

Ablation

Hairpin Stripping in Electric Motors

The boom in e-mobility is generating an increased demand for electric motors across the world. These motors are manufactured with solid copper hairpins in the stator which generate a magnetic field, which in turn creates the motion of the motor. These copper wires are typically laquered or coated with an organic layer to give them electrical isolation. However, they need to be subsequently welded and therefore the laquer needs to be selectively removed to ensure a strong weld is achieved. These wires can take many forms, from small round wires (<3mm) to square sections that can be up to 6mm in width.

This laquer removal has traditionally been achieved by using mechanical means such as wire brushes which generate a lot of dust, or by CO₂ lasers; however the long wavelength of these lasers can leave behind a very fine residue, meaning the part is not fully cleaned back to bare metal.

Our redENERGY G4 pulsed fiber lasers are ideally suited to this task and are able to effectively remove the laquer back to the bare metal with no residual organic coating. This leads to an excellent quality of weld. The built in PulseTune technology of our lasers means that the pulse characteristics can be optimised to cleanly remove the given layers. A 200W EP-Z pulsed laser can remove up to 150mm²/s, but this can be highly dependent on the type of coating. Lower power lasers can also be used but processing rates are decreased generally in line with average power.

Application Parameters

Type	redENERGY G4 200W EP-Z
Power	200W
M ²	<1.6
Beam Ø	10mm
Scanner/Lens	254mm
Energy	WF36 1.2mJ

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