

Review of the basic additive manufacturing (AM)/ rapid prototyping (RP) techniques, printing heads and 3D-printing machines. AM materials (polymers, elastomers, ceramics, metals, mortars etc.) and methods for finishing coarsely manufactured surfaces. Selection of suitable AM method and material. Introduction to rapid tooling (RT). Elements of reverse engineering (RE) and basic RE technologies and machines (touchprobe, laserscanner), accuracy and repeatability of the measurements, measuring techniques on CMMs. Postprocessing of the obtained point-cloud, triangle model and grid repairing techniques, development of CAD models and parametric surface models. Design for AM. Identification of the critical functional tolerances and calculation of fits on functional assemblies. Design simplification and adaptation to the available RP technologies / machines. Placement and support of the objects on AM machines. Techniques for avoiding part warping during and after AM, design of part supports and selection of infill pattern and density. Numerical modeling of RP parts using FEM and assessment of residual stresses-strains and strength. Design assessment.