**Objective:** Develop thermal spray coupon management, dispensing and process tracking system to reduce/eliminate mistakes, improve efficiency, eliminate unnecessary overtime for sample issuance, ensure compliance with coupon handling and tracking requirements and reduce.

**Description:** Mission critical components that are coated using thermal spray methods require process verification coupons to be coated simultaneously with the components. These coupons then undergo rigorous processing and inspection in the metallurgical laboratory to ascertain the coatings have achieved quality microstructure characteristics such as bond strength, porosity, unmelt, oxides, integrity, hardness, etc. There are many types of coupons used, depending on the component to be coated and the type of coating to be applied. The coupons must be serialized and carefully managed throughout the entire production coating process and the laboratory inspection process to ensure the coated component receives certification before being placed in service. Time is often of the essence, and the coated components can be delayed for production release if the coupons are not processed expeditiously. Additionally, due to the many types of coupons, the many types of coatings and the many types of laboratory inspection steps/processes, mistakes can be made that result in unnecessary re-coats and component release delays. Most coupon operations are currently performed manually, requiring significant technician hours that could be better spent on more technical duties.

Development of a system is needed that will manage the thermal spray coupon inventory, provide automated coupon dispense with intelligent serialization at time of use (date, booth, operator, process, etc.) and provide a means of tracking the coupons throughout the entire process of coating application, sectioning, mounting, polishing and the various inspections/evaluations. The system needs to provide automated visibility of coupon status at any time to ensure delivery of high priority components are not delayed. Research is needed to determine the optimal system/process that would initially be used on currently operational thermal spray booths. The research would need to identify how this system could integrate with any existing thermal spray management processes and data. The research would also need to include identification of requirements to expand the use of the system by facilities within DOD. The above-mentioned data is not currently available but would be of great benefit in process tuning and continuous process improvement.

**Phase I:** Proposal must provide: A) Feasibility analysis of automated dispensing of the thermal spray coupons and intelligent serialization at point of use. B) Analysis of tracking/scanning methodologies for the various metallurgical lab processes and providing data that can be queried for various purposes. C) Feasibility analysis to achieve authority to operate adhering to Risk Management Framework (RMF) requirements. D) Feasibility analysis to integrate with any existing DOD thermal spray management processes and data. FEASIBILITY DOCUMENTATION: Offerors interested in submitting a Direct to Phase II proposal in response to this topic must provide documentation to substantiate that the scientific and technical merit and feasibility described above has been met and to identify the potential commercial applications. The documentation provided must substantiate that the proposer has developed a preliminary understanding of the technology to be applied in their Phase II proposal to meet the objectives of this topic. Documentation should include all relevant information including, but not limited to: technical reports, test data, prototype designs/models, and performance goals/results. Read and follow all of the feasibility documentation portions of the Air Force 19.2 Instructions. The Air Force will not evaluate the offeror’s related DP2 proposal where it determines that the offeror has failed to demonstrate the scientific and technical merit and feasibility of the Phase I project.

**Phase II:** Develop prototype concepts and methodologies for thermal spray coupon management, dispensing and process tracking through the entire coating application and metallurgical laboratory inspection processes, including integration with current thermal spray operations and processes. Demonstrate down selected concept and methodology with a prototype system. Develop and initiate plan to achieve authority to operate adhering to Risk Management Framework (RMF) requirements on a production system.

**Phase III Dual-Use Applications:** DUAL USE APPLICATIONS: This technology has application at all the DOD depot facilities engaged in thermal spray coatings for critical weapons system repair. Additionally, this technology would be a good tool for any commercial entity engaged in thermal spray coatings of components that require coupon verification prior to production release of the product.

**References:**
1. Cooray, P. & Rupasinghe, T., 2015, A Real Time Production Tracking and a Decision Support System (PTDSS): A Case Study from an Apparel Company. 12th International Conference on Business Management (ICBM)


KEYWORDS: Thermal spray, metallurgical laboratory, track & trace, automated dispensing, Certification and Accreditation (C&A)