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Prototyping Guide

Phoenix Analysis & Design Technologies (PADT) is a recognized leader in delivering a variety of prototyping options to its customers. The manufacturing staff has prepared this document as a guide to customers on the various technologies that can be applied to meeting their needs. The first step in the prototyping process is for you to send a solid model or drawings to PADT via e-mail, FTP or magnetic media. The staff then evaluates the geometry and the end use and prepares a quote for the proper technology. Once an order is placed, the staff will prepare, manufacture and post-process your prototypes. The staff is always ready to work with you and to answer your questions, so please do not hesitate to call.

Stereolithography

Equipment:	*SLA 250/50 w/ Solid State Laser*
Build Volume:	*10″ x 10″ x 10″*
Build Resolution:	*0.002″ to 0.008″*
Materials:	*RPC 100ND (General Purpose)*
	SOMOS 9120 (Flexible, Mimic Polypropylne)
Advantages:	*Very Accurate, Surface Finish*

Stereolithography, often abbreviated as SLA, is the most accurate and the most common rapid prototyping method. The process is based upon the fact that certain liquid polymers cure when exposed to ultraviolet light. An SLA machine builds parts one layer at a time by focusing a laser beam onto the top layer of a resin vat. A thin layer of material cures immediately wherever the laser hits. An elevator then lowers the solidified layer down a small amount and this process is repeated one layer at a time until the part is completed. A set of scanning mirrors directs the laser beam to draw one cross section of the intended object based upon a cross section obtained from a 3D Solid model.

Fused Deposition Modeling

Equipment:	*FDM2000*
	Prodigy
	Dimension
Build Volume:	*10″ x 10″ x 10″*
Build Resolution:	*0.005 to 0.030″*
Materials:	*ABS Plastic*
Advantages:	*High Strength*
	Cost Effective
	Water Proof

Fused Deposition Modeling, abbreviated as FDM, is a very user friendly layered manufacturing process. As with other methods, a 3D Solid Model is sliced up by software. The sliced geometry is used to guide an extrusion head that lays down a very thin bead of molten plastic. Each layer is placed on top of the previous layer until the part is completed. A good way to describe the machine is a robotic glue gun. But instead of glue, the machine works with ABS plastic or wax. It is an ideal technology for strong parts that are exposed to temperature or water. Because it uses ABS, it is also ideal for prototyping parts that will be made of ABS in production. Different Colors are available.

Selective Laser Sintering

Equipment:	*Sinterstation 2500 Plus*
Build Volume:	*14 x 12″ x 17″*
Build Resolution:	*0.003″ to 0.006″*
Materials:	*Duraform PA*
	Glass Filled Duraform
	Castform PS Polymide
Advantages:	*Very High Strength*
	Large Parts & Fast

Selective Laser Sintering is a layered rapid fabrication process. SLS creates three-dimensional objects from powdered materials in a layered fashion, using heat generated by a CO_2 laser within the Sinterstation. CAD designs are transferred to the Sinterstation, where they are sliced and "drawn" one cross-section at a time, by applying the laser beam to a thin layer of powder. The laser beam fuses the powder particles to form a thin layer of solid mass. As each layer is drawn, the prototypes take shape within the Sinterstation. The SLS process is unique because it allows for the use of a variety of powdered materials that are heat and chemical resistent.

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Plastic Injection Molding

Technology:	*Epoxy Tooling*
Materials:	*ABS, ABS-PC, Nylon 66/GF Crystal Styrene, Polypropylene, Acetal*
Advantages:	*Fast Accurate Parts Molded in Engineered Plastics Cost Effective*

Epoxy Tooling is used for short run or prototype injection molding applications. The process uses an SLA or machined part as a master to cast an aluminum filled epoxy mold. The result is a reasonably priced tool that can process typical injection molding resin pressures and temperatures. Complex parts can be accommodated using manual operations that are inherent to the prototype tooling. This powerful technology allows economic testing and product development with the end use engineering plastics.

Thermo-Vacuum Forming

Equipment:	*EMC Thermoformer*
Build Volume:	*24″ x 36″ x 10″*
Materials:	*Most Plastic Sheet Stock Clear Lexan*
Advantages:	*Cost Effective High Quality Finish Clear or Colored Material Strong Parts Good for Multiple Parts*

Thermo-Vacuum forming is a traditional plastic manufacturing method that is an extremely cost effective way to make multiple prototypes or small production runs of thin-walled plastic parts. The process is relatively simple. A pattern is made that represents the inside surface of the object you wish to make. It is placed into the machine along with a thin sheet of plastic. The plastic is then heated to a temperature where it becomes very flexible. The plastic is then lowered over the pattern and a vacuum system pulls the plastic down tightly over the pattern. The formed piece is then removed and trimmed.

RTV Molding/Resin Casting

Technology:	*RTV Silicon Rubber Tooling Resin Casting*
Materials:	*Rigid and Flexible Urethane Epoxy*
Advantages:	*High Strength Large Parts High Quality Short Lead-Time Multiple Parts*

RTV Rubber Molding & RTV Castings is a fast and affordable method of creating multiple plastic parts from a single pattern. PADT's modeling staff utilizing in-house model making and rapid prototyping technologies to create high-quality patterns for use in the molds. The basic process requires a pattern that is prepared and placed into a mold box. Rubber is poured around the pattern and allowed to harden. The pattern is then removed and plastic is injected to create the final parts. PADT can create up to several dozen copies using this method. The finished parts can be painted and textured as required by the customer. Many PADT customers use this service to create marketing and trade show mock-ups of their new products.

Model Fabrication

Technology:	*Craftsmanship*
Materials:	*Wood ABS Renshape Acrylic Plexiglass*
Advantages:	*Look Alike Work Alike Complex Assemblies*

Model Fabrication is often times the best solution for a large spectrum of projects. A model is usually made by hand out of plastic, wood or foam using a variety of tools. Each part is then hand finished and painted to the customer's specification. Finished models can be mounted on pedestals and motors can be added to show moving parts. PADT offers a unique service because the experience and expertise of our model makers is coupled with our Rapid Prototyping capabilities and our world class computer aided design engineers. Our model shop contains all of the necessary tools including a mill, lathe, sanders, saws and a full paint booth. Attention to detail shows on every part and in how parts are assembled together.