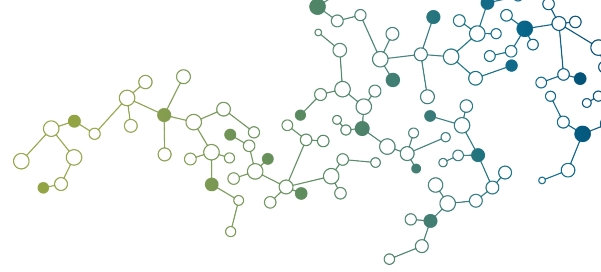


HEALTHCARE



POLYMERIC LASER MARKING

Engineered for Permanent Traceability, Zero Consumables: Marking for the Modern Age



www.Americhem.com

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

Americhem is a global leader in the color and additive compound and masterbatch industry, committed to quality and regulatory compliance, particularly within the critical Healthcare sector. Our mission is to deliver innovative, sustainable, and compliant color and additive solutions. To meet rising traceability demands, we leverage our deep polymer chemistry expertise to create specialized laser marking masterbatches and compounds, the essential ingredient for enabling clean, durable, and compliant identification required for Unique Device Identification (UDI) and modern medical standards.

AMERICHEM OFFERS THE FOLLOWING BENEFITS AND MORE:

REGULATORY COMPLIANCE

Americhem ensures cGMP, FDA, DMF/LOA, and USP regulations are met.

CUSTOMIZATION

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

QUALITY & PERFORMANCE

Delivering unmatched quality and exceptional performance, combining 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.

APPLICATIONS:

- Unique Device Identification
- Permanent Part Traceability
- Surgical Instrument Marking
- Lot, Batch, Date Coding
- Branding & Product ID
- High-Resolution

BENEFITS:

- + Chemical Resistant
- + Sterilization Resistant
- + Tamper Resistant

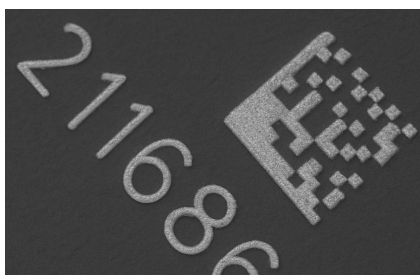
THE CORE POLYMER MARKING METHODS

Laser marking is a non-contact, thermal or photochemical process that uses a highly focused beam of light to create a permanent, 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.



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, permanent mark that is generally black or gray in color.



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.

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 work-horses in industrial plastics marking are the Fiber and UV lasers.

LASER TYPES FOR POLYMER MARKING – COMPARISON

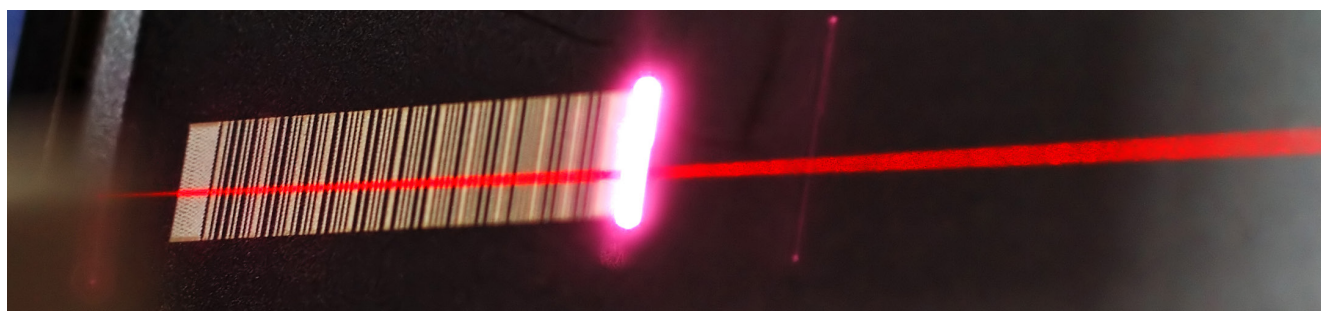
Laser Type	Wavelength	Attributes & Best-Fit Applications	Typical Polymer Compatibility
Fiber Laser (IR)	1064 nm	High-speed, energy-efficient marking; excellent contrast with laser additives; ideal for permanent traceability, barcodes, and datamatrix codes in industrial, automotive, and medical components	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, durable 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 perforations	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)

ADDITIVE REQUIREMENTS BY LASERTYPE



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 maximum durability, contrast, and material integrity. We will tailor your formula for the best possible result.

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 IS LASER-READY: CRISP MARKS. CLEAN MANUFACTURING. ENDLESS POSSIBILITIES.

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.
Engineering Resins (ABS, PC, PA)	Masterbatch & Compound	Dark Mark	IR/UV	Diagnostic device housings, surgical tool handles, glucose meters, blood separation bowls.
High Performance (PEEK, PSU)	Pre-Colored Compound	Dark Mark	IR/UV	Reusable instruments requiring sterilization resistance.
Transparent Polymers (PC, COC, COP)	Masterbatch & Compound	Dark (Maintains Clarity)	UV	Microfluidic chips, clear fluid connectors, dialyzers, high-clarity reservoirs.
Soft Polymers (Elastomers)	Masterbatch & Compound	Dark	IR/UV	Wearable monitoring bands, flexible tubing, seals and gaskets.

Sustainability and Environmental Responsibility

At the core of our product development is a strong commitment to sustainability and environmental stewardship. We understand the importance of creating products that not only perform exceptionally but also contribute positively to the environment.



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.

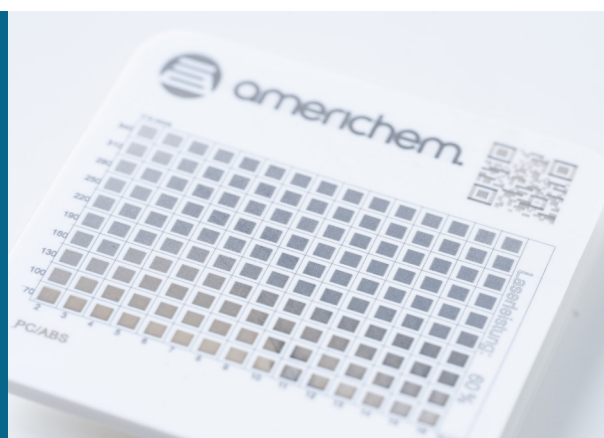
Metric	Traditional Inking/Labeling	Americhem Laser Marking
Consumables	Solvents, inks, labels, ribbons	None. Uses only light energy.
Waste Stream	Chemical waste, cartridge disposal, packaging film.	Virtually zero waste byproduct.
Environmental Risk	VOC emissions, chemical handling, ink leaching.	Clean,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

ENABLING THE CIRCULAR ECONOMY

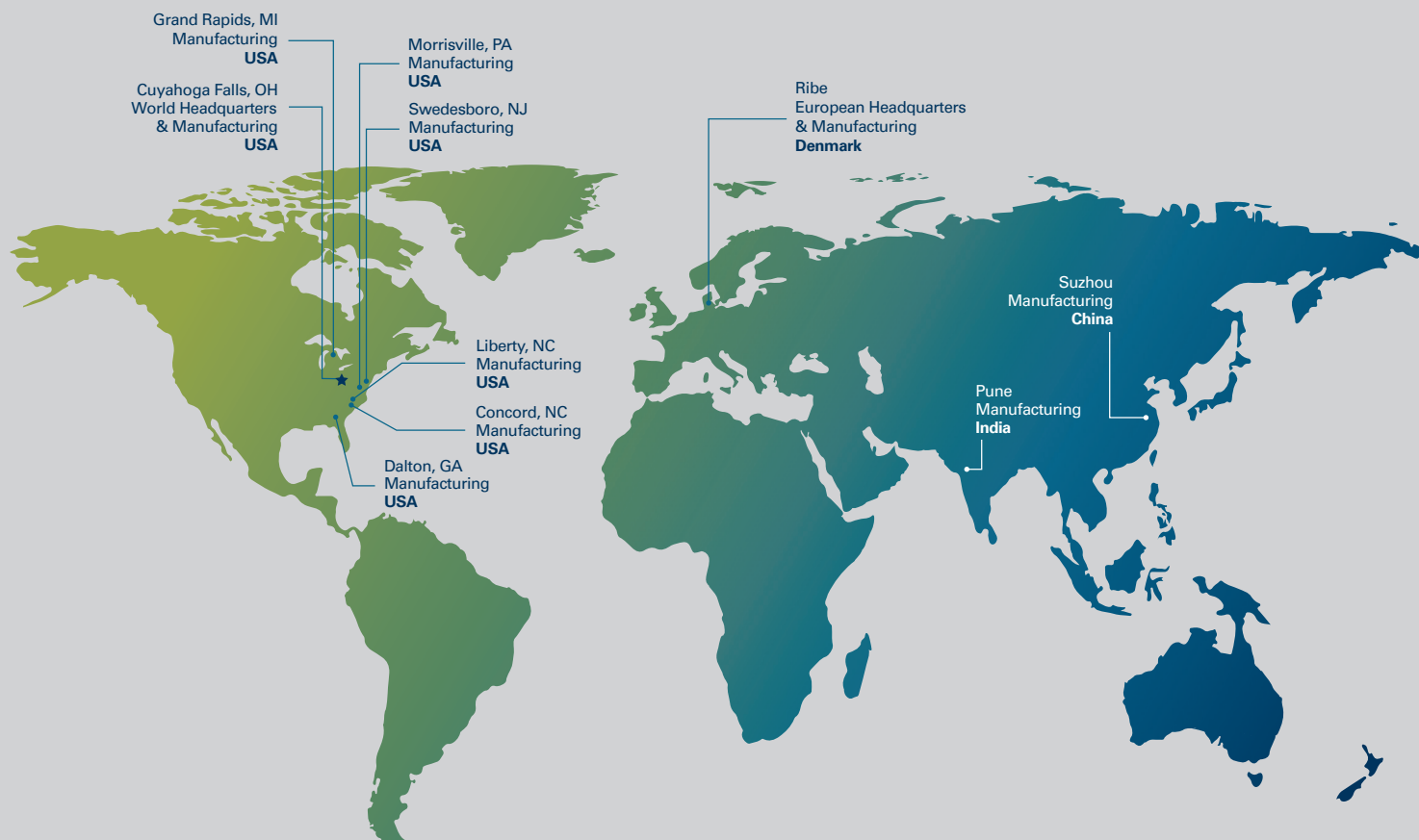
By creating durable, high-contrast, permanent marks that are chemical- and abrasion-resistant, our solutions help close the loop. Permanent identification allows service depots to easily track and verify components for repair, extending product service life. The high-contrast marks can be read reliably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

Ready to Mark the Change?

Partner with Americhem to transform your production line into a clean, efficient, and sustainably traceable system. Contact our technical team today to request a custom formulation trial.



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