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HyperSizer v6 Keys in on Manufacturing Optimization

Structural sizing and analysis tool have been enhanced to bring efficiencies to the design and manufacture of large-scale composite offerings.

By Beth Stackpole, Contributing Editor, Design Hardware & Software -- Design News, May 13, 2011

Riding the trend of composites becoming a go-to material for a variety of products - from aircraft to wind turbine blades - **Collier Research Corp.** released an upgrade of its HyperSizer structural sizing and analysis tool with new capabilities to optimize manufacturing.

HyperSizer analysis software steers marine engineers toward lighter -weight, fuel-efficient composite and metal designs that satisfy loading, stress and structural strength specifications.

In keeping with the evolution of the software and the use of composites across a variety of industries, HyperSizer v6, the latest commercialized version of software developed and used at NASA, now incorporates features designed to address two of industry's biggest concerns, according to Craig Collier, president of Collier Research. That is the inaccuracy of analysis functions within current tools to validate test data and some of the inefficiencies surrounding manufacturing of composites.

"We're finding that industry has now embraced composites as more mainstream," says Collier, who says, up to date, companies have been conservative in terms of their design and use of composites. Specifically, because of the existing tools' limitations in predicting and analyzing failures, engineering groups have been limited in exploring optimized composite layups simultaneously with other design variables. This inevitably leads to design inefficiencies and adding unnecessary weight to composite-based designs, Collier explains.

To address those deficiencies, HyperSizer v6 now has an integrated suite of failure analysis predictions that are validated to test data, an enhancement that will allow engineering groups to be less conservative in their use of composites, Collier says. The software now also automates the process of identifying, defining and controlling ply-count compatibility, laminate sequencing, interleaving and ply-drop minimization-all steps that have historically been done manually and been an onerous burden for engineers, limiting their ability to zero in on optimal designs.

"It used to be done manually and it wasn't done well because it was such as tedious process," Collier says. "There are so many billions of combination and ways to do things, without automation, it was difficult to explore all the possibilities."

Sandia National Laboratories, specifically its Wind Energy Technology Department, is using HyperSizer and partnering with Collier Research, on **large-scale wind turbine design**. Tom Ashwill, technical leader in the lab, says the HyperSizer v6's automation enhancements should address the challenges designers have today in terms of knowing what shape to make a laminate zone, where to stop one zone and start another or how to determine an optimum thickness of layups in different zones. It is also difficult to manually calculate how to handle transitions between zones and where to position many individual ply drops and adds in a single blade, Ashwill says. Using blade-loading results from FEA, HyperSizer will map the laminate zones to more accurately represent the blade physics and calculate a ply stacking sequence for each zone-a capability, Ashwill says, that will greatly improve the composite design and manufacture process.

In addition to these features, HyperSizer v6 also incorporates automated compression, shear and compression-shear post-buckling analyses--features designed to help engineers cut weight in aluminum skin airframes. These analyses, which have been difficult to perform with nonlinear FEA, are now extended to composite materials in this new release.

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