Design of composite sandwich panels for a Formula SAE monocoque chassis.

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Abstract

Physical testing of composite sandwich panels in three point bending is an increasingly important aspect of qualifying a composite monocoque for Formula SAE competition. Required stiffness and strength values have increased over the past three years, and more of the monocoque’s laminates must be tested as well. As a result, there is a need for software to accurately design a sandwich panel to meet stiffness and strength requirements on the first physical test, without requiring redesign and multiple tests.

A method for calculating strength and stiffness of a composite sandwich panel is presented. Extensive physical testing is performed on sandwich panels typical of those found in a Formula SAE monocoque, demonstrating the accuracy of the proposed method.

The Formula SAE rules are examined in depth to determine how the physical testing results are used to determine if a monocoque is legal for competition. This understanding of the rules, combined with the method developed for calculating sandwich panel performance, is used to develop a Sandwich Panel Design Tool. This tool allows the user to design a sandwich panel, predict the physical test results for that panel, and then determine if the panel will meet the rules requirements.

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