Highlight

Aachen,
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Welding of a white goods test case using 1567nm fiber laser radiation

Workpackage 8 of PolyBright covers welding of commercial components from several industries like automotive, medical and white goods sector, where the last mentioned is reported in this Highlight. After part selection, preparation of the polymer masterbatch (Treffert), injection molding and part machining (Electrolux), welding was carried out using ILT's TWIST setup, one out of three assembled PolyBright WP5 prototype machines.

Compounds for door handle and cover are supplied by Treffert:

1. PC, white cover on ABS, white door handle
2. PC, grey cover on ABS, grey door handle

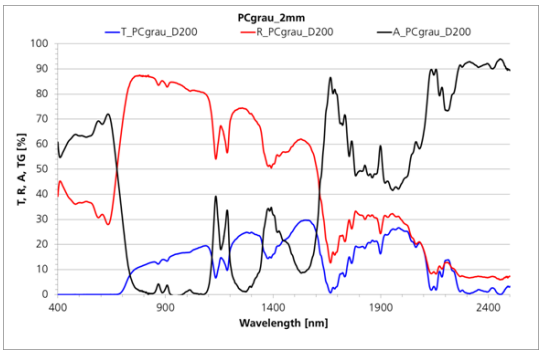


Figure 2: Optical properties of PC cover, 2mm, grey (Electrolux, Treffert)

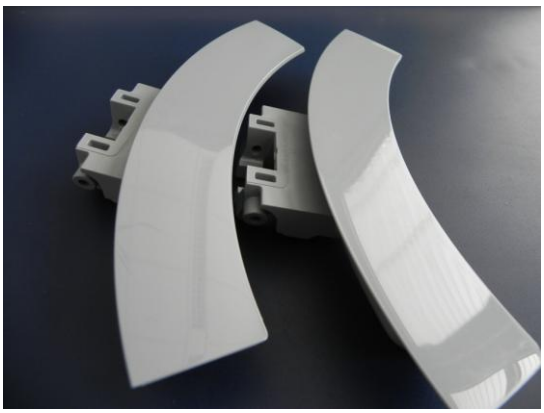
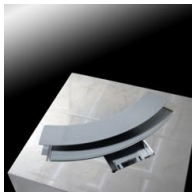


Figure 3: Welded PC+ABS door handle+cover; λ=1567nm, P=30W, v=15mm/s

Figure 1
Top: ILT's TWIST prototype machine for welding door handle+cover with 1567nm fiber laser (ELR120, IPG) and scanner (Fiber Rhino 8.5, Arges)
Bottom: Fixture of door handle+cover in an aluminium plate, which is lifted and pressed against a glass plate during welding.



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Polymer compatibility is ensured for the PC-ABS combination. Welding at 1567 nm is preferred compared to the regular fiber laser wavelength of 1060 nm, due to higher transmittance and lower reflectance for the upper cover part, see measured optical properties of grey 2 mm PC cover in Figure 2.
The cover's thickness has to be reduced from 1 mm to 2 mm to avoid unwanted burning effects at the top surface during processing. Important welding parameters are laser power 30 W, welding speed 15 mm/s, beam diameter 1,8 mm (estimated), TWIST frequency 1000 Hz, TWIST radius 0,5 mm.

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