

Seal Extrusion Development and Demonstration (SEDD)

PROBLEM/OBJECTIVE

Both the F-35 and F-22 aircraft require approximately 3,000 feet of various shaped seals per aircraft. These seals are installed around frequently accessed maintenance panels. The current process cycle includes a significant amount of touch labor to assemble the mold, inject, disassemble and de-mold the part, and the tool is idle during cure.

Although this process has been suitable for the limited quantities of F-35 seal materials required to date, planned increases in requirements for seal materials make current manufacturing practices impractical from both a cost and producibility standpoint.

During the course of the SEDD program, the F-22 began experiencing durability issues with their seals and began investigating results of this program as an alternate approach. The F-22 was interested in the improved material formulation used in the F-35's extruded seals.

ACCOMPLISHMENTS/PAYOFF

Process Improvement: The cast process begins by compounding an elastic binder and a filler material, and casting the material into a 4-foot tool. The process is highly labor intensive as multiple fasteners line the edge of each production tool. During the SEDD program, two contractors developed extruded seals utilizing a thermoplastic extrusion process with the same filler material that was used in F-35 cast seals.

For the F-35, the thermoplastic extrusion process greatly increased the production rate and reduced cost by the elimination of touch labor and a 97% reduction in production tooling. The extrusion process eliminates the need to splice seals along the length of the panel as the seals can be manufactured in the appropriate length. The extrusion process can produce seals on an order of one foot per minute compared to the cast process of one foot per hour.

For the F-22, it is anticipated that the new extruded material will have a superior durability to the baseline material, resulting in lower maintainability costs. The new material in the F-22 extruded seals is predicted to be 15 times more durable than the baseline material.

Implementation and Technology Transfer:

The SEDD program developed a joint qualification matrix with the F-22 and F-35 and validated the qualification matrix data for both suppliers. The extruded seals technology has been transitioned to both the F-22 and F-35 with both programs working to qualify the material for implementation. Tasks were also added to the SEDD program to investigate utilizing the extrusion process to produce F-35 tape.



Expected Benefits and Warfighter Impact:

The Air Force's Return on Investment is expected to be \$881M in avoided costs for extruded seals. The production of tape will result in future production cost avoidance for the F-35 of an additional \$100M.

TIMELINE/MILESTONE

Contract Start Date	May 2005
Seals End Date	November 2010
Tape End Date	November 2011

FUNDING

ManTech	\$1,580K
AFRL/RX	\$870K

PARTICIPANTS

AFRL ManTech, WPAFB OH
AFRL/RXP, WPAFB OH
Universal Technology Corporation, Dayton OH
Lockheed Martin Aeronautics, Marietta GA
Lockheed Martin Aeronautics, Fort Worth TX
ARC Technologies, Inc., Amesbury MA
Cumming Microwave Corporation, Avon MA