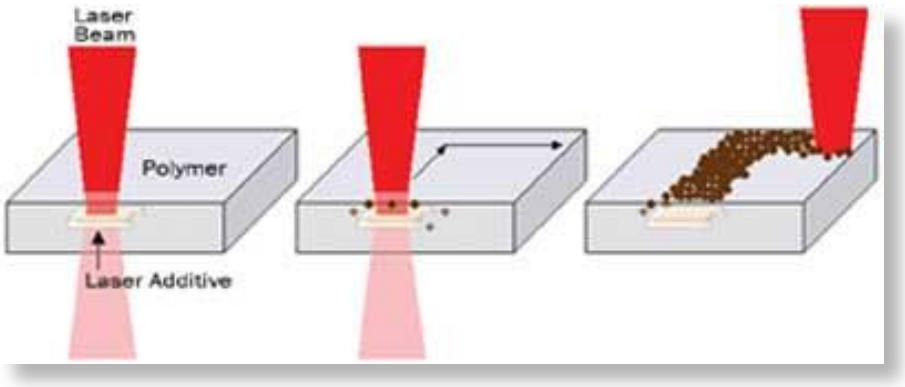
Laser Marking Additives

Laser Marking additives provide superior speed, definition, and high contrast levels to plastic parts.

Summary

Laser Marking of polymers relies on carbonization (char formation) or foaming processes caused by laser beam absorption. The char formation results in dark marks on a plastic part. Foaming creates gas-bubbles in the plastic, which scatters the light and produces light marks. Ampacet has a wide range of additives that can improve absorption properties of just about any plastic.



Laser Marking additives can provide high levels of contrast and shading. These formulations achieve line detail at impressive speeds on plastics that have historically been difficult to laser mark. Designed for thermal chemical surface reactions, these formulations are ideal for fiber, YAG, and vanadate lasers operating at a wavelength of 1060-1070 nm. Ampacet can utilize additives, fillers, pigments, and dyes to enhance the absorption of laser energy for localized color changes. Vastly different formulation chemistries and laser optics/setup parameters are used depending upon the plastic being marked, as well as the desired marking contrast and functionality.

Advantages of Laser Marking

- Lasers are flexible in terms of surface and design
- Economical
- Can be carried out at very high speed and without contact
- Inkless process
- Marking difficult to counterfeit
- Pre-treatment of surface not necessary
- Marking can be miniaturized

Benefits of Ampacet Laser Marking Products

- Can be used with all laser types
- Compatibility with most polymers
- Non-heavy metal formulations available
- Marks dark on most plastics/colors
- Can give a light mark on certain dark parts
- FDA compliant formulations are available

Product Applications

- Bar coding
- Expiration dates
- Serial numbers
- Identification tags
- Security straps
- Traceability
- Aesthetic designs

Laser Marking Systems

- **Nd:YAG** – Solid-state Nd:YAG lasers are the work-horse of the industry. These lasers give higher resolution due to their shorter wavelengths. The shorter the wavelength, the less heating is induced in the plastic substrate.
- **Fiber** – Newer technology and less common, these lasers are capable of high marking resolutions on plastic, with extremely small font sizes possible.
- **Vanadate** – Often used for ablation marking, in which a top coating is removed to expose a lower surface without damaging it.
- **CO_2** – A CO_2 laser etches the plastic surface, removing material by evaporation. The result is a contrasting mark but little or no true color change. Plastics that mark well with CO_2 lasers include PVC, ABS, and most polyesters.

Typical Values of Laser Marking Systems

Category	YAG	Vanadate	Ytterbium (fiber)
Pulse duration (ns)	10–150	5–30	10–200
Beam quality (M^2)	<1.2	<1.2	<2
Peak power (kW)	High, 100 kW range	Medium, 80 kW range	Low, 10 kW range
Average power (W)	5–30	5–40	10–50
Pulse repetition frequency range	5–80 kHz	20–120 kHz	20 kHz–1 MHz

Laser Marking Products

Model	Loading	LDR	Resin Compatibility	Laser Type	FDA	Notes
1000583-N	25	4-12%	All	Nd: YAG, UV	Up to 5%	Very good for TPU
1000614-N	25	1-2%	All	Nd:YAG, Fiber	Up to 5%	Lower Cost
1000582-N	25	1-2%	All	Nd:YAG, Fiber, Vanadate app. 1060nm	Y	High Resolution
1000592-N	25	2%	All	Nd:YAG, Fiber, Vanadate app. 1060nm	In process	
1000591-N	25	2%	All	Nd:YAG, Fiber, Vanadate app. 1060nm	N	
1000581-N	25	1-2%	PE, PP	Nd:YAG	Y	Non-heavy metal
1000615-N	25	1-2%	All	Nd:YAG, Fiber, Vanadate app. 1060nm	Up to 5%	Non-heavy metal

For more information on **Laser Marking,** its uses and complete Regulatory Status, contact your Ampacet Account Executive or visit **www.ampacet.com.**

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