QUALIFICATION WILL BE
REDUCED BY 50%.

SHOCK TEST SPECIFICATIONS

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75
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
FIRE CONTROL TESTING

PROJECT NO: 675 7572
TITLE: THREE-AXIS DYNAMICS SIMULATION OF HELICOPTER ANGULAR MOTION FOR TESTING FIRE CONTROL MATERIEL
COST: $128,000

RESULTS

• THE THREE-AXIS FLIGHT MOTION SIMULATOR (FMS) WAS FOUND TO BE ABLE TO ACCURATELY SIMULATE FLIGHT TEST DATA TAKEN ON AN AH-I COBRA HELICOPTER.

• THE RESULTS ARE BEING INCORPORATED INTO DETAILED ENGINEERING SPECIFICATIONS.

• IT IS ESTIMATED THAT THIS PROJECT COULD RESULT IN A 50% REDUCTION IN THE COST OF HELICOPTER FIRE CONTROL PRODUCTION TESTING.
SECTION III
IMPLEMENTED EFFORTS
EFFORT NO: 77X3524

TITLE: MODULAR SYNTHETIC CAMOUFLAGE SCREENS

COST: $2,605,000

BENEFITS

PROJECT DEVELOPED MANUFACTURING METHODS AND EQUIPMENT FOR MASS PRODUCTION OF A NEW CAMOUFLAGE SCREEN. THE EQUIPMENT PRODUCES A RADAR SCATTERING GARNISH AND APPLIES THE GARNISH TO THE NETTING IN A PRESCRIBED PATTERN.

THE EQUIPMENT IS IN USE AT TWO CAMOUFLAGE MANUFACTURING FACILITIES: (1) BRUNSWICK CORP IN DELAND, FL, AND (2) DEVILS LAKE SIOUX MFG CO IN DEVILS LAKE, ND. SAVINGS PER UNIT FROM USING THE AUTOMATED EQUIPMENT IN LIEU OF HAND METHODS IS $332/UNIT. WITH 40K SCREENS BEING PRODUCED EACH YEAR, YEARLY SAVINGS TOTAL $13,280,000.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
DETECTOR MODULES

EFFORT NO: 2 74 9744
TITLE: FABRICATION OF UNIVERSAL DETECTOR MODULES
COST: $895,000

BENEFITS
PROJECT ESTABLISHED A PILOT PRODUCTION CAPABILITY TO PRODUCE UNIVERSAL DETECTOR DEWAR MODULES FOR HG-CD-TE PHOTODETECTOR ARRAYS. PRIOR TO THIS PROJECT THE MODULES WERE HAND PRODUCED.

TEXAS INSTRUMENTS IS USING THIS PILOT LINE TO PRODUCE DETECTOR MODULES FOR THE ARMY'S AN/VSG-2 TANK THERMAL SIGHT. THE MMT PILOT LINE IS THE ONLY EQUIPMENT ON WHICH THIS COMPONENT CAN BE MASS PRODUCED.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
IMAGE TUBES

EFFORT NO: 2749750

TITLE: FABRICATION OF 18MM WAFER
IMAGE TUBE BY BATCH PROCESSING

COST: $700,000

BENEFITS

LITTON HAD PREVIOUSLY DEVELOPED A
5-PORT VACUUM PROCESSOR FOR
PRODUCING 18MM IMAGE TUBES. THIS
PROJECT UPGRADED THIS EQUIPMENT
TO INCLUDE ELECTRON GUNS FOR OUT-
GASSING AND THE CAPABILITY TO MAKE
AN INDIUM SEAL OF THE PHOSPHOR
SCREEN TO THE TUBE WALL.

LITTON IS USING THIS TYPE EQUIPMENT
IN PRODUCTION OF IMAGE TUBES FOR
AN/PVS-5, NIGHT VISION GOGGLE.
SAVINGS IS ESTIMATED TO BE $3.2
MILLIONS ON TUBES PRODUCED DURING
THE 1976-81 TIME FRAME.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
QUALITY CONTROL TECHNIQUES

EFFORT NO: 2 75 9836

TITLE: ESTABLISHMENT OF QC TECHNIQUES FOR PDN OF ETCHED CORE MICROCHANNEL PLATES

COST: $276,000

BENEFITS

THIS PROJECT DEVELOPED QUALITY ASSURANCE POLICY AND PROCEDURES FOR MANUFACTURE OF 18MM AND 25MM MICROCHANNEL PLATES.

VARIAN ASSOCIATES, PALO ALTO, CA, ADOPTED THESE POLICIES AND PROCEDURES IN PRODUCTION OF MICROCHANNEL PLATES FOR IMAGE INTENSIFIER TUBES. IN ADDITION TO AN IMPROVEMENT IN PRODUCT QUALITY, THE YIELD OF THE PRODUCTION LINE HAS ALSO INCREASED. ESTIMATED SAVINGS FROM 1978-83 WILL BE $2.45 MILLION.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
JOINING ARMOR

EFFORT NO: T 7X 4329
TITLE: JOINING OF STEEL ARMOR-INTERMIX
COST: $276,000

BENEFITS
PROJECT DEVELOPED PRODUCTION METHODOLOGY TO JOIN ARMORS OF DIFFERENT TYPES AND HARDNESS. THIS ALLOWS A MORE IMPACT RESISTANT ARMOR TO BE APPLIED TO AREAS PREVIOUSLY CONSIDERED VULNERABLE.

THE ARMOR WELDING SPEC, MIL-SPEC-W46086, WAS REVISED TO INCLUDE THE PROCESSES DEVELOPED IN THIS EFFORT. CHRYSLER IS USING THIS SPEC AND THESE PROCESSES FOR WELDING ARMOR ON THE XM1 TANK. THIS INCREASES THE BALLISTIC PROTECTION OF THE TANK.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
TURBINE ENGINE COMPONENTS

EFFORT NO: 1 XX 7103

TITLE: IMPROVED MANUFACTURE OF TURBINE ENGINE COMPRESSOR COMPONENTS

COST: $740,000

BENEFITS

THIS PROJECT DEVELOPED MACHINERY AND PROCESSES FOR PRODUCTION OF TURBINE ENGINE COMPRESSOR COMPONENTS THAT HAD NEVER BEFORE BEEN MANUFACTURED. APPLICATION WAS SHOWN ON THE BLISK AND IMPELLER FOR THE T700 ENGINE.

IMPLEMENTATION ON THE T700 PRODUCTION LINE AT THE GENERAL ELECTRIC PLANT WILL COST $14 MILLION, BUT WILL SAVE $16,000 PER ENGINE OR $60 MILLION AT THE SCHEDULED PRODUCTION RATE.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION

ROTOR BLADES

EFFORT NO: 1777112

TITLE: COMPOSITE IMPROVED MAIN ROTOR BLADES

COST: $3,846,000

BENEFITS

PROJECT DEVELOPED AND TESTED A TDP FOR MASS PRODUCTION OF FILAMENT-WOUND ROTOR BLADES. IN ADDITION TO THE TDP, THE PROJECT PROVIDED TOOLING FOR FUTURE FABRICATION OF BLADES.

KAMAN AEROSPACE CORP. IS IMPLEMENTING THIS PROJECT THROUGH THEIR CONTRACT TO RETROFIT THE ENTIRE FLEET OF COBRA HELICOPTERS WITH COMPOSITE MAIN ROTOR BLADES. BENEFITS ARE COMBAT ORIENTED IMPROVEMENTS IN AIRCRAFT PERFORMANCE, SURVIVABILITY, MAINTAINABILITY, AND RELIABILITY.

COBRA HELICOPTER WITH FILAMENT WOUND MAIN ROTOR BLADE

84
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
HOT ISOSTATIC PRESSING

EFFORT NO: 17X 8046

TITLE: SMALL COOLED AXIAL TURBINE
BLADE, VANE AND DISK
FABRICATION

COST: $1,525,000

BENEFITS

GENERAL ELECTRIC APPLIED HOT
ISOSTATIC PRESSING (HIP) TO FORM
TURBINE DISCS AND COOLING PLATES
THAT REQUIRED A MINIMUM OF
MACHINING.

HIPING ELIMINATES FORGING OF
TURBINE DISKS AND COOLING PLATES.

IT REDUCES SUPERALLOY POWDER
METAL QUANTITY BY 50 PERCENT.

THE AS-HIP RENE 95 PROCESS FOR
TURBINE DISKS AND COOLING PLATES
IS IN FULL PRODUCTION AT GENERAL
ELECTRIC.

BASED ON CURRENT SAVINGS FROM
USING THE PROCESS, GE ANTICIPATES
AN AVERAGE SAVING OF APPROXIMATELY
$2 MILLIONS PER YEAR ON THE CURRENT
T700 PRODUCTION ORDER.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
EXTRUSION DIES

EFFORT NO: 175 8154

TITLE: CADCAM OF EXTRUSION DIES FOR ALUMINUM, TI, AND STEEL PARTS
COST: $182,000

BENEFITS
DEVELOPED AN INTERACTIVE SYSTEM OF COMPUTER PROGRAMS FOR DESIGN AND MFG OF EXTRUSION DIES. UTILIZATION OF THIS SYSTEM PROVIDES FASTER DESIGN & MFG OF DIES, IMPROVED DIE TOLERANCES, AND IMPROVED YIELD VIA OPTIMUM EXTRUSION VARIABLES.

THE AIR FORCE MATERIALS LAB IS USING THE SYSTEM TO DESIGN AND GENERATE NC TAPES FOR ALL THEIR AL EXTRUSION DIES. THEY REPORT A $10K PER YEAR SAVINGS. BECAUSE COPIES OF THE PROGRAMS WERE FURNISHED NUMEROUS CONTRACTORS, OTHER IMPLEMENTATION IS HIGHLY POSSIBLE BUT DIFFICULT TO TRACK.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION

EFFORT NO: 375 3157

TITLE: PDN TECH FOR DIODE PHASE SHIFTER ELEMENTS

COST: $650,000

BENEFITS

PROJECT DEVELOPED A HIGH RATE PRODUCTION METHOD FOR MANUFACTURING DIODE PHASE SHIFTER-RADIATOR ELEMENTS BY A THICK FILM PROCESS IN LIEU OF A THIN FILM PROCESS. IT ALSO INCORPORATED A DUAL INTEGRATED ELEMENT MOL. E CONCEPT.

THE MATT CONTRACTOR, HUGHES AIRCRAFT, TRANSFERRED THE TECHNOLOGY TO THEIR NEWPORT BEACH, CA DIVISION WHERE THE METHOD IS BEING USED IN PRODUCTION OF THE AN/TPQ37 FIRE FINDER RADAR. HUGHES ESTIMATES A $10,241K SAVINGS DURING THE 1978-82 TIMEFRAME. OTHER BENEFITS INCLUDE REDUCED WEIGHT AND INCREASED RELIABILITY.

IMPLEMENTATION COST: $200K

64 ELEMENT INTEGRATED SUBARRAY MODULE
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
ROCKET MOTOR PROPELLANTS

EFFORT NO: R 7X 3170

TITLE: REPLACEMENT OF TPH-8156 AND TPH-8159 PROPELLANT

COST: $375,000

BENEFITS

IN 1974, COMMERCIAL SOURCES STOPPED PRODUCING TWO CURING AGENTS USED IN PROPELLANT FOR THE PERSHING ROCKET MOTORS. THIS PROJECT DETERMINED MIXING PROCEDURES FOR MANUFACTURING OF THE PROPELLANTS USING ALTERNATE CURING AGENTS.

LONGHORN AAP IS USING THE DEVELOPED PROCEDURES TO MANUFACTURE THE NEW PROPELLANTS FOR THE PERSHING MISSILE. ALTHOUGH THE NEW PROPELLANTS EXHIBIT IMPROVED PERFORMANCE AND RELIABILITY, THE PRIMARY BENEFIT IS THE ABILITY TO PRODUCE A PROPELLANT FOR THE PERSHING.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION

COMPUTERIZED PROCESS PLANNING

EFFORT NO: 37X3232

TITLE: COMPUTERIZED PRODUCTION PROCESS PLANNING

COST: $345,000

BENEFITS

PROJECT DEVELOPED A COMPUTERIZED PRODUCTION PROCESS PLANNING SYSTEM (CPPP) TO ASSIST PROCESS PLANNERS IN PLANNING THE FABRICATION OF CYLINDRICAL PARTS.

THE CPPP SYSTEM IS BEING USED BY HAMILTON STANDARD, PRATT & WHITNEY AND SIKORSKY, WHICH ARE ALL SUBSIDIARIES OF UNITED TECHNOLOGIES. APPROXIMATELY 50% OF THESE COMPANIES WORKLOAD IS FOR GOVERNMENT AGENCIES. HAMILTON STD ESTIMATES A 39% REDUCTION IN PROCESS PLANNING MANHOURS. OTHER BENEFITS INCLUDE PROCESS STANDARDIZATION AND MACHINE OPTIMIZATION.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
TOXIC HAZARDS

EFFORT NO: 5 TX 1248
TITLE: EVALUATION OF EXHAUST FILTER SYSTEM
COST: $444,000

BENEFITS

THIS PROJECT EVALUATED SIX GAS FILTERS AND FOUND THEM SUITABLE FOR USE IN REDUCING TOXIC HAZARDS. THE PROJECT ALSO DETERMINED THAT A DUAL FILTER SYSTEM WITH AN AGENT DETECTOR BETWEEN THE FILTERS CAN INSURE THAT STACK EMISSIONS DO NOT EXCEED EPA REGULATIONS.

THE DUAL FILTER CONCEPT HAS BEEN INSTALLED AT THE CHEMICAL AGENT MUNITIONS DISPOSAL SYSTEM AT TOOELE ARMY DEPOT AND SEVERAL SMALL SCALE DEMIL OPERATIONS THROUGHOUT THE COUNTRY.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
GRENade Filling

EFFORT NO: 5 7X 1260

TITLE: AUTOMATED FORMING AND FILLING OF STARTER CUP FOR M8 GRENADE

COST: $105,000

BENEFITS

THIS EFFORT EVALUATED THE PRODUCTION OF A PREFORMED M8 GRENADE STARTER SLUG USING A TABLETING PRESS. THIS METHOD IS CURRENTLY BEING USED AT PINE BLUFF ARSENAL IN THE PRODUCTION OF M8 GRENADE STARTER MIX SLUGS. IT IS ALSO BEING UTILIZED TO MANUFACTURE STARTER MIX SLUGS FOR THE 105MM AND 155MM SMOKE CANISTERS.

THE BENEFIT IS AN IMPROVED PROCESS WHICH REDUCES MANPOWER BY 47% AND REDUCES COST OF THE END ITEM BY $0.056 PER GRENADE. THE PROCESS ALSO IMPROVES SAFETY BY GREATLY REDUCING THE NUMBER OF PERSONNEL IN DIRECT CONTACT WITH A PYROTECHNIC MIX.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
CONTAMINANT MONITORS

EFFORT NO: 57X1277
TITLE: HIGHLY SENSITIVE AND FAST RESPONSE CONTAMINANT MONITORS
COST: $1,686,000

BENEFITS

THIS PROJECT DEVELOPED A REAL TIME MONITOR ALARM FOR NERVE AGENTS AND MODIFIED A COMMERCIAL SULFUR ANALYZER TO MONITOR THE EMISSIONS DURING THE DEMIL OF MUSTARD AGENT.

THESE MONITORS WERE INSTALLED IN THE CHEMICAL DEMIL FACILITY AT TOOELE ARMY DEPOT. THE MONITORS PROVIDE IMPROVED SAFETY FOR PLANT OPERATORS AND ASSIST PLANT OPERATORS IN LOCATING FAILURES OR MALFUNCTIONS.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
FUZE ASSEMBLY AND INSPECTION

EFFORT NO: 5 TX 4032

TITLE: AUTOMATED EQUIP FOR ASSEMBLY
OF M739 FUZE

COST: $1,365,000

BENEFITS

PROJECT DEVELOPED A PROTOTYPE PRODUCTION LINE FOR AUTOMATED ASSEMBLY
AND INSPECTION OF THE M739 FUZE.

THE PROTOTYPE PRODUCTION LINE WAS SUPPLEMENTED BY EQUIPMENT PURCHASED
UNDER A FACILITIES PROJECT. THIS PRODUCTION LINE WAS PUT INTO USE AT
HONEYWELL AND HAS PRODUCED OVER 2
MILLION M739 FUZES WITH A MINIMUM OF
DEPENDENCE ON HUMAN JUDGEMENT AND
SKILLED OPERATORS.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
WASTE INCINERATION

EFFECT NO: 5 XX 4114/P06
TITLE: PROPELLANT & EXPLOSIVE
WASTE INCINERATION
COST: $2,450K

BENEFITS
THIS TASK DEVELOPED TWO ACCEPTABLE
P&E INCINERATORS (ROTARY KILN &
FLUIDIZED BED) TO REPLACE OPEN AIR
BURNING. A ROTARY KILN IS INSTALLED
AND OPERATING AT RADFORD AAP.
INCINERATORS OF BOTH TYPES ARE
SCHEDULED FOR INSTALLATION AT
NUMEROUS AMMO PLANTS AND DEMIL
FACILITIES.

UTILIZATION OF THESE INCINERATORS
HAS/WILL PROVIDE A SAFE METHOD FOR
DISPOSAL OF P&E WASTE WITH A
SIGNIFICANT REDUCTION IN POLLUTANTS.

ROTARY KILN SCHEMATIC
TITLE: DETONATION TRAPS FOR IMPROVED SAFETY IN MUNITIONS PLANTS

COST: $623,000

BENEFITS

THIS PROJECT DEVELOPED DETONATION TRAPS WHICH CAN BE INSTALLED IN PIPELINES TO STOP PROPAGATION OF EXPLOSIVE DETONATIONS.

THese TRAPS WERE INSTALLED IN THE ARRADCOM MELT-POUR PILOT PLANT BETWEEN THE MELT BUILDING AND THE LOADING BUILDING. IN THE EVENT OF AN EXPLOSION, THESE TRAPS WILL MINIMIZE THE LOSSES BY PREVENTING PROPAGATION FROM ONE BUILDING TO ANOTHER THROUGH THE PIPELINES.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
EXPLOSIVE RECOVERY

EFFORT NO: 5 74 4205

TITLE: PROCESSING SPENT ACID FROM RDX/HMX REACTION FOR RECOVERY OF EXPLOSIVES

COST: $70,000

BENEFITS

THIS PROJECT INSTALLED A HEATING AND CIRCULATING LOOP ONTO THE PRIMARY EVAPORATOR FEED TANK IN THE SPENT ACID RECOVERY PROCESS AT HOLSTON AAP.

THIS HEAT EXCHANGER INCREASED THE SOLUBILITY OF RDX/HMX IN THE SPENT ACID, THUS DECREASING THE EXPLOSIVE LOAD LIMIT OF THE LINE. ADDED BENEFITS INCLUDE $11,000/YEAR STEAM COST SAVINGS FROM RECOVERING CONDENSATE. ALSO, THE HOT FEED PREVENTS BUILDUP OF CRYSTALLIZED RDX ON PIPE WALLS.
DARCOM PRIOR YEAR MM&T ACCOMPLISHMENT
ARTILLERY SHELL BANDING

IMPLEMENTATION

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>ITEMS SUPPORTED</th>
</tr>
</thead>
<tbody>
<tr>
<td>SCRANTON APP</td>
<td>M509</td>
</tr>
<tr>
<td>CHAMBERLAIN MFG</td>
<td></td>
</tr>
<tr>
<td>New Bedford, MA</td>
<td>M483</td>
</tr>
<tr>
<td>Waterloo, IA</td>
<td>M329</td>
</tr>
<tr>
<td>NORRIS INDUSTRIES</td>
<td>M483, M509, M549</td>
</tr>
<tr>
<td>LOUISIANNA AAP</td>
<td>M483</td>
</tr>
</tbody>
</table>

NEW WELDING EQUIPMENT

EFFORT NO: 5 73 6522

TITLE: COMPUTER MONITOR OF ARTILLERY SHELL BAND WELDING BY CLOSED LOOP TECHNIQUES

COST: $358,000

BENEFITS

PROJECT ADAPTED A MINICOMPUTER AND VARIOUS SENSING DEVICES TO WELDING EQUIPMENT FOR DEPOSITING NONFERROUS OVERLAYS.

THIS EQUIPMENT PLUS FUTURE GENERATIONS OF THIS EQUIPMENT HAS BEEN USED AT VARIOUS METAL PARTS FACILITIES. BENEFITS ARE AS FOLLOWS:

- **REQUIRES LESS SKILLED OPERATORS**
- **50% INCREASE IN YIELD OVER PRIOR METHODS**
- **REDUCED REJECT RATE FROM 11% TO 2%**
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
SHOP DATA COLLECTION

EFFORT NO: 6 7X 7248
TITLE: IMPROVED MFG CONTROL THROUGH DATA AUTOMATION
COST: $396,000

BENEFITS

THIS PROJECT DEVELOPED, INSTALLED, AND IMPLEMENTED AN AUTOMATED SHOP DATA COLLECTION (SDC) SYSTEM AT WATERVERLIEEN ARSENAL. ALL PRODUCTION REPORTING BY SHOP LABOR IS ACCOMPLISHED THROUGH THIS SYSTEM. IN ADDITION, THE PROJECT DEVELOPED A WORKLOAD FORECASTING SYSTEM AND ESTABLISHED A COMMON COMPUTER DATA BASE FOR BILL OF MATERIALS AND PRODUCTION ROUTING.

USING THIS SYSTEM HAS INCREASED PRODUCTIVITY BY PROVIDING MORE ACCURATE AND TIMELY REPORTS TO SHOP MANAGERS. IN ADDITION, HARD SAVINGS WERE OBTAINED FROM THE ELIMINATION OF TIME CLERKS AND KEYPUNCH REQUIREMENTS. SAVINGS ESTIMATED AT $176K PER YEAR.
DARCOM PRIOR YEAR MM&T IMPLEMENTATION

EPOXY RESIN MOLDS
EFFORT NO: 673 7305

TITLE: RESIN BONDED MOLD & DIE PRODUCTION TECHNOLOGY
COST: $35,000

BENEFITS

THIS PROJECT INVESTIGATED THE TECHNOLOGY REQUIRED TO PRODUCE EPOXY RESIN MOLDS FOR SHORT PRODUCTION RUNS OF (1) WAX INVESTMENT PATTERNS, (2) PLASTIC PARTS, AND (3) RUBBER PARTS.

RESIN BONDED MOLDS FOR PRODUCING SMALL INVESTMENT CASTING WAX MOLDS WAS INTRODUCED AT ROCK ISLAND ARSENAL AN AVERAGE SAVINGS OF $21,000 PER YEAR HAS ACCRUED FROM USING THIS PROCESS.

EPOXY MOLD, INVESTMENT WAX PATTERN AND CAST COMPONENT FOR BUTTON (M219)
DARCOM PRIOR YEAR MM&T IMPLEMENTATION
HORIZONTAL QUENCHING

EFFORT NO: 6 74 7481

TITLE: HORIZONTAL SPRAY QUENCHING FOR HEAT TREATMENT OF CANNON TUBES

COST: $100,000

BENEFITS

THIS PROJECT DEVELOPED A HORIZONTAL SPRAY METHOD FOR QUENCHING CANNON TUBES. THIS ELIMINATED THE REQUIREMENT FOR LARGE VERTICLE QUENCH TANKS WHICH COULD ONLY BE CONSTRUCTED WITH DEEP PITS OR HIGH BAYS.

A PRODUCTION SIZE HORIZONTAL SPRAY QUENCHING SYSTEM WAS PURCHASED UNDER A MODERNIZATION EFFORT AT WATERTVIET ARSENAL. THIS EQUIPMENT INCREASES GUN TUBE QUALITY BY REDUCING THE VARIABILITY OF YIELD STRENGTH IN THE TUBE. THE SYSTEM SAVES OVER $1.3M PER YEAR DUE TO INCREASED PRODUCTIVITY IN THE HEAT TREAT CYCLE.
TITLE: APPLICATION OF AUTOMATIC DRAFTING MACHINE

COST: $100,000

BENEFITS

THIS PROJECT EXPANDED THE CAPABILITIES OF A PREVIOUSLY PURCHASED AUTOMATIC DRAFTING MACHINE.

THE PRIMARY BENEFIT WAS THE ABILITY TO VERIFY AND CORRECT N/C TAPES BY SIMULATION ON THE DRAFTING MACHINE RATHER THAN USING THE ACTUAL N/C MACHINE. THE SIMULATION IS A CONSIDERABLY FASTER AND LESS EXPENSIVE METHOD. REDUCTIONS IN ENGINEERING DESIGN, PROGRAMMING, DIRECT LABOR, AND N/C MACHINE TIME HAVE BEEN EXPERIENCED.
DRXIB-MT
DISTRIBUTION (Cont'd):

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PM, Chemical Demilitarization & Installation Restoration, Attn: DRCPM-DR
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