

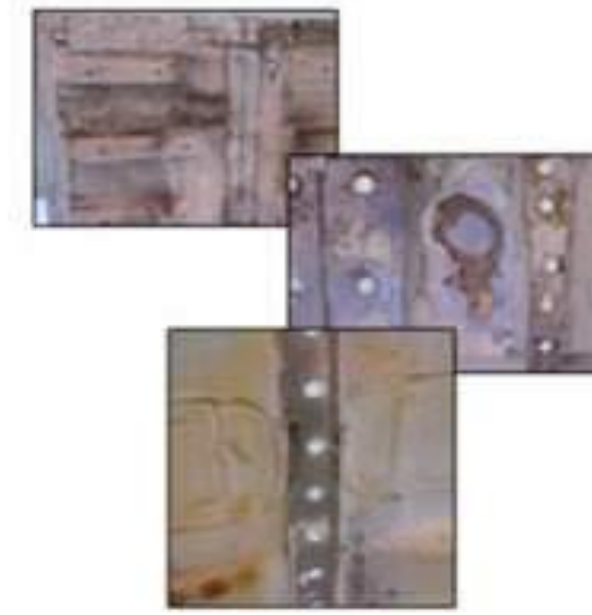
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NEED FOR COMPOSITES REPLACEMENT

- ◆ Lockheed adapted L-188 Electra turbo prop aircraft to produce ASW surveillance aircraft (P3) in 1962.
- ◆ Significant airframe corrosion experienced by P-3C aircraft fleet required expensive part replacement program to keep fleet in service
- ◆ 2002- P-3 Service Life Extension Program (SLEP) developed to extend operational service life of aircraft inventory
- ◆ Multi-mission Maritime Aircraft (MMA) replacement start date not until 2012, with total replacement targeted for 2020
- ◆ Until that date, depot maintenance will continue for years to come

ORION P3 AIRCRAFT



Significant Corrosion Issues



OPPORTUNITIES FOR COMPOSITES

- ◆ Leverage ONR funded design, processing, materials, and prototyping technologies to develop flight worthy replacement article(s) for the P3 surveillance aircraft.
- ◆ Produce test article for flight testing of trailing edge panel
- ◆ Apply lessons learned from program towards design of new aircraft



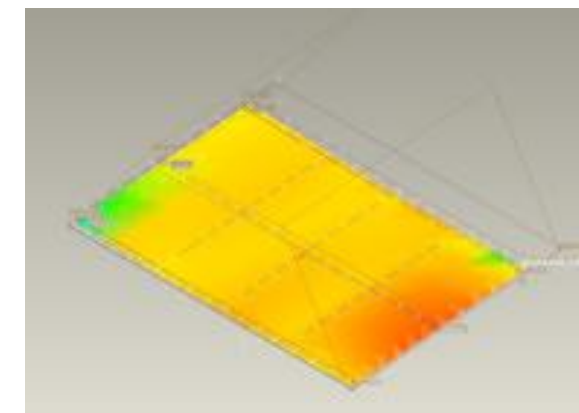
P3 Trailing Edge Flap



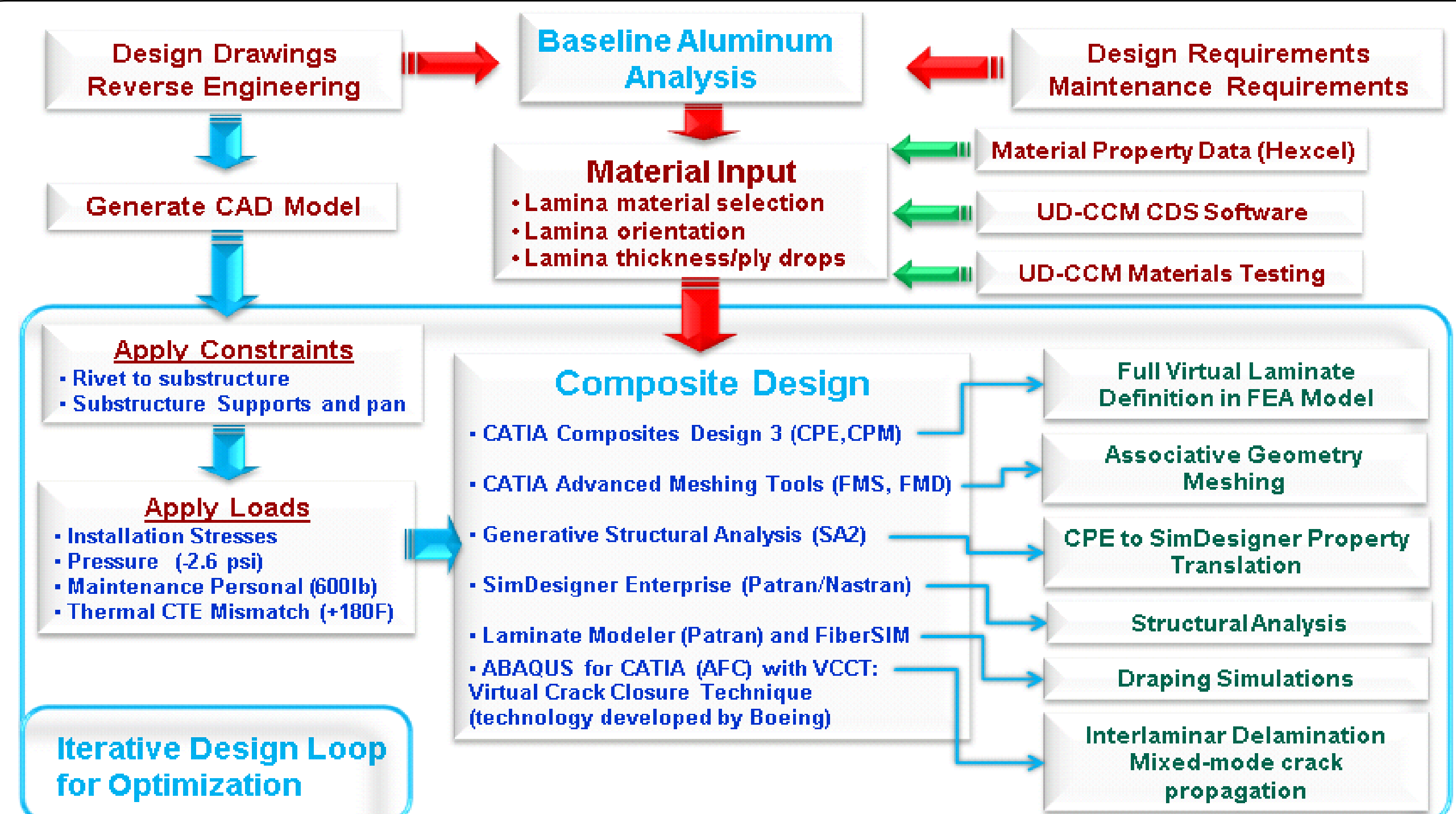
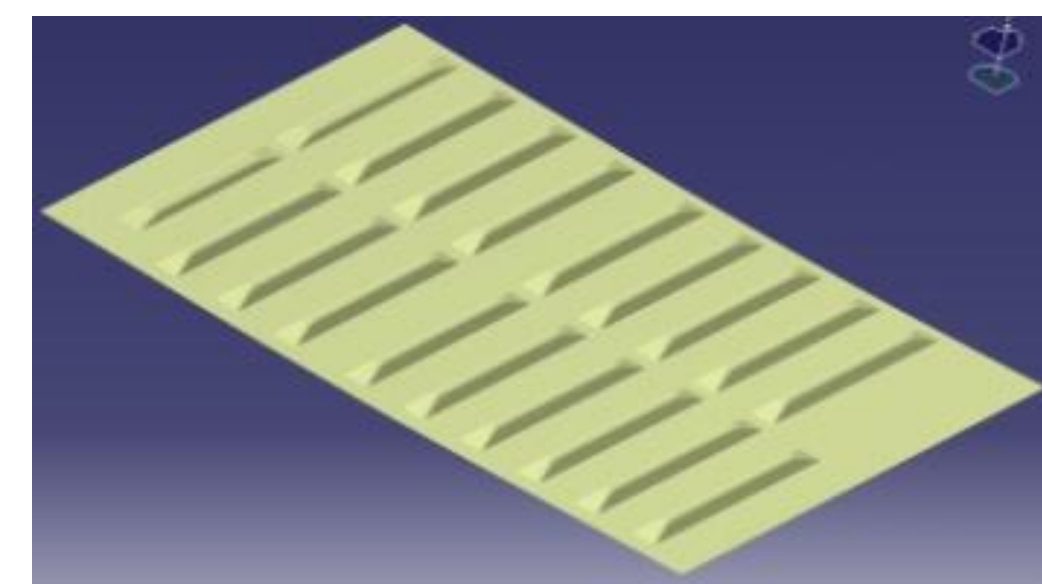
DEVELOPMENT TEAM



REVERSE ENGINEERED

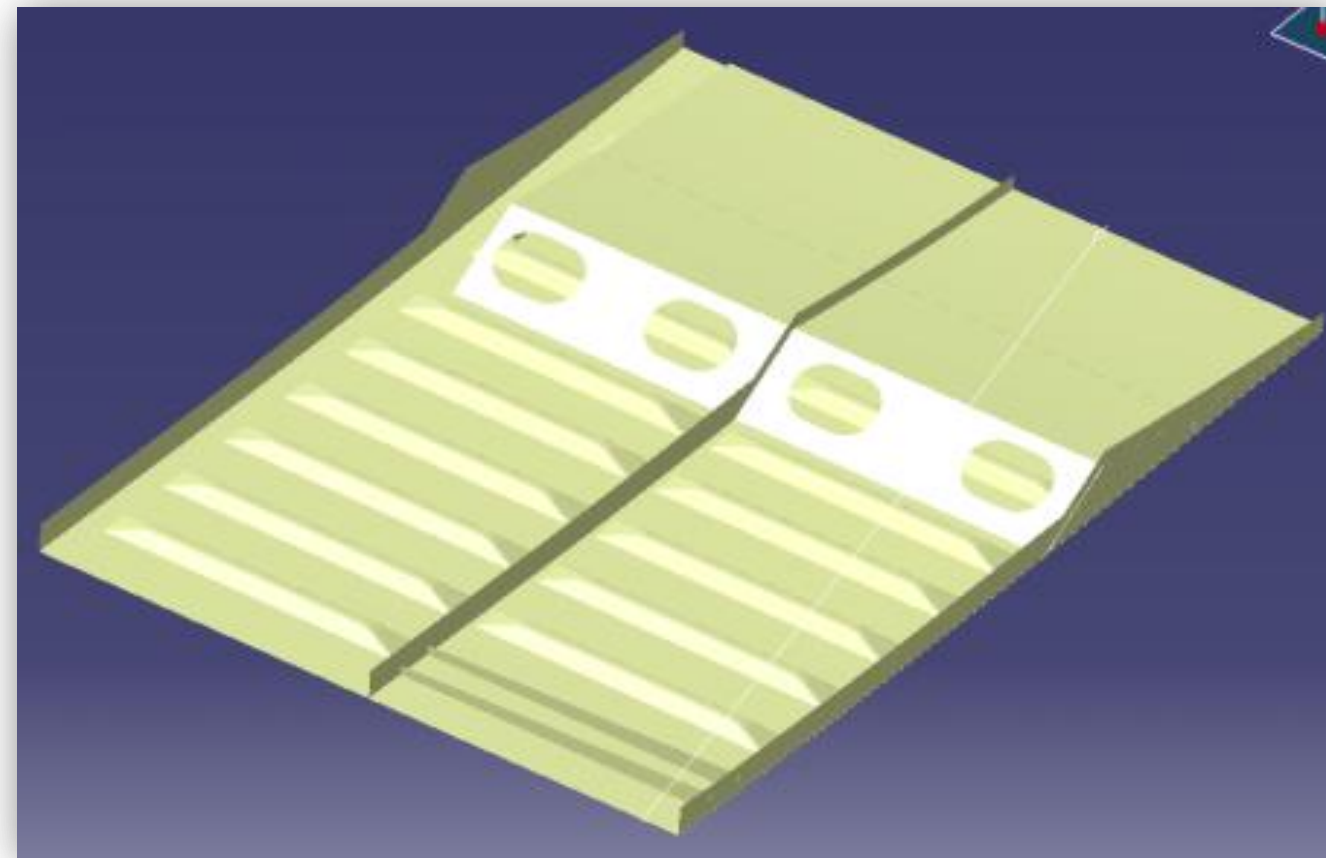


FARO Arm Scanned Part into CATIA

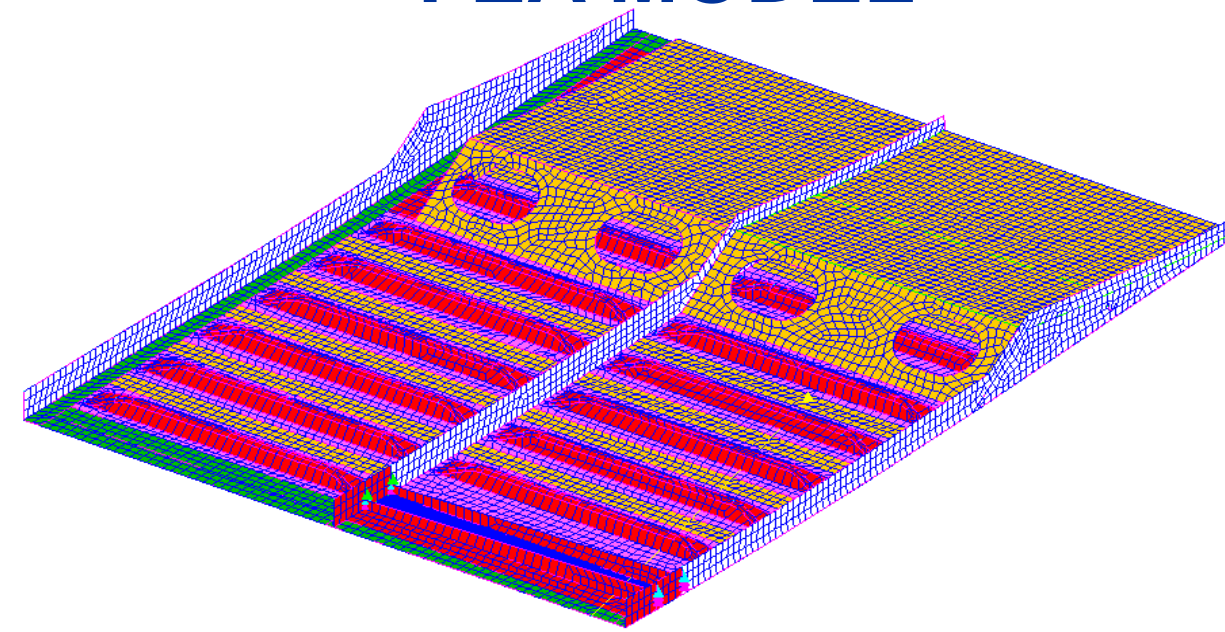


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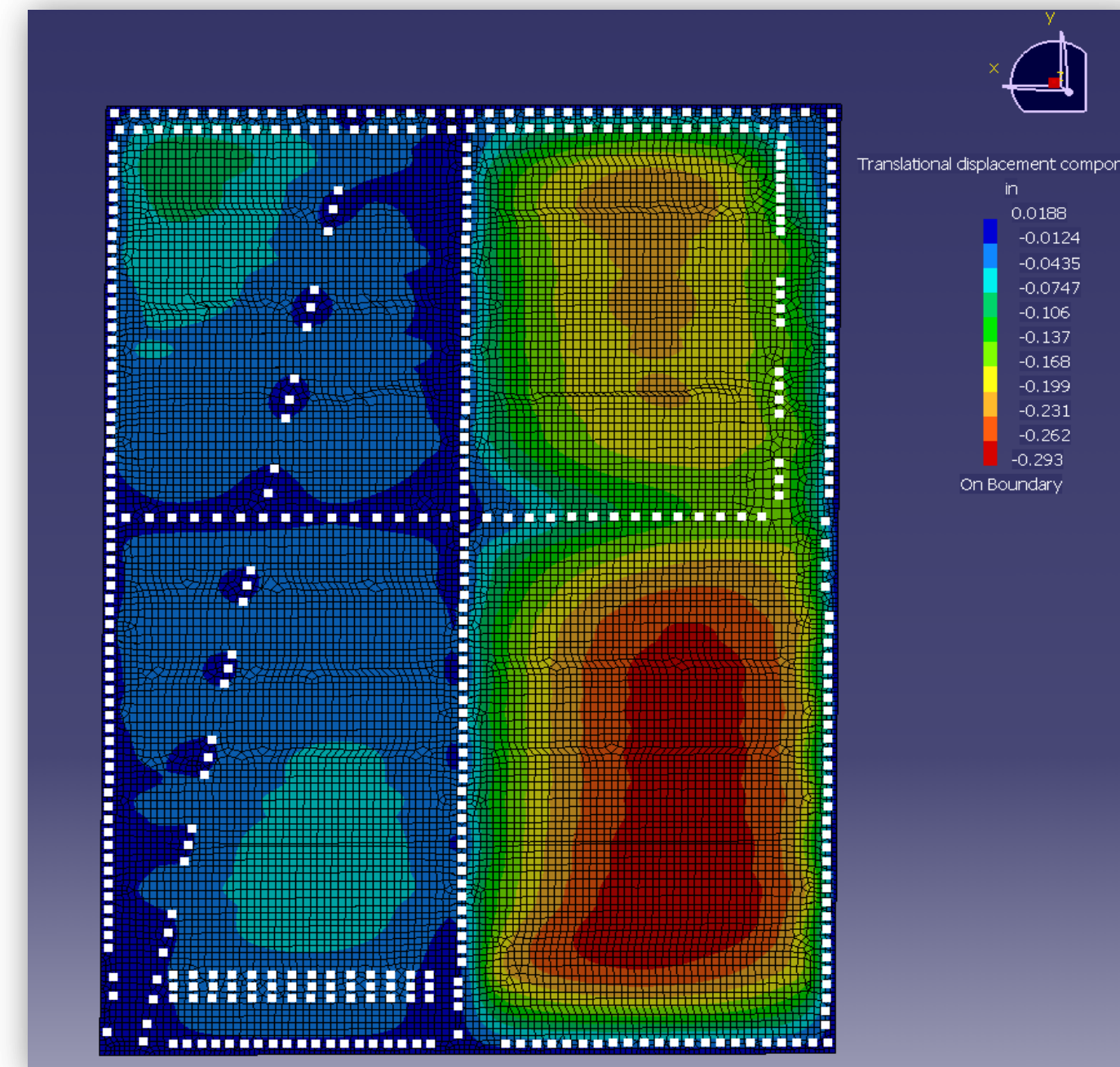
CATIA MODEL



FEA MODEL

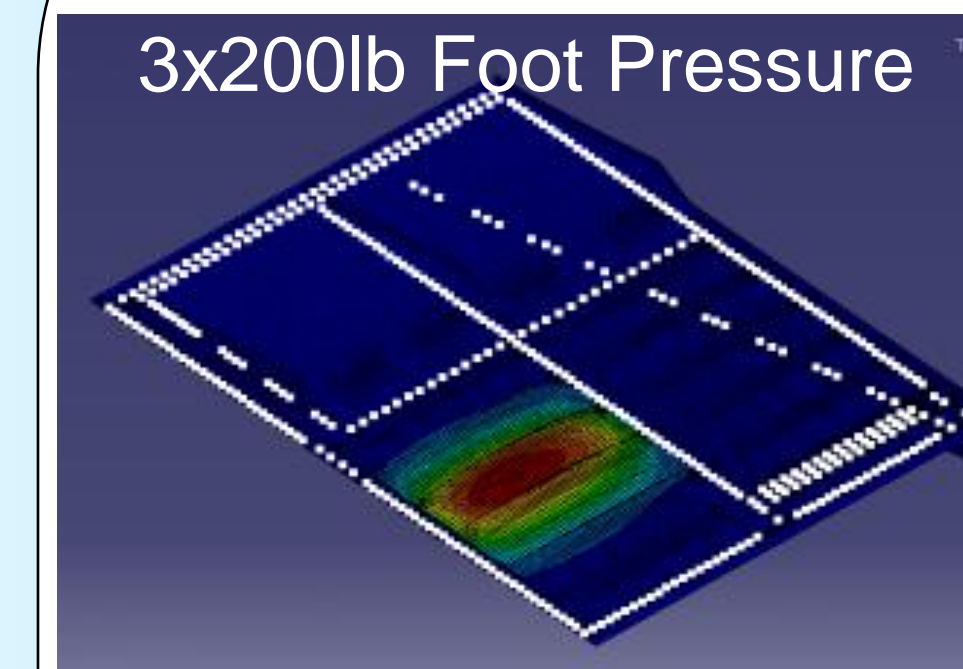


FEA ANALYSIS

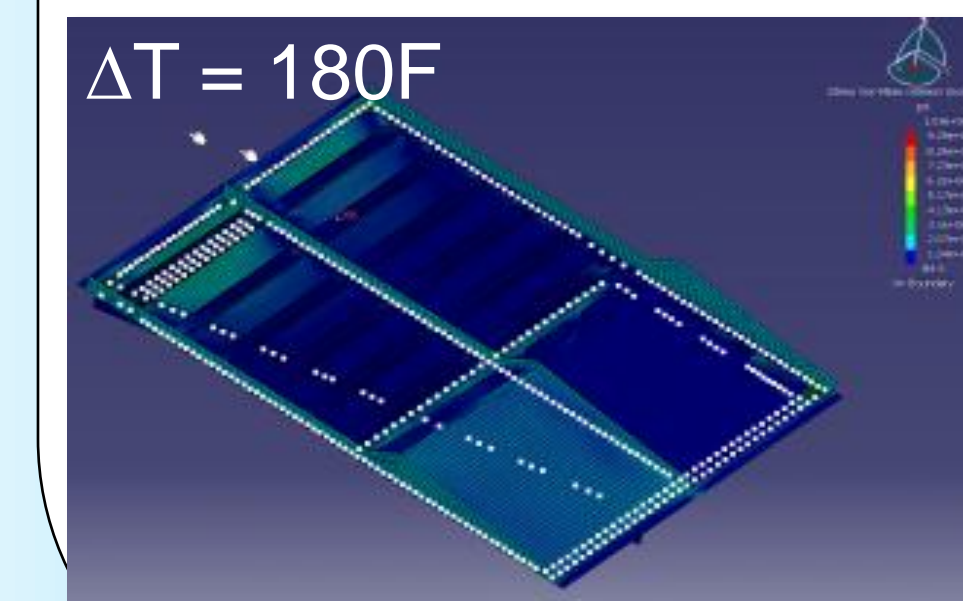


Peak Aerodynamic Vacuum Pressure Loading

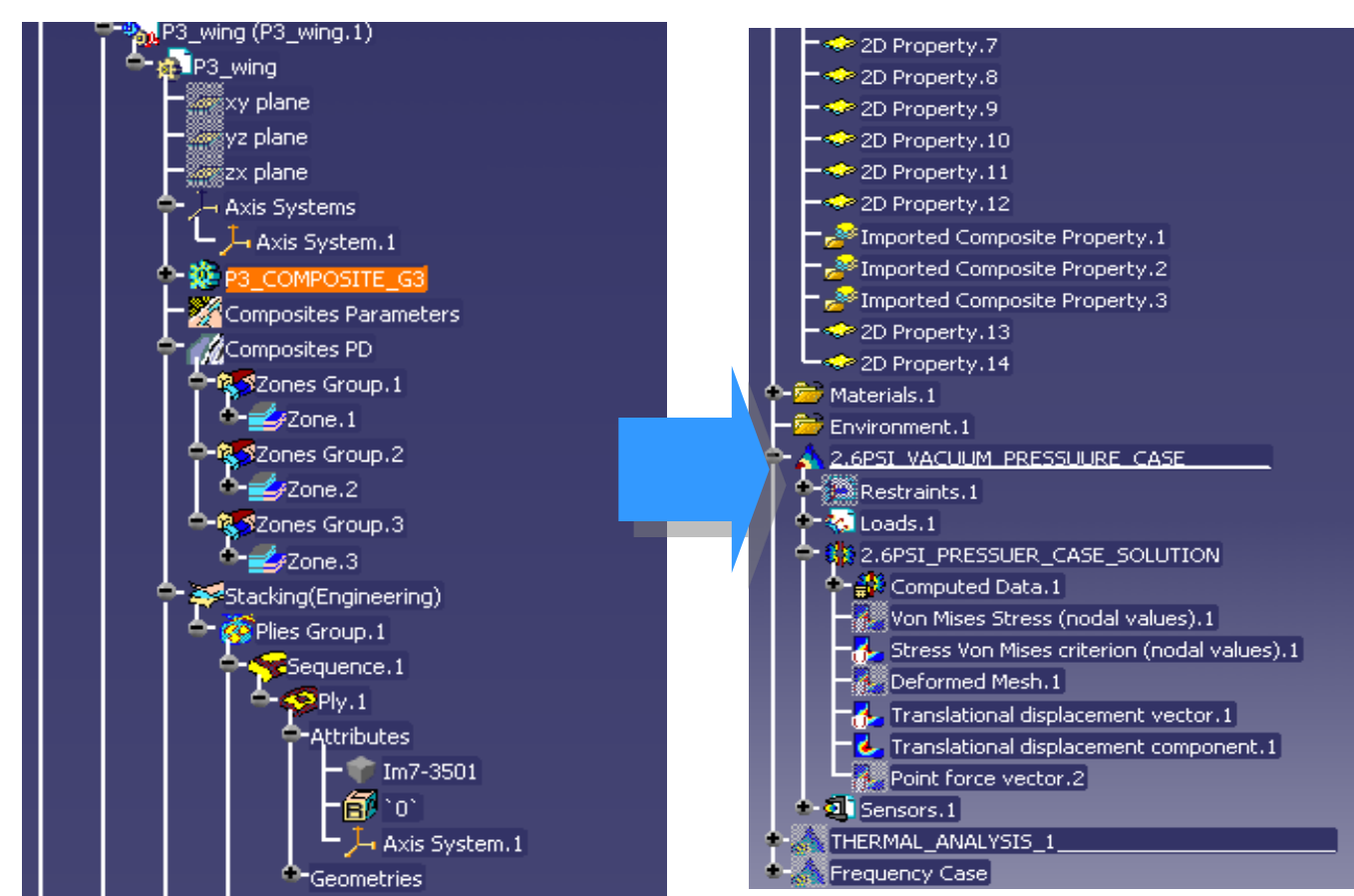
LOCALIZED FOOTPRINT LOADING



THERMAL ANALYSIS



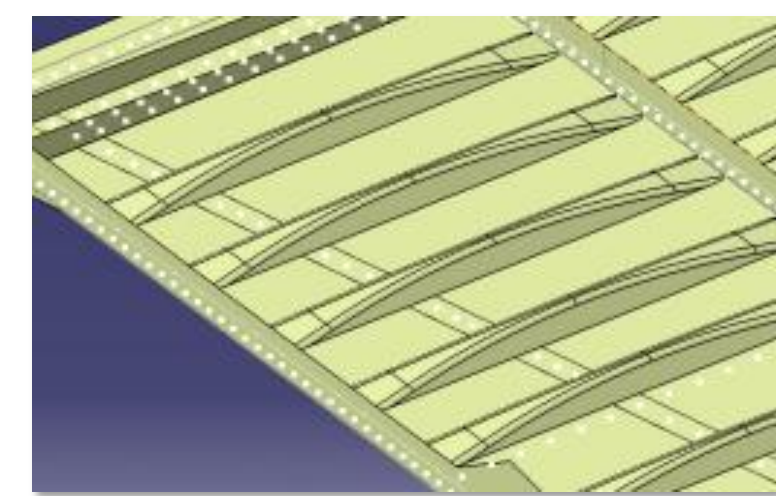
CATIA CAD-CAM-CAE CONNECTIVITY



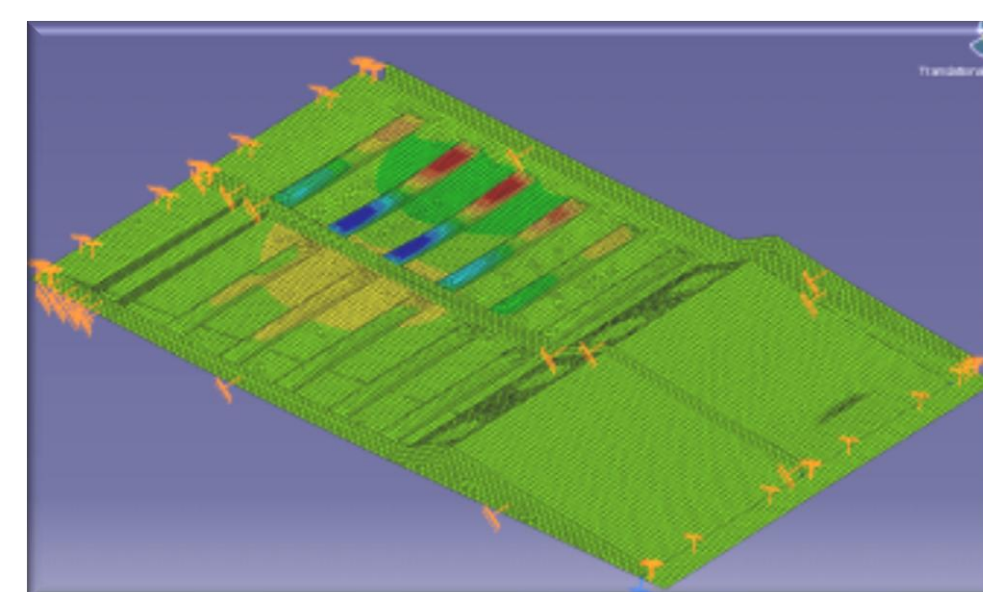
CAD Workbench

FEA Analysis Workbench

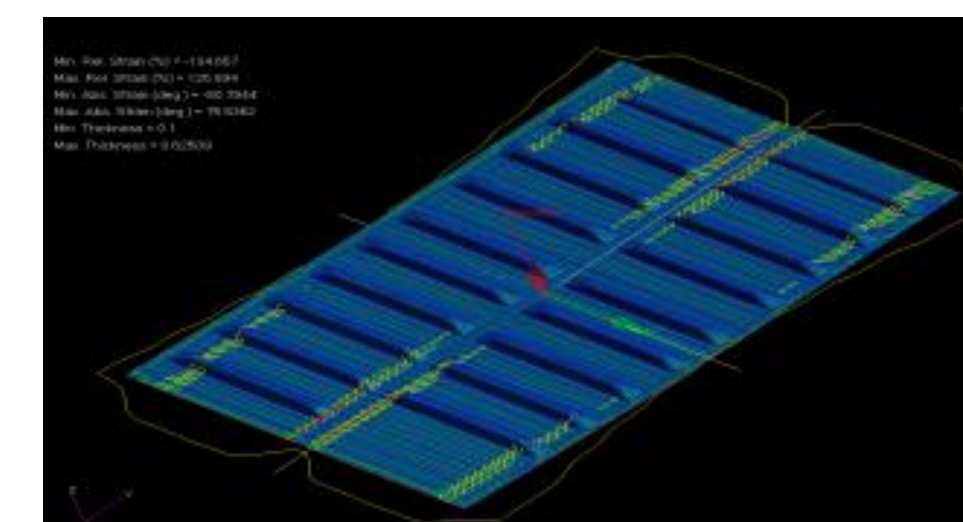
OPTIMIZED HAT STIFFENERS



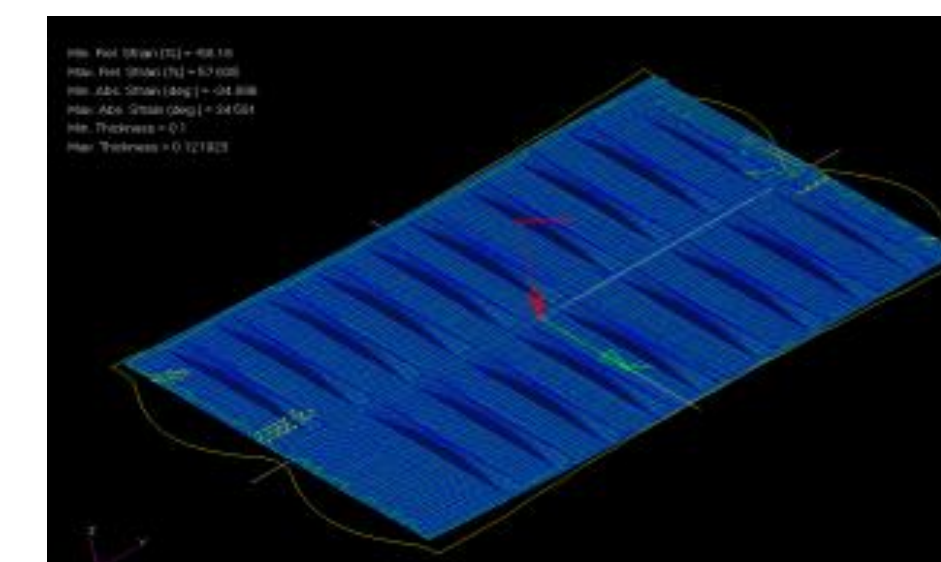
MODAL ANALYSIS



DRAPING OPTIMIZATION



Optimized Design



DESIGN METHODOLOGY

- ◆ Developed standard design and analysis methodology for FEA analysis of composite aircraft components
- ◆ Embedded FEA analysis with CATIA Composites Design (CP3), MSC.SimDesigner Enterprise (Patran/Nastran), Laminate Modeler and FiberSIM

ACKNOWLEDGEMENTS

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