

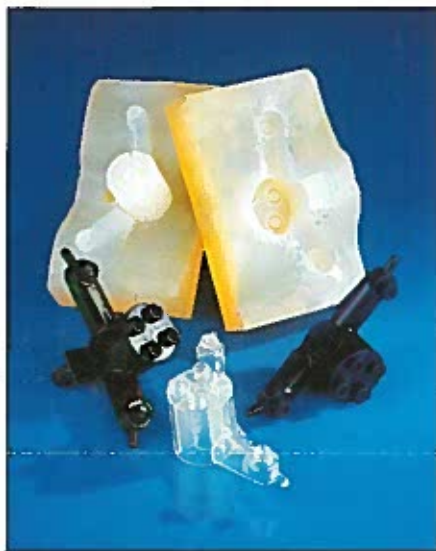
Vacuum casting reduces prototype costs

IN THE LAST TEN YEARS industrial products are being made increasingly in plastic materials. For this reason it is necessary to produce prototypes in thermoplastic-type materials to check the design, function and appearance of each item. Development costs using conventional methods are very high: hand laminated models made of plastic sheet are very expensive and do not offer the required quality, dimensional accuracy or stability. The quickest and simplest method is to use vacuum casting technology to produce moulds and components that can fill these requirements.

Samples and prototypes are used for different stages of the development of a product. They are used for image and design assessment as well as for functional testing of the actual product (see Table 1). A method for producing these low-run prototypes is the MCP Vacuum Casting System, which uses thermoplastic-type resins in silicone moulds.

The basis of this system is the master mould or pattern. It can be made of any material such as plastic, wood, metal, plaster or stereolithography (SLA). Even temperature-sensitive models from wax can be used without taking special precautions.

The first step is to decide on and prepare the parting line of the model



MCP Vacuum Cast components with the mold.

and fix the casting gate into which the resin is cast. These are then placed onto the casting frame. The silicone rubber is evacuated of air utilising the vacuum casting chamber of the machine.

The process of casting the mould is also done using vacuum which guarantees dimensionally accurate, void and bubble-free moulds. The mould is left to

harden in the curing oven at a predetermined temperature and time. After hardening is complete the undamaged model is removed by cutting along the parting line to reveal a mould cavity representing the model in every feature. Should the mould need to be replaced, the model can be used repeatedly.

Vacuum casting of the resins begins with the weighing of the two resin components. For coloured castings, pigments need to be added to the resin. The mixing cups are placed in the vacuum chamber of the machine and the first set-up is run with manual mode on the microprocessor. After the first totally successful casting operation, the parameters are stored on the computer to guarantee perfect results from all further castings.

The resin formulations are an important factor of the system. The materials range from soft types with Shore 40A through types comparable to polypropylene or ABS. High-temperature materials are available for "under the hood" applications as well as "water clear" formulations for optical work. Shrinkage of only 0.2-0.3% creates no dimensional problems. Ribs and cavities can be reproduced due to high viscosity of the resins.

The MCP Vacuum Casting System is suited to the production of prototypes for all industrial requirements such as for automotive, electrical, telephone, home entertainment, toys and computer housings. A complete range of machines is available, up to the new 006 type with a 7-foot chamber, capable of producing car bumpers, dashboards and large TV housings.

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Table 1

Development stage	Requirements	Number of units produced
Planning	Planning new products	1
Artwork	Check and confirm product	1-4
Design	Check and confirm design	4-10
Research & Development	Check and calculate functional checks	10-50
Mechanical Engineering	Check and confirm costs and preparations for full scale production	50-5000
Development & Organisation	Final and complete check of production run	1-5000

Table 2

Tooling processes for producing samples, prototypes and low-runs					
Process	Cost	Moulding size	Manufacturing	Components	Reusability
Steel ¹	100%	unlimited	60 days	over 100,000	under 5%
Zinc ²	70%	4 kg	40-50 days	10,000	90%
Nickel ³	23%	2-4 kg	60 days	5-10,000	No
MCP/TAFA ⁴	15%	3-5 kg	within 3 days	1,000-6,000	90%
Silicone ⁵	2-3%	4 kg	8-12 hrs	approx 100	No

¹Machined steel
²Cast zinc
³Electroformed nickel
⁴Metal Spray
⁵MCP Vacuum Casting System



MCP Vacuum Casting System.