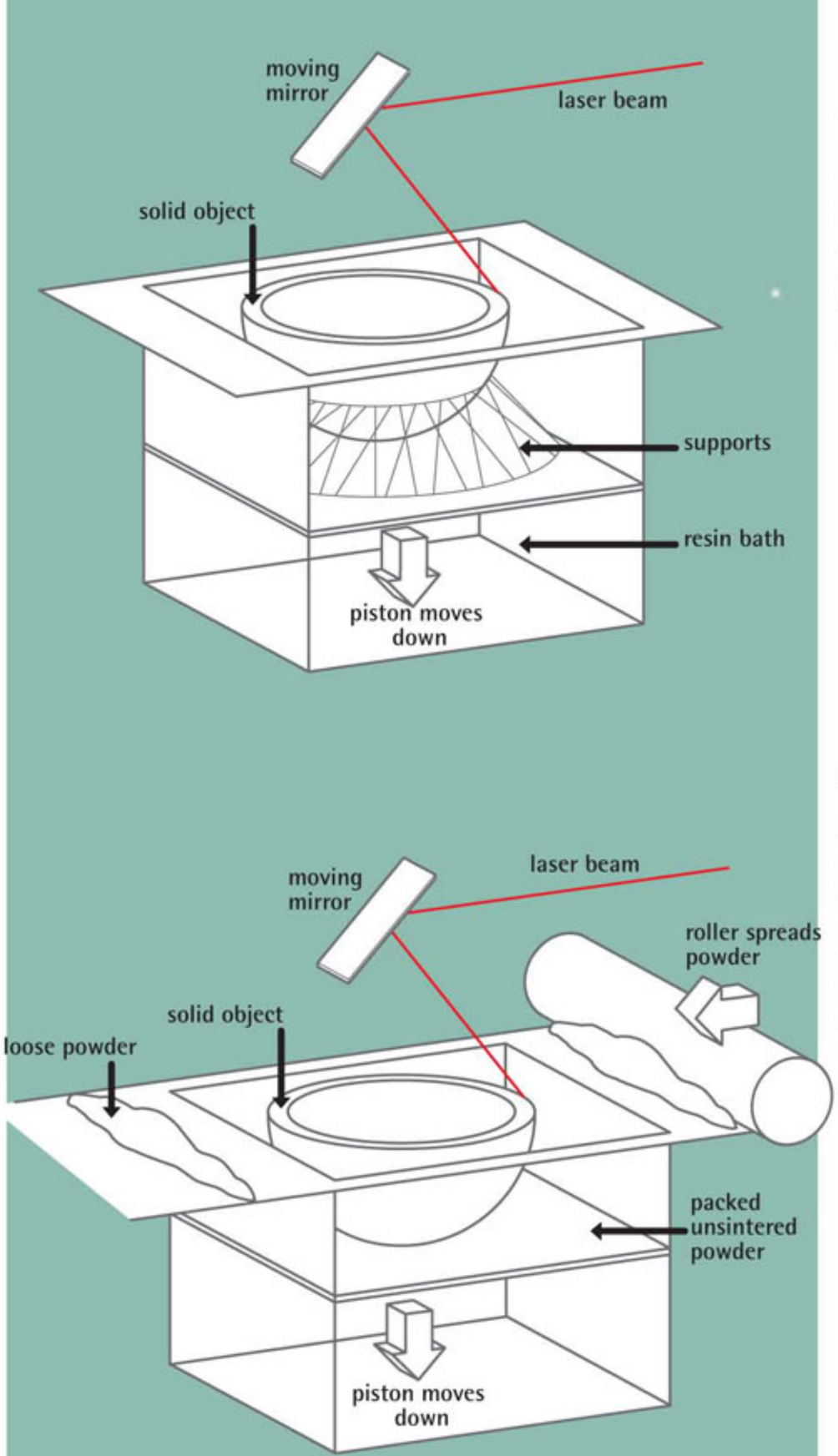
rapid prototype

Rapid prototyping is a generic term for a number of processes that rely on "slicing" a 3-dimensional computer model to achieve a series of cross-sections, these sections or layers can then be made individually, each layer being built on top of the preceding layer with the bonded stack of layers forming the final solid object.

The processes are most commonly used in the aeronautical and automotive industries, product design and engineering, medical procedures & products and architectural design but are becoming increasingly available to all.

Each technique has its own advantage and limitations. The most common techniques are stereolithography (SLA), selective laser sintering (SLS), laminated object manufacture (LOM) and fused deposition modelling (FDM).



Stereolithography (SLA)

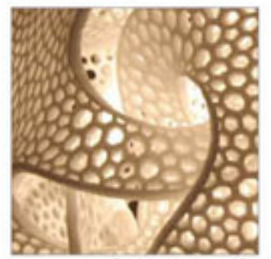
The solid object is made by scanning each section/ layer of the CAD model with an ultraviolet (UV) laser beam over the surface of a bath of epoxy resin. The resin hardens on exposure to the UV light. Once a layer is complete, the base plate moves down a little in the bath and a new layer of liquid flows in over the top. Then the next layer is drawn by the laser beam. Any loose or overhanging elements of the object are secured by supporting structure to prevent them drifting away. The supports are made by the same process and at the same time as the main object. At the end of the build, the base plate is raised in the bath to lift the object clear, it is then drained, washed, and the support structures broken away.


David Goodwin


Martin Woolner

Selective Laser Sintering (SLS)

This process uses a flat layer of nylon powder, heated to close to its melting point. A carbon dioxide laser beam scans each section/ layer of the CAD model over the powder and heats the grains so that they melt on the outside and stick together (sinter). Then the base plate moves down slightly, and the next layer of powder is spread across the surface by a rotating roller. The object is supported as it is made by the tightly packed un-sintered powder, so it does not need extra supporting structures. At the end of the build process, the entire cake of powder, sintered and un-sintered, is allowed to cool down and lifted out of the machine. Then the loose powder is shaken off and the sintered object is freed. The finished objects have a matt, powdery surface.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Justin Marshall