

# Die casting mold repair by Hybrid Manufacturing

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This paper describes the process of repairing a damaged die injection mold using a 5 – axis Hybrid Milling Machine equipped with a Direct Laser Deposition (DLD) tool. A software developed by the Authors — DUOADD [0] — is adopted to detect the location of the missing material and to create a solid model of the damaged spot. The resulting CAD file is used to calculate the toolpaths of the DLD nozzle for filling the damage spot with new material. Finally, to restore the original shape of the mold, the surplus of added material is removed by a milling operation. The paper describes every step of the repair process: from the 3D scanning of the damaged component to the finishing operation. This repair method can be applied to extend the life of a costly component and to restore the original shape of valuable objects — e.g. historical or artistic artifacts. The material used for the mold repair is stainless steel 316L, while the mold is made of hot–die–steel. In this paper the functionality of the repair process has been investigated checking whether all the damaged spots are properly filled with the new material. Moreover, this work investigates how to perform the milling operations. Specifically, the aim is to restore the original shape of the object, avoiding mismatches between the machined surface and the original one. The entire process has been tested on a real die injection mold and the results are reported.

[0] DUOADD — “Duoadd Uses Octrees As Damage Detector”  
<https://bitbucket.org/PeriniMatteo/duoadd/src/master/>