

Our STTR technology:

Main goal: Develop tool to design blends for gas turbine engines and other blade systems

- Develop and validate an integrated design and analysis tool to assess large damage (FOD/cracks) and to design blends for compressor IBRs on gas turbine engines and other blade systems and design

Turbine Blade Blend Shape Design

- Design blend shapes
- Evaluate effects on engine vibration, stress, aerodynamics, predictions
- Works with existing Finite Element Analysis (FEA) software
- Works with existing Computational Fluid Dynamics (CFD) software

Advantages:

An expansion of the blend limits on IBRs increases the size, shape, and number of blends/repairs that can be executed on an IBR

- Lowering the cost of engine removal from the aircraft to make repairs
- Extending the current life cycle of the of the engine

The MAX method:

- Developed at University of Michigan
- Significantly reduces the time to calculate the structural response (vibration and stress) of blended blades and their effects on full blisks, as compared to a full FEA calculation.
- Stores a library of blends that can be mixed and matched to simulate any combination of different sizes, shapes, and locations, of blends.
- Blends can be on leading edge, trailing edge, blade tips, and blade corners.

Contact Us

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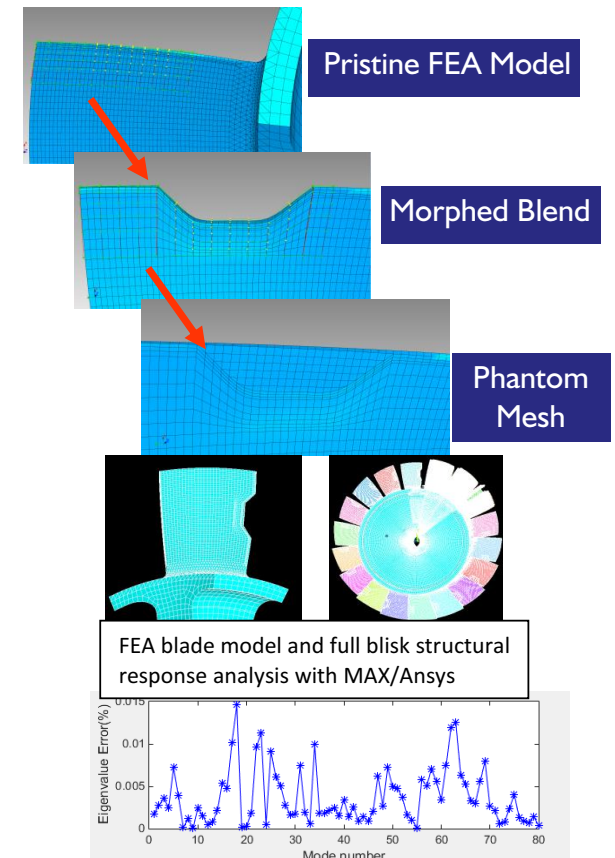


Optimal Solution Software, LLC



“ Shape optimization of CFD/FEA/CAD is like clay in your hands... ”

Sculptor is used in this current STTR work to design the shape of blends to repair damaged turbine/fan blades.





Company History

Initial Shape Optimization Research 1995-2000

Consulting work projects (1996 – present)

- Automotive industry (Toyota, Honda, others)
- Motorsports Industry (Formula 1, others)
- Defense Industry (Lockheed, others)

Founded 2001: Commercial Sculptor Release

Worldwide software sales and support

NASA SBIRs Phase II

DOD Air Force SBIRs Phase II

DOD Army SBIRs sub on Phase II

DOD Navy SBIRs Phase II

Current Navy STTR

Mission/Vision Statement

Help design engineers optimize their structural and aerodynamic designs easily and quickly.

Provide the best software, support, and consulting services possible.

Offer true value added tools and services that fit into and enhance our customers' current design and manufacturing processes.

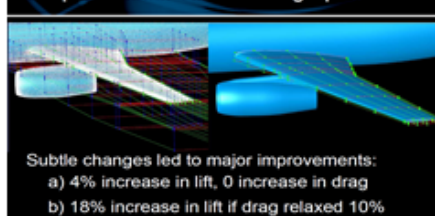


Core Competency

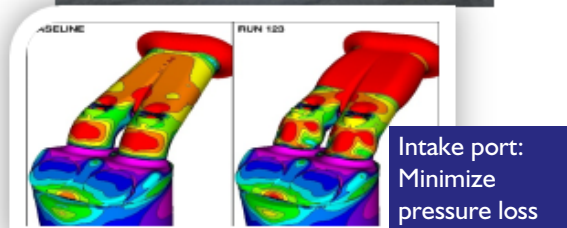
- Worldwide sales and distribution
- R&D in CFD/FEA shape optimization
- Consulting Services
 - Shape optimization in CFD design
 - Shape optimization in FEA design
 - Shape Matching for analysis of as-built parts
 - Design optimal blend shape for turbine/fan blades
- We work with all commercial and most government analysis software for computational fluid dynamics (CFD), finite element analysis (structural FEA), CAD.

Sculptor is a mature optimization design tool that morphs 3D models (CFD, FEA, CAD) with its powerful Arbitrary Shape Deformation (ASD) tools into optimal shapes. It has been successfully used in Aerospace, Automotive, Motorsports, Biomedical, etc. The current STTR work uses it to design the shape of blends to repair damaged turbine/fan blades.

Sample Results: Aircraft Wing Optimization



Fluid Structure Interaction with ASD



Market/Customers

- Government: U.S. Navy, U.S. Air Force, NASA, DOE
- Private: Harley-Davidson, Cummins, Pratt & Whitney, Lockheed, Cessna, Gulfstream, many others
- International: Formula 1 Racing, NASCAR, Toyota, Honda, Mercedes, Ship Building, others

Contract Vehicles

- Current STTR Phase II and Phase II Option with U.S. Navy NAVAIR

