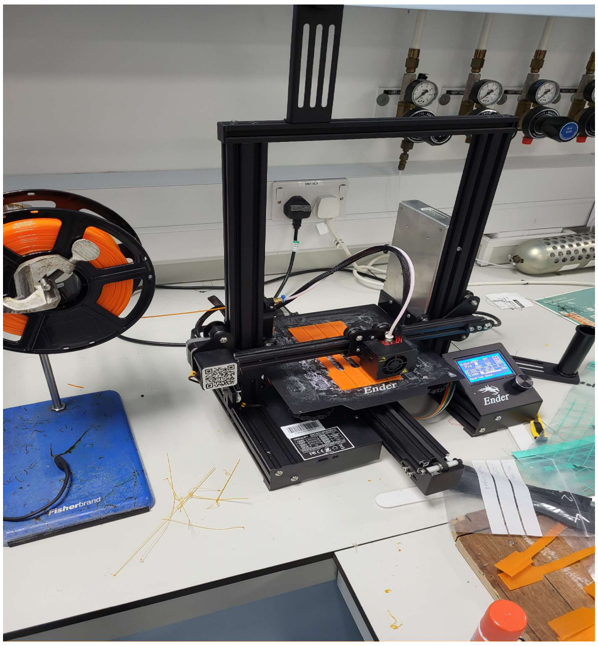
Titel Diplomarbeit Heat treatment for 3D FMD parts

Bild



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Ausgangslage (max. 300 Zeichen)	3D FDM (Fused deposition modelling) technologies give opportunities to improve manufacturing method for complex and/or light parts with a low-cost solution. In another hand, PLA (Polylactide acid) is also a low-cost material with a low impact on environment due to its production and composition. However, 3D FDM with PLA has two major disadvantages. Firstly, this method of production is a lot slower than milling or SLS (Stereolithography) and must be use only when these two other solutions are not possible. Secondly, a 3D FDM part with full fill is less strength than the same part with the same material produced by milling. This difference happens because of the process. The FDM method produce layer to form the shape and to fill it. So, the structure is no more isotropic and become weaker than the filament used to produce the part.

Aufgabenstellung/Ziel (max. 250 Zeichen)	Our goal on this project is to find a simple as possible solution to change properties of a 3D FDM part printed with PLA and increase its general strength. These improvements can carry new opportunities and ways of use for this process. Regarding to the possibilities of structural change or transformation and the low possible complexity for our solution we will try to use an oven to warmup and/or quenching the part and investigate about the change. The expected result with this method is that the layer expansion will push out air on gapes and be welded together to turn the layer part to an isotropic part.
Ergebnisse/Nutzen (max. 300 Zeichen)	Results of our test had show us that the expected change had not occurred. General tensile strength had decrease and density test had showed us that the general density had not change after the warmup. However, changes have occurred, the test had showed us interesting result against flexure during the ILSS (Inter Laminar Shearing Strength) test. Parts with 0° fill short beam strength had been improved. Our hypothesis about this result is that the air on gaps has not been removed during the warming up and was stuck on the parts. In consequence, the air has also expanded and compressed the layer at the interlayer welds. By this change, layers do not transfer cracks to another layer. This specificity gives to parts the possibility to better assume flexure choc with less force transfer to the rest of the structure. This result is only an indication of possibility and need to be completed with other test focused on this specificity to improve the specificity and give a possible real application.