



THE HYSpan GROUP



Hyspan Corporate Group



HYSpan PRECISION PRODUCTS, INC.

HYSpan de MEXICO



FLEXIAL CORPORATION



FLEXIBLE METAL, S.R.O., Prague

FLEXIBLE METAL, INC. Tucker GA

FLEXIBLE METAL, INC. Hamburg MI

FLEXIBLE METALS MEXICO



UNIVERSAL HOSE & BRAID

Flexial is part of the Hyspan Group

Advanced flexible solutions



100+ million in revenue



500+ employees globally



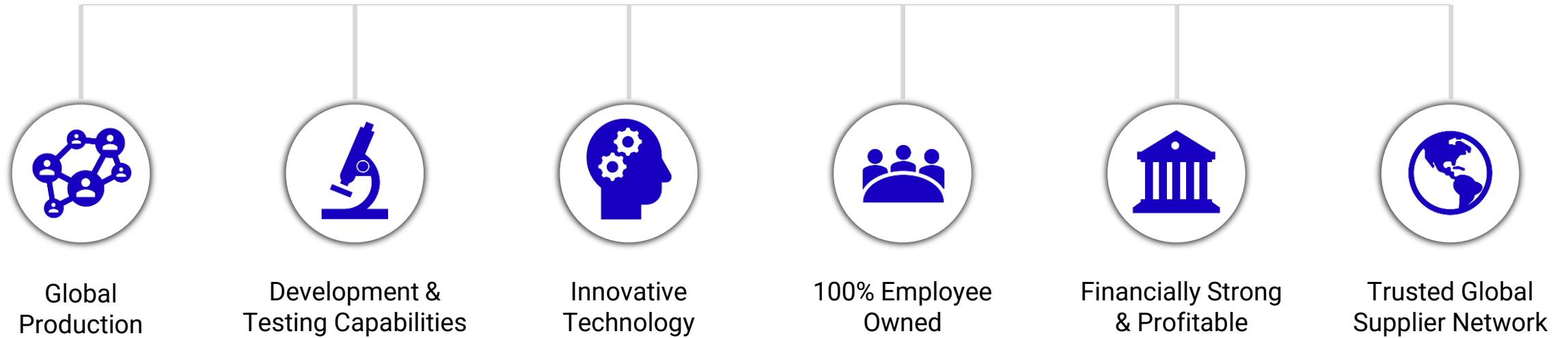
8 global factories



Inclusive & diverse culture



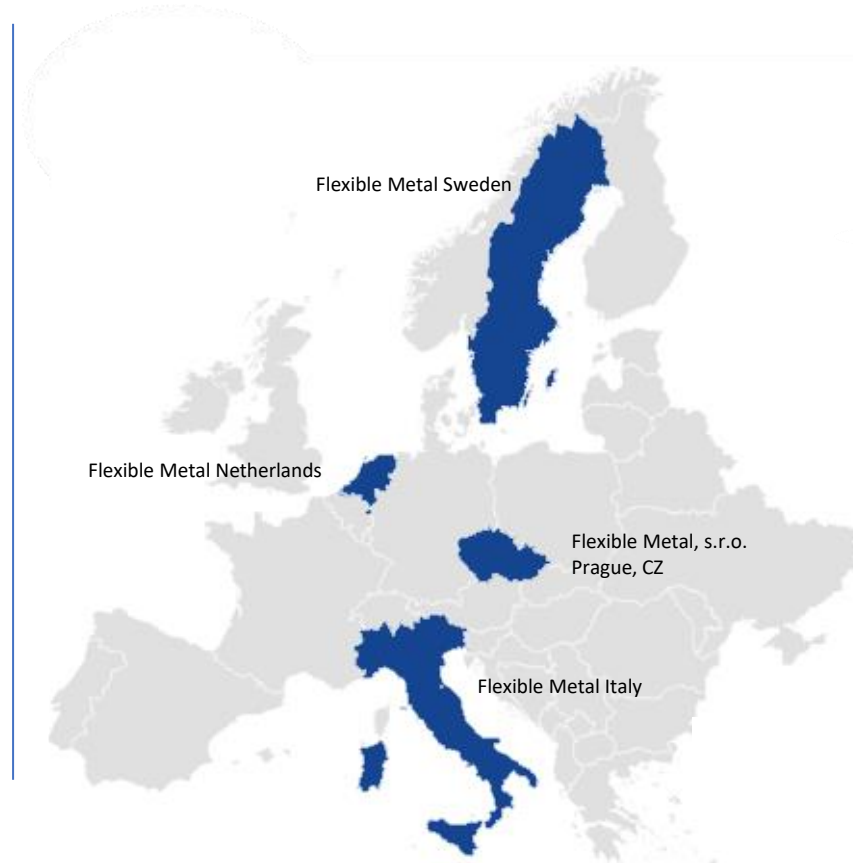
4 powerhouses of innovation & expertise in bellows, hoses & thermal management



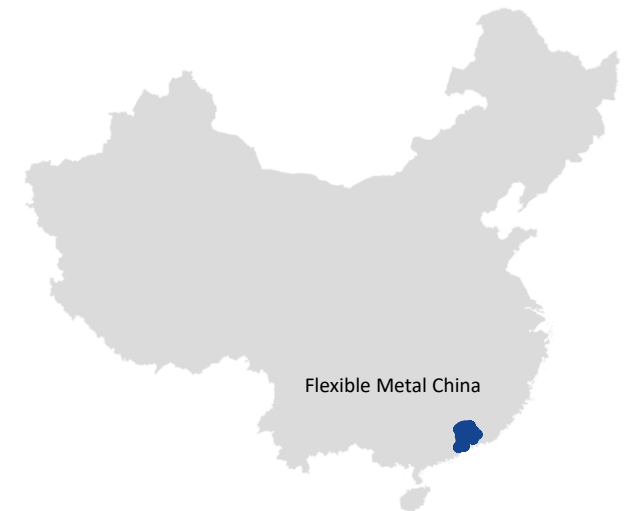
North America



Europe



China



Employee Stock Ownership Plan

In 2017, an ESOP was established as an employee benefit plan that gives workers ownership interest in the company.

Because our employees have stake in our company's success, quality & customer service are our #1 priorities.

When our customers win, we win!

ESOP companies account for over half of Fortune Magazine's "100 Best Companies to Work for in America" *





Hyspan[®]

EXPANSION JOINTS



Commercial
& HVAC



Industrial Process



Petrochemical



Power Generation



Defense



Scientific &
Laboratory



Shipbuilding
& Maritime



OEM





BLUE ORIGIN



Matson.

SIEMENS



Caltech

Cargill™



DYNO®
Dyno Nobel



HARVARD
UNIVERSITY

 Ashland™

Development & Engineering

Manufacturing

Program Management

Quality Assurance

Advanced Flexible Solutions Start Here

Hyspan’s solution approach includes design and engineering of metal bellows, expansion joints, compensators, and pump and V-flex connectors ranging in diameter from 3/4" NPS through 20 foot diameter.

With decades of holistic engineering expertise combined with performance analysis, multiple patents and testing, Hyspan and its family of flexible tubular metal products create durable solutions that withstand the toughest environments.

Leveraging engineering software including:

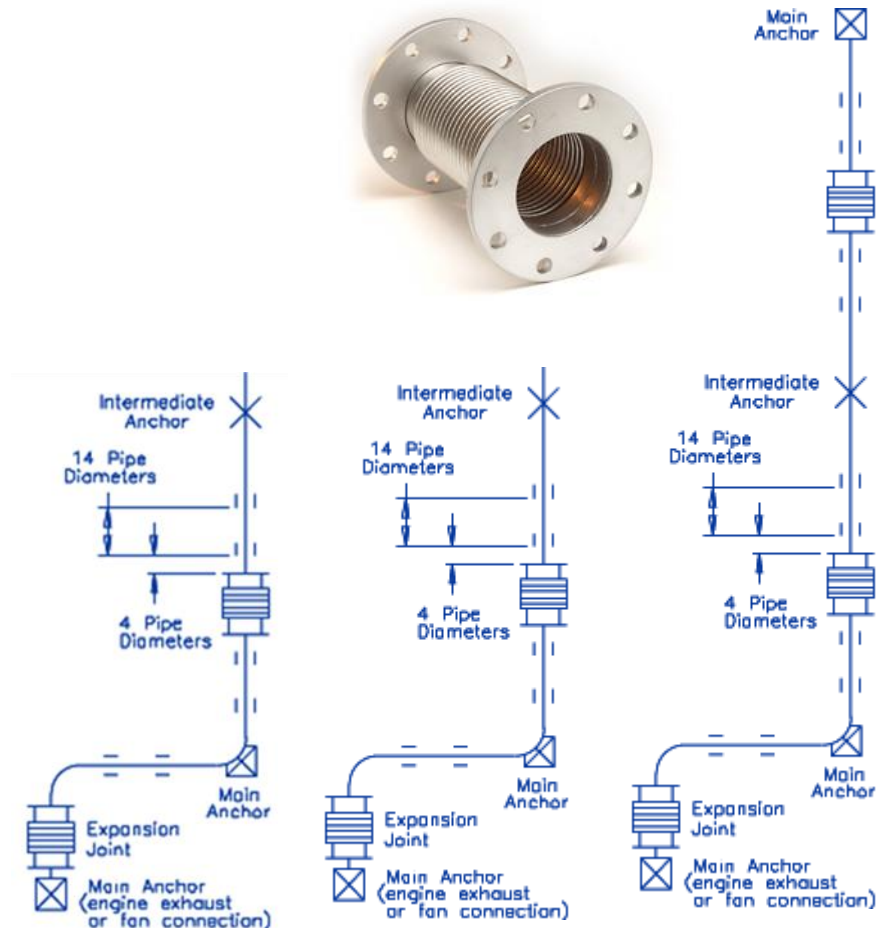
- ANSYS DesignSpace® Finite Element Analysis
- Inventor®
- AutoCAD®
- CAEPIPE®-SSTLM Pipe Stress Analysis
- Proprietary EJMA Bellows Stress Analysis



System Engineering & Review



Force & Stress Analysis



Development &
Engineering

Manufacturing

Program
Management

Quality
Assurance

With extensive raw material handling including plasma burn, machining centers, plate and sheet rolling, bellows forming, welding, and extensive test capabilities, more than 90% of manufacturing is performed in-house.

Product manufacturing is located in North America, including Chula Vista, CA USA & Tijuana, BC Mexico

Bellows Forming



Ball Joint
Manufacturing



Slip Joint
Manufacturing



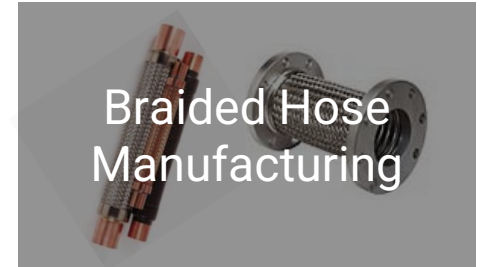
Fabric
Manufacturing



Specialty Products



Braided Hose
Manufacturing



Development &
Engineering

Manufacturing

Program
Management

Quality
Assurance



Advanced Flexible Solutions. Advanced Customer Service.

With global engineering, manufacturing, and program management, resources are always available to assist and keep your projects on track.



Specialized products call for specialized support.

It is frequently necessary to design and fabricate the forming machines, tools and fixtures, and test apparatus to support product development. Our fabrication facilities include tool and die and machine tool fabrication capabilities to provide prototype and full production support.



Field services for better program management

High risk and critical systems can require “First Time Right” level expertise and schedule support. Our broad experiences with trained factory and representative personnel, supports site inspection and audits. Hyspan also provides, recommended solutions, reports, and field service installation for metal expansion joints, hose assemblies, and fabric expansion joints.

Development & Engineering

Manufacturing

Program Management

Quality Assurance

Hyspan's quality system conforms to:

- ISO 9001:2015
- Expansion Joint Manufacturer's Association
- ASME Section VIII
- European Pressure Equipment Directive (PED)



Cryogenic Liquid Nitrogen Testing



High Temperature Endurance Testing

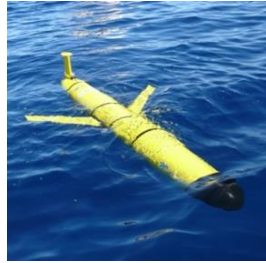


Leak & Pressure Testing

Hyspan's quality assurance department is staffed with **American Society of Non-Destructive Testing (ASNT)** certified professionals qualified to perform liquid penetrant, air-jet, magnetic particle, ultrasonic, Helium leak detection, and radiography.

FLEXIAL

EXTREME SOLUTIONS





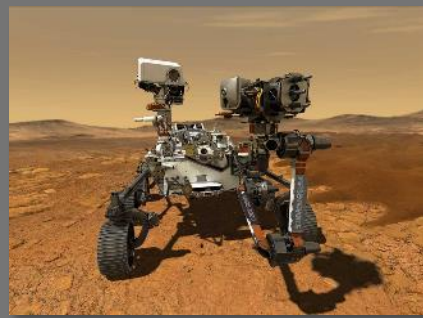
Commercial Aviation



Military Aircraft



Space Launch Systems



Space Vehicles



Missile Defense



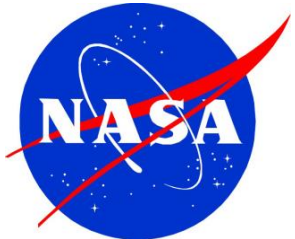
Oil & Gas



Energy Distribution



Medical Systems





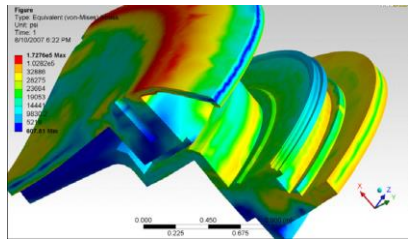
Flexial's engineering and analytical capabilities ensure a better design, longer life and a higher performance product.

- 3-D Solid Modeling
- Integration
- System Performance Analysis
- Thermal and Fluid Flow
- Linear & Non-Linear Bellows Analysis
- Structural, Fracture Critical & Vibrational Analysis
- Fatigue Analysis
- Plastic Analysis

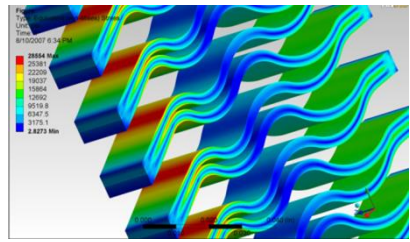
Comprehensive Fluid, Structural and Thermal Analysis Capabilities



Fluid Analysis
Dynamic compensation and surge analysis



Structural Analysis
Non-linear fatigue life and modal analysis



Thermal Analysis
Steady-state, transient and heat transfer analysis

Engineering Testing Capabilities

- Hydraulic cycle testing (2 systems)**
<5000psig at temperature
Variable Fluid type
Fully programmable
- Hydraulic cycle testing (1 systems)**
<3500psig at temperature
Variable Fluid type
- Temperature Testing**
-67 to 275 F
2 Large chambers (4'x4'x4')
1 small (20"x20"x20")

Development
& Engineering

Production
Manufacturing

Program
Management

Quality
Assurance

Engineering or Qualification Testing

- Hydraulic Pressure Testing – Static & Dynamic
- Pneumatic Pressure Testing – Static & Dynamic
- Helium Leak Testing
- Data Collection

Production Testing

- Spring rate testing (3 systems)
- Pressure vs displacement testing
- Pneumatic cycling (2 systems)
- Helium MST
- Proof and burst testing
- Metallurgical sample preparation and evaluation



Development &
Engineering

**Production
Manufacturing**

Program
Management

Quality
Assurance



Flexial Corporation applies solid manufacturing technologies to the manufacture of precision bellows products, including investments in:

- Design of edge-welded bellows, formed bellows, and accumulators
- Precision machining (titanium, stainless steel, aluminum and nickel-based superalloys)
- Precision, ultra-thin stamping
- Micro welding (TIG, micro plasma)
- Semi-automatic, mechanized, and automatic GTAW and laser welding
- Modern CNC machining and forming equipment
- Precision cleaning processes



Development & Engineering

Production Manufacturing

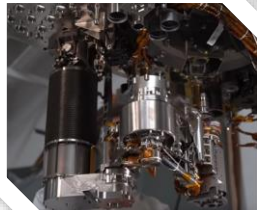
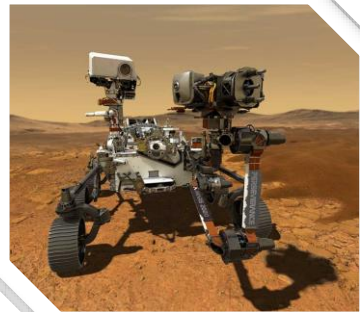
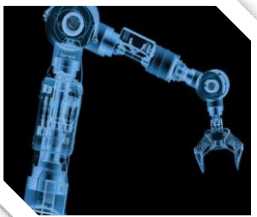
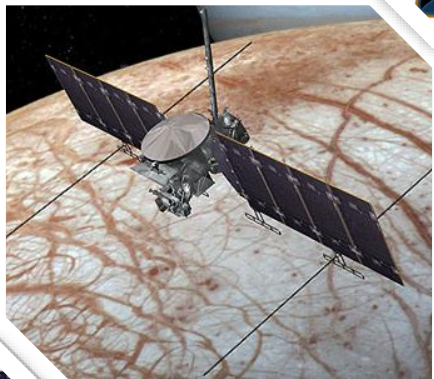
Program Management

Quality Assurance

Over 25 years in aviation, space & defense means we have the tested expertise for a more robust, holistic solution.

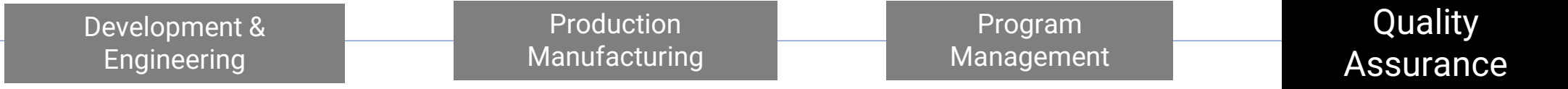
Flexial's control systems provide excellent planning and execution of program management activities, from concept to manufacturing.

Flexial's internal policies and organizational culture is devoted to customer service – and Flexial proactively seeks to understand how its customers feel about the company's performance, providing a strong foundation for continuous improvement activities.



Europa Clipper
Thermal Actuators

Curiosity / Perseverance Rovers
Integrated Pump Assembly
Robotic Arm



Quality Management System (FLEXNET)

- Comprehensive paperless, web-based information and control system
- Recognized in the industry as one of the best-developed and implemented systems in this industry. NASA reviewed Flexial QMS as a foundation for their own system updates.
- Certified Supplier, IAQG (International Aerospace Quality Group)
- ISO9001, AS/EN9100, HSM10 and others...
- Leveraging Technology: All systems are integrated into a database-driven management system that provides every functional group immediate and controlled access to documents, records, and dynamic content that ensure they know how to do their jobs.





FLEXIBLE
METAL

Creating flexible solutions that last.



Automotive



Power Generation



On-Highway



Off-Highway



Hydrogen



EV





Bellows

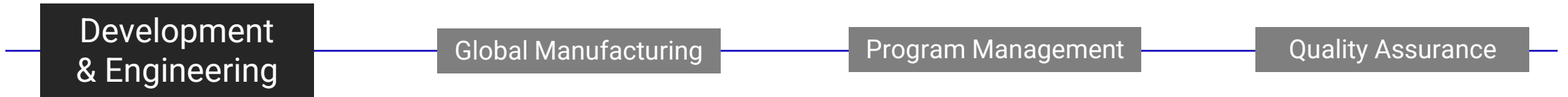
EGR Tubes

Exhaust Tubes

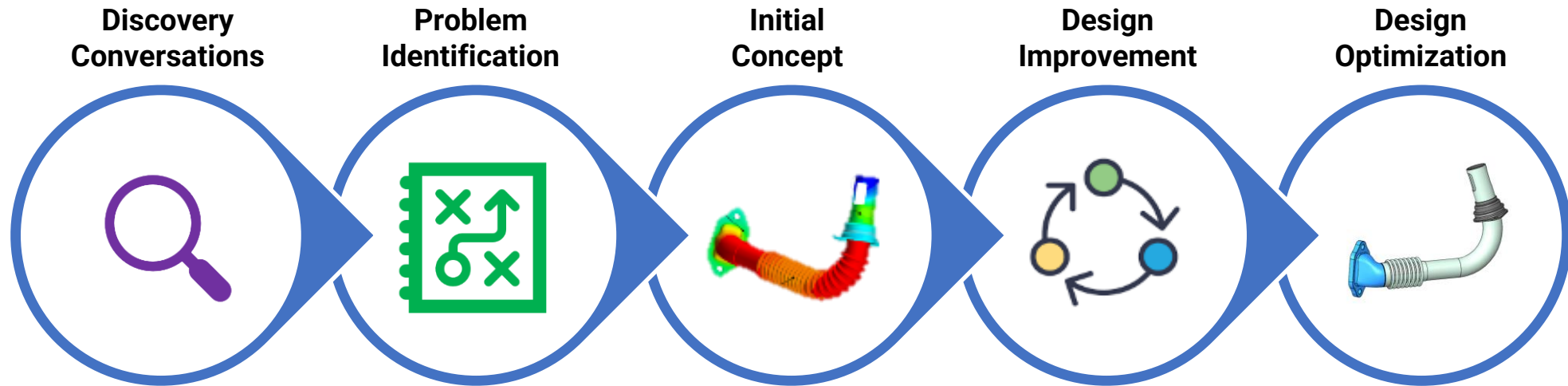
Oil Lines

Exhaust Manifolds

EV Coolant Drop Tube



Flexible Metal's Design Process



Development
& Engineering

Global Manufacturing

Program Management

Quality Assurance

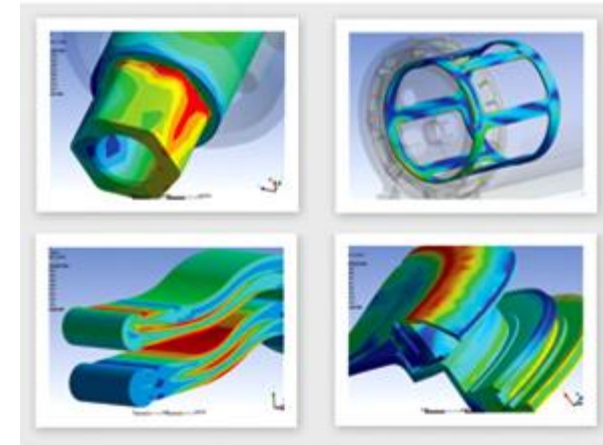
Testing & Analysis

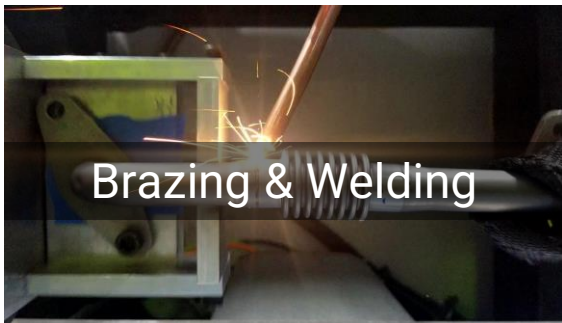
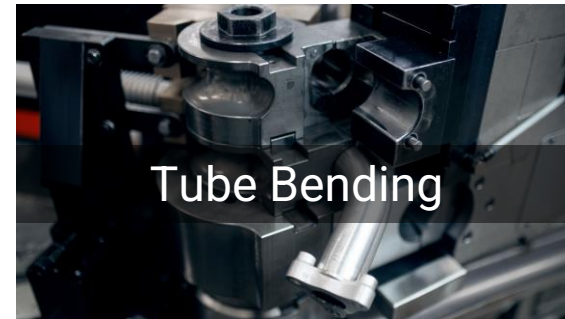
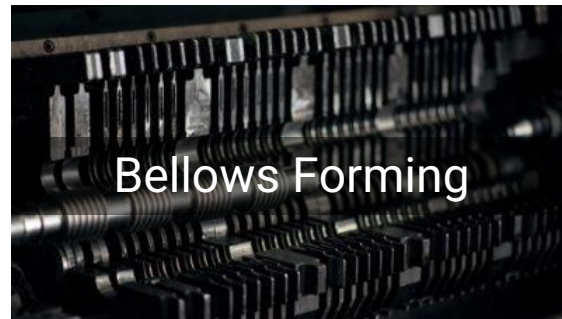
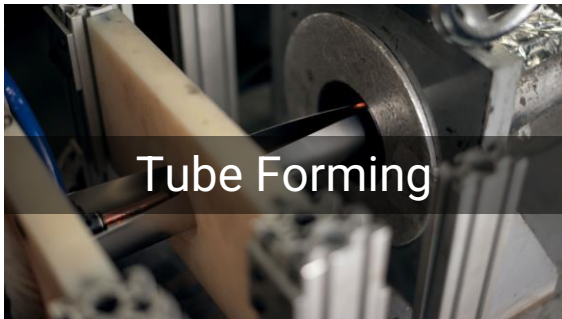
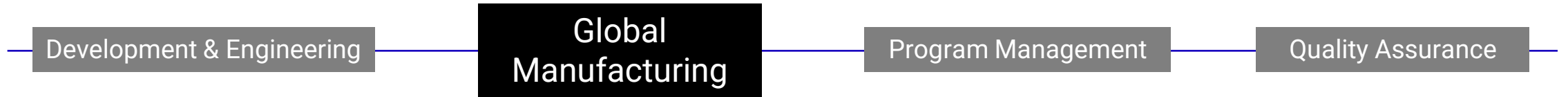
With data-backed designs and concepts validated against real-world scenarios and applications, risks are minimized to protect against defects and other system failures.

Thermal & Modal
Analysis

Design Analysis
via CFD/FEA

Hot Vibration Testing





MANUFACTURING LOCATED IN

Tucker, Georgia, USA

Hamburg, Michigan, USA

Prague, Czech Republic

Querétaro, Mexico

Development & Engineering

Global Manufacturing

**Program
Management**

Quality Assurance

From design concept to production, our engineering experts collaborate with you through the most stringent requirements to design a system that lasts.

What you can expect from Flexible Metal:

- Fast, knowledgeable communication
- Data-backed designs for real-world application
- World-class engineering & customer support
- Collaborative workspace for instant updates
- Global manufacturing capabilities



Development & Engineering

Global Manufacturing

Program Management

Quality Assurance

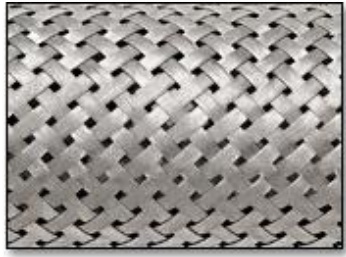
We adhere to the industry's most strict regulations to provide you with **quality solutions you can trust.**

- Design analysis & performance testing
- Engine test cells rated to 900 horsepower
- Pressure tests
- Flow testing
- Leak tests
- Quality inspections



universal

hose & braid a Hyspan company



Aerospace



Agriculture



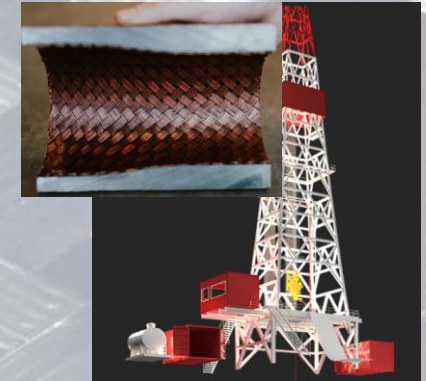
Automotive



Distribution / Fabricators



Energy
Oil & Gas



HVAC



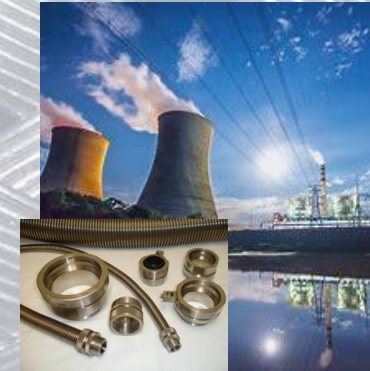
Industrial Gases



Instrumentation
(Measure / Control)



Power
Generation



Sea / Underground
Cable Protection





Orhan Holding



Product Development

Extensive Manufacturing

Special Processes

Quality Assurance

Product Development

Hose Geometry

- Design interlock and corrugated hoses with proprietary design methods to optimize pressure and flexibility capabilities

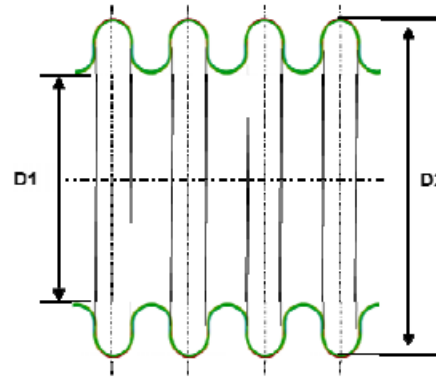
Braid Configurations

- Maximize coverage and pressure capabilities using wire properties and analytical review

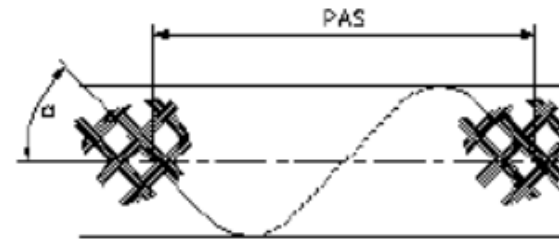
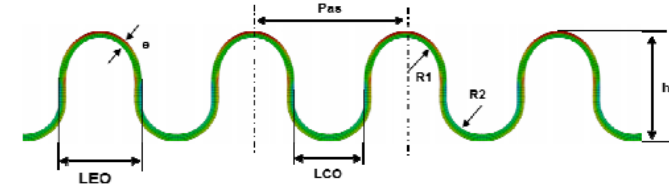
Product Validation

- Performance tests per ISO 10380
- Burst tests to validate analytics

D1 : inner diameter
D2 : outer diameter
e: thickness



Pas: pitch
h: height
LEO: top of corrugation width
LCO: inside corrugation width



Burst Test

Product
Development

**Extensive
Manufacturing**

Special
Processes

Quality
Assurance

Extensive Product Range

Interlock

- Wide variety of styles and types
- Diameter range: 1/16" to 16"
- Materials: Hot dipped galvanized, tin plating, 304, 316, and 321 series stainless, and Inconel 625

Braid

- Carriers: 24, 36, 48 and 96
- Beamed, braided braid, and flat braid with basket and diamond weaver
- Materials: 304, 316, 321, nickel alloy, and copper

Tube Production

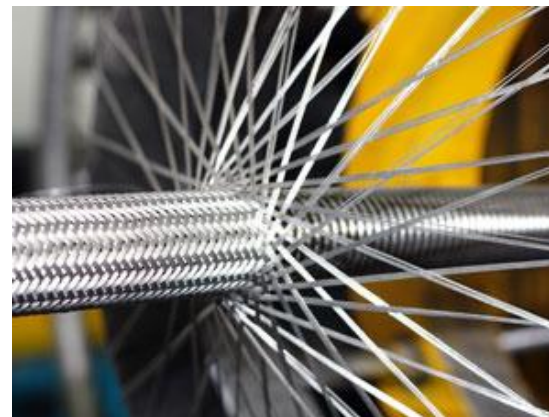
- Diameter range: 1/4" to 16"
- Materials: 316, 321 stainless, high nickel alloys, bronze

Corrugated Hoses

- Helical bronze: 1/4" to 2 1/2"
- Helical strip welded B1 Supra, B2 DUO: 3/16" to 6"
- Annular: 1/4" to 16"
- Materials: 316, 321 stainless, high nickel alloys

Hose Assemblies

- Wide range standard and custom assemblies



Product
Development

Extensive
Manufacturing

**Special
Processes**

Quality
Assurance

Special Processes

Welding: (ASME/ANSI/AWS)

Engineered Assembly Techniques

Special Fabrications

- Flat braid and braided braid
- Single, double and triple braid
- End forming and cutting

Special Cleaning

- Ultrasonic
- Hot aqueous solution with multiple DI rinse
- Compliance with vacuum, cryogenic and oxygen services



Product
Development

Extensive
Manufacturing

Special
Processes

Quality
Assurance

Quality Assurance

Non-Destructive Testing

- Hydrostatic and pneumatic
- Liquid Penetrant
- Radiographic (external)
- Visual

Helium Leak Testing

Training and Certifications

- Compliance with ASNT-SNT



What our customers say about us...

"I've talked to other engineers at Lockheed who interface with many other companies, and I'll have to hand it to you: you guys are simply the best to work with. I have not seen a team like yours who performs to a high standard and at the same time continues to aggressively look for ways to improve every aspect of your business."

Lockheed Martin
Corporation



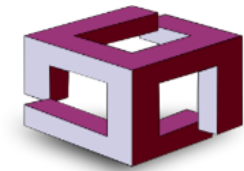
"We have no other supplier that can turn around data this fast, outstanding engineering support."

MAN, Bus & Truck



"We couldn't find anyone to match the quality you ship out to us."

CompuVac



*"Hyspan's Employees are truly the best, it makes our job easier knowing our needs are always met. Sometimes they even make the impossible, possible.
Thank you!"*

Associated Steam
Specialty





100% employee owned

“The Hyspan group prioritizes service and excellence above all to provide our customers with innovative, quality solutions and a world-class experience.”

-Eric Barnes, Hyspan Group President & CEO

Questions?

Contact:

Phone

Email: