Direct Digital Manufacturing for Helicopter Engines & Other DoD Warfighter Platforms

OBJECTIVE/SOLUTION:
Improve manufacturing capabilities and affordability of production components using Direct Digital Manufacturing (DDM). This additive manufacturing technology enables the defense industrial base to supplement traditional component fabrication and performance limitations for both legacy and future critical gas turbine engine components. This program will advance the MRL for DDM from MRL4 to MRL6 for production applications and accelerate the implementation of DDM for advanced engine platforms.

Achievements:
• Part down selected from 15 to 1 — Inlet Swirl Frame
• Direct Metal Laser Melting (DMLM) component performance studies in process (e.g., life analysis)
• Design of Experiments (DOE) plan for process throughput improvement refined/coupons completed and under evaluation
• Draft Airworthiness Qualification Plan (AQP) in process

Benefits:
• Validated method for DDM component(s) used in aviation propulsion and power generation gas turbine engines
• Enable operational flexible reconfigurable factory infrastructure model with reduced logistical requirements and compressed supply chain
• Surface Finish Improvement vs. Productivity Enhancement

Benefits (cont):
• 926 Manufacturing steps eliminated
• 147 parts reduced to 25 parts
• Part cost reduction

Transition and Weapon Systems/Secondary Items Impacted:
• Initial transition to T700-GE-701D Black Hawk & Apache; Leveraging/Future Transition Opportunities with Improved Turbine Engine Program (ITEP), Advanced Affordable Turbine Engine (AATE), Future Affordable Turbine Engine (FATE), Joint Heavy Lift (JHL) advanced turboshaft demonstrators; GE-38 for Navy CH-53K advanced heavy lift helicopter program.

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