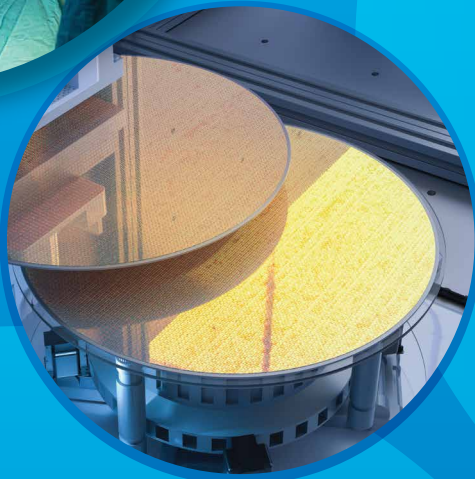
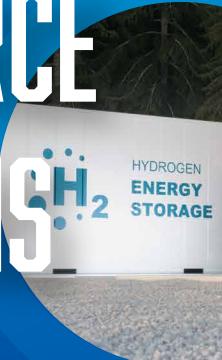


senior
Metal Bellows



YOUR ENGINEERING & MANUFACTURING RESOURCE FOR BELLOWS SOLUTIONS



SINCE 1955



Custom Engineered Solutions

ABOUT SENIOR METAL BELLOWS

We've built a 65+ year legacy of solving the toughest challenges in demanding industries, creating precision components that function reliably under the harshest conditions.

Senior Metal Bellows was founded on a breakthrough process for creating edge welded diaphragm metal bellows in 1955. Our customers represent the top innovators in aerospace, defense, energy, medical and semiconductor markets.

Senior Metal Bellows operates in a 120,000 square foot engineering and manufacturing facility in Sharon, Massachusetts. Our vertically integrated plant incorporates all aspects of metal fabricating and joining as well as electromechanical fabrication and assembly. All metal joining processes are maintained in the facility with particular attention to our core competency, fusion welding technologies. This allows us to completely control the quality of the innovative solutions we offer our clients.

Industries We Serve



Aerospace



Semiconductor



Weapon
Systems



Medical



Space



Oil & Gas



Hydrogen



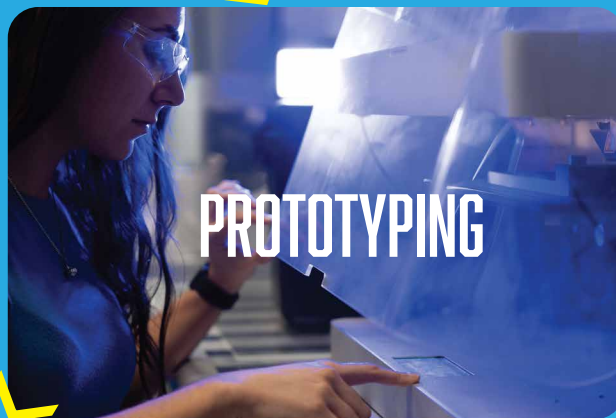
Nuclear

VERTICALLY INTEGRATED FROM DESIGN TO PRODUCTION MANUFACTURING



The design process begins with a thorough understanding of the customer's specific requirements for their custom engineered metal bellows solution.

Prototypes can be created and tested to validate the design, ensuring proper function and performance before the manufacturing process begins.



All products undergo thorough testing, including pressure, life cycle and/or leak testing, to verify its ability to perform as required in real-world applications.

The final design is then manufactured using advanced techniques to produce consistent, high-quality metal bellows components that meet the customer's specific requirements and specifications.





NEW PRODUCT DEVELOPMENT

Senior Metal Bellows applies our core edge-welded bellows technology to solve our customers' unique challenges. Our engineers work closely with our customer's engineers to ensure that we understand the application and critical performance factors in order to meet or exceed all technical requirements.

We can provide custom engineered solutions from one of our existing technology areas or we can create entirely new products - whatever is needed to meet our customers' needs.



Our core competencies are:

- Problem solving and new product development
- Designing for high reliability and high cycle life
- Testing
- Production manufacturing

We apply our welded metal bellows technology to overcome performance and/or reliability issues with conventional solutions.

AREAS SENIOR EXCELS

High Reliability

- High cycle life capability
- Zero friction and zero wear
- Zero contamination
- Redundant and double containment systems with fault indication

High Pressure

- Application pressures of 37,000 psi and higher
- Zero leakage pneumatics & hydraulics
- Unique HIPRES® bellows
- Patented high pressure bellows technology

Zero Leakage

- Candidate for zero leakage replacement of dynamic elastomeric seals
- Movement across a vacuum boundary
- Handling of dangerous/corrosive liquids and gases

Temperature Extremes

- Cryogenic applications
- Designs to 1800°F or higher
- Automatic thermal actuators to 1000°F plus



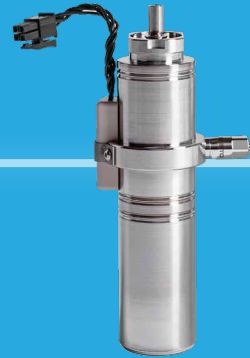
ACCUMULATORS & RESERVOIRS

- » All welded metal construction — no elastomeric seals
- » Maintenance and service free for the life of the program
- » Accurate sizing using “real gas” sizing analysis considering isothermal and adiabatic operation
- » Suited for hydraulic, fuel, oil and cooling systems applications



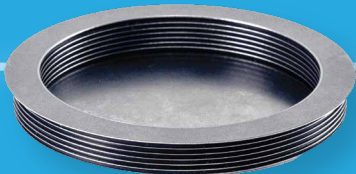
THERMAL VALVES / ACTUATORS

- » All metal, hermetically sealed construction
- » No elastomers
- » Maintenance and service free for the life of the program
- » Operating and actuation temperatures to 1,000°F plus
- » Accurate, repeatable performance — no performance drift over time



PRIME MOVER ACTUATORS

- » No elastomers for smooth continuous motion across the vacuum boundary
- » Integrated position sensing with automatic temperature compensation
- » Precision guiding for accuracy and repeatability
- » Can be individually tuned
- » Very wide operating temperature range
- » 1,000,000+ lifecycle



MEDICAL IMPLANT BELLOWS

- » Extremely thin gauge titanium construction
- » Low spring rate
- » High cycle life
- » Zero leakage



COMPLEX ASSEMBLIES

- » Engineering and manufacturing capability to offer higher level assemblies integrating welded metal bellows

Senior Metal Bellows has the engineering staff, the design and analysis tools, the test lab facilities and advanced manufacturing equipment to rapidly bring your custom solution from concept to production.



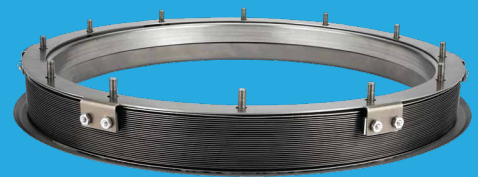
VACUUM PUMPS & COMPRESSORS

- » Hermetically sealed — employs welded bellows that provide positive containment and contamination free sampling
- » Stainless steel construction — all wetted surfaces are corrosion resistant stainless steel except for valve assembly gaskets that are either teflon or viton
- » Long life — capable of a minimum of 10,000 hours continuous operation
- » No maintenance — no wearing surfaces and no lubrication required



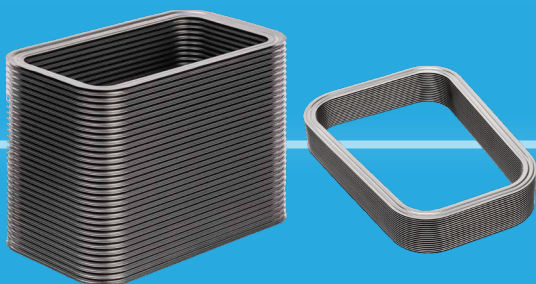
MICROLITER PRECISION DISPENSING

- » All metal construction is suitable for corrosive and caustic fluids
- » No elastomeric seals to wear
- » Friction-free operation eliminates "stiction" issues
- » Compact form can bolt onto a manifold



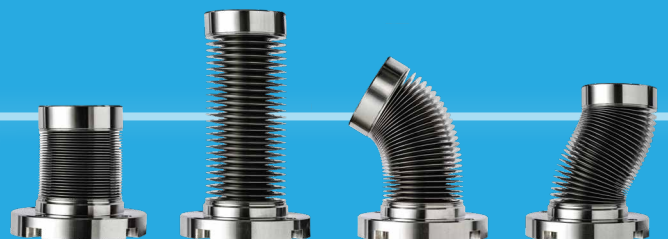
DYNAMIC BELLOWS SEALS

- » Bellows dynamic seals designed for high-temperature applications
- » Seals available in various shapes with stainless steel or high nickel alloy construction
- » All metal, ceramic, or carbon sealing surfaces
- » Ideal for engine nacelle, firewall, fuel drain, and engine duct seals



NON-ROUND BELLOWS

- » Non-round bellows can be manufactured in a variety of shapes to meet unique geometric requirements



WELDED METAL BELLOWS

- » Welded metal bellows are highly flexible in all directions and can accommodate axial, lateral and angular deflection while maintaining zero leakage



DEFYING THE IMPOSSIBLE

SINCE 1955

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Sharon, MA 02067

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www.metalbellows.com

CERTIFICATIONS

QUALITY

ISO 9001:2008 and EN/JISQ/AS9100:2009

REPAIR

FAA Repair Station
PMA Authority for Several Airline Parts
European Aviation Safety Agency (EASA) Repair Station

NADCAP

AC7110 for Welding
AC7102 for Heat Treating
AC7102/1 for Brazing
AC7101/3 for Mechanical Testing
AC7101/4 for Metallographic and Micro Hardness Testing
AC7101/5 for Hardness Testing
AC7114 for Non Destructive Testing
AC7108 for Chemical Processing

ENVIRONMENTAL HEALTH AND SAFETY

ISO 14001:2004 Certified — Environmental Management System
BSI — OHSAS 18001 Certified — Occupational Health and Safety Management
EHS Policy Statement 10-19-17