









material, hollow shells and a cross hatched structure of discrete walls called `EOSTYLE` supports.

After completing the build of a part there may be voids containing unmelted powder contained between the formed shape made of melted powder and the platen. And in the case of non solid supports there will be unmelted powder contained within them. This unmelted powder presents numerous problems to subsequent processing.

Firstly, to remove the stresses inherent in the as-built part a thermal process is needed for all but the smallest parts (such as dental inlays) whilst the part is still firmly attached to the platen. Some desirable thermal processes are sufficiently hot as to melt the loose powder thereby solidifying it in enclosed voids.

Secondly, to cut the part from the platen may require a wire Electrical Discharge Machining (EDM) process, particularly for hard alloys such as cobalt chrome. Loose powder contained within voids shorts out the wire in the EDM process presenting significant difficulties and additional costs for this process.

Thirdly, if cutting with a saw, lubricant may be used and the loose powder then mixes with the lubricant creating difficulties.

Fourthly, the metal powder may be hazardous to health, or valuable (such as in the case of titanium alloys). Hazard control and powder recycling is best performed prior to further processing.

For these and other reasons it is therefore advantageous to have a method of removing powder contained within voids whilst the built part is still attached to the base plate and before heating or cutting operations--and yet the part must be firmly attached to the base plate because of the thermal stresses inherent in the process.

It is not trivial to conceive of support structures that meet the requirement of: 1. Enabling substantially all trapped loose powder to be removed by e.g. gravity, tapping, vacuum or blowing and, 2. Providing a sufficiently firm anchorage during building of the part to the platen to resist delamination and, 3. Not being a solid--(which is time consuming to build and negates much of the benefit of the process-cutting a solid support from a complex solid shape is difficult and costly and negates a benefit of the powder process) and, 4. Is capable of being reliably produced by the laser sintering/melting process.

In particular it should also be understood that the laser sintering/melting process is not capable of making any and all structures and in particular cannot reliably make free standing thin pillars.

From one aspect the invention is an intermediate grooved or channelled solid layer that is built by the laser sintering/melting process between the platen and the desired part built.

This built channelled layer is either an intermediate layer below the prior art supports and/or is at least a part of the support itself including an entirely solid support with channels. If the deposition process is a powder bed process (using a recoater blade) then preferably the grooves/channels are built to lie in the line of traverse of the recoater blade. The grooves/channels are sufficiently wide as to allow loose powder to be removed whilst the built part is still attached to the base plate and before any further processing.

Typically the powder used in a laser sintering/melting process is spherical and of a D50 of 20-100 microns and in particular has a mean diameter of about 50 microns. A groove or channel that can be reliably built by the process is of the order of 0.5 mm in width.

A preferable grooved structure is of a 0.5 mm wall/rib thickness and 0.5 mm gap giving a 50% solid upper surface.

Surprisingly a 50/50 0.5 mm rib/gap structure is both physically sufficient to build solid parts upon (i.e. the laser sintering/melting process can bridge the gaps) and strong enough to prevent delamination of built parts from the platen either during the build process or during a subsequent heat treatment. Also, the 0.5 mm walls of the support are relatively easy to remove from the built parts.

From another aspect the invention consists in a method of forming a support for use in a selective sintering







