


Precision-Engineered Metal Bellows



MW Components

Precisely Flexible

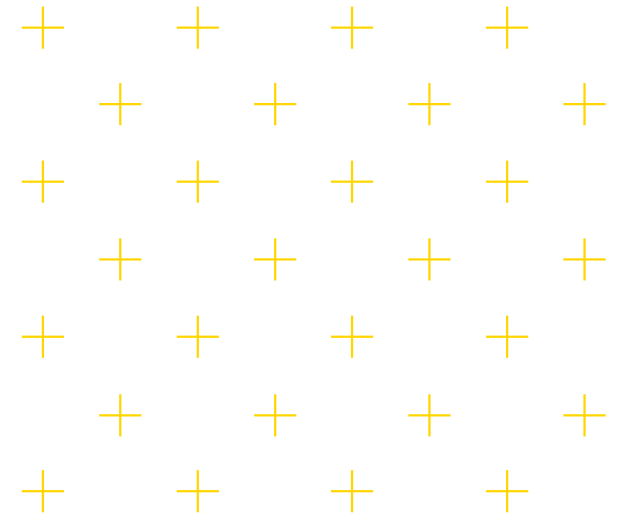


Metal bellows are fundamental to the efficient working of a wide variety of industrial applications, including energy, oil and gas, semiconductor, defense, medical, and aerospace. As a component specifically designed to separate different environments, achieving a leak-tight seal while delivering the required flexibility demands precision engineering.

MW Components manufactures stock and custom metal bellows with the precise tolerances required to deliver exact dimensions, stroke length, convolution length, and temperature ranges for demanding applications across multiple industries.

Multiple Manufacturing Processes

We produce custom-manufactured metal bellows using three key technologies: edge welding, electrodepositing, and hydroforming. Each can be used to produce precision parts for the most demanding applications. The optimum choice of technology will depend on your specific application.

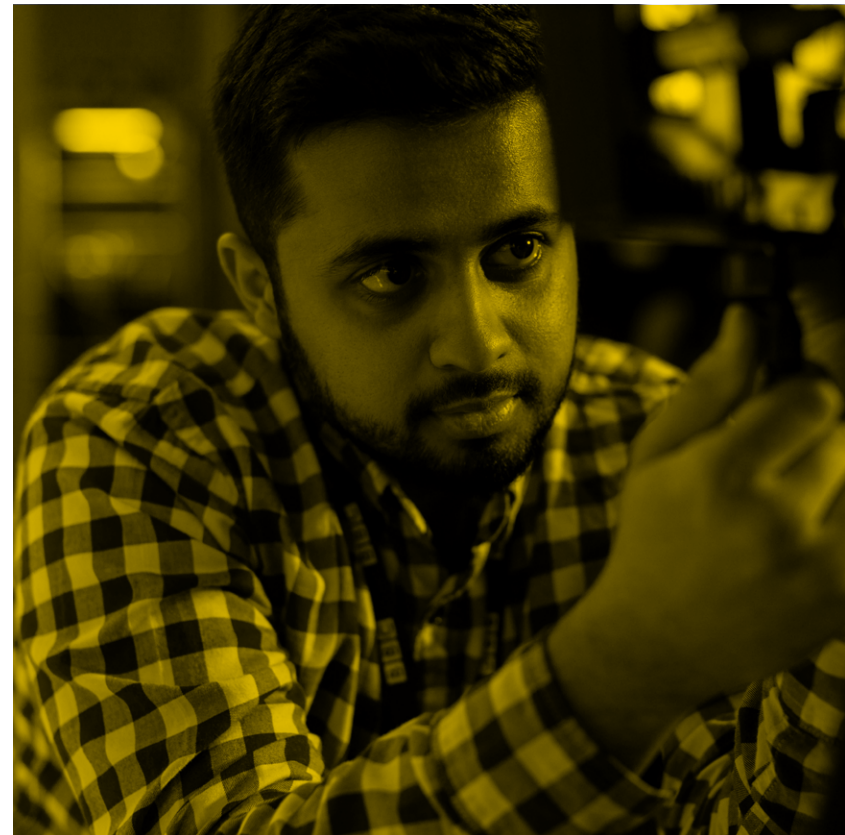


Edge Welding—metal bellows provide an all-metal barrier and seal that flexes in one or more directions. Edge-welded metal bellows provide the most flex in the smallest amount of space of any bellows technology on the market – a stroke length of 90% of free length is achievable. With various materials and configurations, edge-welded bellows can achieve the high pressure, high and low temperature, leak rate and cycle life requirements that customers demand.

Electrodeposition—bellows created via electrodeposition are the optimum solution for critical applications demanding complex geometries, seamless construction, and miniature sizes. They deliver performance, durability, repeatability, and dependability that other alternatives cannot. In fact, using our signature Cobalt-Nickel alloy, FlexNickel, we are able to meet the temperature capability and structural rigidity of metal components yet retain the flexibility and weight of plastic.

Hydroforming—uses high-pressure hydraulic fluid to form unheated metal into a die. Hydroforming produces lightweight parts with greater stiffness to weight ratio with a per-unit cost lower than other forming alternatives. Durability is excellent with an extremely high life cycle rate (1,000,000,000 cycles or more).

If you are unsure which approach will deliver the best results for your specific application, our engineers are on hand to offer expert advice.



Metal Bellows Comparison

	Measurements	Stroke	Sensitivity	Minimum Wall Thickness	Leak Rate
Electrodeposited	Smallest OD (Min OD) 0.020" (0.5mm) Largest OD (Max OD) 9" (228mm) Max Convolution Length (One Section) 10" (254mm)	35% free length (typical) up to 50% possible for certain applications	Very Sensitive. Can be designed to deflect with a force as low as 4 grams (0.14 oz.)	0.0002" (0.005mm)	1×10^{-6} cc He/sec @ 1 atm standard (1×10^{-9}) cc He/sec @ 1 atm as required
VS.	VS.	VS.	VS.	VS.	VS.
Edge Welded	Smallest OD (Min OD) 0.358" (9.1mm) Largest OD (Max OD) 25.59" (650mm) Max Convolution Length (One Section) 96" (2438mm)	Certain bellows designs can stroke as long as the free length. Typically with a max 25% of stroke in extension with 75% of stroke in compression. These percentages can be modified with heat treatment	Varies with bellows size, material thickness, and length. Spring rates of 1 pound/inch or less are easily achievable if desired	0.0015" (0.038mm)	1×10^{-5} to 1×10^{-9} cc He/sec (standard based on material)
VS.	VS.	VS.	VS.	VS.	VS.
Hydroformed	Smallest OD (Min OD) 0.25" (6.35mm) Largest OD (Max OD) 43" (tooled) 50" max (not tooled) Max Convolution Length (One Section) Varies by ID size and material Wall thickness 3" - 200 feet	Typical 15% compression 10% extension free length. Special design up to 35% between compression and extension	Varies with material thickness and convolution design	0.002" (0.051mm)	1×10^{-9} cc He/sec

Corrosion Resistance	Maximum Pressure (Differential)	Temperature Range	Tooling Cost	Material	Life Cycles
MW Components FlexNickel®Alloy suited for air and hydrocarbon environment. Not recommended for sea water or acidic environments without Gold plate or Parylene coating to enhance corrosion resistance	Depending on design, up to 10,000 psi	High Temperature MW Components FlexNickel®Alloy: 350°F (177°C): Copper Bellows: 200°F (93°C) Low Temperature -423°F (-253°C) or lower may be possible	Bellows typically have no tooling cost. NRE charges for Leak Test, Spring Rate, and Assembly fixtures may apply	FlexNickel®Alloy and Copper. Coatings Available: Gold, Silver, Tin, Parylene	Up to 1,000,000,000 cycles (Theoretical "Infinite" Life)
VS.	VS.	VS.	VS.	VS.	VS.
Wide material selection available for many applications including seawater, acidic, alkaline, and downhole environment	Certain designs can withstand up to 2,500 psi (external). We have achieved over 15,000 psi (external) with an oil filled (internal design)	High Temperature 1500°F (815°C) Low Temperature -420°F (-251°C)	For a complete set of new bellows tooling, for OD's between 0.5" and 10", typically ranges between \$4500 to \$8000	AM350, 304L SS, 316L SS, 321 SS, 347 SS, Titanium Gr 2, Haynes 242, Hastelloy® C276, Inconel® 600, 625, 718 Aluminum	Many designs guaranteed up to 3,000,000 with even greater cycles achieved in use
VS.	VS.	VS.	VS.	VS.	VS.
SS 300 Series - appropriate for basic corrosion protection; Hastelloy®C22, C276 - corrosive resistant; Monel™ - seawater; Inconel® - heat & corrosion resistant	Varies based on wall thickness of material with braid (1,000 - 3500 PSI)	High Temperature Stainless Steel – 900°F Inconel® over 900° F (recommended) Low Temperature -420°F (251°C)"	Typically ranges between \$1000 to \$3000	Nickel alloys, 321 SS, 316L SS, Inconel® 600, 625, 718, Hastelloy® C22, C276, Copper, Brass, Phosphorous Bronze, Titanium, Monel®	Varies: 1,000,000 - 30,000,000 or more

These variables represent guidelines for typical user applications and designs. Consult a technical support engineer for parameters outside these industry best practices.

End-to-End Quality Assurance

When it comes to manufacturing metal bellows for today's demanding applications, there can be no compromise on quality. Our manufacturing facilities are accredited by multiple external bodies—from ISO 9001 and AS9100D certification, through to compliance with national and international frameworks such as RoHS and REACH.

Bellows Industries:

- Aerospace
- Cryogenic
- Energy
- Food & Beverage
- High-Performance Auto
- Industrial
- Lab & Research Facilities
- Medical
- Oil & Gas
- Semiconductor
- Sensors & Instrumentation

Bellows Applications:

- Accumulators
- Actuators
- Aneroids
- Couplings
- Electrical Contacts
- Electroforms
- Expansion Joints
- Imaging Equipment
- Lifter Bellows
- Mechanical Feedthroughs
- Mechanical Seals
- Medical Test Equipment
- Pumps
- Reservoirs
- Sensors
- Test Stand Bellows
- Valve Sealing Equipment
- Vibration Dampeners
- Volume Compensators
- Wave Guides



Let's Talk

Discover the difference we could make to your success, contact us at Sales@MWComponents.com to schedule a conversation about your needs.



MW Components

About MW Components

MW Components is focused on accelerating the entire process of delivering custom, stock, and standard parts to virtually any volume and against demanding deadlines. We work to highly complex tolerances. We help simplify the management of any number of different components. And we take a no-compromise approach to quality. With MW Components, you can be sure you'll get the right part to the right specification when and where you need it.

MW Components. Whatever it takes.

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