

## THE DENTAL TECHNOLOGY IN ART FOUNDRY

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### ABSTRACT

*The paper presents results of a study undertaken to implement the dental casting technique of small parts characterized by extremely complex drawings of surfaces and thicknesses reduced specific objects. During the study there was a similarity between this technique and casting forms obtained with models used to obtain spare fuses in the car industry. They could highlight differences between the materials and the equipment used in dental technology and art foundries.*

KEYWORDS: dental, foundry, design, casting technique

### 1. Introduction

Achieving a work of art or decorative, or cultural, is a challenge to any existing foundry and, especially, informer. For the production of small objects, whether jewelery or religious objects or souvenirs or ornaments, with accessible, economical technology, can be a profitable productive activity. The dental technique, with specific castings and tools developed to produce them, is an alternative to large, massive machines that require large space for installation and operation, and high consumption of materials and energy.

In addition, this technique provides the possibility to obtain thin-walled parts without surface defects, which usually requires no further machining. The possibility to obtain complex parts attracts the attention of artists and art foundry, giving at the same time, ideas to dental technicians.

Time has moved from manually operated centrifugal cast machine or vacuum has changed the construction of the fuse model, forms and methods of implementing the execution model etc.

In general the phases of dental technology are the same as those encountered in the casting of precision engineering industry, with differences in the chemical composition consisting of alloys and training materials, equipment size, etc.

### 2. Making mold and fuse model.

#### Owner results

Making a model casting part that the subject of this study, taking into account the complexity and difficulty of its exectuției was not possible for this

purpose using a brass icon whose design had a very complex: design complex and reduced height and thickness of the reduced model details as seen in Figure 1.



**Fig. 1.** Metal model used in the study

Unlike dental technique which fuses are easily realizable models for each paper in the study to obtain models chosen for making a mold capable of providing a large number of children in terms of reproduction and fine detail, the suitable material for obtaining them are caucicul silicone. By this method we adopted is different and quite common procedures foundries to manufacture precision molds which are currently used metallic materials, easily fusible metals, plastics etc.

Again, the main conditions imposed molds are perfect:

-play configuration model as the original metallic, precision piece depends, largely, the

dimensional accuracy of the model, a goal achievable through more precise machining and finishing mold advanced as the active surface or, if metal molds, chrome plating work surfaces thereof;

-keeping the size as well during the manufacturing technology fuses models, not to produce the dimensional deviations between tracks;

-making it at least cost to the number of parts is poured.

Taking shape piece (making mold - Fig. 2) was quite easy by pouring silicone rubber, in turn, form the two cavities separated by surfaces and contraformele piece of plaster made previously, the separation plan, configuration, model, representing it its flat surface.



**Fig. 2.** Matrix used to obtain models fuses

Fuses to obtain models (Fig. 3) was used dental wax, which melted, was injected into the mold. Injecting wax into the mold, the mold melt extraction model and its finish, before being put on stream operations is seen with conventional precision casting.



**Fig. 3.** Model easily fusible

"Frame" used to achieve form a metallic cylinder with a diameter of 100 mm, closed at one end with a cover that is integral with the casting funnel model, centrally located. The icon, different in shape and dimensions of castings usually in dental technology workshops, also meant a disposition otherwise shaped patterns (Fig. 4): back to back, evenly spaced about the stem of the funnel and the rods of wax it, and ventilation channels, all the wax, fixed to the back of each.

Network hardware is made based on the same criteria as for casting accuracy, making sure that it has little weight as possible to achieve a minimal

casting alloy, condition very important, especially for alloys high cost.



**Fig. 4.** Layout models as a whole form-fitted models on the table vibrating, ready pentru turnarea mass packaging

Generally, the material used in dental technology training is a mixture of refractory material (usually silicon dioxide), binder (calcium sulfate, phosphate, ethyl silicate etc..).

And other chemicals, used to ensure certain properties physical. This material, marketed as "packing table" not specified composition representing Supplier's secret.

To obtain the mixture of training, all materials used in dental technique, using a container (bowl) and a clean spatula, scrap material enhanced hardness can reduce interference, change and modify the setting time dilation. Have the manufacturer's requirements fully, being about a particular product.

Mixture was mixed in vacuum forming, thus ensuring uniform mixing of air and remove it, then

was cast in the form carefully placed on a vibrating table. Forms manually tamping method is inadequate, because on the one hand wax models can be damaged and the other does not get a uniform compaction of the mixture and the complete elimination of air bubbles which form to fill box saturated mixture.

After hardening and cooling shape at 35-40°C (the process of strengthening the reaction mixture creates heat), it is placed in an oven pre-heating (Fig. 5), cone down on such support that they can escape wax, which will be heated to remove the wax and bring it to the casting temperature.



*Fig. 5. The oven used to dry forms.*

Casting alloy to form precision models in forms fuses is warm, with temperatures above 800°C, to ensure their proper filling. The temperature inside the oven to start the heating process of the form is the environment.

Turning water into steam in form, with increased intensity, starting at a temperature of 110°C. During evaporation, the temperature remains at 110-120°C shape, and when it reached the center temperature of 120°C, the evaporation is finished and the temperature rises again.

Cristobalitului transformation starts at a temperature of 220°C form increased in intensity up to 255°C, where transformation reached its climax, and ends at a temperature of 270°C. In the phase where cristobalitul turns itself form temperature should be between 255°C and 270°C. In the packed mass heating, quartz transformation does not begin

until the temperature reach 570°C, and between 570 to 580°C in a period of 30 minutes, to create optimal conditions for transformation of quartz. It is important that this temperature is reached inside the shape.

Quartz sintering occurs between 820-860°C and is not subject to time. This process takes place without causing movement of expansion or contraction. This phase is particularly important for precision work. Working temperature of the packed mass must always reach 900°C to ensure smooth and accurate surface detail molded cast part.

Casting icon was made of two alloys used throughout the dental technique, respectively gaudent (9.65% Al, 4.25% Ni, 2.07% Fe, 1.18% Mn, remainder Cu) and niadur (62% Ni, 24.5% Cr, 10.3% Mo, 1.7% Si, 1.5% Fe) and electric resistance was melting. (Fig. 6)



*Fig. 6. Electric molding furnace*



*Fig. 7. Centrifugal casting in plant field*



a



b

**Fig. 8.** Finished piece: a - from gaudent; b - from niadu

To achieve piece molding technique was used centrifuge machine used for this purpose is shown in Figure 7.

After cooling the alloy, form was destroyed in order to extract part of it, they are subject to further removal process known network hardware and finishing, obtaining finally finished icons (Fig. 8).

### 3. Conclusions

Forms of plaster, usually are part of permanent forms, while they are forms of temporary dental service, the packaging of this model requiring fuses.

Forms obtained with fusible models allow casting a special dimensional accuracy even in art, where models are highly complex and can not be "copied". In modeling does not take too much account of contraction.

Forms of plaster used in the study will produce parts with very smooth surfaces, what if parts of the category of art is a basic ceriță. The high percentage of water in mixtures used to obtain forms, requires the use of their hardware only after their complete drying, the difference, the net favorable dental technique, consisting in reducing the period of 10 to 12 times.

By casting models forms easily fusible, the technique adopted, it can get pretty thin walled parts, and can thus significantly reduce the weight of the object.

Casting method in accordance with fusible models in precision casting, allows recovery of burnt material, while in dental technology that burns thus lost.

Materials used to obtain the forms in the studies normally use dental technique, are trade secrets of companies supplying and using them is by their recommendations. Plaster forms, even when used for packaging weight, are relatively inexpensive compared to other precision casting processes.

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