Faster Brazing in the Roof Joint

Task

Since the mid-90s brazing has been used in automotive manufacturing. The advantages of brazing are most apparent when it is used in class A show surfaces. Low warpage, a stiff joint ready for the paint shop, and almost no post-processing make it a unique process. Compared to laser welding or spot welding, laser brazing improves the aesthetics of a joint so dramatically that the usual plastic strip needed to cover it can be omitted. The brazing process was first made possible by fiber-coupled, lamp-pumped Nd:YAG lasers. In 2001 the diode laser made its debut as a brazing tool in the manufacturing of the tailgate of the Audi A3. Typical process speeds were initially 2.4 m/min. To increase production figures, Volkswagen set a goal of improving brazing speed without compromising quality.

Result

Both the brazing speed and the joint quality were increased using the Laserline diode laser. By working in the focus of the top hat laser beam, a better distribution of the power density into the boundaries of the joining partners was achieved. With the diode laser, edge notches were reduced by 75 percent and maximum process speed increased to 4.4 m/min. Volkswagen decided to replace all YAG lasers used in the Touran production line with 6 kW diode lasers. Today, Volkswagen Group uses numerous diode lasers from 3 to 6 kW worldwide.

Process

At the VW Touran production line in Wolfsburg, a process comparison was conducted between a 4 kW YAG laser and Laserline’s 6 kW diode laser. While the existing YAG laser used a defocused beam, the new diode laser was set up with the beam in the focus position and a 3.2 mm diameter focus. The trial examined the quality of the joint at higher process speeds as well as the process stability in series production.

Material: Zinc coated steel sheets
Task: Increased process speed for laser brazing of roof joints
Laser: LDF 6000-100
Optics: Tactile brazing head with CuSi3 filler wire
Brazing speed: 4.4 m/min
<table>
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<tr>
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### Laserline has a worldwide presence, with subsidiaries and representatives in many countries. Please look up the Laserline contact in your country at www.laserline.de

#### Laserline's LDF Matrix

- **LDF 6000-100**
- **LDF 6000-40**
- **LDF 6000-20**
- **LDF 6000-10**
- **LDF 6000-5**
- **LDF 6000-2.5**
- **LDF 6000-1.25**
- **LDF 6000-0.625**
- **LDF 6000-0.3125**
- **LDF 6000-0.15625**

**Applications:**
- Brazing
- Brazing
- Brazing
- Brazing
- Brazing
- Brazing
- Brazing
- Brazing
- Brazing
- Brazing

**Keyhole Welding**

- **20 mm mrad**
- **30 mm mrad**
- **40 mm mrad**
- **60 mm mrad**
- **100 mm mrad**

**Welding**

- **2000 W**
- **4000 W**
- **6000 W**
- **10000 W**
- **15000 W**

**Heat treatment / Hardening**

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We reserve the right for errors and alterations | Source: Volkswagen AG, Dr. Lars Engelbrecht, EALA 2009

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