Laser processing reflective materials

Many products are manufactured from reflective materials. Electric car batteries contain copper, jewellery is commonly made from silver and gold, and even the 2012 Olympic torch is manufactured from aluminium.

Aluminium is a highly reflective material, redirecting around 92% of visible light and up to 98% of medium and far infrared radiation. This can make it difficult to process using lasers. Light from the laser is reflected back onto the delivery fibres, which can cause damage. Similar issues arise when processing gold, silver, copper, brass and certain polished metals.

To avoid reflected light, some manufacturers adjust the angle of the focus head. This alteration ensures reflected light is directed away from the laser but at the expense of the spot shape. The resulting elliptical (rather than circular) spot can increase kerf and cut widths, creating imperfect designs.

JK Lasers has developed a patented system that directs reflected light away from the delivery fibres and into a beam dump without the need to adjust the focus head. Back reflection levels are continually monitored and trigger an automatic shutdown if acceptable limits are exceeded.

Integrated into JK Lasers’ Nd:YAG and fiber lasers as standard, back reflection protection also eliminates the need for a separate Faraday isolator. These are often costly and can cause power loss and beam degradation due to the thermal effects in the crystal.

Using JK Lasers’ unique back reflection protection, the JK500FL can cut 1mm aluminium at 15m/min (20µm spot size). A similar kerf width is possible in 2mm aluminium at 3.3m/min. For fine feature gold and silver cutting, lower power fiber lasers such as the JK200FL are ideal. For example, 0.7mm gold can be cut with an 8µm spot size at 0.2m/min. Faster speeds are possible with higher powered fiber lasers, but with correspondingly bigger kerf widths.

Visit http://www.youtube.com/jklasers to see JK Lasers’ newly launched 2kW fiber laser (JK2000FL) cutting copper. The design was cut at 4m/min with short pulse widths to reduce the heat affected zone. Straight line cutting speeds of 10m/min are achievable in reflective materials using the JK2000FL.

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