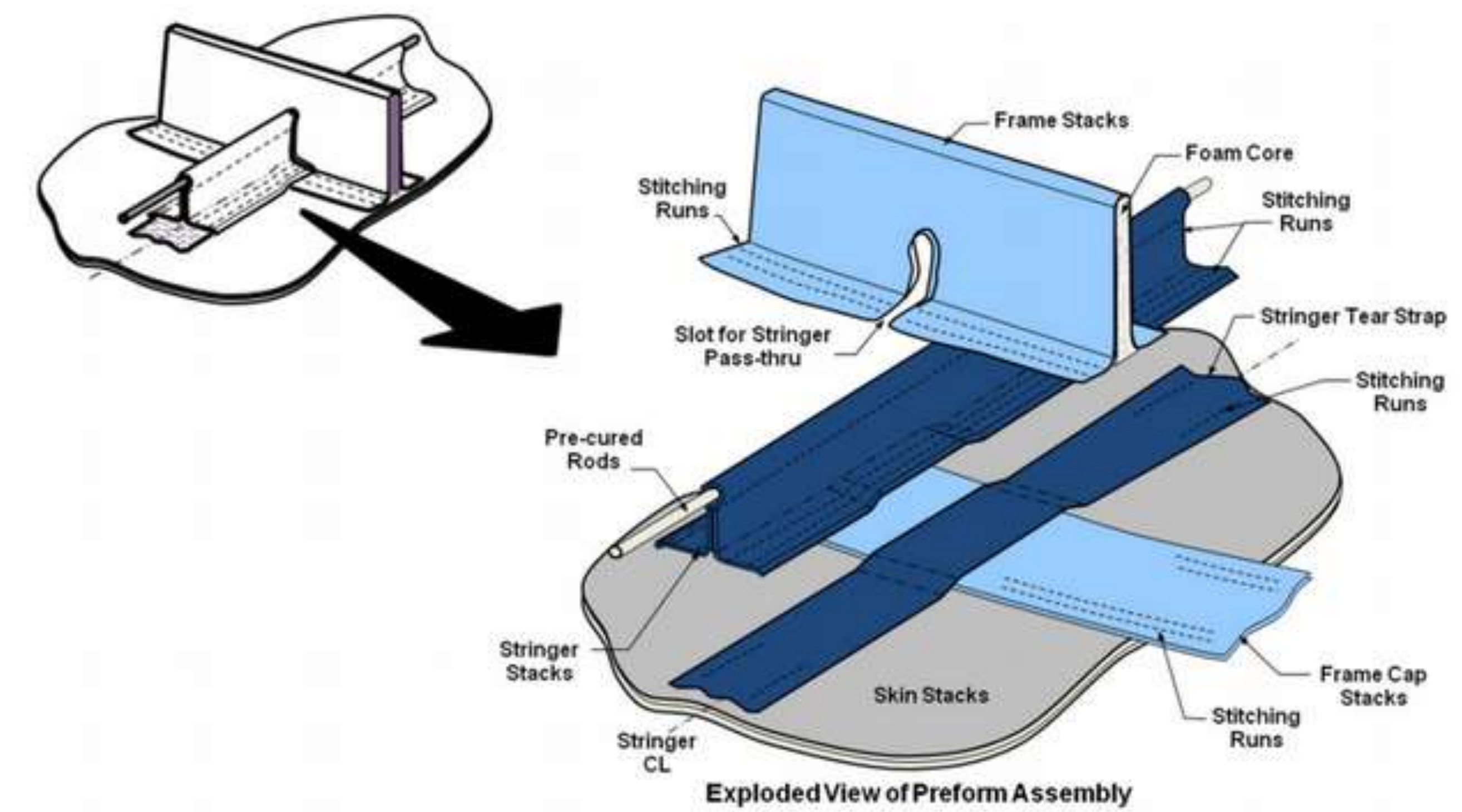


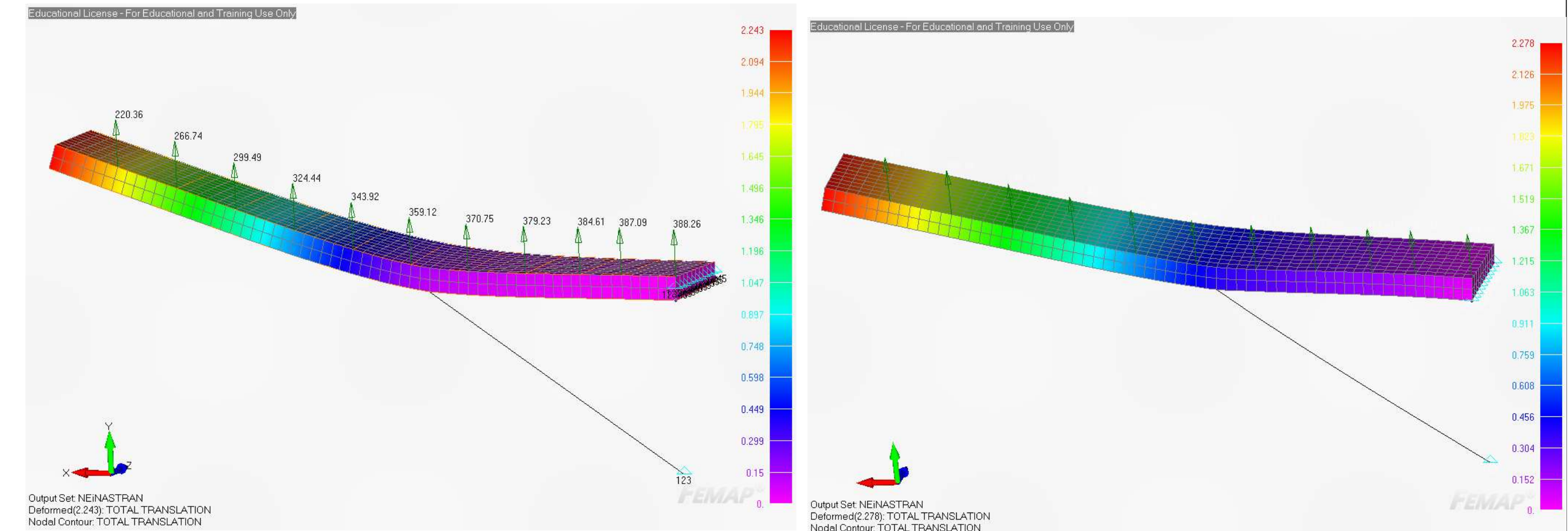
Pultruded Rod Stitched Efficient Unitized Structure

NASA and the Boeing Company have been actively working on the development and optimization of a new composite structure that presents substantial advantages over those used in traditional aircraft. This new concept, **Pultruded Rod Stitched Efficient Unitized Structure (PRSEUS)**, eliminates the use of fasteners with stitched unitized co-cured panels. The PRSEUS structural concept has a higher energy absorption rating when compared to conventional aircraft aluminum structures. PRSEUS carbon fiber composites can also offer better crash worthiness, weight reduction, and better load bearing and damage arrest capabilities than other conventional aircraft composite designs. Our project is centered around applying the PRSEUS panel design to a structure that can be used on a general aviation aircraft such as the Cessna 172 Skyhawk.

The picture to the right shows an assembly and exploded view of a PRSEUS panel. The stitching of the stringer to the skin removes the need for fasteners and the design is such that fatigue and failure of the panel occurs along the stringer/skin bond.



Two wing boxes were modeled in FEMAP with NeiNASTRAN. Aluminum and carbon composite with PRSEUS were used to model each wing box. Deflections were matched to ensure consistent bending stiffness.



Total deflection of aluminum wing box.

Total deflection of composite wing box with PRSEUS

Post buckling analysis of a PRSEUS single stringer panel.

