

## NAVAIR FRCSW North Island Cold Spray Implementation Team



### By DON Innovation

Over the past few years, Fleet Readiness Center Southwest (FRCSW) North Island's Cold Spray Implementation Team has made tremendous strides, using Cold Spray technology, in repairing and returning high-value, low in-supply, and long lead-time aircraft components to the Fleet. The team's objective was to develop a process to rapidly repair aircraft components for return to service rather than scrapping them and buying replacements (i.e. cost avoidance).

Cold Spray is an additive, solid-state thermal spray process that can restore critical dimensional features to components that have been lost due to corrosion, wear, or mechanical damage. This technology uses either a handheld or robotic gun to apply a metallic coating onto the surface in need of repair. Coatings are applied using helium gas to accelerate a fine metal powder through a nozzle. Powder kinetically impacts the surface and forms a metallurgical bond. Cold Spray is in the same family as thermal spray but operates at a higher velocity, higher pressure, and lower temperature; these differences make it possible to prevent damage or change of properties to the metal powders and the repaired metallic surfaces.

The use of Cold Spray technology has increased Fleet readiness by refurbishing previously scrapped components. It offers a cheaper and faster method of high-quality repair. As the fleet of NAVAIR aircraft ages, costs associated with maintaining and repairing aircraft and their components will continue to become a progressively greater financial burden to maintain

operations. In providing timely mission support to sustain operational tempo, repair procedures need to make economic sense and furthermore, be of substantial benefit to the warfighter. Overhauling, reworking, and dimensionally restoring components while meeting specific hardware design, function, and safety requirements has proven to be a challenging balance.

At FRCSW North Island, CA, Cold Spray repair processes have been successfully developed and implemented to repair aircraft components that would have otherwise been demilitarized. Historically, large quantities of aircraft components are scrapped due to dimensional discrepancies or materials lost resulting from wear, corrosion, and mechanical trauma. Other than these minimal dimensional variations, the parts would usually be considered serviceable. Cold Spray, which is considered an additive manufacturing process, repairs damaged surfaces of aircraft components by building up and restoring lost material to original dimensions without the typical side effects of other thermal coating processes. Side effects include heat affected zones, fatigue knockdown, porous surfaces, oxidation layers, and poor adhesion.

Other potential applications of Cold Spray under consideration are Hard Chrome electroplating alternative, substitute for other metal spray processes, and for Cadmium and Ion Vapor Deposition (IVD) Aluminum coatings touchup repair. Cold Spray is more environmentally friendly and has a faster repair cycle time. Thereby reducing repair turn-around-time (TAT) and significantly increasing the speed of delivery to the Fleet while other proposed repair methods are not robust enough to endure the rigors of operational tempo. Switching to Cold Spray will significantly improve and extend the service life of these assets.

The implementation of Cold Spray technology has resulted in a number of positive effects. Morale of local production personnel has increased tremendously; everyone has a more vested interest in expanding the new technology to other areas due to its ease of application and its vast potential, which never existed with prior technologies. Other FRCs have recognized the Cold Spray repair successes at FRCSW and are eager to collaborate and further develop their own new repair concepts and strategies. Additionally, Cold Spray technology has had an overwhelmingly positive effect on Naval Aviation and has created awareness on a national level that has extended well beyond military applications.

With their extensive technical expertise and ingenuity, the team has identified and developed Cold Spray repair for use across multiple applications on various aircraft platforms. Of notable significance is the far reaching potential that Cold Spray repair could have on current and future Fleet requirements. These repair processes will save the Navy substantial cost savings and avoidances, vastly decreasing production repair cycle times, extending the service life of limited and low in-supply components, reducing the need to purchase Original Equipment Manufacturer (OEM) replacement parts, and create spare parts pools that have not existed for some time or never existed. By procuring a Cold Spray system that was installed at FRCSW in August 2015, the team has been instrumental in incorporating this technology into the Depot as a standard repair process. As part of the procurement effort, the team collaborated with industry experts, researched, evaluated, and tested numerous commercially available Cold Spray systems to select one best suited for NAVAIR repair needs. FRCSW North Island has the first and only operational Cold Spray production system in the Department of Defense. This will enable FRCSW and Naval Air Systems Command (NAVAIR) to fast track development, certification,

and incorporation of repair techniques to maximize strategies for restoring aircraft components in support of Fleet Readiness.

