

METAL MOLDS ^a

Donald F. Gearhart, D.M.D.
Chief, Restorations Service

Veterans Administration Prosthetics Center
252 Seventh Avenue
New York, N.Y. 10001

The Restorations Service of the VA Prosthetics Center, New York City, has been active in the research, development, and testing of methods and materials used to fabricate facial and other body prostheses. Since its work deals with the prosthetic treatment of the body surfaces, only extra-oral restorations to the head and face are provided.

The Service's earliest work in making metal molds was applied to developing a dependable mold for making the hand forms for use with the cosmetic glove, a great challenge at the time. The first attempt involved an electrolytic process for developing a mold surface. This was hopeless due to the many chemical problems involved and the cumbersome equipment required. The first successful metal molds were made with metal spray equipment for making metal molds. The equipment required an excessive amount of care in its operation with consistent good results hard to obtain, and it was a dangerous operation. Practice in the use of the equipment was improving the results when it was discovered that the Devcon Corp. was introducing a material for making molds known as Devcon Epoxy Steel. Early studies with this metal epoxy showed some good possibilities, but it was heavy and had a tendency to rust which could stain the polyvinyl plastic material being used in the fabrication of the restorations. With proper care to avoid oxidation of the mold, the Restorations Service was able to produce prostheses of acceptable quality with these molds. At last a simple method for metal mold making was available.

A short time later the Devcon Corp. introduced Devcon Epoxy Aluminum, the best contribution of all to metal mold making. It consists of 80-percent aluminum and 20-percent epoxy plastics and modifiers. With this material, metal mold making was further simplified and the risk of oxidation was eliminated. The fabrication of high-quality prostheses was also consistent. The epoxy-aluminum molds are sufficiently strong for fabricating facial prostheses. Every detail of the sculpturing is identically transferred

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to these molds. Heat transfer is also enhanced for curing the vinyl resins.

The epoxy-aluminum mold transfers details of a wax surface without detrimental effects on the epoxy material of the mixture. If sculpturing is done in plastilene, however, the oils will contaminate the epoxy of the Devcon mixture to the detriment of the mold surface. For this reason it is necessary first to make a dental stone mold and cast a vinyl prosthesis. The vinyl prosthesis is then sealed in position on the original stone cast and readied for duplicating in Devcon Epoxy Aluminum.

The Restorations Service also uses low-fusing plastisol resins in prostheses which require both heat and pressure for curing. Metal molds are adaptable for use with room temperature vulcanization (RTV) silicones and soft acrylic resins.

Selectively, vinyl resins require variable temperatures of heat and pressure for curing. For such uses, the mold can be reinforced with strips of aluminum $\frac{3}{16}$ in. x $\frac{1}{2}$ in. stock. The strips can be embedded in the soft epoxy-aluminum mixture while making the mold. They are located near the external surfaces at the top and bottom of the mold. The added aluminum strips improve the rigidity of the mold when exposed to heat. With the epoxy-aluminum mold completed, the parts may be assembled and two convenient marginal locations selected for drilling from top to bottom through the embedded strips and assembled parts. These openings are then tapped for bolts to be placed down through the top of the mold. When the bolts are completely drawn tight, the mold is securely held together. The procedure completely eliminates any need for external clamps, and the mold with its plastic content is ready for curing with heat and pressure.

However, for facial prostheses polyvinyl copolymer solution is preferable. To employ this particular plastic only the original dental stone mold is needed. The stone mold is duplicated in metal only when the prosthesis is not to be duplicated frequently, or where changes in the form of the prosthesis will continue to be minimal.

In summary, there is no perfect material for all mold requirements. Epoxy-aluminum molds are best in some applications while dental stone molds are equally valuable for others.