The following technical paper abstract information was recently submitted in connection with session DOD108,Maintenance Prep/Reassembly/ Preservation

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Paper Title: Additive Manufactured Masking Tools for Plastic Media Blasting (PMB) of Aircraft
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Abstract: Current practices for the masking of aircraft prior to paint stripping are time-consuming, consumable-intensive, and require significant expertise. At the FRCSW Paint/Blast shop, each F-18 Super Hornet inducted spends 2 days being masked by a team of 7 trained artisans. The danger of media intrusion and the sensitivity of many areas of the aircraft make this a high risk operation. With Super Hornet workload expected to increase there is a large focus on possible reductions to turn-around time (TAT). FRCSW maintains several aircraft platforms, but the Super Hornet was chosen for the proof of concept and trial run.

The goal of this project was to develop a low-cost, reusable kit of additive manufactured (3D printed) plastic masking tools custom fit to specific areas of the aircraft. We proposed that with a set of masks in their toolkit, not only would artisans perform their work more quickly and efficiently, but we could also significantly mitigate the risk of media intrusion. With a plastic masking tool, all of the consumables laboriously applied by hand (impact tape, preservation tape, sheets of plastic, hot glue, etc.) could be eliminated, except for hot glue—simply put an unbroken bead of hot glue around the outside of the mask tool and install. This process would be performed the same way every time, for each mask, by each artisan.

Laser scanners were used to collect digital surface data for each masking location. That data was imported into reverse engineering CAD software and used to design suitable tools. Several masks were produced and provided to shop artisans for PMB testing and installation trials. Each part held up to PMB dwell testing and demonstrated significant reductions to installation time. By extrapolating labor hour reductions from those smaller parts and considering input from artisans we project that, with the kit of 16 masks that have been designed, masking TAT will be reduced by 5 hours per Super Hornet (labor hour savings of 35.6 hours per aircraft). The initial cost to manufacture (using a Stratasys Fortus 3D printer) is roughly $30,000, but the return on investment is 6:1 over 5 years of use.

With significant savings to labor costs, consumable use, and aircraft masking TAT, this project is poised to play a major role in the commitment of FRCSW to return aircraft to the warfighter as quickly as possible. Due to the widespread applicability of custom masking tools, kits can be produced for any number of platforms (not limited to aircraft) and used for any number of maintenance procedures (not limited to PMB). This project will pave the road for further capability enhancements and will be shared with other NAVAIR Fleet Readiness Center facilities around the country for replication.