## ΕΛSTΜΛΝ

# Laser welding Eastman medical copolyesters

Molded plastic medical devices frequently require joining multiple components to form a functional assembly. Common assembly techniques include ultrasonic welding, hot plate welding, vibration welding, solvent bonding, and various types of adhesive bonding. There are two laser welding techniques currently available for the medical market segment. Traditional laser welding operates at 810–1100 nm, and a more recent technology operates at 1900–2010 nm.

#### Laser welding example

- Opposing material may be opaque or clear. Additional absorbing material may need to be applied at joint interface when utilizing 810–1100 nm technology but not with 1900–2010 nm technology for clear-to-clear welding.
- 2. Mating surface clamped in position. -
- 3. Laser energy applied to weld joint. —
- Process parameters such as clamp pressure, laser power, beam size, and welding speed are adjusted for maximum joint strength and aesthetics.



Laser energy is passed through a near-infrared transmitting part and is absorbed at the surface of a second near-infrared absorbing part. Energy sufficient to cause a temperature rise above the melting point of the polymer is supplied to the joint interface. Heat in combination with external clamping pressure causes the two surfaces to weld at the joint interface. Parameters such as laser power, laser beam width, and laser speed are used to optimize joint strength.



Laser welding can be accomplished with transparent to opaque or transparent to transparent. The part nearest the laser must be transparent/clear to allow proper transmittance of the laser to the weld joint for absorption.

### Desirable characteristics of the laser welding process:

- Excellent joint strength with Eastman copolyester resins
- Excellent welded joint aesthetics with no surface damage
- No flash or particulate created by the welding process
- Very short weld cycle time, depending on part size
- No additional cure time required
- · Clear-to-clear welds with no additives
- Automated process
- Simple joint designs
- Hermetic seals achievable
- Complex shapes possible
- Multiple welds possible
- Low residual stress

Weld efficiency is a measure of joint strength relative to the strength of the parent material. Weld strength data is currently being obtained, so feel free to reach out to Eastman for additional data, information, and assistance.



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**Brett Jones** 137 Regional Park Drive Kingsport, TN 37660 Phone: +(1) 423-229-6415 Safety Data Sheets providing safety precautions that should be observed when handling and storing Eastman products are available online or by request. You should obtain and review the available material safety information before handling any of these products. If any materials mentioned are not Eastman products, appropriate industrial hygiene and other safety precautions recommended by their manufacturers should be observed.

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