ENDEAVOS Innovations Inc.
Engineering Design Analysis Validation Optimization Simulation

Advanced Engineering & Technology Consulting Firm
Company Overview & Services

Endeavos Innovations is a comprehensive product development, research and engineering services company. Our core philosophy is creativity through collaboration. We work with startups, academia and large companies as part of their team to help innovation through engineering. We utilize state of the art methods and tools combined with years of experience to move an initial idea through various phases of technology development to market in the least amount of time and cost. Our services can also be employed at any phase of development or for any engineering or consulting need.

- Clifton Park, New York, USA.
- Established 2014.
- Technology Development & Engineering.

Clifton Park, NY Office
Engineering Team

Dr. Zaeem Khan, Ph.D, (Founder & President)
Dr. Khan is responsible for managing the operations of Endeavos Innovations Inc. He has over 22 years experience performing and supervising engineering analysis. He has previously held R&D position at GE Global Research where he worked on a variety of engineering projects ranging from bio-medical devices to wind turbines. His expertise includes: modeling and simulation of structures and dynamical systems involving Multiphysics (aero, structural, & thermal), design optimization, finite element analysis, conceptual and detailed design.

Dr. Murat Ozmusul, Ph.D, (Principal Consultant)
Dr. Murat is a senior consultant. He is a mechanical engineer with more than 23 years of experience in the R&D industry. His expertise is in brush seals, steam turbines and mechanical design of test rigs. He was formerly a co-founder of SDM research and engineering based in Turkey and the founder of Pro-Solutions US engineering company. He has several high profile projects under his belt including multiple patents.

Yahya Doğu, Ph.D. (Principal CFD Consultant)
Dr. Yahya Doğu has over 20 years of experience in design and analysis of industrial applications of thermal-fluid systems and has been involved in many R&D projects. His expertise is built on fundamental sciences of fluid mechanics, heat transfer and thermodynamics and validating that with CFD simulations. His experience involves many specific areas: sealing in turbo machinery (brush seal, labyrinth seal, honeycomb seal, cloth seal), flow in porous media, water turbines, solar collectors, optical fiber drawing process, thermal analysis of metal cutting process, 3-D in-cylinder combustion modeling for internal combustion engine, heat exchangers, etc. He has filed two patents on brush seals at GE-CRD and authored many journal and conference papers.

Gerald Reidenbaugh, (Mechanical Design Engineer)
Jay Reidenbaugh has over 26 years of mechanical design and manufacturing experience. He has expertise in new concept development, design, analysis, project management, scheduling, estimating, simulation and optimization. He is a great team player with excellent problem-solving, time management, and organizational abilities when faced with complex multi-disciplinary engineering projects.
How We Do it...

• One stop resource for all mechanical engineering services
• State of the art CAE tools & engineering expertise.
• Expertise is provided when needed. This cuts overhead costs.
• Low rates for pre-seed, seed and early stage startups.
• Valuable resource on standby for established companies.

Market Need
- Explore all potential options to meet requirements.

Conceptual Design
- Concepts evaluated via high fidelity simulations.

Testing
- Setup test rigs, instrumentation & controls for prototype testing.

Physical Prototyping
- Prototypes developed for testing

Detailed Final Design
- Down select concept is thoroughly evaluated & optimized for performance.

Results & Benefits

Analysis & Optimization

Field Testing
Engineering Design

- Engineering design involves conceptual design based on simple first order engineering calculations. This process enables initial material selection, size and performance estimation.

- Based on this CAD (computer aid design) of initial concept is generated.

- This service also includes generation of engineering drawings for machining from provided CAD models as well as creation of CAD models from engineering drawings.

- Physical models are created using rapid prototyping tools such as 3D printing, desktop CNC machining as well as laser cut cardboard and foam.
Advanced simulations based on numerical computations such as finite element method (FEM) and computational fluid dynamics (CFD) is an essential part of product development process and detailed analysis of existing designs. This capability enables virtual prototyping and testing which significantly cuts down product development time and cost.

- Structural stress (Elastic/Plastic)
- Joints: Bolted, Adhesive (bonded), Welded, Riveted.
- Nonlinear Plasticity & Buckling.
- Fatigue Analysis
- Dynamics: Transient, Rigid Body, Explicit.
- Mechanical Vibrations (Modal, Harmonic, and Random Vibration Analysis).
- Rotor Dynamics.
- Composite Structures.
Finite Element Analysis (FEA)

- Structural stress (Elastic/Plastic)
- Nonlinear Plasticity & Buckling.
- Fatigue Analysis.

- Steady-State & Transient Thermal Analysis.
- Coupled Thermal & Structural Analysis

Gasket Analysis
Seal & Leakage Analysis
Finite Element Analysis (FEA)

- Joints: Bolted, Adhesive (bonded), Welded, Riveted.
- Dynamics: Transient, Rigid Body, Explicit.
- Rotor Dynamics.
- Mechanical Vibrations (Modal, Harmonic, and Random Vibration Analysis).
We have the capability to optimize structural designs to reduce mass, deflections as well as change structural stiffness to improve mechanical vibration behavior. Various tools and methods are utilized such as topology and shape optimization. Additionally, any aspect of thermal-structural performance can also be optimized.
Composite Material Structures

- Composite Meso-Scale (Laminate Analysis)
- Micro Mechanical Analysis
- Composite Macro-Scale Analysis

Fiber
Matrix
RVE, hexagonal array

www.endeavos.com
We provide full spectrum of numerical simulations, however, not every aspect of real world physics can or should be modeled and numerically computed. On the other hand, physical experiments using test rigs might be needed. In some cases, simple analytical spread sheet models are sufficient for quick design assessment, concept evaluation etc.

- We have developed in house analytical tools for analysis such as bolted joints, gaskets and flanges based on current and established design and analysis methods.
- We also have the capability to link spread sheet tools with finite element analysis using ANSYS APDL. This standardizes analysis and removes any dependence on user skill level. All post processing can be automated.
- Based on your product development needs, we can custom build simple analytical spreadsheet tools for your organization.

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<th>Value</th>
<th>Unit</th>
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Spread Sheet Tool

ANSYS FEA APDL Tool
Computational Fluid Dynamics (CFD)

- Air, ground and sea vehicle lift and Drag.
- Thermal-Fluid systems
- Seals for gas/steam turbine (brush seal, labyrinth seal, honeycomb seal, cloth seal)
- Flow in porous media
- In-cylinder combustion for internal combustion engine
- Hydro, wind turbines
- Heat exchangers
Computational Fluid Dynamics (CFD)

Turbo Machinery

Combustion

Equivalence Ratio
Plate 1

Temperature
Velocity

HC: 3.175 mm (1/8'')
Düz Stator
HC: 0.793 mm (1/32'')
HC: 1.590 mm (1/16'')
System Models

- Multi-Domain Lumped Parameter Models based on Matlab & Simulink platforms.
- Simulate effects of dynamic loads on structures e.g. wind, seismic, ocean wave loads.
- System design & performance optimization.
Robust Design and Design Optimization
Test Rig Design, Instrumentation & Controls

Development of Complete Test Rigs
Engineering Software & Hardware Tools

Software Tools:
- SolidWorks (CAD/CAM)
- ANSYS (FEA & CFD)
- Matlab (System Models)
- NI LabVIEW (Test Rig instrumentation)

High Performance Computing:
Xeon Gold 6130, 16 core CPU with 128 GB RAM with SSD storage.

Desktop CNC

3D Printing
We work closely with Sanken Industry based in Japan for development of prototypes for testing. Sanken offers highest quality of machined components based on their unique in house technology with fast turn around times.