Engineering Analysis & Design

Wet Electrostatic Precipitator - Temperature, Thermal Expansion, & Stress

Autonomous Undersea Vehicle (AUV) Structural Analysis

DeepSoft, LLC

Ultrasonic Cleaner - Modal Analysis

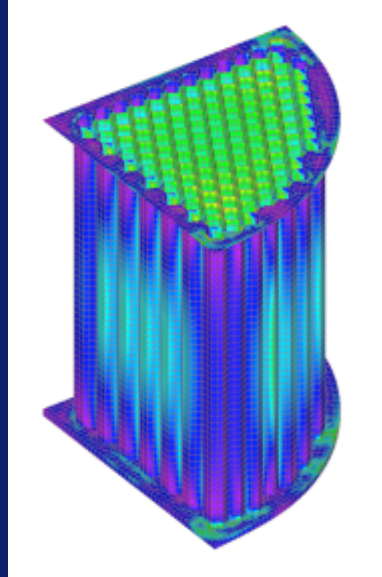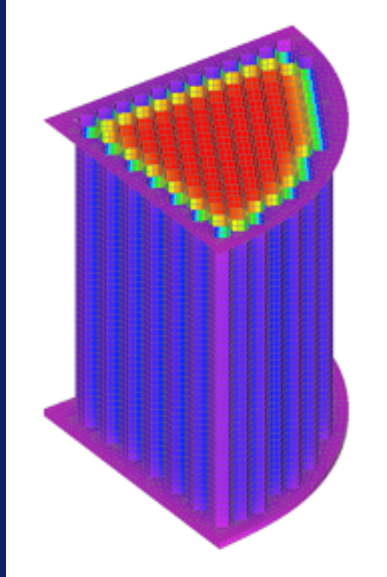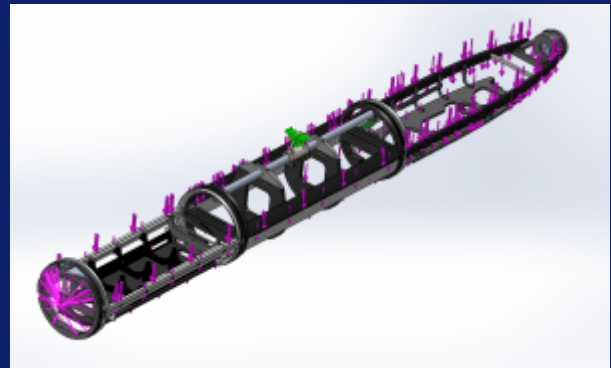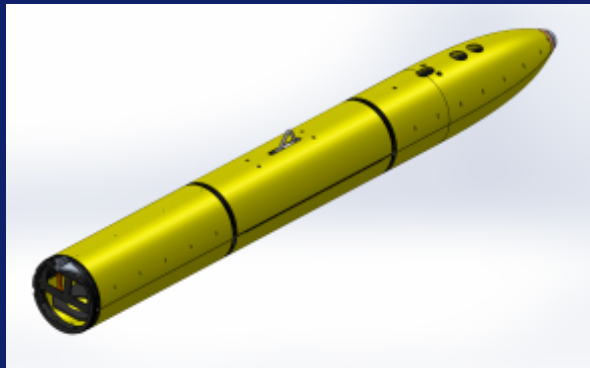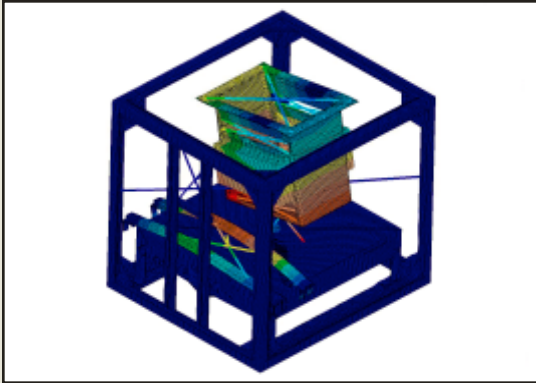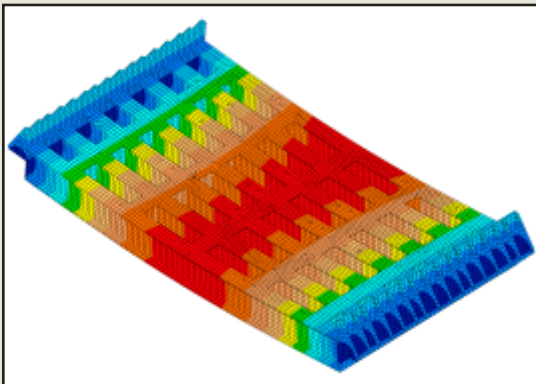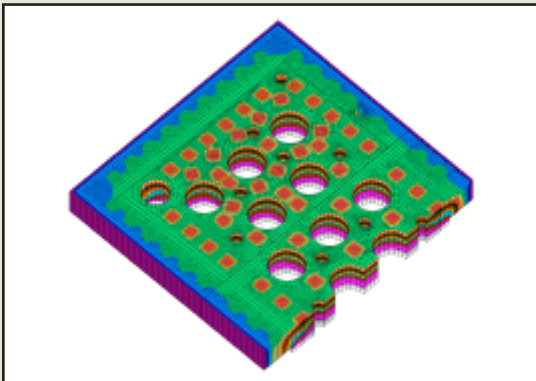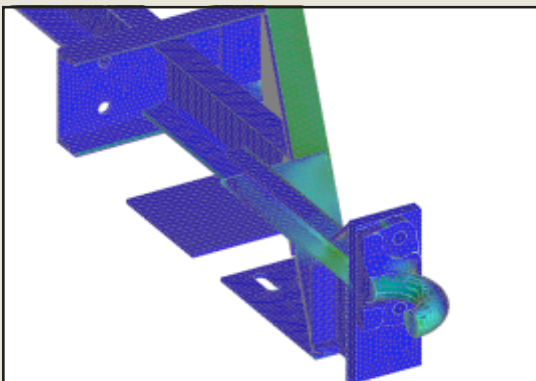Nuclear Waste Melter Base - Displacement

Nuclear Waste Melter Lid - Temperature

Tow Bar - Dynamic Impact Stress

Engineering Analysis & Design

TurboSonic, Inc., retained DeepSoft, LLC. (DSL) to provide a detailed Nastran Finite Element Analysis (FEA) of their Wet Electrostatic Precipitators which are shown on the cover. Analyses included heat transfer, thermal expansion & stress, buckling, and structural stress. For Duratek, Inc.'s nuclear waste vitrification melters Algor FEA analyses included heat transfer, thermal expansion and stress, structural stress, and coolant loop pressure drop. Battelle Laboratories required a dynamic modal FEA to determine resonant frequencies, and a dynamic drop impact analysis of their portable ultrasonic cleaner developed for the US Army. For DHS Systems DSL performed a FEA dynamic impact stress analysis of their tow bar for a US Army trailer.

Some projects may be best served by manual calculations alone without a FEA. Preparation for FEA may involve 20-30 pages of fluid dynamic, thermodynamic, heat transfer, and structural calculations to determine loads, boundary conditions, concentrated mass, and material properties. These are typically automated with Mathcad, Excel, or a C/C++ computer program.

Stone Aerospace, developer of the Endurance Autonomous Underwater Vehicle (AUV), retained DSL to create 3D SolidWorks parts, assemblies, and drawings of their science package winch design for a series of Antarctic dives. Inventor or SolidWorks are used for new designs - SpaceClaim allows importing almost any 3D model geometry for design changes or FEA preparation. The principal has also designed a diver propulsion vehicle and a diver's decompression computer. Ocean Engineering, an interdisciplinary field, is a specialized layer of training built on top of traditional Mechanical, Electrical, and Software Engineering. Think of it as "wet" Mechatronics.

Engineering Tools

- Autodesk Nastran (NEi Nastran) & Femap FEA
- Autodesk Simulation Mechanical (Algor FEA)
- Autodesk Simulation CFD (Blue Ridge Numerics)
- Mechanical Event Simulation
- FatigueWizard
- Inventor, SolidWorks, SpaceClaim, AutoCAD
- Mathcad, Excel, & Custom C/C++ programs
- 700 Volume Engineering & Programming Library
- ~1000 Pages of notes on using these tools

Applications

- Design and analyze virtual products
- Create more innovative and technically enhanced products
- Reduce the number of physical prototypes and tests
- Reduce total product cost and time to market
- Improve marketing and customer satisfaction
- Increase product quality, reduce product recalls
- Increase automation from Art to Part
- Increase automation with Mathcad, Excel, & C/C++
- Reverse Engineering with 3D Laser scans
- 3D Printing & Rapid Prototyping
- Aid to certification or design approval

Finite Element Analysis

Linear
- Static & dynamic stress & deflection
- Buckling
- Composites

Thermal
- Steady & transient state heat transfer
- Thermal expansion & stress

Dynamics
- Modal analysis - resonant frequencies
- Drop impact - quasi static
- Drop impact - nonlinear response
- Time step - modal superposition
- Time step - direct integration
- Response analysis - frequency response
- Response analysis - random vibration
- Response analysis - response spectrum
- Fatigue life analysis

Nonlinear
- Geometric nonlinearity
- Material nonlinearity
- Contact nonlinearity
- Mechanical Event Simulation

Software Training Courses
- Inventor, SolidWorks, AutoCAD
- Autodesk Simulation Mechanical (Algor FEA)
- Autodesk Nastran (NEi Nastran) FEA
- C/C++ programming
- See online course descriptions at DeepSoftInc.com

Depth & Breadth of Experience

When it comes to CAD, CAE 3D solid modelers, FEA, and creating custom C/C++ engineering programs; Ted Fryberger, the principal of DeepSoft, LLC, is among the most experienced engineers in the country. He began using AutoCAD in 1984, Algor FEA in 1988, and 3D solid modelers in 1999. Nastran FEA, Algor nonlinear FEA, and FatigueWizard were added in 2004; SolidWorks Simulation in 2013; and Autodesk Simulation Mechanical & CFD in 2014. C programming began in 1984 and C++ in 1991. He has been a member of the Autodesk Developer Network (ADN) for over twenty years, focusing on custom ObjectARX C++ AutoCAD and Inventor applications. For eight years he taught all of the onsite C & C++ programming courses at NASA's Goddard Space Flight Center to engineers, programmers, and scientists.
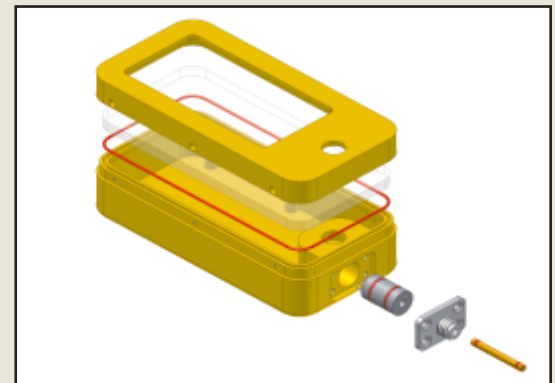
Innovate, Automate, Educate, or Evaporate

In this intensely competitive global market, DeepSoft, LLC. can assist you with developing new and more innovative products, improving quality, automating your workflow, reducing time to market, and training your staff.
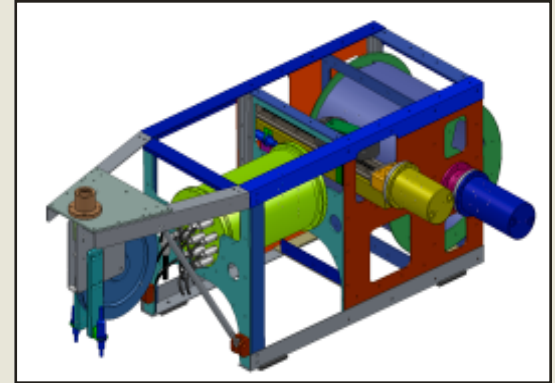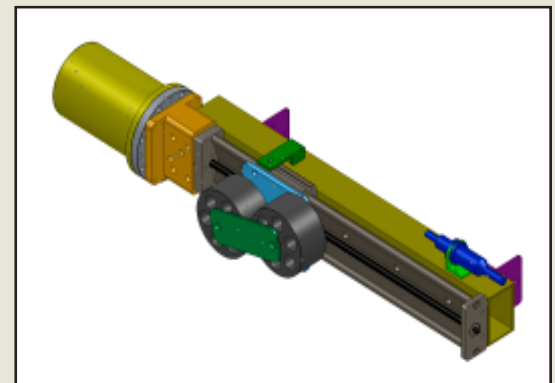

Endurance AUV Winch
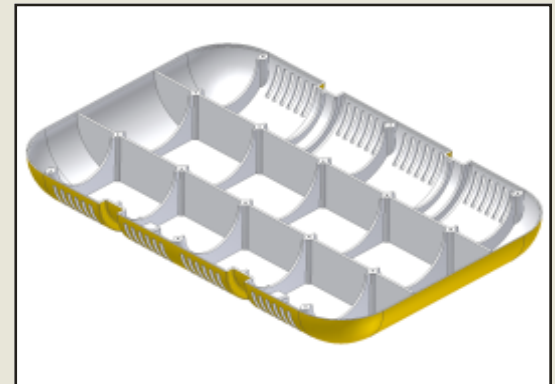
Hydrodynamic Fairing

Instrument Case

Endurance AUV

DeepSoft, LLC. is an independent consulting engineering firm specializing in engineering analysis including Finite Element Analysis (FEA) for stress, thermal, dynamic, buckling, and fatigue. Analyses can be performed for static, dynamic, linear and nonlinear models including composites. Computational Fluid Dynamics (CFD) is a new area of focus. DeepSoft also provides Mechanical and Ocean Engineering design services, custom C/C++ programming for engineering applications, and technical software training in using these powerful, complex, state of the art engineering tools.

Ted Fryberger, PE, has an MS in Mechanical/Ocean Engineering from the University of California at Berkeley, and a BS in Mechanical Engineering from the Pennsylvania State University. Prior to founding DeepSoft, LLC., he worked as a thermal/stress analyst at the Applied Physics Laboratory of Johns Hopkins University. He holds Professional Engineering licenses in Maryland and Pennsylvania, and is a member of the American Society of Mechanical Engineers, and the Autodesk Developer Network. He has been selected as an FEA consultant by both Algor, Inc., and Noran Engineering, Inc.; as well as an Autodesk Developer and Consultant by Autodesk, Inc.
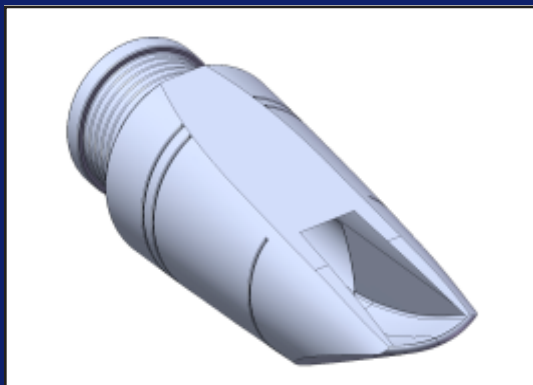

Ted Fryberger, PE
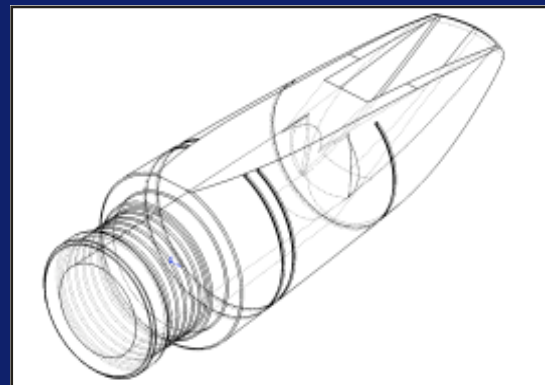Principal
MSME/OE, BSME

Original Clarinet Mouthpiece
3D Laser Scan Point Cloud Data
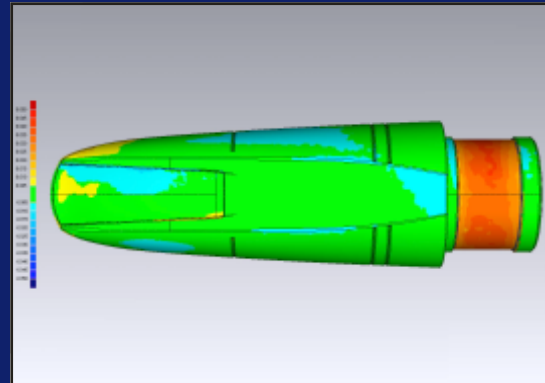
3D Deviation Analysis
Laser Scan vs New Parametric Solid Model

New Clarinet Mouthpiece
Parametric Solid Model

New Clarinet Mouthpiece
Hidden Line Detail

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Engineering Analysis & Design

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