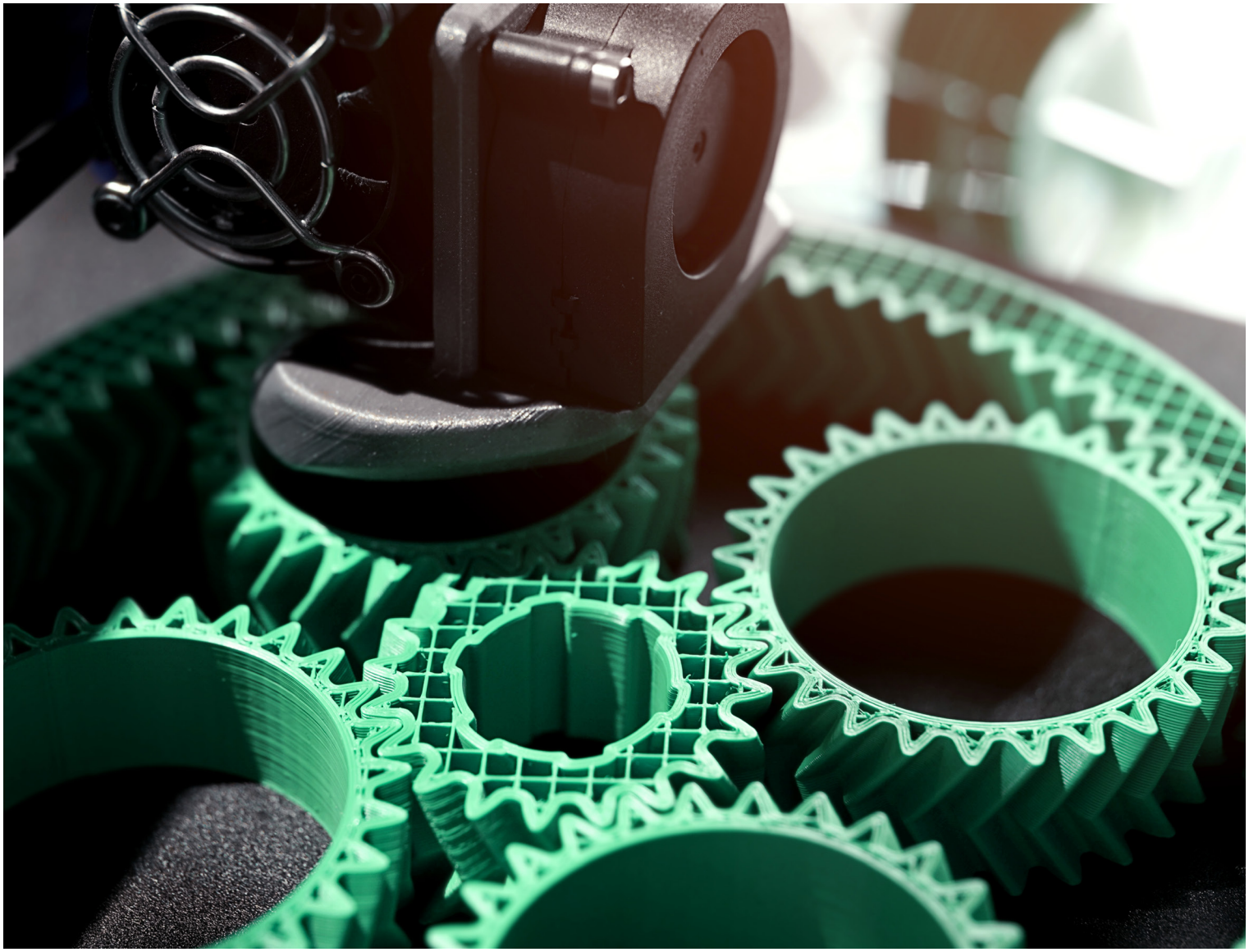
SUSTAINABLE SOLUTIONS

ECOLUBE™ PFAS-FREE COMPOUNDS

High-Performance, Sustainable Solutions for Plastics



www.Americhem.com

americhem HEALTHCARE

For decades, Americhem has been at the forefront of innovative polymer solutions and material science.

Recognizing the growing need for sustainable alternatives to traditional lubricants, Americhem proudly introduces EcoLube™, a cutting-edge family of PFAS-free compounds engineered to deliver superior lubrication and durability while minimizing environmental impact.

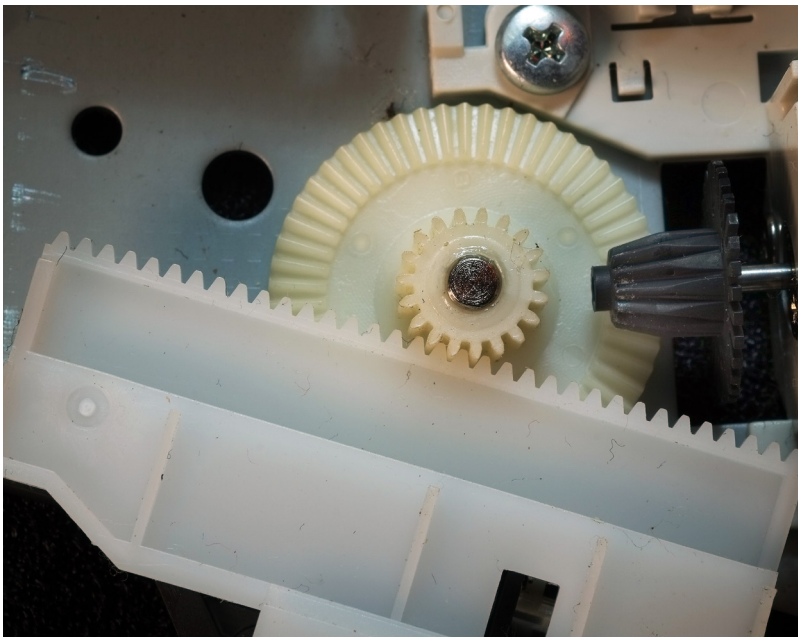
AMERICHEM OFFERS THE FOLLOWING BENEFITS AND MORE:

MEET COMPLEX SPECIFICATIONS
World-class color expertise combined with advanced polymer compounding

REDUCE TIME AND COST
Extensive data and material testing capabilities

DRIVE SMART DECISIONS
Personalized assistance and technical expertise during product development

GLOBAL RELIABILITY
Robust global quality systems and certifications



TACKLING THE PFAS CHALLENGE HEAD ON

At Americhem, we are not only committed to delivering high-performance solutions for our customers, but also doing so in a responsible environmentally and health-conscious way.

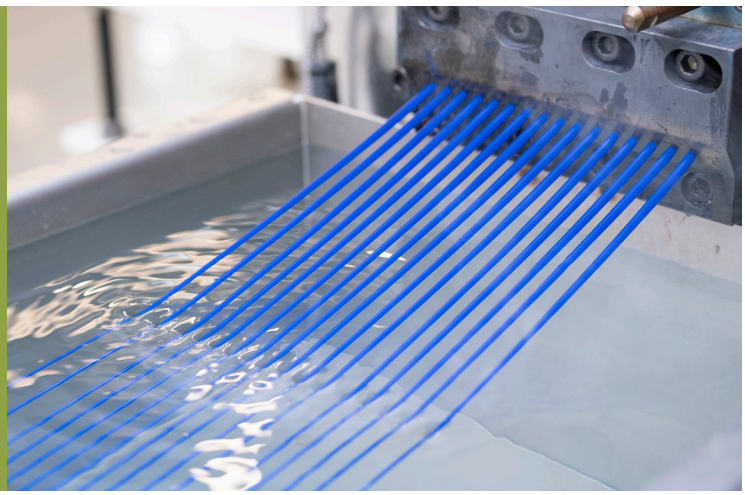
That is why we developed EcoLube™, a family of tribological compounds that reduce friction and wear while minimizing the use of harmful additives. This new line is just one example of how Americhem aims to become a global sustainability leader in the polymers industry.

APPLICATIONS

- Syringe Pumps
- Drug Delivery Pens
- Infusion Pumps
- Catheters
- Minimally Invasive Surgical Devices
- Surgical Robots
- Prosthetics
- Surgical End Effectors
- Drug Delivery Wearables
- Hospital Mobility
- Gear Trains and Motion Transmission

Performance from a Global Leader

The EcoLube™ brand of technology integrates specially designed functional additives, providing long-lasting lubrication. A variety of compounded solutions cater to specific applications, resulting in a versatile product line capable of tackling a wide range of lubrication challenges.



Solid State Lubricants

Non-migrating lubricants that stand up to extreme pressures, reducing frictional wear and "slip-stick" behavior in nylon bearings.

- Molybdenum Disulfide
- Graphite
- Boron Nitride

Boundary Lubricants

Migrating lubricants reduce the coefficient of friction and wear rate by providing immediate lubrication at start-up and high speeds.

- Silicone-Based Lubricants
- PE and PP Waxes

Fiber Reinforcement

Non-traditional formulations offer shear reinforcement and wear resistance between moving or mating parts.

- Glass Fiber
- Carbon Fiber
- Aramid Fiber

Inherently Wear-Resistant Polymers

Polymers such as POM, POK, PEEK, PAI, and certain PA, have good inherent wear resistance and may require less lubrication.

Proprietary Wear and Friction Alloys

Formulated polymer blends designed to provide internal lubrication within plastics. These offer good wear resistance and lower friction coefficients, with very little to no migration or plate-out.

Covering a range of proprietary blends of different chemistries, the type and loading can be selected by Americhem's technical experts to achieve the correct balance of tribological and mechanical properties.

A Wide Range of Base Resins

Americhem has formulated EcoLube™ compounds in a wide variety of base resins that include ABS, PBT, PC, PC alloys, PEI, PPE, PPS, PE, PP, PSU, PPSU, POM, PEEK, PPA, PA, and TPU.

Americhem's proprietary alloy product line offers tailored solutions optimized for various polymer matrices, achieving a balance of mechanical and tribological properties.

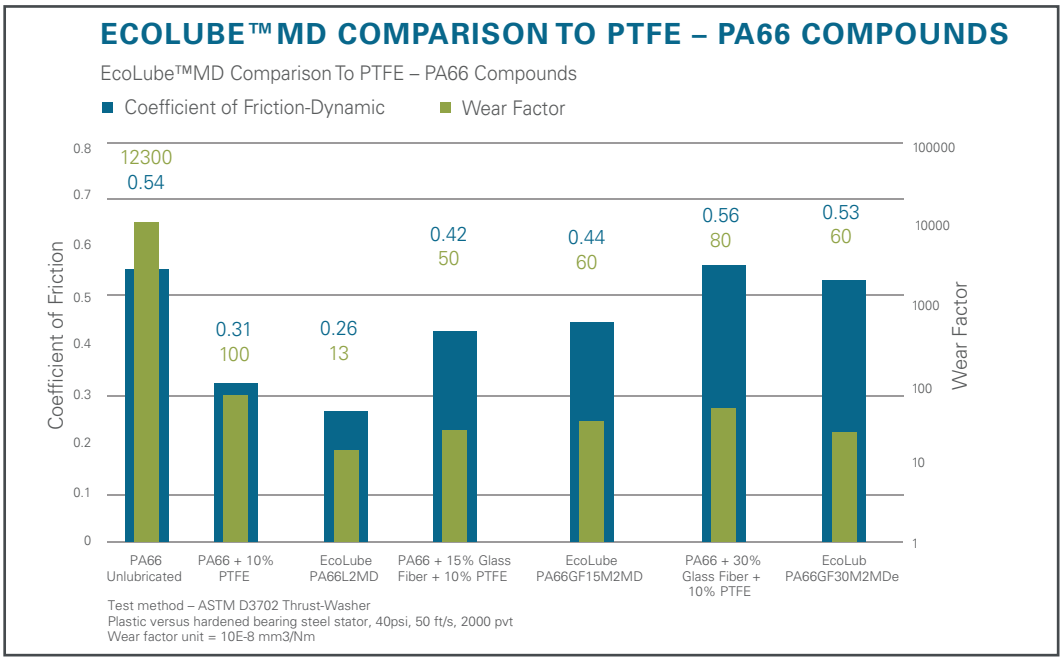
Synergistic combinations of these technologies in single formulations provide further performance enhancements.

These custom-engineered alloys are designed to meet specific application requirements by carefully balancing mechanical strength with friction and wear performance.

Contact our team today to learn how our expertise and products can benefit your product development efforts.

Testing Friction and Wear

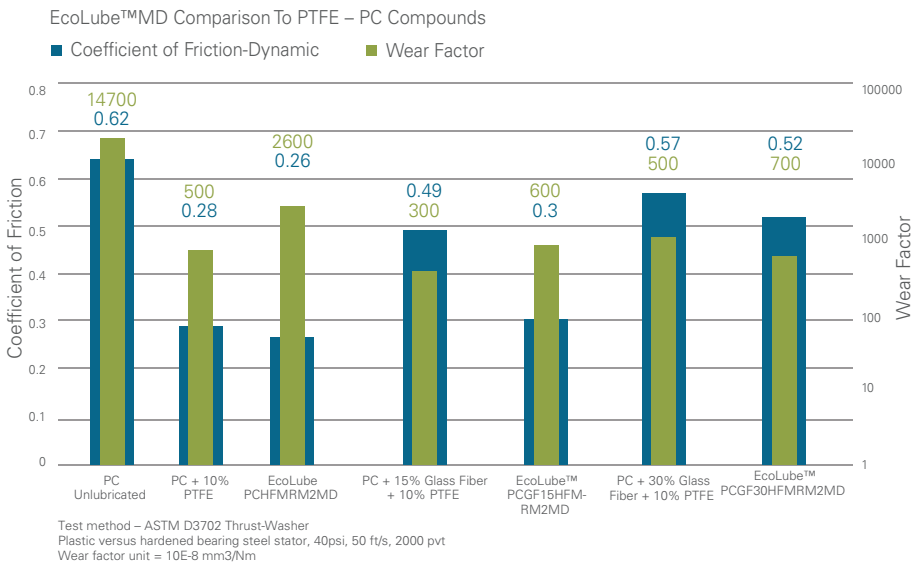
ASTM D3702 Standard Test Method for Wear Rate of Materials in Self-Lubricated Rubbing Contact
A Thrust Washer Testing Machine is a crucial standard for evaluating the wear performance of materials used in sliding or rotating contact, particularly in self-lubricating applications. This test method employs a thrust washer configuration where a rotating washer is pressed against a stationary washer under a controlled load, speed, and temperature. By measuring the weight loss and/or dimensions of the rotating washer over a specific period, the wear rate of the material can be accurately determined. This standardized approach allows for direct comparison of different materials and lubricants under consistent conditions, providing valuable data for material selection, product design, and quality control, especially in applications where friction and wear are critical performance factors. The data generated by ASTM D3702 is essential for validating the performance of materials intended to replace traditional lubricants like PTFE and PFAS, ensuring that new formulations meet or exceed the performance of existing solutions.



Test method – ASTM D3702 Thrust-Washer Plastic versus hard-ened bearing steel stator, 40psi, 50 ft/s, 2000 pvt
Wear factor unit = 10E-8 mm3/Nm

Test	Density	Notched Izod Impact Strength	Tensile Strength	Tensile Elongation	Flexural Modulus
Method	ASTM D792	ASTM D256	ASTM D638	ASTM D638	ASTM D790
Units	g/cm3	ft-lbs./in.	psi	%	psi
PA66 + 10% PTFE	1.20	1.00	10,400	8.0	434,000
EcoLube™ PA66L2MD	1.11	1.50	9,900	5.8	416,000
PA66 + 15% GF + 10% PTFE	1.31	1.25	15,300	3.2	850,000
EcoLube™ PA66GF15M2MD	1.22	1.45	14,200	3.3	748,000
PA66 + 30% GF + 10% PTFE	1.45	2.90	20,500	3.1	1,305,000
EcoLube™ PA66GF30M2MD	1.34	3.90	20,400	3.3	1,270,000

ECOLUBE™ MD COMPARISON TO PTFE – PC COMPOUNDS



Test method – ASTM D3702 Thrust-Washer Plastic versus hardened bearing steel stator, 40psi, 50 ft/s, 2000 pvt Wear factor unit = 10E-8 mm3/Nm

Test	Density	Notched Izod Impact Strength	Tensile Strength	Tensile Elongation	Flexural Modulus
Method	ASTM D792	ASTM D256	ASTM D638	ASTM D638	ASTM D790
Units	g/cm3	ft-lbs./in.	psi	%	psi
PC+ 10% PTFE	1.26	1.89	8,500	6.0	374,000
EcoLube™ PCHFMRM2MD	1.17	11.81	8,600	7.0	354,000
PC + 15% GF + 10% PTFE	1.37	2.82	11,400	3.3	721,000
Ecolube™ PCGF15HFMRM2MD	1.27	2.94	12,000	4.5	720,000
PC + 30% GF + 10% PTFE	1.51	2.48	14,000	2.0	1,216,000
Ecolube™ PCGF30HFMRM2MD	1.39	2.79	15,500	2.4	1,203,000

EcoLube™ MD (Medical Designated): Enhancing Healthcare with Advanced Materials

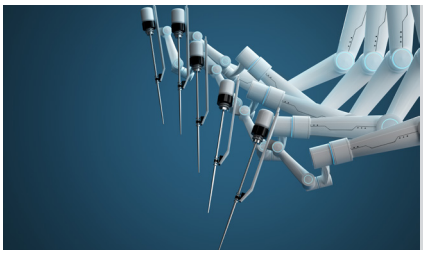
The healthcare industry demands materials that are not only durable and reliable but also biocompatible and safe for human contact. EcoLube™ MD technologies offer a range of solutions that meet these stringent requirements, enabling advancements in medical devices and equipment. The EcoLube™ MD designation signifies a line of compounds, specifically designed for medical applications.

EcoLube™ MD compounds have locked formulations, meaning the composition remains constant over time. This provides peace of mind for medical device manufacturers who need to maintain consistent material properties. EcoLube™ MD compounds may also be precolored using our ColorRX® technology and have ISO 10993 biocompatibility.

Surgical Instruments

Minimally Invasive Surgery

EcoLube™ MD-enhanced polymers can be used in the construction of minimally invasive surgical instruments, providing smooth operation, reduced friction, and improved precision.



Robotic Surgery

EcoLube™ MD can enhance the performance and durability of robotic surgical instruments, ensuring precise and reliable operation during complex procedures.

Development, testing and production of EcoLube™ Medical MD biocompatible compounds and alloys offer a multi-level solution to your needs.

Additional testing results and data are available by request. Please contact your Americhem Healthcare representative to learn more.

Enhanced Medical Device Performance

EcoLube™ MD offers significant advantages for healthcare applications, driving improved patient outcomes through enhanced device performance and enabling advanced medical technologies. As a sustainable, non-PFAS solution, EcoLube™ MD not only addresses the critical need for effective wear and friction reduction but also ensures compliance with current and future regulations, demonstrates environmental stewardship, reduces environmental impact, and protects public health.

Medical Devices

Catheters

EcoLube™ MD enhanced polymers can reduce friction and wear within catheters, improving patient comfort and reducing the risk of complications.

Drug Delivery Systems

EcoLube™ MD can enhance the performance and reliability of drug delivery systems, ensuring accurate and controlled release of medications.

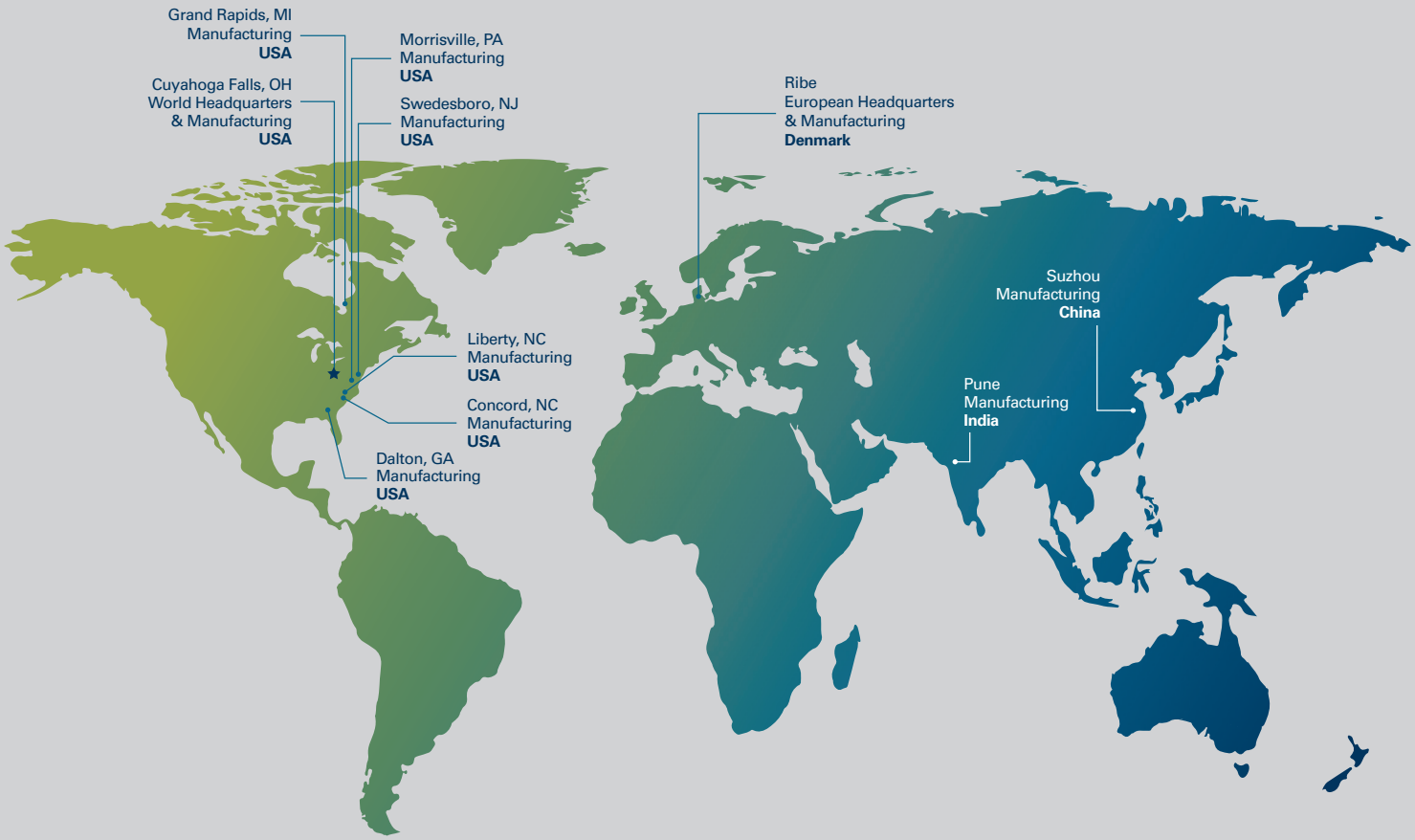
Prosthetics

Prosthetic Limbs

EcoLube™ MD enhanced polymers can improve the durability, comfort, and functionality of prosthetic limbs, enhancing the quality of life for amputees.

Contact our team today to learn how our expertise and products can benefit your product development efforts.

A GLOBAL LEADER IN HEALTHCARE



BATCH TO BATCH.
MARKET TO MARKET.
CONTINENT TO CONTINENT.

From our headquarters in Cuyahoga Falls, Ohio, to our manufacturing locations and sales offices across the world, our expansive footprint provides global reach for your organization's needs. Not only are we dedicated to getting your materials where they need to be, when they need to be there, we work behind the scenes to reduce your supply risks. In addition to our network of plants, regulatory and compliance teams, we have contingency plans and support services in place to secure your product against unforeseen interruptions.

americhem HEALTHCARE

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