Design Software Supports Spirit AeroSystems' Early Delivery of Bell V-280 Valor Tiltrotor Fuselage

HyperSizer® software, from Collier Research, automates structural sizing and load analyses

HAMPTON, Va. (December 8, 2015) – When announcing the completion of the Bell V-280 tiltrotor fuselage at a September press conference, Bell Helicopter leadership applauded the Bell Helicopter/Spirit AeroSystems team for a job well done, ahead of schedule and within budget. This event marked the culmination of a successful first-time collaboration between the two companies.

The sizing and analysis software Spirit used to prove out the structural integrity of the V-280 has a long history in aerospace: HyperSizer®, from Collier Research, was the first software package used by NASA made available on the commercial market. Employed for both aircraft and space-launch vehicles fabricated with composite or metallic materials, the software automatically performs design, stress analysis and sizing optimization, typically reducing the weight of structures by 20-40%. HyperSizer is also applicable in the wind energy, high-speed rail, automotive and shipbuilding industries.

On the V-280 fuselage prototype program, Spirit employed HyperSizer for detailed sizing of the fuselage. Important structural requirements include strength, stability, stiffness and deflection/rotation limitations for severe flight, landing and ground load cases.

The V-280 Valor is competing in the Department of Defense's Joint Multi-Role Technology Demonstrator (JMR TD) program. This is a science and technology precursor to the Department of Defense's Future Vertical Lift program, with the goal to replace 2,000 to 4,000 medium-class utility and attack helicopters. The V-280 Valor is Bell Helicopter's offering for the JMR-TD program. A next generation tiltrotor, the Bell V-280 Valor advanced technology tiltrotor provides unmatched speed, range and payload for expeditionary maneuvers.

The unit was designed and assembled in Spirit's rapid prototyping facility in Wichita, Kan., in just 22 months. The composite fuselage was shipped to Bell Helicopter's facility in Amarillo, Texas for final assembly, and the build continues towards a first flight in the in the second half of 2017.

"The design-analysis cycle for a typical aircraft program requires many iterations between the designer (CAD) and the stress analyst," says James Ainsworth, Collier Research structural engineering. "This is a very time-consuming process."

To meet the aggressive V-280 schedule, HyperSizer was employed in a 'design-by-analysis' approach that successfully sized and analyzed the fuselage structure. "The automated analysis tool in our software allows the stress analyst to define the required structural configuration, informing the designer about the best configuration that optimizes the stiffness of the structure," says Ainsworth.

HyperSizer also provided the engineers with automated stress-report generation that enabled them to review and vet all relevant data in order to prove-out the structural soundness of the fuselage.

“A small team of stress and design engineers acquired the right tool set to support their in-house capabilities and efficiently deliver ahead of schedule,” Ainsworth says.

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Media Contact:
Lynn Manning
Parker Group
(401) 272-1510
team@parkergroup.com

Collier Research Contact:
Ivonne Collier
Vice President
(757) 825-0000
Ivonne@hypersizer.com

About Collier Research Corporation

What began at NASA 20 years ago has continuously developed into today’s HyperSizer suite of structural software solutions. As Collier Research Corporation’s flagship product, HyperSizer performs design, stress analysis, and detailed sizing optimization for aircraft and space launch vehicles fabricated with composite or traditional metallic materials. On average, the software reduces the weight of structures by 20-40%, an exceptional achievement for aerostructures. HyperSizer replaces the need for spreadsheets and “hand calculations” with automatically generated stress reports for FAA certification. HyperSizer customers are able to produce results faster and more accurately, giving them an edge over competitors.

Collier Research Corporation provides software solutions, methods research, and consulting services for the aerospace, wind energy, and automotive industries with its broad range of structural capabilities. For more information on Collier Research Corp, visit HyperSizer.com.