

required to cure the resin. The laser unit is long and rectangular, about 4 feet long, and remains stationary. The laser beam is transferred to the part surface below by a series of optics, the final of which moves to scan the cross section of the part being built. Also required, however, are the post processing units; an ultraviolet oven call the Post Curing Apparatus (PCA); and an alcohol bath large enough to hold entire build platens with parts attached. Parts are washed in the alcohol or a similar solvent immediately after being removed from the machine (while still attached to the build platen). This step removes any extra resin that clings to the surfaces of the part. After the final supports are removed, with some build styles the parts are required to be placed in the PCA to finish fully curing.

- **The main advantages of using SLA are:**

- Parts have best surface quality
- High accuracy
- High speed
- Finely detailed features like thin vertical walls, sharp corners & fall columns can be fabricated with ease.

- (1) *Round the clock operation.* The SLA can be used continuously and unattended round the clock.
- (2) *Good user support.* The computerized process serves as a good user support.
- (3) *Build volumes.* The different SLA machines have built volumes ranging from small to large to suit the needs of different users.
- (4) *Good accuracy.* The SLA has good accuracy and can thus be used for many application areas.
- (5) *Surface finish.* The SLA can obtain one of the best surface finishes amongst RP technologies.
- (6) *Wide range of materials.* There is a wide range of materials, from general-purpose materials to specialty materials for specific applications.

The main disadvantages of using SLA are:

- It requires post processing i.e.post curing
- Careful handling of raw materials required
- High cost of Photo Curable Resin

- (1) *Requires support structures.* Structures that have overhangs and undercuts must have supports that are designed and fabricated together with the main structure.
- (2) *Requires post-processing.* Post-processing includes removal of supports and other unwanted materials, which is tedious, time consuming and can damage the model.
- (3) *Requires post-curing.* Post-curing may be needed to cure the object completely and ensure the integrity of the structure.

Applications of SLA

- Investment casting
- Wind and tunnel modelling
- Tooling
- Injection mould tools

The SLA technology provides manufacturers with cost justifiable methods for reducing time to market, lowering product development costs, gaining greater control of their design process and improving product design. The range of applications includes:

- ❖ Models for conceptualization, packaging and presentation.
- ❖ Prototypes for design, analysis, verification and functional testing.
- ❖ Parts for prototype tooling and low volume production tooling.
- ❖ Patterns for investment casting, sand casting and molding.
- ❖ Tools for fixture and tooling design, and production tooling.

Software developed to support these applications include QuickCast™, a software tool which is used in the investment casting industry. QuickCast enables highly accurate resin patterns that are specifically used as an expendable pattern to form a ceramic mold to be created. The expendable pattern is subsequently burnt out. The standard process uses an expendable wax pattern which must be cast in a tool. QuickCast eliminates the need for the tooling used to make the expendable patterns. QuickCast produces parts which have a hard thin outer shell and contain a honeycomb like structure inside, allowing the pattern to collapse when heated instead of expanding, which would crack the shell.