Abstract – Thomas Studnicka

Free-form-printing enables the printing of designs on curved surfaces and from any angle. This technology permits the manufacturing of a 0.5-kilogram structure, able to hold 500 kilograms of weight. Common 3D-printer extruders are unsuitable for free-form-printing. A new extruder is needed to maximise the advantages of free-form-printing. In this thesis a nozzle-system combining heater block and nozzle is designed using state of the art free-form-nozzles as references. This nozzle caters to the specifications of free-form-printing. For the design different nozzles are evaluated. One concept is manufactured and tested. Thermal conductivity, flow-rate and wear-rate are simulated. Those simulations validate design decisions. In tests the nozzle-system extrudes 50% more mass in the same volume as a common 3D-printer nozzle, when used for free-form-printing. This nozzle enables free-form-printing by mounting a printer head on an industrial robot.