U.S. ARMY COMBAT CAPABILITIES DEVELOPMENT COMMAND – GROUND VEHICLE SYSTEMS CENTER

JTEG Brief - Powder Coating and Flame Spraying, 140850

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JTEG BRIEF
POWDER COATING AND FLAME SPRAYING, 140850

Purpose:

- Increase powder coating use throughout the military, and especially in the depot setting, by
  - Developing guidance for powder coating application in a wide variety of conditions
  - Developing powder coatings which can be applied using thermal spray, enabling application without the traditional curing oven

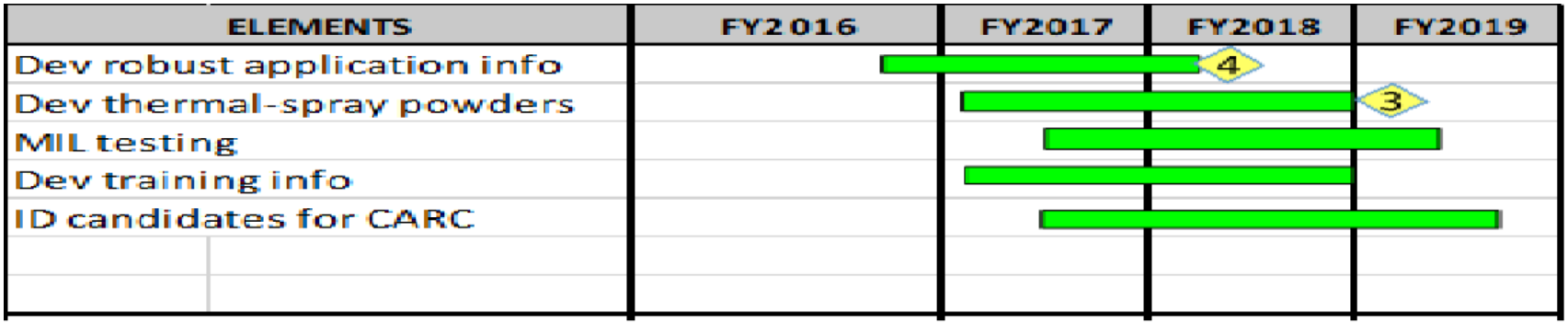
Products:

- Robust powder application guidance and instruction for parameters such as particle size, film thickness, application voltage, gun and tip type, and bake profile
- Thermally-sprayed powder coatings which meet CARC requirements.

Payoff:

- Increased use of high-performing environmentally-friendly powder coatings
- Ability to select application parameters to optimize powder coating performance
- Deployment of powder coatings that can be applied and cured without the need for a curing oven

PROJECT SCHEDULE



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TASK 1 - THERMAL SPRAY APPLICATION DEVELOPMENT – SUBTASKS

Subtask 1.1 - Benchmarking

- Identify a thermal spray system candidate(s) to use throughout the remainder of the program. Identify gaps in the ability to apply existing powder coatings through the selected thermal spray equipment. Conduct performance testing of coated panels and identify gaps.

Subtask 1.2 – Development

- Identify thermal spray equipment and at least one formulation that meets MIL spec on a laboratory scale.

Subtask 1.3 – Scale Up

- Demonstrate that at least one powder formulation can be successfully thermally sprayed at a part scale.

Subtask 1.4: Demonstration

- Assess suitability for depot application

PROGRESS:

Identify thermal spray coating candidate(s)

- Complete – Identified Resodyn PTS-30 thermal spray unit as feasible for thermal powder coating application.

Identify thermal spray equipment/powder coating combination meeting MIL-PRF-32348 requirements

- Initial investigation into formulation modifications and application settings has been completed.
- Results showed both modification of the resin system and optimization of application parameters can have an effect on the film smoothness.

Demonstrate that at least one powder formulation can be successfully thermally sprayed at a part scale.

- Not yet started

Thermal spray CARC Depot demonstration

- Not yet started

TASK 2 - POWDER COATING APPLICATION ROBUSTNESS IMPROVEMENT – SUBTASKS

Subtask 2.1: Plan

- Develop a test plan of experimental designs to identify which powder and process variables have the largest impact on final film properties, as well as identify any interactions between variables.

Subtask 2.2: Execute Plan

- Identify a robust application window up to pilot scale and any formulation changes that may be needed.

Subtask 2.3: Validate Application Window at Depot

- Confirm that the application window predicted by lab and pilot work translates to the depot

PROGRESS:

Subtask 2.1: Develop Test Plan – (Initial Benchmark – Design of Experiment (DOE))

- Evaluated the following using Fluoropolymer and CARC
  - Bake time and temperature
  - Spray gun KV, air flow and atomization settings
  - PPG powder primer used on all panels in study, 0.8 – 1.2 mils 375oF/5” cure
  - Topcoat sprayed at 2.5 – 3.5 mils
- **Measured**
  - DFT, gloss (60o/85o), hardness (STM-0742), adhesion (ASTM 3359), boiling water adhesion, solvent double rubs (STM 5091), color/DE, UV-Vis
- **Observed**
  - Smoothness under the microscope

Subtask 2.2: Execute Plan

- Developing plan of action in contractor’s Application Lab

Subtask 2.3: Validate Application Window at Depot

- Not yet started

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TASK 3 - DEMONSTRATE TECHNOLOGIES, COMMUNICATE RESULTS, PROVIDE TRAINING

Subtask 3.1 (2.4): Technology Transfer

- Maximize awareness of project results in DoD community
- Develop a suite of tech-transfer tools to include: An updated technical manual for powder technology application; A troubleshooting guide; Conduct training of powder applicators at up to two depots

Task 3 - FINAL REPORT

- Invested contractors will write a final report to be reviewed by TARDEC and ARL.

PROGRESS:

- Not yet started

QUESTIONS?