Poster 6 AB21_64 **AB2021**

6TH INTERNATIONAL CONFERENCE ON STRUCTURAL ADHESIVE BONDING



Investigation of the Cleaning Effectiveness of Laser Radiation for Improved Adhesion on Glass Fiber Reinforced Polyamide 6

C. J. A. Beier¹, R. Seewald¹, H. Dittmar², M. Bazilyanski¹, J. Weiland¹, A. Schiebahn¹, P. Jaeschke², L. Overmeyer², U. Reisgen¹,

¹ISF – Welding and Joining Institute, RWTH Aachen University, Pontstrasse 49, 52062 Aachen, Germany

²LZH – Laser Zentrum Hannover e.V., Hollerithallee 8, 30419 Hannover, Germany



MATERIALS & METHODS

- Laser: Nd:YAG 1064 nm wavelength,
 100 ns pulse length, 64 µm spot diameter
- Substrate: Polyamide 6 with 30 % glass fiber reinforcement (PA6-GF30)
- Contaminations:
 - Release agent
 - Frekote C-200 by Henkel AG & Co. KGaA, water based emulsion with silanes
 - Glass dust, glass bubbles S32 by 3M Deutschland GmbH average diameter of particles 40 µm, 80 vol.-% of particles are between 20 µm and 75 µm diameter

Contamination	Laser Power	Repetitions	Test series
Glass dust	0 % 50 %	1	For the different contaminations the laser power and number of transits is varied. The results are compared to uncontaminated, pre-treated samples
Glass dust	0 % 50 %	3	
Release agent	0 % 50 %	1	
Release agent	0 % 50 %	3	
Uncontaminated	0 % 50 %	1	

Conversion table for laser power	Nominal Power [%]	Laser Output Power [W]	Pulse fluence [J/cm²]
	10	0.53	0.173
	20	1.05	0.343
	30	2.70	0.882
PAG GE20 comple	40	4.57	1.492
FA0-GF30 Sample	50	6.44	2,103

- Artificial contamination with release agent and glass dust emulsion to achieve a defined and reproducible contamination
- SEM investigations to determine amount of particles on the surface
- Mechanical testing to expose the influence of the contaminations on the adhesion properties and evaluate the treatment:
 - roller peel test (DIN EN 1464)
 3M 425 tape, acrylate based
 100 mm/min traverse speed
 - tensile shear test (DIN EN 1465)
 Adhesive: 3M SW DP609, 2C-PUR
 1.5 mm/min traverse speed



The IGF-project 19727, "ProKleb" of the research association "DVS German Welding Society" is funded within the framework of the industrial collective research program (IGF) by the Federal Ministry for Economic Affairs and Energy on the basis of a decision by the German Bundestag.



RWTH Aachen University ISF - Welding and Joining Institute Univ.-Prof. Dr.-Ing. Uwe Reisgen Pontstraße 49, 52062 Aachen, Germany www.isf.rwth-aachen.de