MODIFIED AUTOMATED TAPE LAYING (ATL)

QUICK SUMMARY

- Mature composite manufacturing approach for complex, man-rated vehicles.
- Reduced material scrap of >60 percent compared to manually intensive tape wrapping.
- Improved yields of >95 percent at decreased costs of >80 percent for Carbon/Carbon (C/C) heatshield assemblies.

Textron Systems has developed patent pending technology for the automated tape laying (ATL) of composite heatshields. The primary advantages for ATL over traditional tape wrapping include good dimensional stability post-cure and post-densification, reproducible precision and low part-to-part variability from automation, and the capability of accommodating many types of prepreg carbon fiber tapes. Coupled with a proprietary enhancement process for interply interfaces, the modified ATL process also shows improvements to the strength of cured composites. The improvements to manufactured parts extend to densified C/C components where ATL preforms drastically reduce the number of delaminations in a part, which increases the yield of expensive C/C structures.

Through an internal development program, demonstrations of the ATL process show cost reductions of >80 percent using qualified prepreg and anticipated improvements to yield to >95 percent from <50 percent for tape wrapping. Automation and nearer net shape manufacturing translate into an expedited assembly timeline, and modifications to accommodate various hypersonic-relevant geometries are relatively straightforward and easily implemented. Textron Systems also plans to integrate in-process nondestructive evaluation (NDE) techniques for process control and additional yield improvements. Textron Systems continues to work with its partners in the government and industry to deliver superior technologies that address the most pressing material processing challenges faced by the nation today.

Modified ATL Thermal Protection System