



## A CURSORY INTO CASTING PROCEDURES

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### ABSTRACT

According to Rosensteil casting is the process by which a wax pattern of a prepared tooth is fabricated and converted to its metallic replica. Casting techniques in dentistry have received wide spread consideration by many researchers. To satisfy the requirements for a superlative restoration, a casting must be made to fit the prepared tooth accurately. Although the goal of impeccable reproduction is an ideal for which we strive, it should be accepted that for all practical purposes we can only hope to style it. This article discussed the various techniques used for casting procedures in dentistry and the recent advances.

**Key words:-** Rosensteil, Casting techniques, dentistry.

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### INTRODUCTION

Casting is defined as something that has been cast in a mold, an object formed by the solidification of a fluid that has been poured or injected into a mold (GPT). According to Rosensteil “Casting is the process by which a wax pattern of a prepared tooth is fabricated and converted to its metallic replica”. Alloys used for dental casting must demonstrate biocompatibility by conducting toxicity testing according to ANSI/ADA document no. 41, which describes recommended standard practices for biological evaluation of dental materials [1].

Corrosion testing must be completed for new alloys by comparing their performance to alloys that have been in use successfully for at least five years. The corrosion test is a static immersion test that is performed by immersing samples in an acidic solution at 37 C for seven days. The sample is removed and the residual solution is analyzed for metal ion release. Additionally, testing must be conducted to determine the potential of the alloy to tarnish. Casting alloys are used for inlays of all classes, as well as for individual partial- and full-coverage restorations and frameworks for fixed and removable partial dentures. These alloys also can be used for restoration posts and cores and for splints [2].

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## History

In approximately 500 BC, the Etruscans produced bridges made of soldered gold bands. The most ancient dental prosthesis fabricated from gold wire was found in Egypt and dated as far back as 2500 BC. Copper was cast in Mesopotamia in about 3000 B.C. The oldest dental castings were gold inlays found in teeth from the natives of Ecuador in about first Century AD. In 11th Century AD, Theophilus described lost wax technique, which was a common practice in fabrication of jewelry. The renaissance craftsman and sculptor Benvenuto Cellini (1500-1571) in his autobiography described his method of casting in both gold and bronze by coating his finely detailed wax model with a reinforced refractory shell. In 1558 B. Cellini attempted use of wax and clay for preparation of castings. Dr. Philbrook demonstrated the 1st cast gold inlay in the Dental Society. In 1903 Lentz cast occlusal surfaces to banded gold crowns by the lost wax method of mould formation but apparently did not apply his technique to the fabrication of cast inlays [3].

## Methodology

Reproducing the wax up in metal with predictable results has always been a challenge. Small variation in investing or casting can significantly affect the quality of the final restoration. Successful castings depend on attention to detail and consistency of technique. Objectives of casting are to heat the alloy as quickly as possible to a completely molten condition and to prevent oxidation by heating the adequate pressure to the well melted metal to force into the mold. Steps involved in the casting process are tooth preparation /cavity preparation, making an accurate impression, die preparation, wax pattern fabrication, spruing, investing, burnout, casting and finally cleaning & polishing.

For each step due diligence should be given. Tooth preparation should be done by following the appropriate principles and impression should reproduce the details accurately. The impression should be made with a dimensionally stable material and die cutting must be done according to the guidelines. The wax pattern should be anatomically accurate and should be made just before the investment process is to be carried out. The investment material should be selected according to the alloy that is to be used. It should compensate for shrinkage of molten alloy by expanding [4].

The burnout procedure employed must be governed by the specific investment material and technique used. For low temperature metals, mixture of natural/artificial gas, oxygen/tank gas –oxyacetylene can be used. It is less faster than electric heating but more faster than resistance heating. Electric melting is used for higher temperature metals. Electric resistance melting, induction melting melts alloy faster & can be easily over heated. So care must be taken [5].

After the casting has solidified the ring is removed and quenched in water. This leaves the cast metal in annealed condition resulting in a porous, soft, granular investment that is easily removed (Gold alloys). Often the surface of casting appears dark with oxides and tarnish, such a film can be removed by process called pickling.

## Types of casting machines

Centrifugal casting is a method of casting parts having axial symmetry. The method involves pouring molten metal into a cylindrical mold spinning about its axis of symmetry. The mold is kept rotating till the metal has solidified. Mold material like steels, Cast irons, Graphite may be used. The mold wall is coated by a refractory ceramic coating. Rotation of the mold is at a predetermined speed. Molten metal is poured directly into the mold. The mold is stopped after the casting has solidified and extraction of the casting from the mold is done.

Direct current arc is produced between two electrodes Alloy & water cooled tungsten electrode. When the temperature within the arc exceeds 4000 °c, the alloy melts very quickly. Disadvantage is that the alloy can become overheated.

Electrical resistance heated casting machine is an automatic melting of metal in graphite crucible. This is advantageous for metal ceramic restoration in which trace amount of base metals are prevented from oxidation by preventing overheating [5].

## Titanium casting

Several equipments are commercially available for casting titanium but their cost is considerably higher than the conventional casting equipments. Materials with low reactivity are used to prevent superficial reactions with the melted metal while materials with high expansion are used to compensate the high shrinkage of titanium. For this purpose, it is preferable to use titanium alloys. The most common is the Ti–6Al–4V alloy, mainly because of its simple reproducibility [6].

There are three main types of titanium casting systems: casting under pressure/vacuum with separated chambers of melt and casting; casting under pressure/vacuum with a single chamber of melt and casting; casting under vacuum/centrifugation. Also, dental titanium casting can be accomplished through the methods of centrifugation or pressure/vacuum . The metal is melt with an electric plasma arch or through inductive heating in a chamber full of inert gas or at vacuum. The metal is melt and then is transferred to the refractory mould through the centrifuge or through filling under pressure/vacuum [7,8].

## CONCLUSION

Casting procedure plays a huge role in the success of the prosthesis. Proper knowledge of the

procedure is hence crucial. This article provides a brief outlook into the casting procedures from historical aspects to recent advances.

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