

# PRODUCTION OF REMOVABLE DENTURES BY INJECTION MOLDING OF THERMOPLASTIC MATERIAL



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Sun Rise Laboratories, which has 14 years' experience in manufacturing orthopedic dentures using jet molding technology, brings now to your notice series of articles related to thermoplastic materials. Specificity of these materials is illustrated with the examples from real clinical practice.

## Materials

In the days of rapid growth of living standards and widespread people's awareness of technological progress in dentistry, interest increases in production of different types of removable dentures made of thermoplastic materials, which the technology is being considered as a step-ahead solution on the way towards achievement of high-level aesthetic standards. The present article is referred to the first stages of production of flexible prostheses using thermoplastic material **Flexi N512** (Evolon Ltd, Israel).

**Flexi N512** is a high-molecular polyamide-type light, flexible, elastic and stable polymer notable for its optimal flexibility, years-long retention of original shape, quality and performance attributes. While producing, the material is added with high-quality coloring agents (pigments) that provide magnificent realistic color and unique translucent properties that make it virtually imperceptible in mouth cavity. We use this material as a flexible base for partially removable dentures.

## Proposed clinical use

The material is being used to repair small and medium defects in tooth alignment, for manufacture of cosmetic dental clasps and temporary denture in post-implantation period, in cases of traumatic losses of permanent teeth in children, as a thin denture base for patients with excessive gag reflex.

The material represents an ideal solution in cases of recurring fractures of acrylic dentures, fabricating dentures for patients with allergic reactions and making dentures for patients with chronic conditions.

Such frames are applicable as a gingival prosthesis meant for correction of a lip line and recommended for the people whose occupation puts them at risk of maxillofacial traumas.

Choice of these prosthetic repair methods arises from their obvious advantages for both professionals and patients. They widen spectrum of optimum solutions for orthopedic works including performance of complex operations that combine use of different types of thermoplastic polymers with acryl and metals. At the same time, **Flexi N512** stands well against "curling", lends itself favorable to processing and polishing thereby substantially simplifying the work of dentist and dental technician.

As a result, you improve profitability of your business and a patient obtains comfort and excellent aesthetics.



**Photo 1**



**Photo 2**



**Photo 3**



**Photo 4**

## **A clinical example**

### **Impressions**

Thus, the decision has been made in a clinic to repair tooth alignment using flexible thermoplastic material **Flexi N512**. For impression taking alginates are used that are known as materials providing accurate imprints under relatively low pressure exerted upon oral mucosa. Alginates do not require rapid casting and this feature is their additional advantage.

Photos 1-4 show stages of preparation of the base-plate tray and taking impression.

### **Analysis**

Analysis of an impression and a model that should be performed conjointly by dentist and laboratory technician and targeted to taking an optimal solution for a particular case, is the next stage of the process.

Adequate choice for a model design is the key to successful dent fabrication. At our courses we consider in detail all the spectrum of options common for thermoplastic materials including processing compositions with various materials such as metals, acryl and acetal.

### **Designing**

Designing of a future denture and marking out future borders of the frame is an extremely important stage (see Photos 5-7).



**Photo 5**



**Photo 6**



**Photo7**

The denture border should round muscles of mucosa and not extent to the mucosa's moving part. The borders shall be covered with thin layer (0.1 mm) of wax. It may be seen, in the present specific case, that **Flexi N512** blankets minimum of a patient's palate on both palatinal and buccal parts. One more advantage of **Flexi N512** is that the material keeps its functionality being of minimum dimensions and thickness. The frame with thin connector gives a patient feeling of comfort, allows quick and painless accommodation to the new denture.

Now, please pay attention on how the denture clasp's borders are lined up: it is important here to take into account its functional purpose. The clasp shall be lined up in such a manner that makes distribution of forces acting on the alveolar crest while chewing to be most facilitative. At the same time it shall look absolutely aesthetic: one third of the clasp shall fall at the neck of the tooth (up to its equator) and two thirds – at gingivae. At the final stage, the clasp should replicate the papilla's shape. Care must be exercised that borders of the clasp follow teeth shape and coincide with constitution of oral cavity.

Zones of concavities should be blocked at this stage. It is important to prepare abutment teeth for the denture painless seating fit. Blocking at abutment teeth shall be performed using parallelometer. Traumatic zones left after tooth extraction and all abnormalities shall be blocked as well (see Photos 8-10).



**Photo 8**



**Photo 9**



**Photo 10**

### **Duplicate**

Just after a duplicate model has been fabricated and up until the processing stage, all operations shall be applied to the duplicate.

Many dentists use various technical-grade silicon materials to fabricate duplicate models. But it should be taken into account that all such materials are featured with their specific shrinkage and extension factors. While solidification of silicon mass, expansion forces are directed from periphery of dental flask to its center and this may lead to unaccounted shrinkage of the model. And despite the fact that such shrinkage is micrometer-sized only, it may result in excessive pressure acting upon mucous of oral cavity. That's why gelatin-made duplicate model is the best solution (see Photos 11-13).



**Photo 11**



**Photo 12**



**Photo 13**

It should be pointed out that in our case gelatin intended for work with plaster is used (important note: in no case gelatin meant for manufacture of metal constructions shall be used!). Expansion forces while gelatin jelling are acting from flask center to its borders thereby creating optimal conditions for providing accurate matching between duplicate model and the situation that takes place in oral cave.

We will continue discuss the subject in the next issue of the Journal with spotlighting such topics as criteria and nuances of manufacturing process that are conducive to stable quality of aesthetic restorations.