



MECHANICAL • ELECTROMECHANICAL • ENERGY SYSTEMS

***API ENGINEERING LLC***



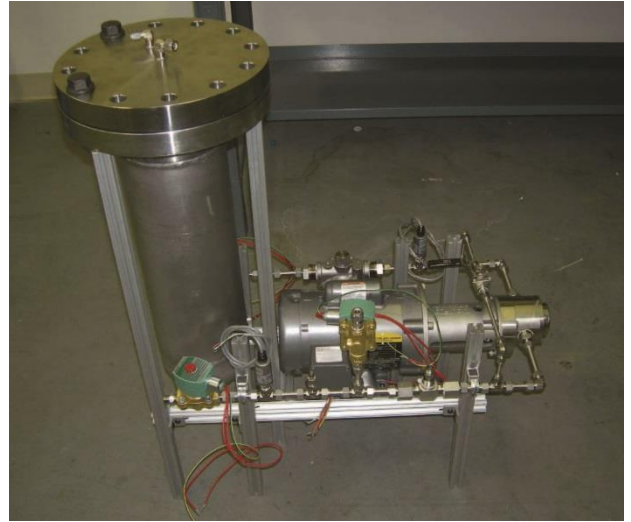
Dedicated to solving our customers' mechanical, electromechanical and energy system problems with cost effective and innovative engineering solutions.

# SUPPORTING PRINCIPLES

Cost Effective / Innovative Problem Solving / Customer Focused

## VALUES

We approach every job with a basic sense of responsiveness to the customers need. That need might be a small amount of consulting or it might be a significant design/build job; it might be a desire for firm fixed price or more comfort with a time and materials arrangement; it might be a really demanding schedule or it might be a need to adjust the work to an uncertain funding schedule. With our experience we have confidence we can find a way to meet your needs.

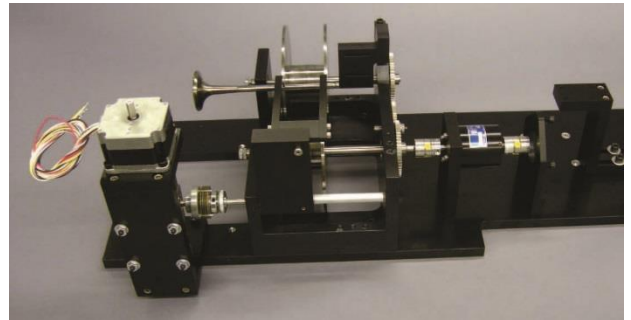


Fluid Systems

## CORE COMPETENCIES

### Mechanical Systems

- ▶ SOLIDWORKS® 3D CAD Design
- ▶ ANSI Y14.5M Geometric Dimensioning and Tolerancing
- ▶ Low production volume products
- ▶ Precision machined or welded static structures
- ▶ Rotating machinery
- ▶ Stress analysis, life analysis
- ▶ Material and processing selection
- ▶ Manufacturing method selection



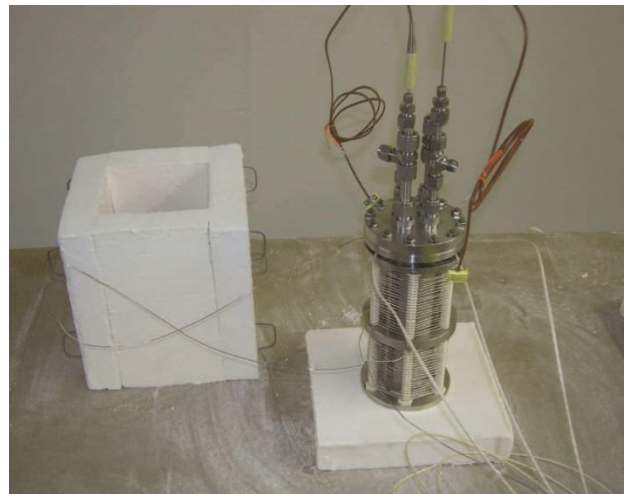
Electro-Mechanical Systems

### Electromechanical Systems

- ▶ Drive mechanisms
- ▶ Precision positioning mechanisms
- ▶ Motor and drive selection
- ▶ Integrated Packages

### Energy Systems

- ▶ Thermodynamic analysis
- ▶ Heat transfer analysis
- ▶ Fluid systems
- ▶ High temperatures/pressures
- ▶ Propulsion and power systems
- ▶ Chemical processes
- ▶ System architectures, control methods



Energy Systems

API provides research and development to government customers in undersea power systems and general contract engineering services in mechanical, electromechanical and energy systems.

## SCOPE OF SERVICES

### Research & Development

API Engineering conducts internal and funded R&D in undersea power systems.

#### Specific Areas Include

- ▶ Oxygen generation technology
- ▶ Undersea fuel cell power systems
- ▶ Undersea vehicle propulsion systems
- ▶ Innovative undersea vehicle engines

### Undersea Power Systems Services

- ▶ Systems engineering and conceptual design
- ▶ Propulsion and energy systems design
- ▶ Underwater vehicle mission analysis, conceptual and preliminary design
- ▶ External and internal aerodynamics and hydrodynamics design & analysis
- ▶ Engine thermodynamics/cycles/performance analysis
- ▶ Fluid mechanics/heat transfer and fluid control system design
- ▶ Loads/environments and structural design/analysis
- ▶ Mechanical design/specification/drafting
- ▶ Electromechanical systems and mechanisms design and analysis
- ▶ Prototype fabrication/assembly/test



Undersea Vehicle Power System Research

### General Mechanical Engineering

The API staff of professional engineers, associate consultants and specialists has the technical and project management skills to meet your mechanical engineering services needs.

#### Specific Experience Includes

- ▶ Test system mounts and fixtures
- ▶ Optical and camera mounting for inspection systems
- ▶ Optical inspection mechanisms
- ▶ High pressure and temperature fluid test systems
- ▶ Chemical process equipment

### Engineering Services

#### Design/Build

- ▶ Custom Mechanical, Fluid, and Energy System Test Equipment
- ▶ Electromechanical Drive Systems, Positioning Systems
- ▶ Production Tools Including, Holding, Lifting, and Positioning
- ▶ Lifting, Positioning
- ▶ Product design, analysis, prototyping

#### Mechanical Engineering

- ▶ Machine Design/Analysis
- ▶ Structural Design/Analysis (FEM Capability)
- ▶ Fluid System Design/Analysis (Hydraulic and Pneumatic)
- ▶ Heat Transfer Analysis
- ▶ Design/Drafting Using 3D CAD (SolidWorks, GD&T)

#### Systems Engineering

- ▶ Specification development support
- ▶ Interface management support
- ▶ Program management consulting
- ▶ Proposal preparation support and consulting
- ▶ Subcontractor management support: SOW's, specifications, and procurement planning



Since 2009 API has been developing undersea power systems based on API oxygen generator technology for the Navy utilizing thermal reactor technology. Prototype oxygen systems for Solid Oxide Fuel Cells (SOFC) are currently under test.



Oxygen Reactor Vessels

## Unmanned Underwater Vehicle (UUV) Power System Technology

### ADVANTAGES

#### **SAFE OXYGEN SOURCE:**

Non combustible, non volatile, aqueous solution.

#### **EASILY HANDLED OXIDIZER & FUEL:**

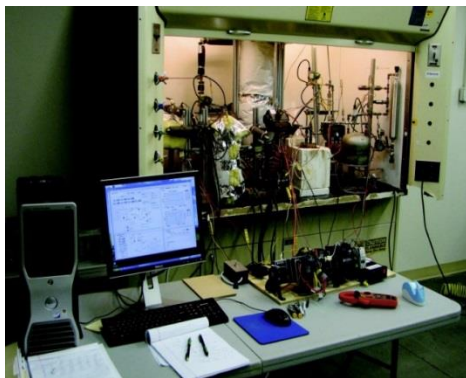
Room temperature liquids simplify UUV refueling.

#### **DENSE OXYGEN STORAGE:**

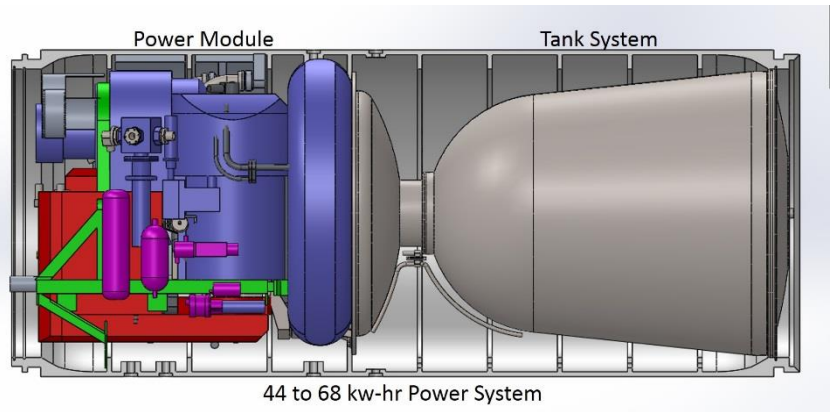
Minimizes storage volume for long duration missions.

#### **HIGH EFFICIENCY POWER SYSTEM:**

>50% efficient solid oxide fuel cell for minimum system size.



Brassboard Oxygen Generator Under Test



Complete Power System – 21 inch UUV



## MARKETS/CUSTOMERS

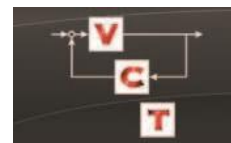
### Customer List – Government

- ▶ **OFFICE OF NAVAL RESEARCH, Arlington, VA:**  
SBIR Phase I and II, and Subsequent Phase II on oxygen generator technology for fuel cell systems



### Customer List – Commercial

- ▶ **BOULDER IMAGING, Louisville, CO:**  
Mechanical design of camera mounts and optical inspection equipment
- ▶ **VEHICLE CONTROL TECHNOLOGIES, Arlington, VA:**  
SBIR Phase I support on undersea vehicle design
- ▶ **SUNDROP FUELS, Louisville, CO:**  
Thermal/mechanical consulting on biofuel reactor design
- ▶ **BLUELINE ENGINEERING, Colorado Springs, CO:**  
Optical test system mounts
- ▶ **FIVEFOCAL, INC, Boulder, CO:**  
Support to SBIR on design of miniature gimbal for UAV camera



# OUR PARTNERS

## **Ken Presley, Chief Engineer & President API Engineering LLC**

Mr. Presley is Principle Investigator on the SBIR oxygen generator program with the Office of Naval Research for development of an oxygen source for undersea power systems. Mr. Presley is President of API Engineering LLC and also serves as its chief engineer. His background includes 34 years in aerospace research, design, development, and production including 17 years in undersea propulsion, 13 years in space based systems, and 4 years in consulting and contract engineering.

He began as a systems engineer at Garrett Pneumatic Systems Division where he became integration lead on the MK50 torpedo propulsion development program. He later joined Advanced Propulsion Inc. where he was a principal in the successful Submarine Torpedo Defense (SMTD) undersea propulsion program and led multiple engineering services programs. At Ball Aerospace he served as chief systems engineer and technical manager on multiple spacecraft mechanism programs.

In 2009 Mr. Presley formed API Engineering LLC and reentered the undersea propulsion market as the initial focus. Since then the business has expanded to include commercial mechanical design services.

Mr. Presley has a BS in Mechanical Engineering from Texas A&M University.

## **James Raum, System Engineer, Vice President API Engineering LLC**

Mr. Raum is vice president of API Engineering LLC and serves in roles as financial management as well as systems and test engineering. His background includes 32 years in aerospace research, design and development including 15 years in system and test engineering and 17 years in project management.

He started his aerospace career at Ball Aerospace as test engineer on pointing sensors for GPS satellites. Later at Ball, Mr. Raum became project lead for various pointing mechanisms for satellite systems including surveillance, laser communication and scientific instrument applications. In 2009 Mr. Raum teamed up with Mr. Presley to form API Engineering.

Mr. Raum has a BS in Engineering Science from Oakland University in Rochester, Michigan and MS in Engineering Design/Economics from University of Colorado in Boulder, Colorado.

## **Scott Meyers, Systems Engineering Associate, API – Tempe, Arizona**

Mr. Meyers experience includes 31 years in the research, design, development and manufacture of aircraft fluid control systems, nuclear power fluid control systems, and propulsion systems for aircraft and undersea vehicles. Mr. Meyers began his career at Westinghouse Hanford Company working on the breeder reactor program. He designed, developed and fabricated test vehicles and associated specialty instrumentation for nuclear reactor experiments.

At Honeywell Inc. (formerly the Garrett Corporation), he directed the engineering development and production of the Torpedo MK50 Propulsion System energy system components. Other development programs at Honeywell Mr. Meyers played key roles in included: Long Term Mine Reconnaissance System vehicle propulsion system, the Mobile Multifunction Device torpedo decoy propulsion and control system, the Leave Behind Acoustic Source Stirling engine heater and Advanced Amphibious Assault, vehicle propulsion system.

Mr. Meyers supports API's advanced concept work for undersea power systems. As systems engineer, he creates and applies system analysis and detail design spread sheet models for designing propulsion systems and prepares detail design of the system. Mr. Meyers also directs fabrication of components and systems in support of the development programs.

Mr. Meyers has a BSME and MSME from Purdue University, W Lafayette, Indiana. He is a licensed professional engineer with the state of Arizona.



API Engineering LLC was founded in 2009 to pursue business in propulsion systems and undersea power systems and to provide general engineering services. API Engineering draws on the propulsion and energy experience base of Advance Propulsion Inc, our associate company office located in Tempe, Arizona.

## CORE ADVANTAGE - Broad Industry Experience

### Engineering Services Programs

Engine Valve Optical Inspection Bench: Boulder Imaging  
Propulsion Design Support to SBIR Study: Vehicle Control Technologies  
Camera Mount Systems: Boulder Imaging  
Bio Fuels Reactor Design Support: Sundrop Fuels  
Bio Matter Decomposition: Cycled Life  
CH47 FARE System: Robertson Aviation  
Boeing 777 Door 1 Mockup: BF Goodrich  
Bell Helicopter PMA Parts Reverse Engineering: Air Services International  
SeaWolf Submarine Actuator Test Fixtures: Allied Signal Fluid Systems  
Corrugated Sheet Metal Stretch Forming Machine: Powers Steel  
Conversion of German Seat Belt Drawings to English: AMSAFE

### Funded Research

Thermal Mechanical Aqueous Chlorate Oxygen Generator: SBIR Phase I & II for ONR, ongoing  
Low-cost Combustor Research: SBIR for NASA Lewis

### Propulsion & Power System Programs

Submarine Torpedo Defense Propulsion System: Argo Tech/Martin Marietta Naval Sys  
Mobile Multi Function-Device Propulsion System: Bendix Oceanics  
MK50 Torpedo Propulsion: TRW/Westinghouse

## VALUE PROPOSITION

API Engineering is a customer responsive small business able to provide cost effective and innovative solutions to your mechanical engineering problems. Our services offer many benefits:

- ▶ Competitive FFP for turnkey product development gives you cost predictability
- ▶ You can use our systems engineering and project management skills to help prepare
- ▶ statements of work and specifications to make outsourcing easy
- ▶ Using our design and build services keeps your staff lean and able to focus on your core business
- ▶ We provide rapid turnaround
- ▶ You can expect quality engineering solutions



Proof of Concept R&D



Mechanical /Structures



Electro-mechanical



## CONTACT

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