

Laser-Assisted Tape Laying of CFRPs

Task

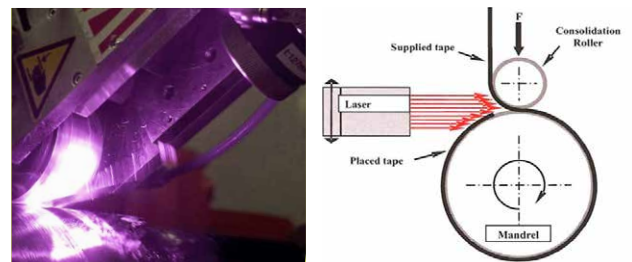
Increasingly, items such as aircraft parts, pressure vessels, seals, and pipes that have traditionally been made of steel or aluminum are being replaced by ones made out of carbon fiber-reinforced plastic based on elastomers (CFRP). The use of CFRP improves the mechanical properties of the product and can create a weight savings of up to 70 percent. Laserline's customer – AFPT GmbH – manufactures CFRPs from tape coiled or layered in a mold. In a temporally and spatially controlled process, the diode laser efficiently heats and melts the tape material in the joint area.

Process

AFPT GmbH built a tape placement head mounted on a robot to place CFRP tape on the 3D preform. Working in close cooperation with the customer, Laserline developed special homogenizing optics to heat the CFRP strips as they are placed. These optics produce a rectangular laser focus with a very uniform energy distribution. A coaxial multi-point temperature control regulates the laser power to ensure a safe heating of the material and keeps it below the decomposition temperature.

Result

Since 2009, diode lasers have been used in the production of CFRP components. Special homogenizing optics, 3 kW of laser power, and a high process efficiency result in tape layering speeds of several meters per minute. The small footprint of Laserline's fiber-coupled diode laser module LDM 3000-100, coupled with its high efficiency, allowed the customer to build a robust, compact, class-1 welding cell, suitable for transport on roads.



Material: Carbon fiber reinforced plastic (CFRP)

Task: Temperature controlled, non-porous melting of the elastomer matrix

Laser: LDM 3000-100

Parameters: Approximately 2 kW up to 5 m/min

Result: In production use since 2009



● Headquarters ● Subsidiaries ● Representatives
 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

	LDM 500-xx	LDM 1000-xx	LDM 1500-xx	LDM 2500-xx	LDM 3000-xx
LDM yyy-100					
LDM yyy-60					
LDM yyy-40					
LDM yyy-30					
LDM yyy-20					
	500 W	1000 W	1500 W	2500 W	3000 W

LDM Matrix

- Heat treatment / Hardening
- Cladding
- Welding
- Plastic welding
- Pumping
- LDM 3000-100

Laserline GmbH
 Fraunhofer Straße | 56218 Mülheim-Kärlich, Germany
 Tel. +49 2630 964 0 | Fax +49 2630 964 1018
sales@laserline.com | www.laserline.com

- USA** Laserline Inc. | info-usa@laserline.com
- Brazil** Laserline do Brasil Diode Laser Ltda. | info-brasil@laserline.com
- China** Laserline Laser Technology (Shanghai) Co. Ltd. | info-china@laserline.com
- India** Laserline Diode Laser Technology Pvt. Ltd. | info-india@laserline.com
- Japan** Laserline K.K. | info-japan@laserline.com
- Korea** Laserline Korea Co. Ltd. | info-korea@laserline.com