Repairing Damaged Coatings

Task

Alabama Laser was tasked with repairing a customer’s damaged propeller shaft, which had originally been covered with a special ceramic coating designed to protect the base material. The coating had chipped off in several places, rendering the shaft useless and irreparable in the field. The customer needed a fix that provided the same protection as the ceramic coating, but was longer-lasting and field-repairable.

Process

Alabama Laser repaired the coating with a Laserline LDF 6000-60 6 kW laser and their own proprietary hot wire technology. After removing the old coating and affixing the shaft in the cladding equipment, the laser was focused on the rotating part, and hot ALS024 wire was added to the melt pool.

Result

By using a diode laser to apply the stainless steel coating, Alabama Laser cut the processing time to less than three weeks and the processing cost to a quarter of the cost of a typical ceramic coating. The actual cost of the new coating is comparable to that of other conventional cladding methods, and because it is stainless steel, the part is post-weldable, meaning it can be repaired in the field if need be.

The hot wire diode laser cladding process offers improved performance over conventional surface coating methods, as it produces no wasted filler material, reduces heat input, and improves production repeatability and stable production rates. The Laserline laser’s temporal stability and uniform beam profile played a crucial role in making this process development a success.

Material: Stainless steel
Task: Repair of propeller shaft
Laser: LDF 6000-60
Optics: f_foc = 400 mm
Parameters: Hot wire diode laser cladding
Result: Improved surface, cost reduction
LDF Matrix

<table>
<thead>
<tr>
<th>LDF 2000-xx</th>
<th>LDF 4000-xx</th>
<th>LDF 6000-xx</th>
<th>LDF 10000-xx</th>
<th>LDF 15000-xx</th>
</tr>
</thead>
<tbody>
<tr>
<td>LDF 20 mm</td>
<td>LDF 30 mm</td>
<td>LDF 40 mm</td>
<td>LDF 60 mm</td>
<td>LDF 100 mm</td>
</tr>
</tbody>
</table>

- **Brazing**
- **Heat treatment / Hardening**
- **Cladding**
- **ID Cladding**
- **Welding**
- **Aluminum welding**
- **Keyhole welding**

LDF 6000-60