

FAN EXIT GUIDE VANES

COMPONENT PURPOSE/REQMTS:

- removes swirl component of bypass air to increase thrust
- requires high specific stiffness and excellent ballistic/erosion response

COMPONENT CONFIGURATION:

- solid graphite/epoxy vane in thermosetting base

PROBLEM:

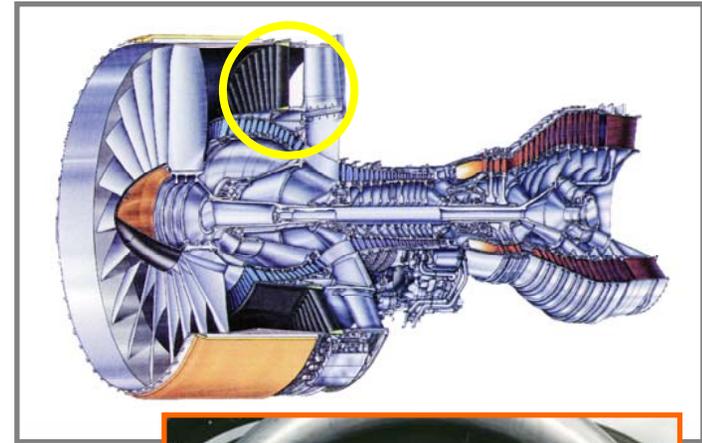
- poor erosion resistance to rain and airborne particulates, ballistic damage from hail led to high in-service costs and flight safety concerns
- interim solution of Ti foil over leading edge improved erosion resistance, but not ballistic response, and added significant cost

PREFERRED SOLUTION:

- affordable, supportable component with low acquisition and support costs

CANDIDATE:

- Al 6092/SiC/17.5p hollow extruded vanes



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TEAM AND APPROACH:

- Pratt and Whitney, DWA Al Composites, AF Materials and Manufacturing Directorate and AF Title III Program Office
- collaborative design trade and M&P studies
- MIL-HDBK 5 data generation

MATERIAL AND PROCESS:

- extruded P/M billet of *Al 6092/SiC/17.5p* produced by DWA Al Composites
- high reduction, high tolerance double-hollow extrusion configuration produces net shape
- cut to length and coined for slight camber
- embedded in thermoplastic end fittings with elastomeric coupling agent

RESULTS/PAYOFF:

- component weight is equivalent to gr/epoxy
- significantly improved resistance to erosion (7X) and foreign object damage over graphite/epoxy
- reduced acquisition & maintenance costs, 3X increase in life, provide savings of ~\$100M
- first commercial aeropropulsion application of DRA– used in PW 4084, 4090, 4098 engines



OMC Guide Vane after FOD test



DRA Guide Vane after FOD test