

Introduction of Laminated Object Manufacturing Process

1. Introduction

The laminated object manufacturing (LOM) process is an effective rapid prototyping technology with a variety of application possibilities, it is also based on the disperse/deposit forming principle of RP technology. The main process of the LOM is shown in the following: at first, a slice material such as paper is transported onto the work table, the work table raise, and then a hot beam press and heat up this slice to bind it with the built part; the laser beam which is controlled by computer will cut this layer along the outline of object shape, and it will cut the rest part beside the shape into small piece in order to wipe them off after build all layers; after cutting is finished, the work table fall and repeat the first step.

2. Research on process of hot-pressing

One of the most important problems of LOM is the process of hot-pressing. The purpose of hot-pressing is binding the current layer to the built part. The speed of hot-pressing must match with the power of heating up. If the movement of hot-pressing is too fast, the binding between layers will not be firm; while if the movement is too slow, the layer will be over-heated and the stress of hot will affect the shape of object.

Another question is focused on the match of the speed of cutting and the power of laser beam. When the cutting speed become faster, the power must increase, otherwise the laser can not cut through one layer. On the other hand, if the power is too powerful, it will cut over one layer so that the shape of the layer under the current will be destroyed. The match of them will influence the quality of cutting.

The LOM process is very advantageous in many aspects. First, because the laser beam only cut the outline of shape, this process can reduce more process times than other RP process such as SLA. It is the most efficient process in all kinds of RP process. Secondly, the LOM process can manufacture very complicated object. The complicity of the LOM object is less limited than the FDM (Fused Deposition Modeling) object because there is no need of support material in the LOM process. At the same time, low material cost is also an advantage of this process.

3. Applications of LOM Process in CLRF

Rapid prototyping machines have developed in Center for Laser Rapid Forming, Tsinghua University, China, such as M-RPMS-III, SSM-800 and SSM-1600, they could perform the LOM process.

The LOM process can be applied in many field such as patternmaking, art recuring, toy designing and so on. Figure1 shows a thin-wall part manufactured by LOM process. This part is very complicated and large. There are many difficulties manufacturing this part by other process such as FDM. It is too large to that process. Figure2 shows a ball part manufactured by LOM process. If this ball is produced by FDM process, the support material would be a very serious problem. While in LOM process, there is no problem. Figs. 1 and 2 are examples.

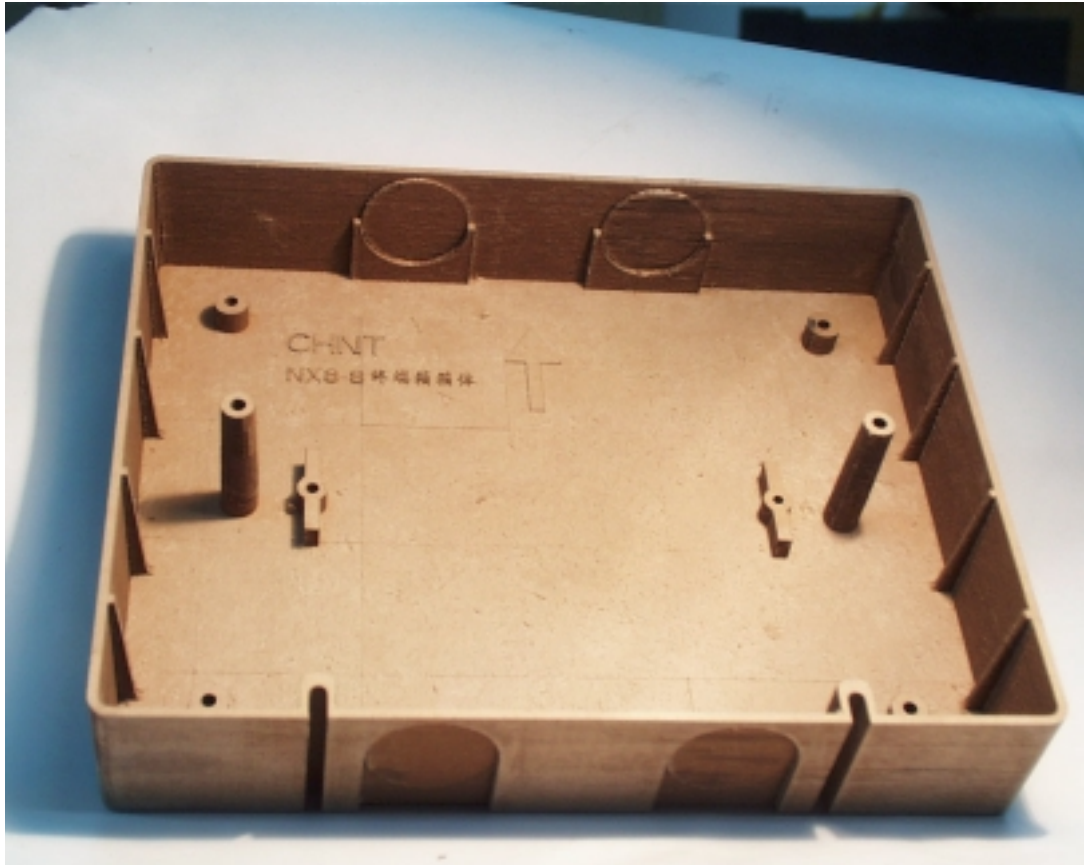


Figure 1. A thin-wall part manufactured by LOM process



Figure 2. A Taiji ball manufactured by LOM process