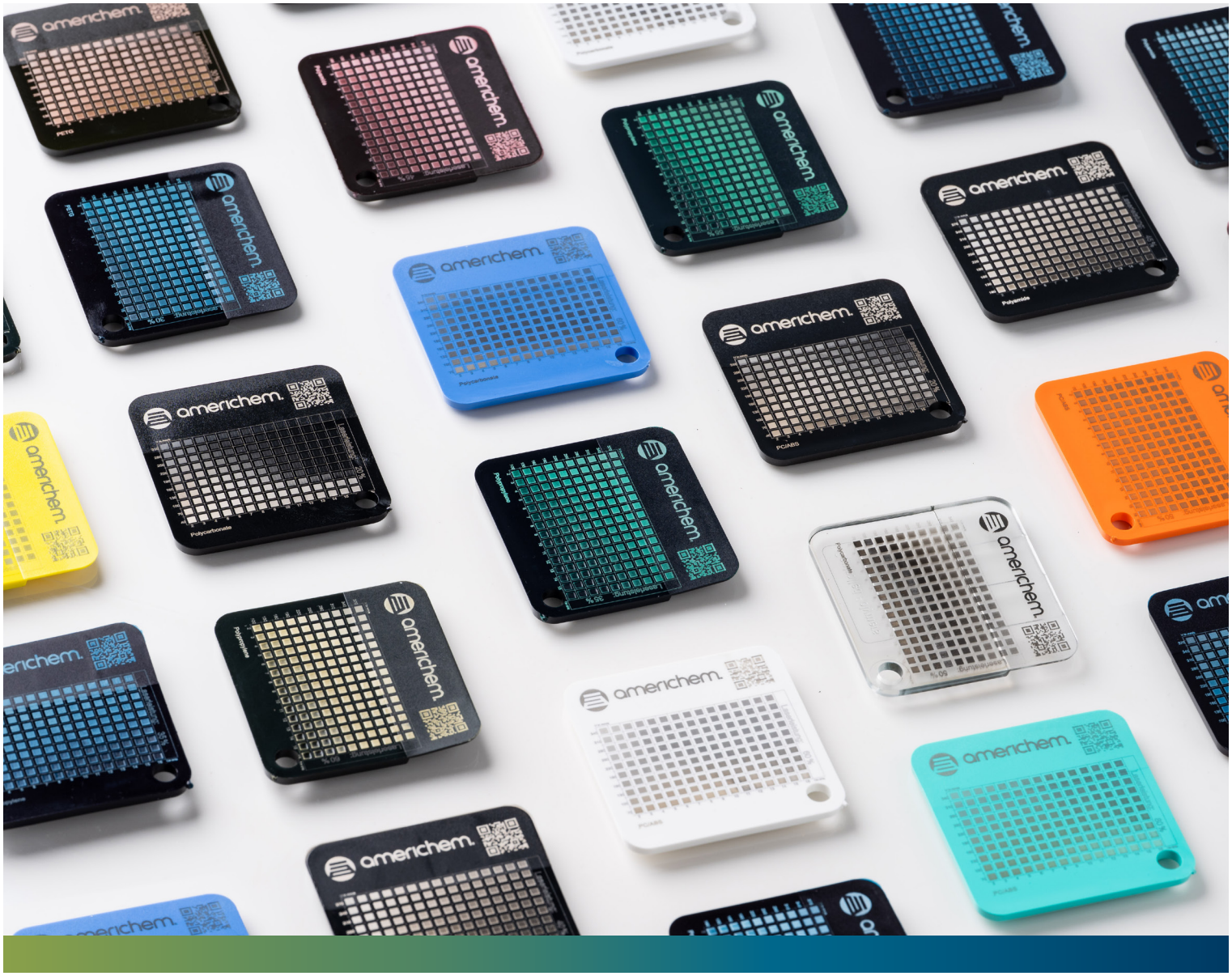
LASER MARKING SOLUTIONS

Robust Marking Solutions on Polymeric Substrate



www.Americhem.com

americhem
PERFORMANCE | SOLUTIONS | TRUST

MEET AMERICHEM LASER MARKING SOLUTIONS

Precise, Resilient, High-Contrast: Laser Marking Solutions for Modern Manufacturing

Americhem is a global leader in color and additive masterbatch and engineered compounds, delivering solutions aligned to quality and regulatory requirements in healthcare and other high-performance industries. To meet rising traceability demands, we apply polymer chemistry expertise to develop laser-responsive masterbatches and compounds that enable robust, high-contrast identification embedded directly into the material.

These material-engineered marking solutions support healthcare, transportation, and industrial manufacturing applications where durability under environmental stress, lifecycle traceability, and process efficiency directly affect product performance and regulatory confidence.

AMERICHEM OFFERS THE FOLLOWING BENEFITS AND MORE:

REGULATORY COMPLIANCE
with Americhem develops solutions designed to support cGMP, FDA, DMF/LOA, and USP compliance requirements

CUSTOMIZATION
Americhem offers a wide range of options, allowing customers to tailor their material accordingly

QUALITY & PERFORMANCE
Delivering consistent quality and high-performance material solutions designed for durability, precision, and versatility

EXPERTISE & INNOVATION
Leveraging years of industry experience and expertise to develop solutions

GLOBAL REACH
Americhem offers consistent quality and service to customers worldwide

STOP SETTLING FOR SUBPAR PRODUCT IDENTIFICATION

In today's complex supply chains and heavily regulated industries, basic product identification is no longer sufficient. Relying on dated, consumable-based marking methods creates critical vulnerabilities for your products and your business. Traditional marks—such as printing or adhesive labels—are susceptible to fading, smudging, and deterioration when exposed to chemicals, abrasion, heat, or cleaning processes, leading to costly traceability failures. Consumable systems inherently require constant purchases of inks and solvents, driving up high long-term operational costs, while physical methods like stamping or chemical etching pose risks to both product integrity and the environment. In transportation and industrial environments, these failures lead to warranty exposure, traceability gaps, and production inefficiencies.

BENEFITS:

- High-resolution, machine-readable marking
- Eliminates label adhesion failure under heat, fluids, and repeated cleaning processes
- Sterilization-resistant for regulated applications
- Abrasion-resistant for long service life
- Resilient, tamper-resistant identification
- Consistent marking across high-volume production environments
- Enables faster design integration through material-level marking capability

americhem
PERFORMANCE | SOLUTIONS | TRUST

2000 Americhem Way
Cuyahoga Falls, OH, 44221 USA

Phone: +1.888.337.3226
Web: www.Americhem.com

06/2026

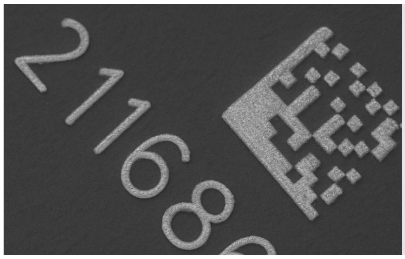
LASER MARKING PRIMER

THE CORE POLYMER MARKING METHODS

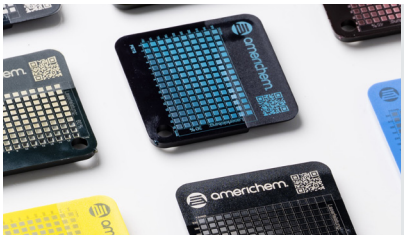
Laser marking is a non-contact, thermal or photochemical process that uses a highly focused beam of light to create a durable, high-resolution mark on a polymer material's surface. Unlike pad printing, which applies a foreign substance (ink) that can wear off, laser marking interacts directly with the plastic compound itself, changing its appearance or structure without compromising its mechanical integrity.

The mark is controlled by sophisticated software that directs the beam across the surface with incredible speed and accuracy, allowing for complex logos, detailed serial numbers, and machine-readable 2D codes (like DataMatrix and QR) to be created in milliseconds. Laser marking enables robust identification across applications ranging from sterilized medical devices to high-stress automotive systems and high-speed industrial production.

Carbonization: The "Dark Mark" Effect: This process is ideal for light-colored plastics. The laser energy heats the polymer's carbon-based additives, causing a chemical reaction that darkens the material surface without removing it. This creates a smooth, high-contrast mark designed for long-term durability.



Foaming: The "Light Mark" Effect: The laser heats the material rapidly, trapping gas bubbles beneath the polymer surface. These bubbles diffuse light, creating a raised, tactile mark that appears white or light grey against the dark background. It is highly durable and solvent-resistant. This mark is ideal for surfaces where a subtle texture is acceptable.



Breaking the Monochrome Barrier: While most laser marking is limited to grayscale, Americhem's specialized solutions allow for colored marks on dark colored plaques. By engineering specific additives that react to laser energy at precise wavelengths, we can achieve distinctly colored undertones on dark substrates, offering unique branding and coding opportunities with monolayer components.

APPLICATIONS

HEALTHCARE

- Unique Device Identification (UDI)
- Surgical Instrument Marking
- Diagnostic and Drug Delivery Components

TRANSPORTATION (AUTOMOTIVE, AEROSPACE, MOBILITY)

- Durable Part Traceability and Serialization
- Under-the-Hood and Interior Components exposed to Thermal, Chemical, and Mechanical Stress
- Electrical Connectors and Safety-Critical Systems

EMERGING & INDUSTRIAL MARKETS

- Electronics, Connectors, and Data Infrastructure Components
- High-Speed, Packaging and Production Environments
- Industrial Automation and Robotics Systems

americhem
PERFORMANCE | SOLUTIONS | TRUST

2000 Americhem Way
Cuyahoga Falls, OH, 44221 USA

Phone: +1.888.337.3226
Web: www.Americhem.com

06/2026

WAVELENGTH, POWER, POLYMER: SELECTING YOUR OPTIMAL LASER STRATEGY

The choice of laser hardware is highly dependent on the plastic material and the desired marking effect. While several types exist (CO2, Green, Hybrid), the two workhorses in industrial plastics marking are the Fiber and UV lasers.

LASER TYPES FOR POLYMER MARKING – COMPARISON

Optimized for performance across regulated medical devices, automotive components, and high-volume industrial applications.

Laser Type	Wavelength	Attributes & Best-Fit Applications	Typical Polymer Compatibility
Fiber Laser (IR)	1064 nm	High-speed, energy-efficient marking; excellent contrast with laser additives; ideal for permanent traceability, barcodes, and datamatrix codes in industrial, automotive, and medical components	PA, PBT, PC, ABS, PP, PE (enhanced with additives)
UV Laser (Cold Marking)	355 nm	High-resolution, low-heat marking with minimal material damage; ideal for medical devices, electronics, and micro-marking applications	PC, PMMA, PET, PEEK, nylon, fluoropolymers
Nd:YAG (Pulsed)	1064 nm	High peak power pulses for crisp, Resilient marks; suitable for demanding industrial codes and deeper surface contrast	Engineering polymers such as PC, PA, PBT, PPS
Green Laser	532 nm	Improved absorption in clear or reflective plastics; useful when IR lasers provide insufficient contrast; controlled marking on transparent components	PC, PMMA, PET, PE/PP (with additives), PVC
CO_2 Laser	10,600 nm	Strong surface heating and ablation; well suited for thin films, packaging, and organic materials; commonly used for high-speed date and lot coding, scoring and perferations	PET films, thin PE/PP films, PVC, acrylics

Laser performance depends on wavelength, polymer chemistry, and the use of laser-responsive additives.

PRODUCT OVERVIEW

- **Masterbatches & Compounds** engineered for laser responsiveness
- **ColorRX® + Laser Marking Combination Solutions**
- **Custom Formulations** for specific polymers and equipment
- **Sustainability-focused options** (low-additive, recyclate-compatible, heavy metal limited)

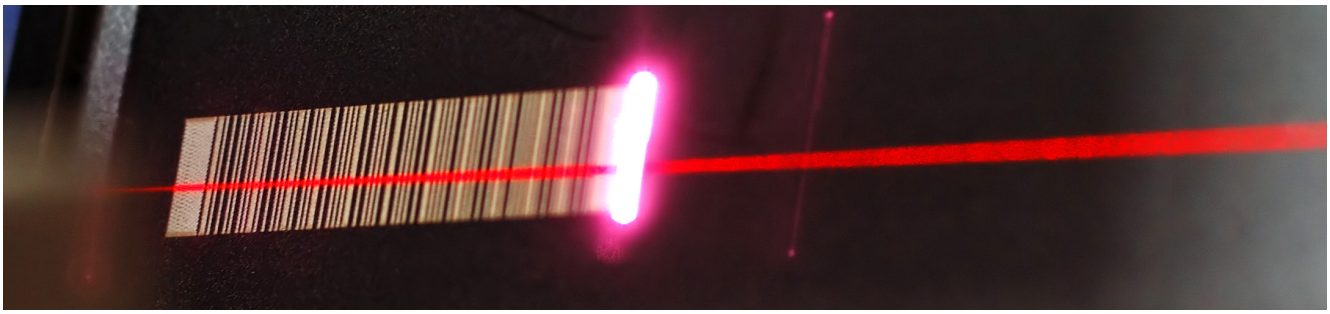
americhem
PERFORMANCE | SOLUTIONS | TRUST

2000 Americhem Way
Cuyahoga Falls, OH, 44221 USA

Phone: +1.888.337.3226
Web: www.Americhem.com

06/2026

ADDITIVE REQUIREMENTS BY LASER TYPE



The Precision of the Mark is in the Formulation

Laser marking performance is not just about the machine; it is fundamentally about the polymer composition and the specific laser-responsive additives incorporated. We focus on engineering the optimal formulary solution, be it a focused additive masterbatch or a complete, fully compounded material, to ensure the marking process utilizes the precise laser wavelength and power required for optimized durability, contrast, and material integrity. We will tailor your formula for the best possible result. This formulation-driven approach ensures consistent marking performance across regulated healthcare environments, long-life transportation systems, and high-speed industrial production lines.

Laser Type	How the Laser Interacts With Plastics	Additives Required?	Typical Additive Types	Why Additives Are Used
Fiber Laser (IR)	IR energy absorbed at surface, carbonization, foaming, or color-change reaction	Yes – commonly required	Laser-responsive color-change additives, IR absorbers, pigment packages	Improve contrast, reduce laser power, increase marking speed and consistency
UV Laser (355 nm)	High-energy photons break chemical bonds, precise “cold” marking	Sometimes (polymer-dependent)	UV absorbers, color-change additives, stabilizers	Boost contrast on UV-transparent plastics and protect sensitive polymers
Nd:YAG (Pulsed)	High peak IR energy, localized carbonization or color change	Yes – similar to fiber	Laser-sensitive additives, IR absorbers	Achieve crisp, high-contrast marks at lower energy
Green Laser (532 nm)	Visible light absorption, controlled thermal and photochemical effects	Often helpful	Visible-light absorbers, laser color-change additives	Enable marking on clear, reflective, or IR-resistant plastics
CO_2 Laser	Surface heating, foaming, ablation, or vaporization	Rarely	Occasional IR absorbers, pigment optimization	Improve legibility on darker or thicker materials

americhem
PERFORMANCE | SOLUTIONS | TRUST

2000 Americhem Way
Cuyahoga Falls, OH, 44221 USA

Phone: +1.888.337.3226
Web: www.Americhem.com

06/2026

AMERICHEM IS LASER-READY: CRISP MARKS. CLEAN MANUFACTURING. ENGINEERED FOR COMPLEX APPLICATIONS.

We don't believe in "one size fits all." Our laser marking portfolio is organized by polymer family to ensure the highest compatibility and marking contrast for your specific application. Whether you need a concentrate to add to your hopper or a fully pre-colored compound, we have the chemistry to match.

Polymer Family	Product Form	Desired Mark Effect	Ideal Laser Source	Key Applications
Polyolefins (PE, PP, HDPE)	Masterbatch & Compound	Light or Dark Mark	IR / UV	Syringe barrels, pill bottle caps, pharmaceutical packaging, laboratory consumables, automotive fluid reservoirs, packaging closures and high-volume components
Engineering Resins (ABS, PC, PA)	Masterbatch & Compound	Dark Mark	IR/UV	Diagnostic device housings, surgical tool handles, glucose meters, blood separation bowls, electrical connectors, interior automotive components, industrial housings
High Performance (PEEK, PSU)	Pre-Colored Compound	Dark Mark	IR/UV	Reusable instruments requiring sterilization resistance, aerospace components, high-heat industrial systems
Transparent Polymers (PC, COC, COP)	Masterbatch & Compound	Dark (Maintains Clarity)	UV	Microfluidic chips, clear fluid connectors, dialyzers, high-clarity reservoirs, optical and electronic components
Soft Polymers (Elastomers)	Masterbatch & Compound	Dark	IR/UV	Wearable monitoring bands, flexible tubing, seals and gaskets for transportation and industrial use

Engineered for compatibility across applications requiring regulatory compliance, long-term durability, and high-throughput manufacturing.

Sustainability and Environmental Responsibility

At the core of our product development is a strong commiment to sustainability and environmental stewardship. We understand the importance of creating products that not only perform exceptionally but also contribute positively to the environment. Eliminating consumables supports cleaner manufacturing across healthcare, automotive, and high-volume industrial production environments.

americhem
PERFORMANCE | SOLUTIONS | TRUST

2000 Americhem Way
Cuyahoga Falls, OH, 44221 USA

Phone: +1.888.337.3226
Web: www.Americhem.com

06/2026

BEYOND INK: THE SUSTAINABLE FUTURE OF IDENTIFICATION

Laser marking technology, powered by Americhem's custom masterbatches, offers a dramatic shift away from traditional, consumable-heavy marking methods. This transition delivers measurable sustainability benefits, contributing to process efficiency, waste reduction, and the long-term circular economy of plastic products. Eliminating consumables supports cleaner manufacturing across healthcare, automotive, and high-volume industrial production environments.

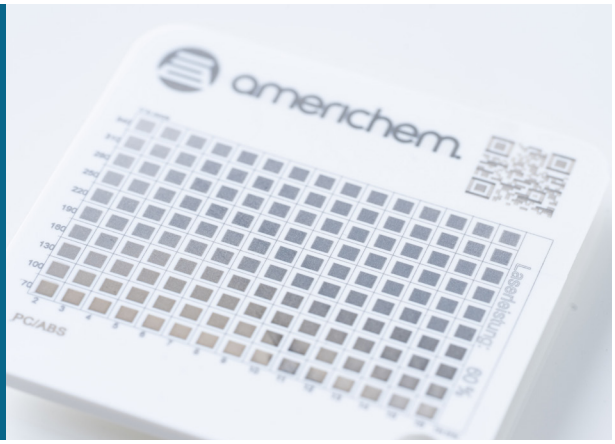
Metric	Traditional Inking/Labeling	Americhem Laser Marking
Consumables	Solvents, inks, labels, ribbons.	None. Uses only light energy.
Waste Stream	Chemical waste, cartridge disposal, packaging film.	Virtually zero waste byproduct.
Environmental Risk	VOC emissions, chemical handling, ink leaching.	Clean, non-contact process; minimal to zero thermal impact (especially with UV).

ENABLING THE CIRCULAR ECONOMY

By creating durable, high-contrast marks designed for chemical and abrasion resistance, our solutions help close the loop. Robust identification allows service depots to easily track and verify components for repair, extending product service life. The high-contrast marks can be read reliably by high-speed vision systems, potentially aiding in advanced sorting and separation of plastics for high-value recycling streams. Meeting UDI requirements with a resilient, non-toxic mark is key to sustainable operations in regulated industries.

Ready to Mark the Change?

Partner with Americhem to implement clean, Resilient traceability across healthcare, transportation, and industrial manufacturing systems. Our team will develop a formulation aligned to your polymer, laser system, and performance requirements.



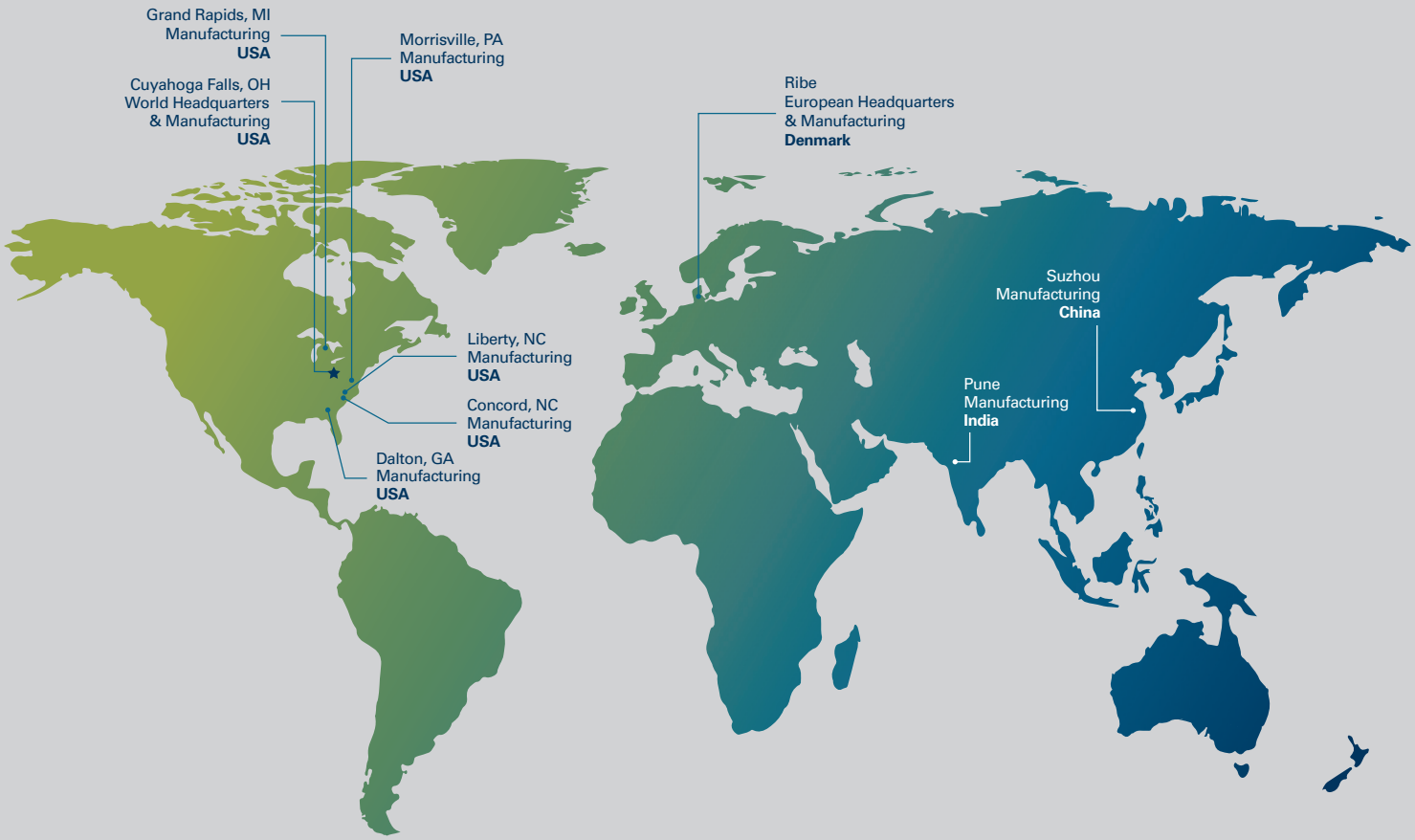
americhem
PERFORMANCE | SOLUTIONS | TRUST

2000 Americhem Way
Cuyahoga Falls, OH, 44221 USA

Phone: +1.888.337.3226
Web: www.Americhem.com

06/2026

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.

Explore our full capabilities at americhem.com

americhem
PERFORMANCE | SOLUTIONS | TRUST

2000 Americhem Way
Cuyahoga Falls, OH, 44221 USA

Phone: +1.330.929.4213
Web: www.Americhem.com

06/2026