1. Objective of Proposed Work

The objective of this Statement of Need (SON) is to develop a large-scale non-chemical, non-media removal process for thick, elastomeric coatings and treatments, such as rain erosion materials, sealants, and fuel tank coatings used on Department of Defense (DoD) weapon systems. Ship hull coating removal was covered in a separate SON in 2010, so will not be considered applicable to this topic.

The proposed novel coating removal technology should:

- Effectively remove the coatings without causing damage to the underlying substrates and treatments.
- Not cause excessive thermal or impact damage to other underlying coatings and materials that would render them ineffective.
- Be as cost effective as current baseline coating removal processes and reduce cycle time for removing coatings.
- Generate no inherent waste streams other than the removed coatings.
- Allow for coating debris capture and removal to manage cleanliness and air standards.
- Be amenable to automated as well as manual operations.
- Work in standard DoD industrial coating removal environments or require minimal retrofit to existing facilities.
- Allow for concurrent maintenance or related treatment removal processes, if possible.
- Not present environmental or health and safety hazards or concerns that would limit or restrict the technology usefulness in different facilities.

The scale of interest of this research effort is to provide full aircraft surface coating removal. Non-media and non-chemical coating removal methods that can be used for complete removal of specialty coatings on airframe substrates of interest (e.g. graphite composite, bismaleimide composite, aluminum and titanium) without damaging the substrates or treatments below the low observable coatings are desired.
2. **Expected Benefits of Proposed Work**

The proposed research effort will greatly reduce the environmental impact for removing specialty coatings from DoD weapon system platforms as well as reduce the total cost and process times. Other costs associated with containment, treatment and disposal of hazardous waste would be greatly reduced. Additionally, since legacy specialty coating removal processes are principally manual in nature, they are inherently ergonomically challenging. The proposed effort will greatly reduce long-term impacts and costs associated with worker damage to hands and wrists from repetitive motion injuries.

3. **Background**

Specialty coatings used for providing certain characteristics to weapon systems are extremely difficult to remove and require considerably more time and care to preclude damage to underlying treatments and substrates. These coatings tend to be applied in thicker layers than standard primer and topcoat applications, and are more elastomeric. These two characteristics defeat the kinetic and chemical breakdown approaches of media blast and chemical stripping, resulting in poor removal rates and large waste streams. The thick layers and elasticity of the coatings cause them to be very resistant to standard blast media because the kinetic energy is absorbed rather than removing the coating from the surface. Wheat starch has had some applicability to certain specialty coatings, but that is because as wheat starch breaks down, many sharp crystalline surfaces are formed for coating cutting. Wheat starch is less effective on some of the newer coatings, and strip rates are not cost competitive nor cycle time compliant. In addition, most of the outer moldline aircraft skins are composite materials and, as such, chemical strippers are generally not acceptable.

Fuel tank coatings are highly cross-linked, chemically resistant coatings and are generally two component materials designed for application to non-ferrous surfaces. The fluid resistance requirements for these materials are significantly more severe than those of the standard primer and topcoat. A conventional topcoat must withstand 24-hour immersion on unscribed panels without degradation, whereas the fuel tank coating specification requires 14 days immersion of specimens with scribes through the coating. This high degree of chemical resistance is necessary because the coating is not only subjected to the various chemicals contained in aviation fuels, but it is also exposed to aircraft operational chemicals, salt water, and dilute acidic solutions. As such, these coatings are quite difficult to remove through chemical and media processes.

4. **Cost and Duration of Proposed Work**

The cost and time to meet the requirements of this SON are at the discretion of the proposer. Two options are available:

**Standard Proposals:** These proposals describe a complete research effort. The proposer should incorporate the appropriate time, schedule and cost requirements to accomplish the scope of work proposed. SERDP projects normally run from two to five years in length and vary considerably in cost consistent with the scope of the effort. It is expected that most proposals will fall into this category.
Limited Scope Proposals: Proposers with innovative approaches to the SON that entail high technical risk or have minimal supporting data may submit a Limited Scope Proposal for funding up to $200,000 and approximately one year in duration. Such proposals may be eligible for follow-on funding if they result in a successful initial project. The objective of these proposals should be to acquire the data necessary to demonstrate proof-of-concept or reduction of risk that will lead to development of a future Standard Proposal. Proposers should submit Limited Scope Proposals in accordance with the SERDP Core Solicitation instructions and deadlines.

5. Point of Contact
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For Core Proposal submission due dates, instructions, and addition solicitation information, visit the SERDP website.