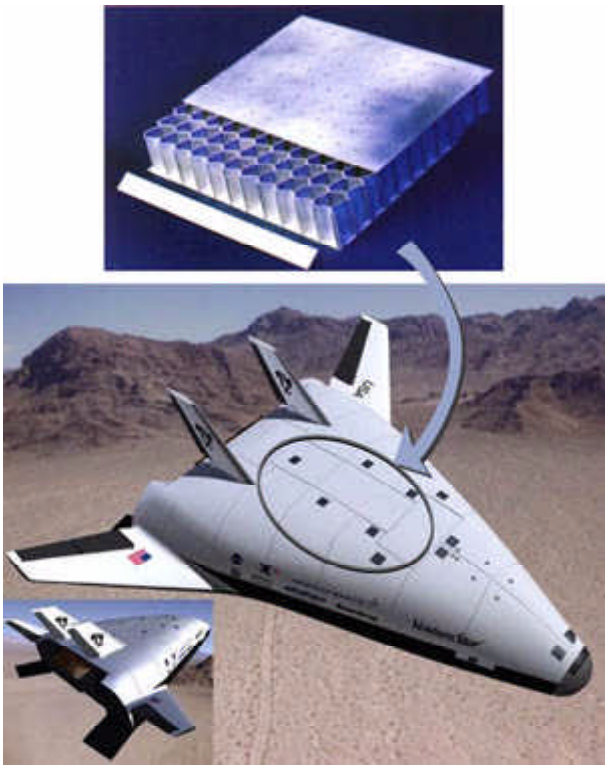
Titanium Aluminide Technologies Successfully Transferred From HSR Program to RLV VentureStar Program

Titanium aluminide truss core subelement manufactured by BFGoodrich Aerostructures group using HSR technologies.

Through a cost-share contract, BFGoodrich Aerostructures group successfully fabricated three titanium aluminide (γTiAl) truss core structures using technologies pioneered in the High-Speed Research (HSR) program at the NASA Glenn Research Center at Lewis Field. The truss core subelement is approximately 60-cm (24-in.) long by 14-cm (5.5-in.) wide by 6-cm (2.5-in.) deep. To fabricate this subelement, BFGoodrich first obtained γTiAl sheets from Plansee (Austria) which produced the sheets using techniques developed collaboratively by Glenn, Pratt & Whitney, and Plansee. This new γTiAl production technology has significantly lowered the cost of γTiAl sheet (~75-percent decrease) and has made the production of larger γTiAl sheets possible (~60-percent increase).

BFGoodrich then hot-formed the γTiAl sheets into "hat" sections (individual internal stiffeners of the truss core that are shaped like the Greek letter omega) using a production hot press at near production rates as established by the HSR program. The γTiAl hat sections and γTiAl face sheets were then joined using HSR brazing technologies to produce the final truss core structure. NDE methods indicated that the truss core

structures were sound, with over 98-percent coverage of all brazed joints.



VentureStar reusable launch vehicle, showing where the titanium aluminide metallic thermal protection system will be used.

The significance of this program is twofold. First, it demonstrated that HSR γTiAl sheet fabrication technologies could be transferred from the laboratory into the production house environment. Second, it was a vehicle to transfer the HSR γTiAl fabrication technologies to the Reusable Launch Vehicle (RLV) / VentureStar (Lockheed Martin Corporation) program and other space transportation programs. According to BFGoodrich, this transfer has significantly aided their efforts in developing a metallic γTiAl thermal protection system for the RLV/VentureStar program. This technology transfer is a prime example of the synergy between technologies developed for aeronautic applications enabling space transportation programs to meet their goals.

Glenn contact: Dr. Paul A. Bartolotta, (216) 433–3338, Paul.A.Bartolotta@grc.nasa.gov

Author: Dr. Paul A. Bartolotta

Headquarters program office: OAST

Programs/Projects: HSR, VentureStar