



UNIVERSITATEA DE STAT DE MEDICINĂ ȘI FARMACIE  
„NICOLAE TESTEMIȚANU” DIN REPUBLICA MOLDOVA

# Artificial crowns. Cast crown.

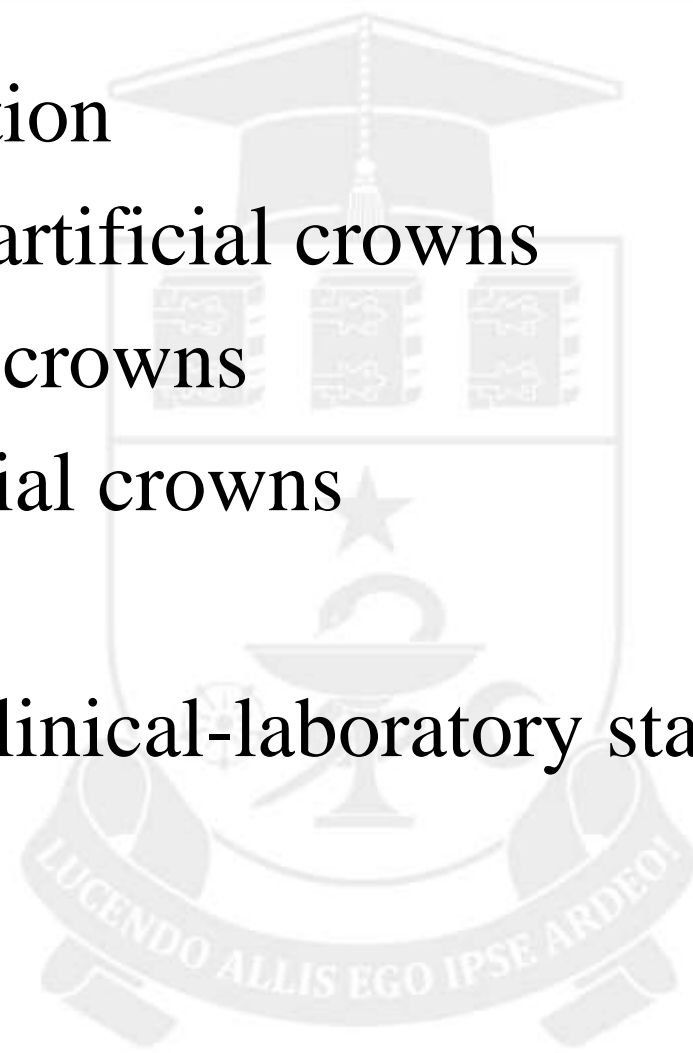


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Catedra de propedeutică stomatologică  
“Pavel Godoroja”*



# The content of lecture

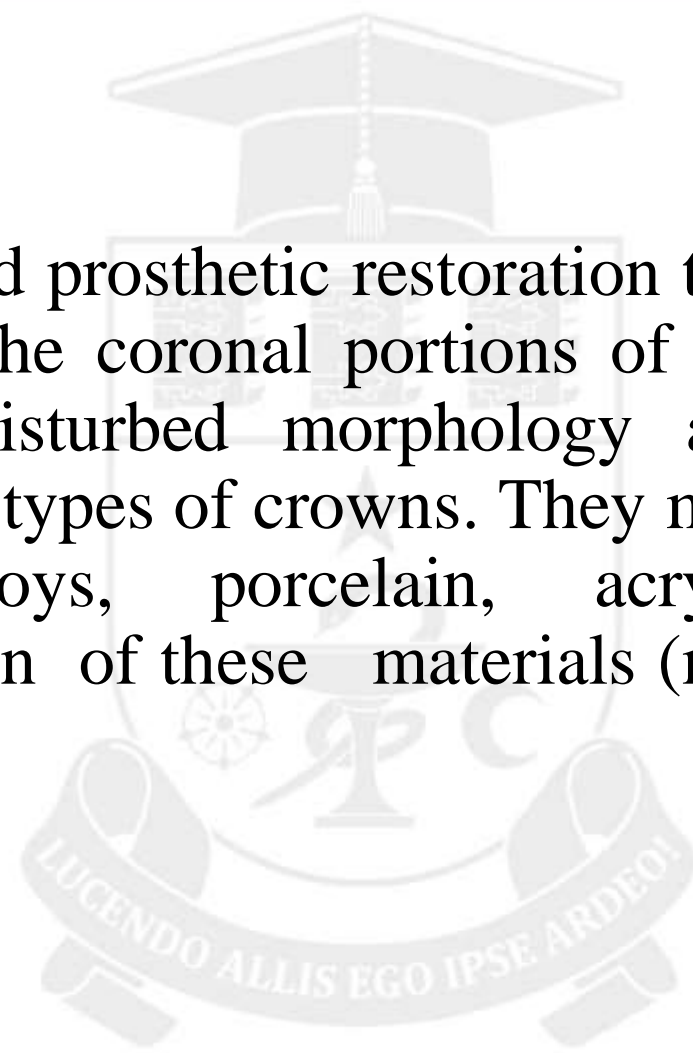
- Artificial crown. Definition
- Classification of dental artificial crowns
- Indications for artificial crowns
- Requirements for artificial crowns
- The Stamp crown.
- The Full Cast crown. Clinical-laboratory stages.
- The Casting process.





# Artificial crown. Definition.

An artificial crown is a fixed prosthetic restoration that covers more than half of the coronal portions of the tooth, establishing the disturbed morphology and function. There are several types of crowns. They may be made of metal alloys, porcelain, acrylic polymers or a combination of these materials (m/c or m/a).





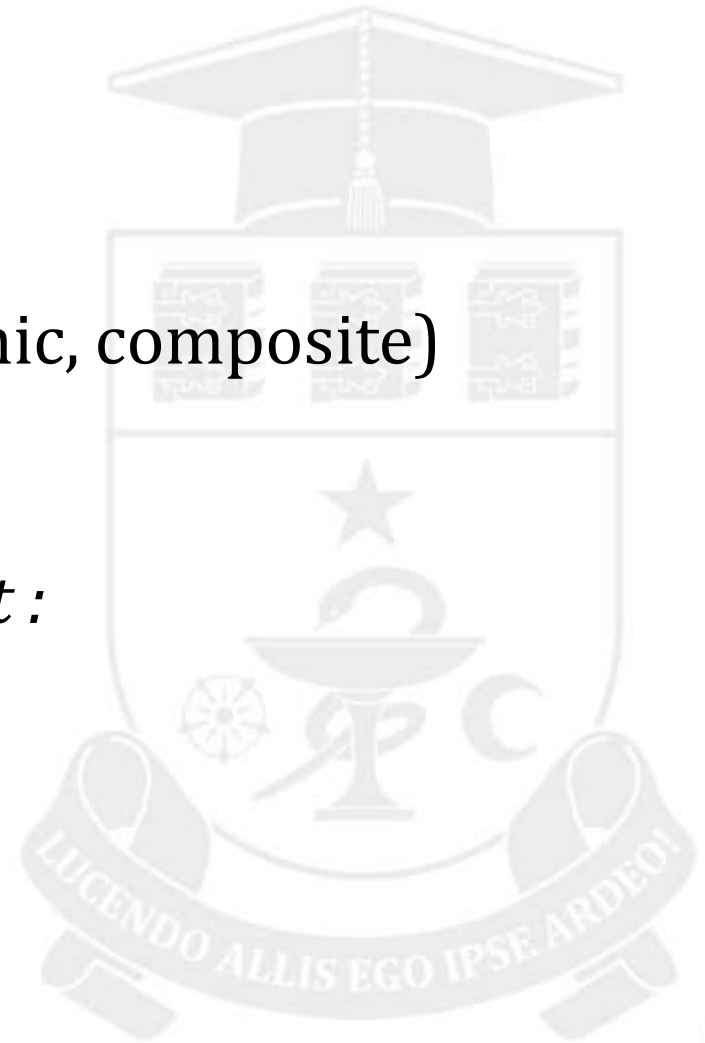
# Classification of dental artificial crowns:

## 1. *By the material:*

- Metallic
- Nonmetallic (acrylic, ceramic, composite)
- Mixed

## 2. *By the physiognomic aspect :*

- Physiognomic
- Non physiognomic
- Half-physiognomic





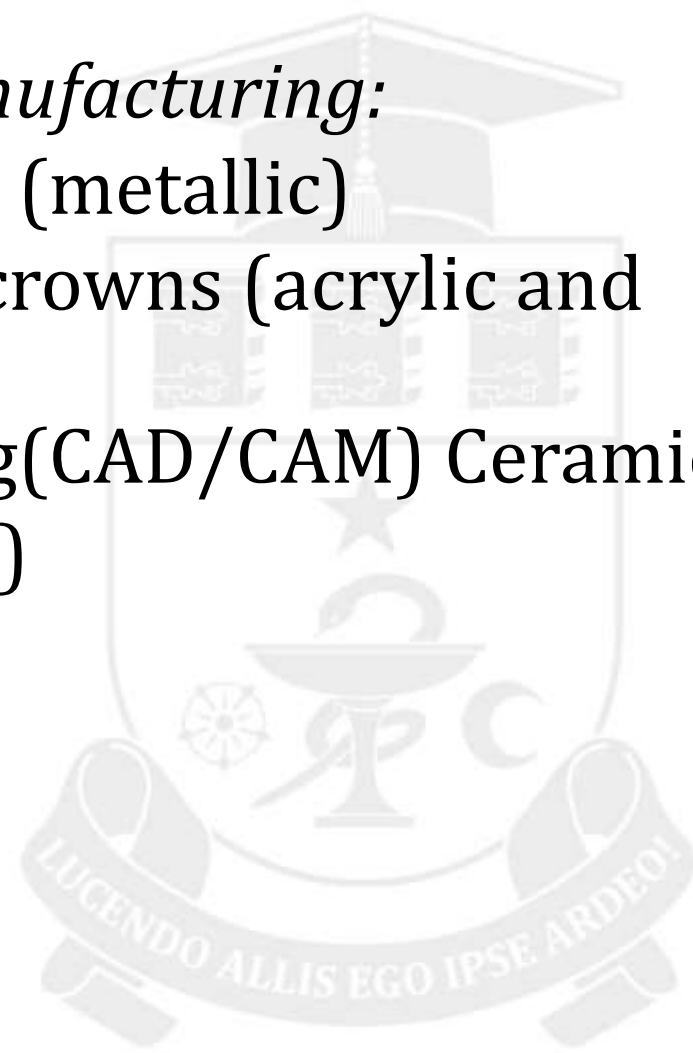
# Classification of dental artificial crowns:

## 3. *By the technology of manufacturing:*

- Stamp and Cast crowns (metallic)
- Light, self or hot cured crowns (acrylic and composite)
- Burned, pressed, milling(CAD/CAM) Ceramic
- Mixed ( casted +burning)

## 4. *By the period of use:*

- Temporary
- Permanent

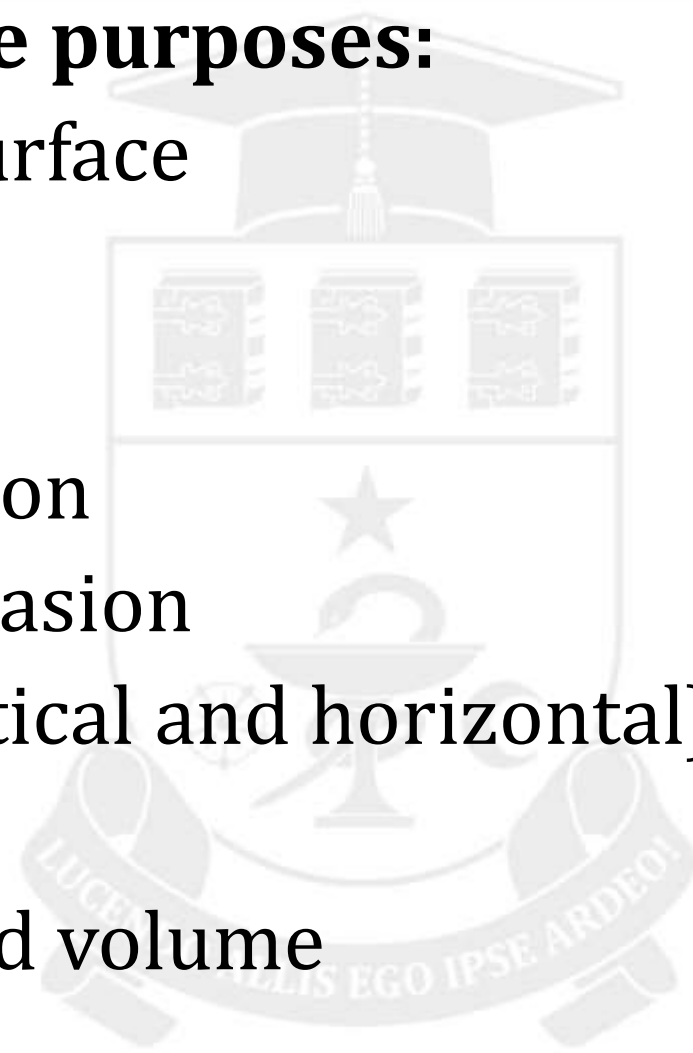




# Indications for artificial crowns:

## **For restorative purposes:**

- ❖ Extensive cavities in surface
- ❖ Crown's fractures
- ❖ Deep cavities
- ❖ Dental localized abrasion
- ❖ Dental generalized abrasion
- ❖ Dental migration ( vertical and horizontal)
- ❖ Color changes
- ❖ Anomalies of shape and volume

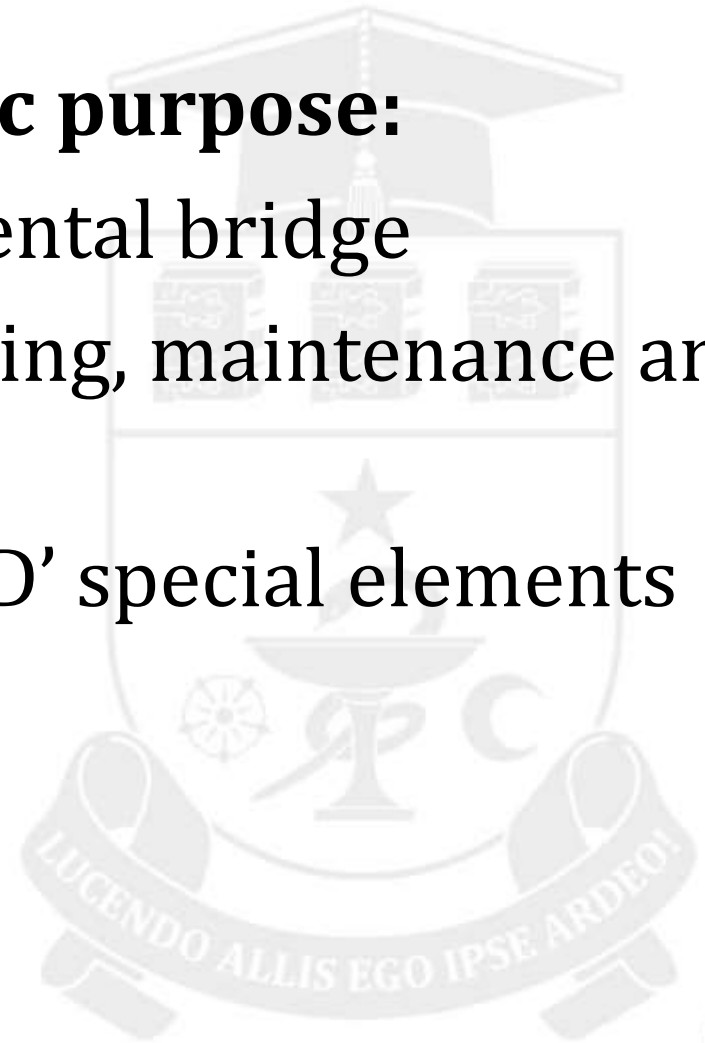




# Indications for artificial crowns:

## **For prosthetic purpose:**

- ❖ Support element for dental bridge
- ❖ For application anchoring, maintenance and stabilization elements
- ❖ For application the RPD' special elements

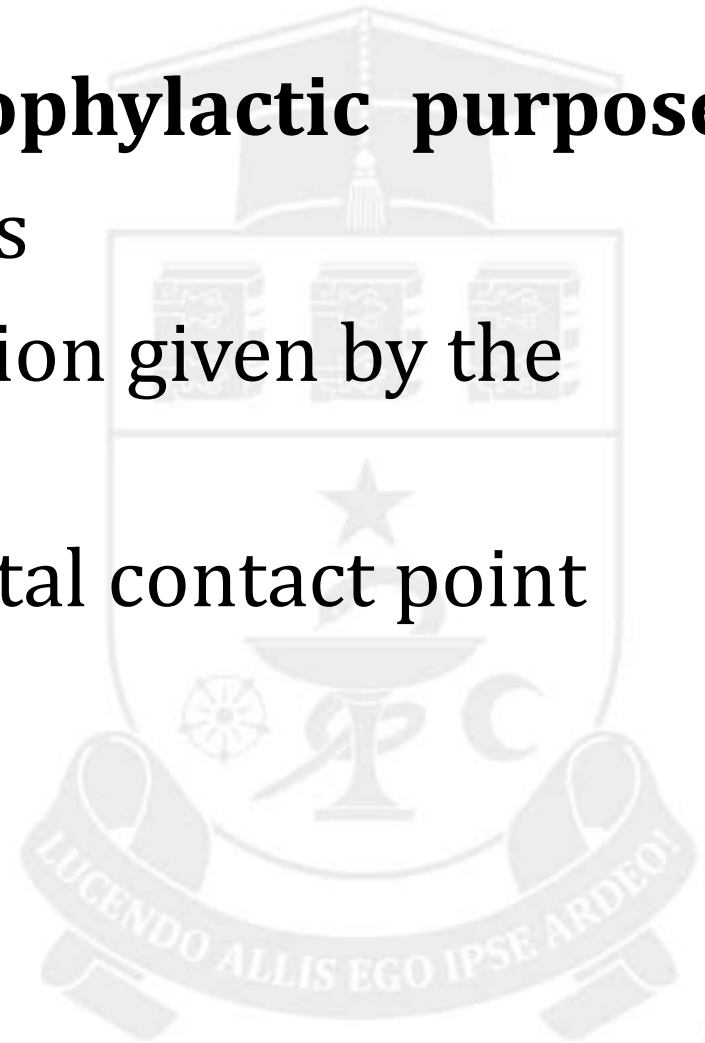




# Indications for artificial crowns:

## **For preventive and prophylactic purpose:**

- ❖ Teeth with large fillings
- ❖ To prevent dental erosion given by the dental clasp
- ❖ Restoring the interdental contact point







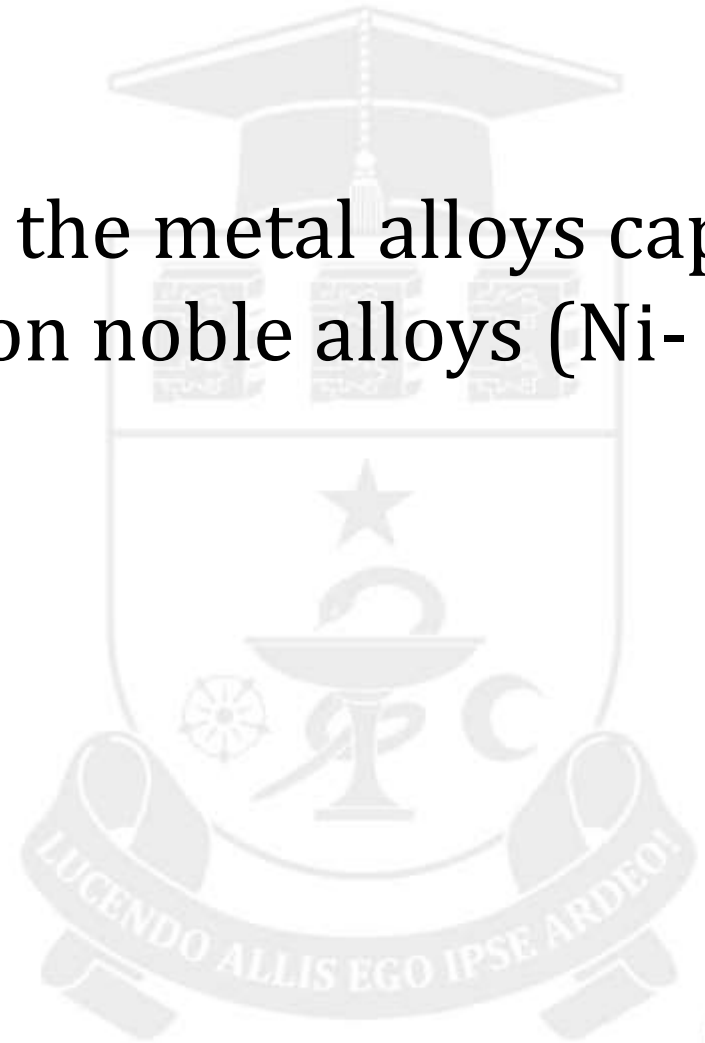
# Requirements for artificial crowns

- To reproduce exactly the functional morphology of the tooth
- Must not be in higher or lower occlusion
- The relief of occlusal surface must be cusp – fosse
- To ensure a free sliding in jaw movements
- To restore the physiognomic aspect
- Closely to cover the tooth neck



# The stamp crown

Is obtained by pressing the metal alloys caps from noble (gold) or non noble alloys (Ni-Cr-Fe).





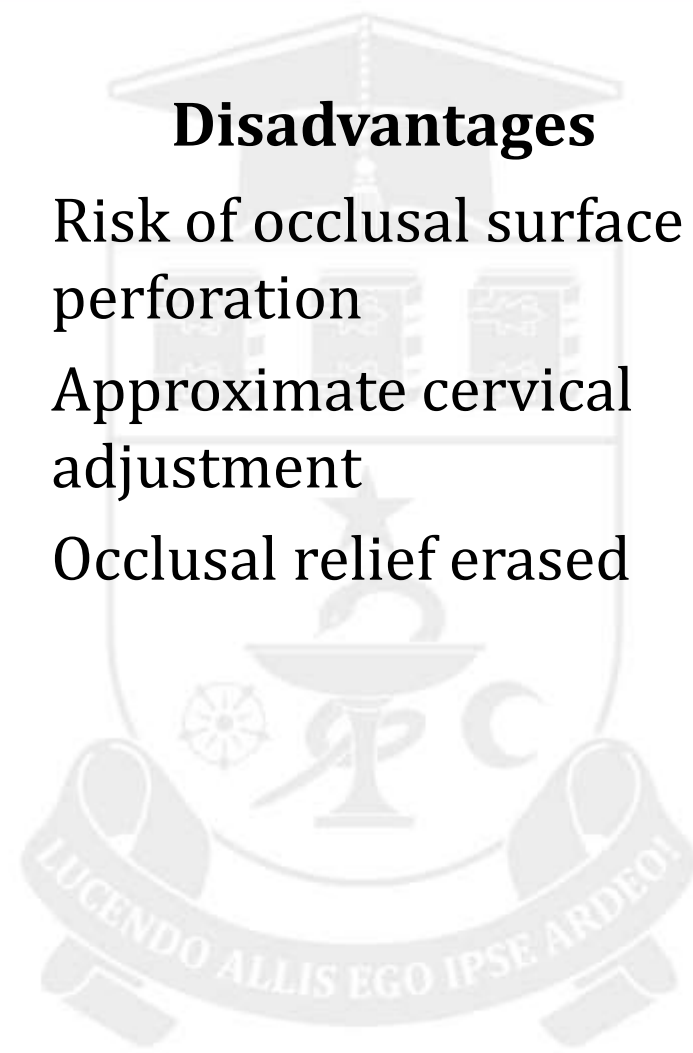
# Advantages and disadvantages for stamp crowns:

## Advantages

- Less preparation of tooth tissues
- Low-priced technology

## Disadvantages

- Risk of occlusal surface perforation
- Approximate cervical adjustment
- Occlusal relief erased





# Methods of stamping

Internal



during stamping, the crown support pressure from inside, that's means that the crown is pressed from interior to exterior.

External



The crown is pressed from exterior to interior.

Mixed



The crown is pressed from both sides (interior and exterior)



# Clinical-laboratory stages

**Clinical** –tooth preparation, taking the impression

**Laboratory** – manufacturing the cast from gypsum, mounting the casts in the articulator, modeling the future crown from wax

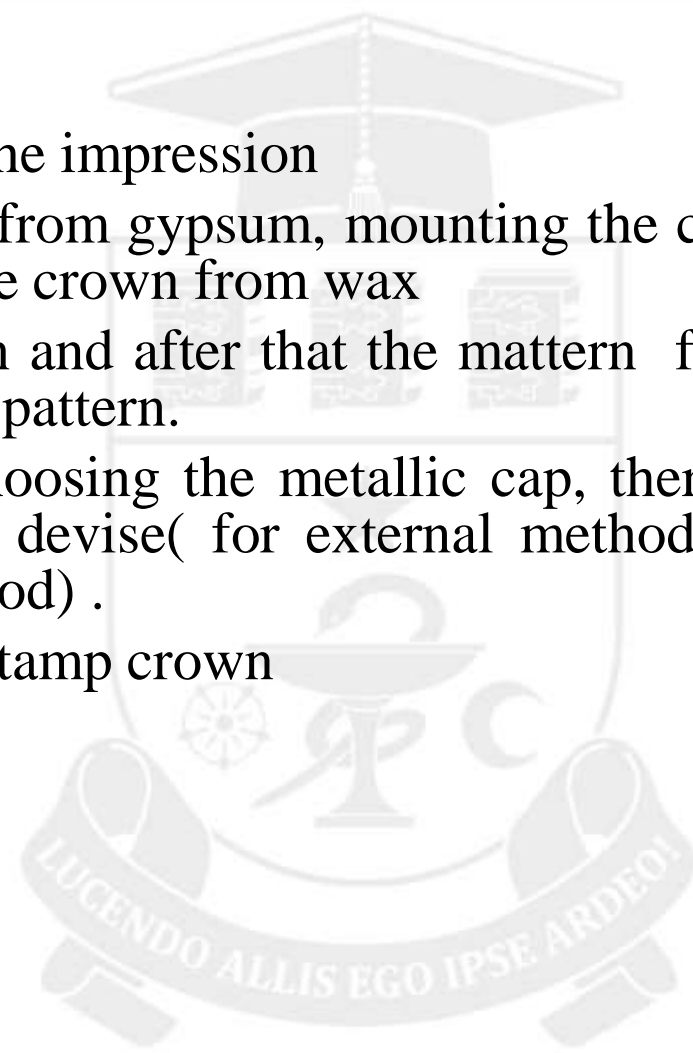
(undersized), manufacturing the pattern and after that the pattern from gypsum, manufacturing the metallic pattern.

(from soft metal) in a special sink, choosing the metallic cap, thermal processing and stamping in Parker device( for external method) or Bromshtrom device (for mixed method) .

**Clinical** – trying on the metallic stamp crown

**Laboratory** – polishing the crown

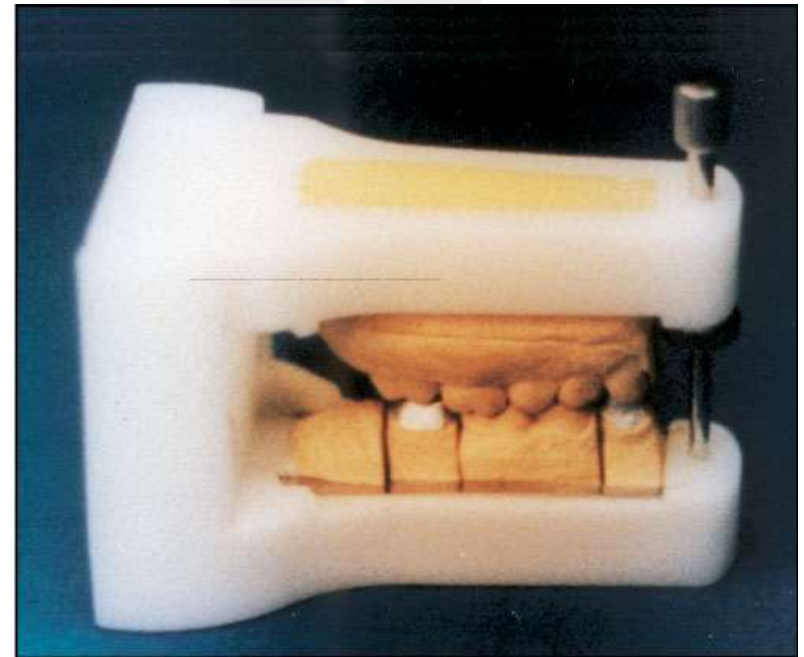
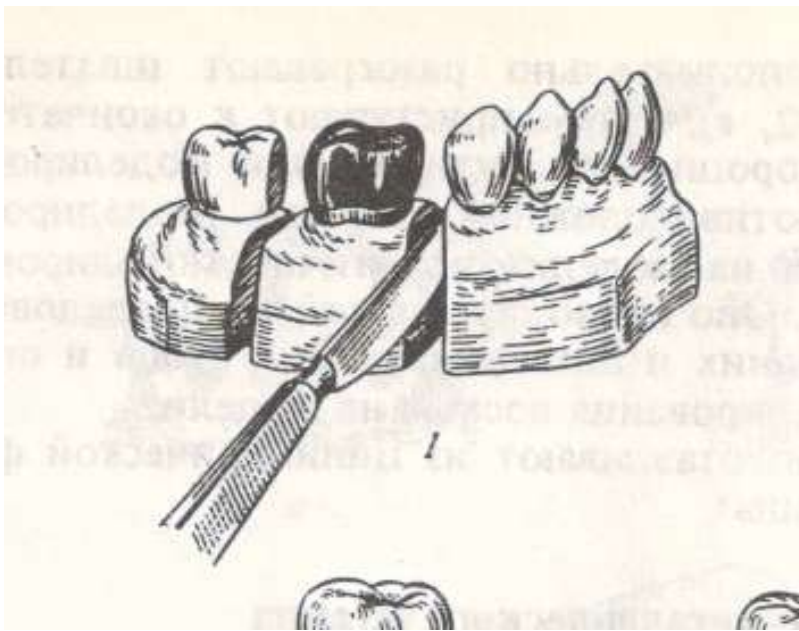
**Clinical** – final trying and fixation





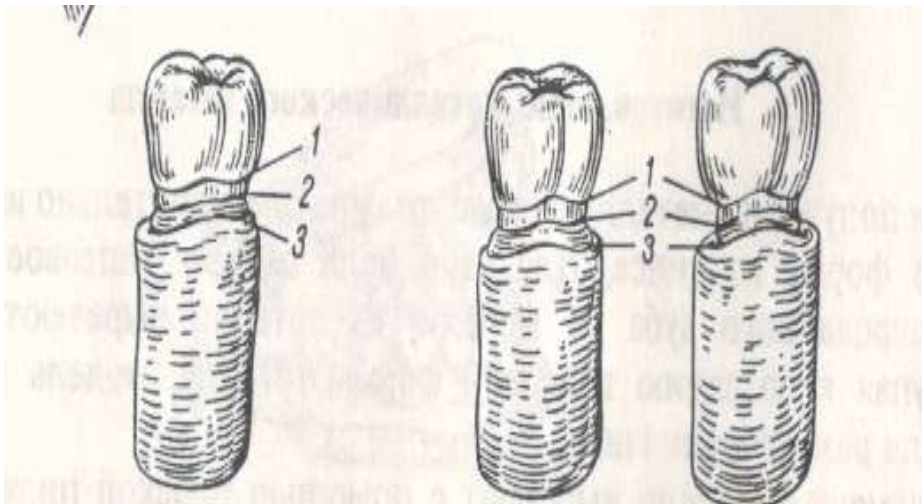
# Clinical-laboratory stages

The cast is manufacturing with fixed or movable blunts.

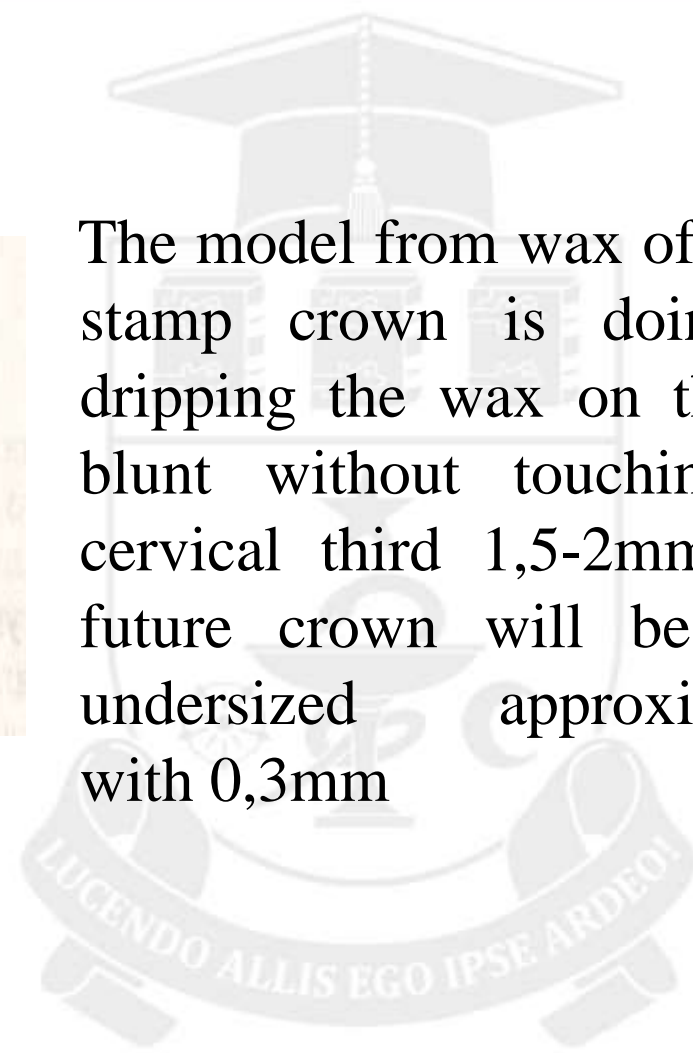




# Clinical-laboratory stages



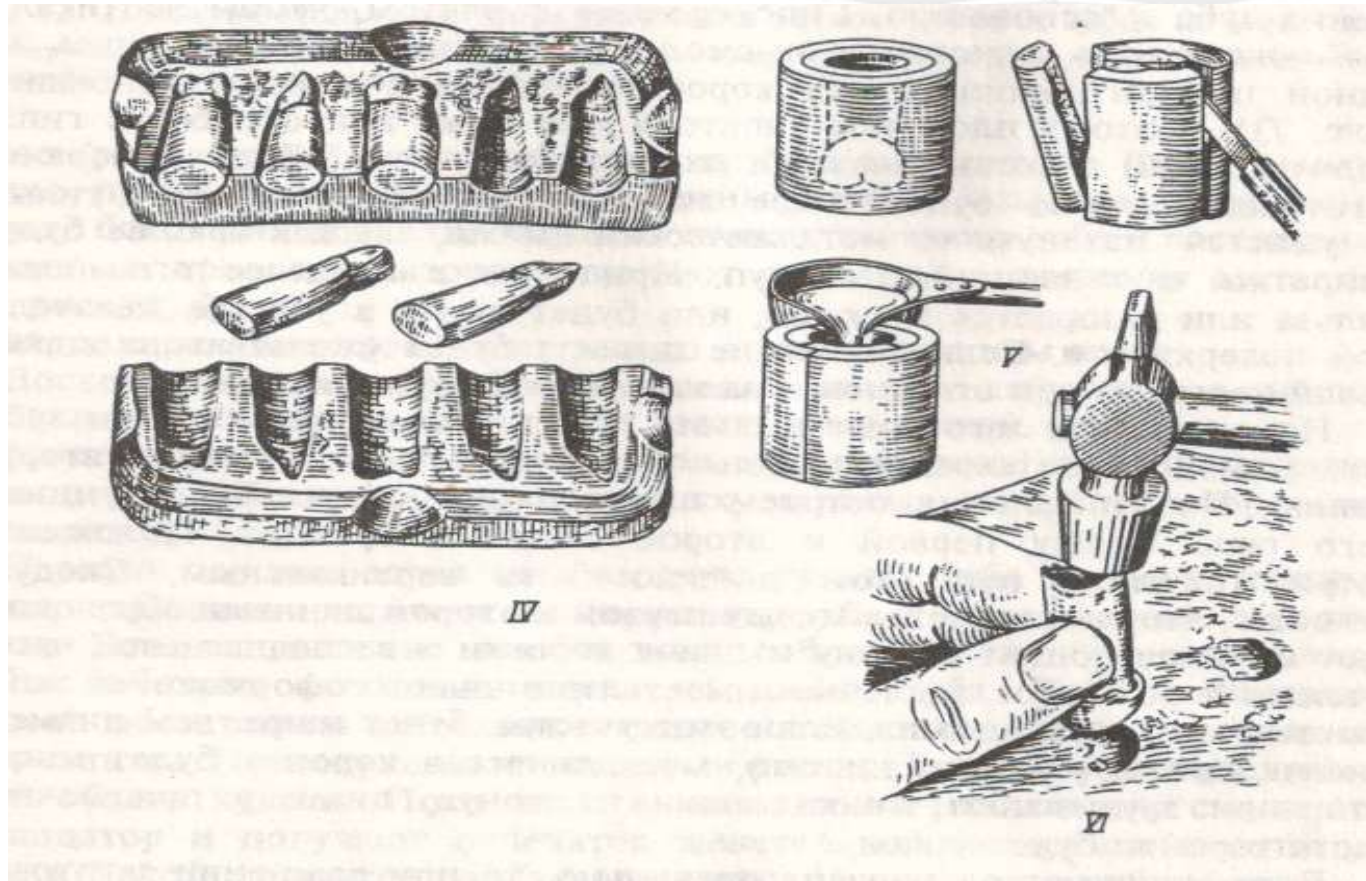
The model from wax of future stamp crown is done by dripping the wax on the dry blunt without touching the cervical third 1,5-2mm. The future crown will be mold undersized approximately with 0,3mm







# Clinical-laboratory stages



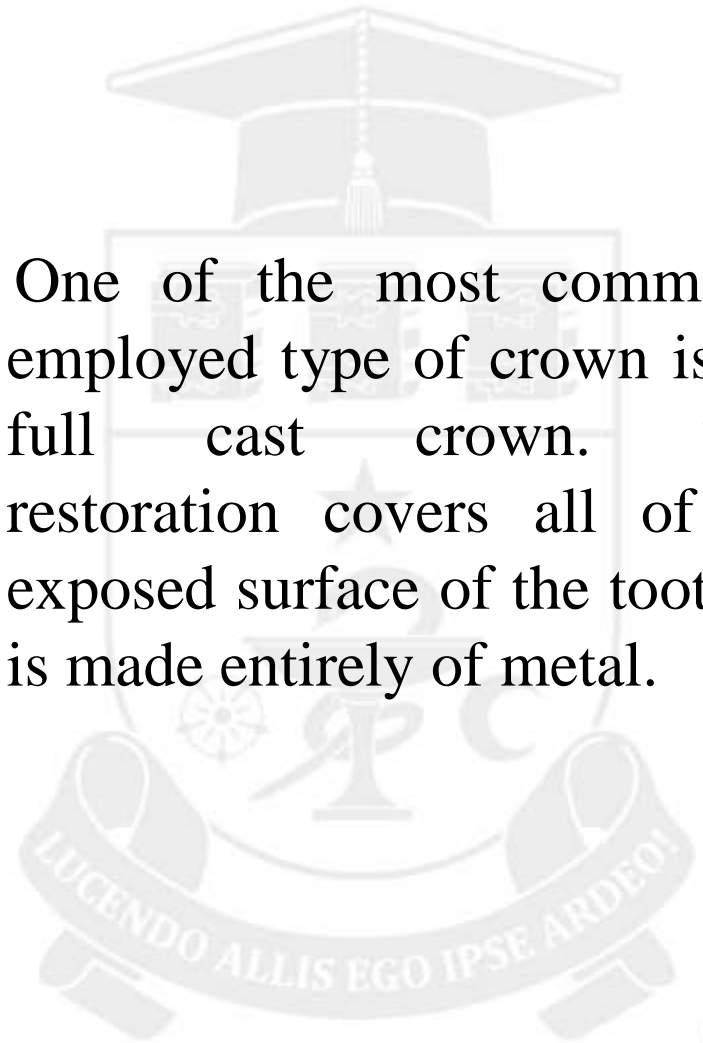




# Full Cast crown



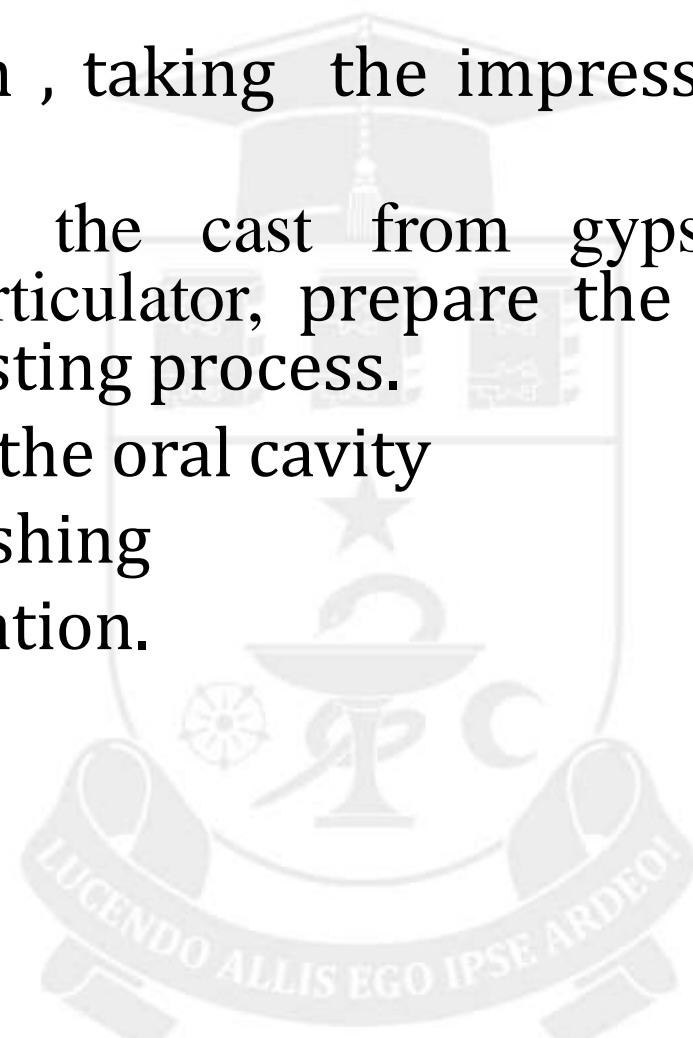
One of the most commonly employed type of crown is the full cast crown. This restoration covers all of the exposed surface of the tooth. It is made entirely of metal.





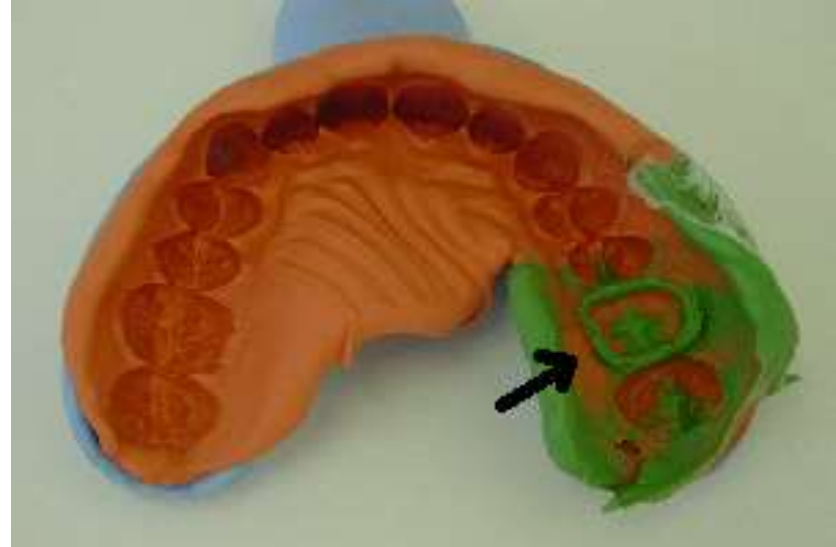
# Clinical-laboratory stages

- Clinical – tooth preparation , taking the impression, bite registration.
- Laboratory –manufacturing the cast from gypsum, mounting the casts in the articulator, prepare the die, making the wax pattern , casting process.
- Clinical – try in of crown in the oral cavity
- Laboratory – finishing , polishing
- Clinical – final try in and fixation.



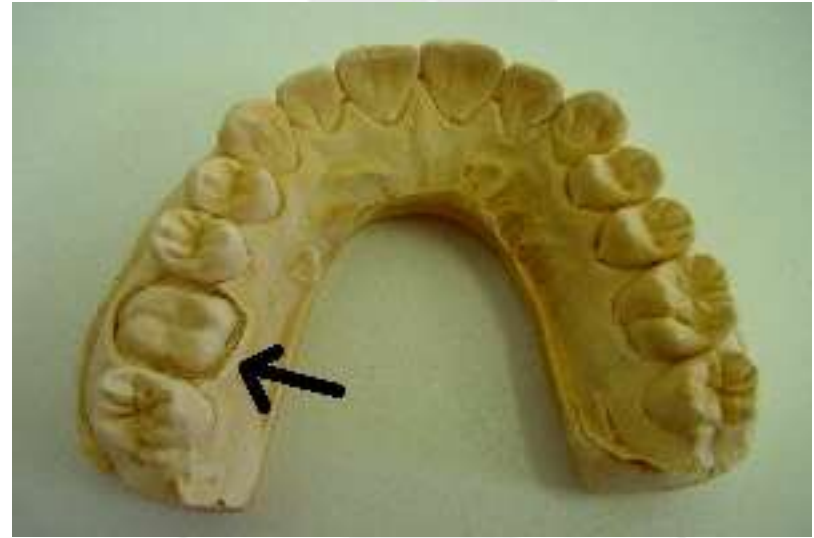


# Preparing the tooth and taking the impression





# Manufacturing the cast and mounting it in the articulator





# Methods of modeling the wax pattern

## uncontrolled

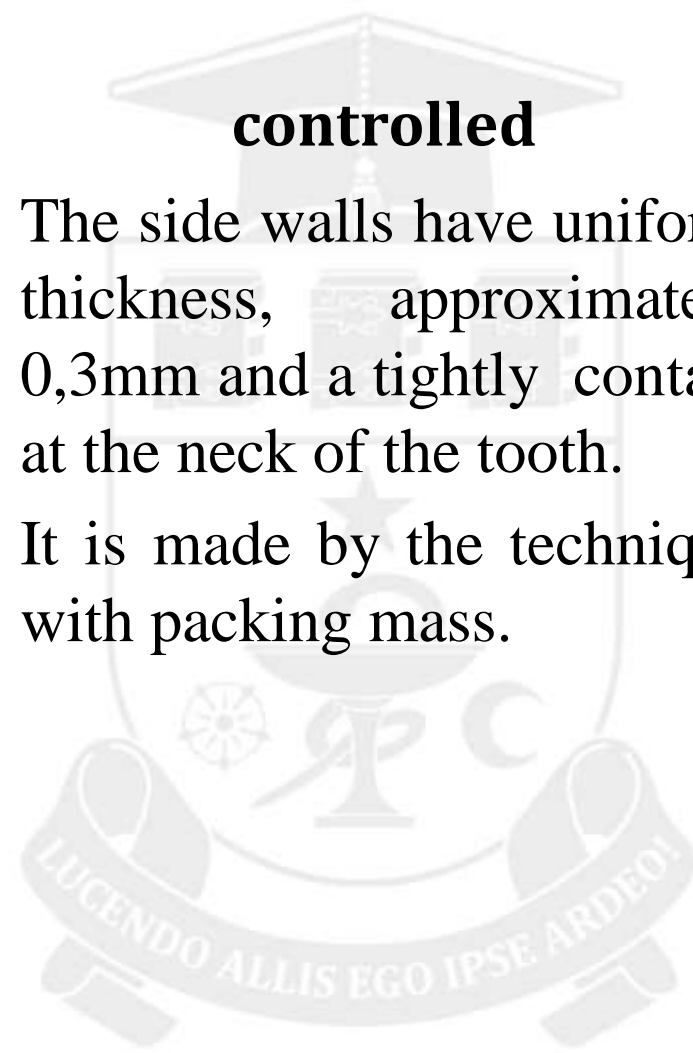
- By dripping
- Sinking the blunt into a flask with melted wax

After the cap was realized, the morphology of the tooth is modeling from wax.

It should be easy removed from the blunt.

## controlled

- The side walls have uniform thickness, approximately 0,3mm and a tightly contact at the neck of the tooth.
- It is made by the technique with packing mass.



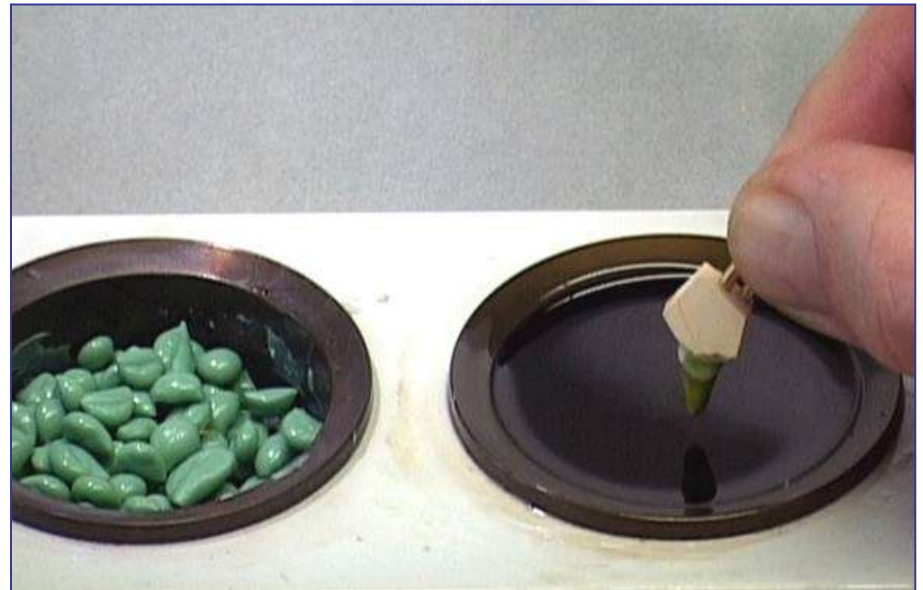


# Modeling the wax pattern

**By dripping**



**Sinking the blunt into a flask with melted wax**







# The wax pattern of the cast crown





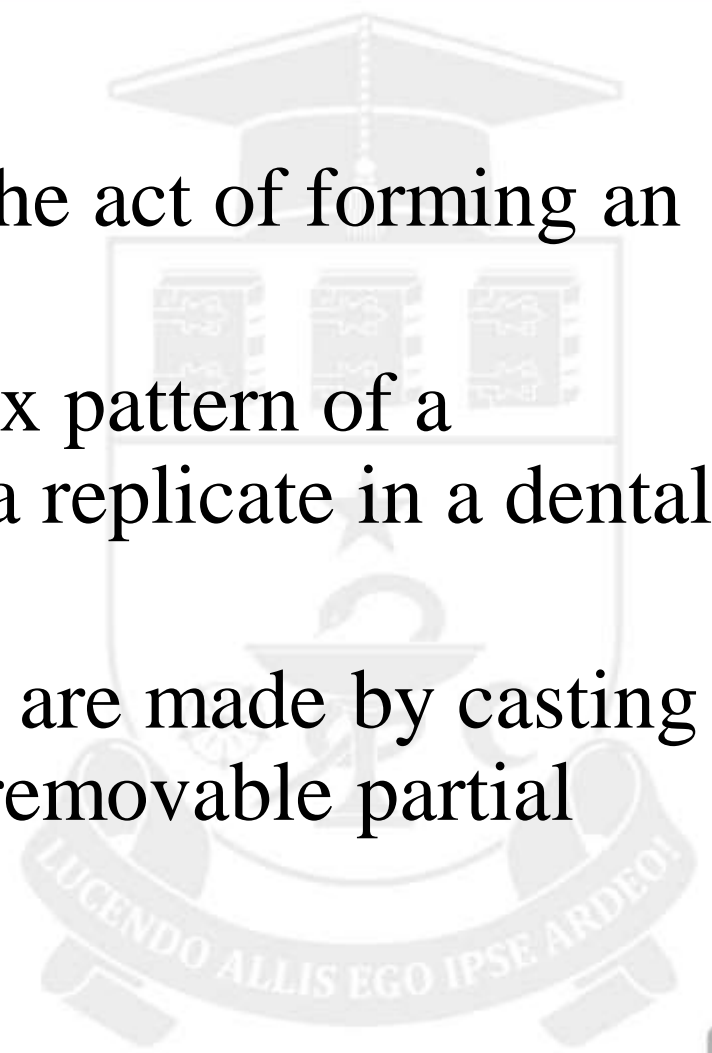
# The Casting process

## □ Notion

Casting can be defined as the act of forming an object in a mold.

The process by which a wax pattern of a restoration is converted to a replicate in a dental alloy.

□ Many dental restorations are made by casting (inlays, onlays, crowns, removable partial denture frameworks etc.)







# The Casting process

- A wax pattern of the restoration is made on a die.
- The pattern is then sprued and invested in a refractory material.
- The wax is burned out in an oven, to leave an empty mold ( the investment that is exactly the same shape as the pattern and sprue).
- Molten metal is then cast into that space, and after cooling the investment is broken away from the casting.
- The metal replica of the wax pattern is cleaned, trimmed and polished.
- The sprue is removed and then the casting is polished.
- The cast crown is ready to be delivered to the patient.



# Spruing

❑ The process of attaching a sprue former/sprue pin to the wax pattern is called as spruing

❑ Purpose:

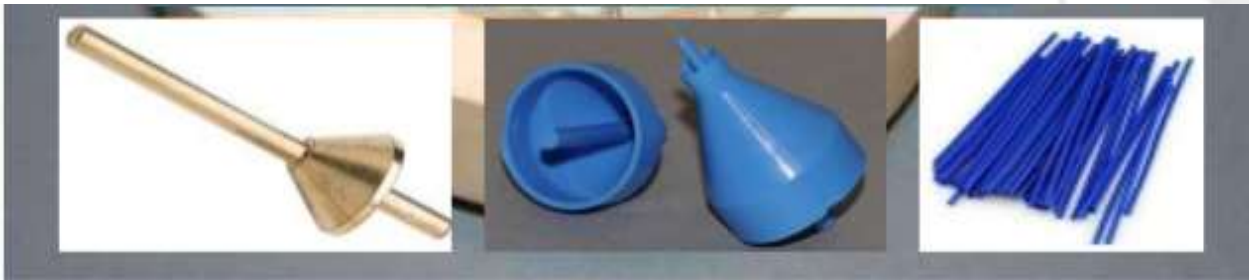
To provide a channel through which molten alloy can reach the mold in an invested ring after the wax has been eliminated.





# Spruing

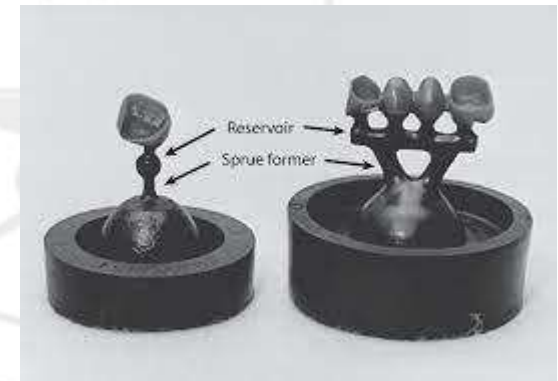
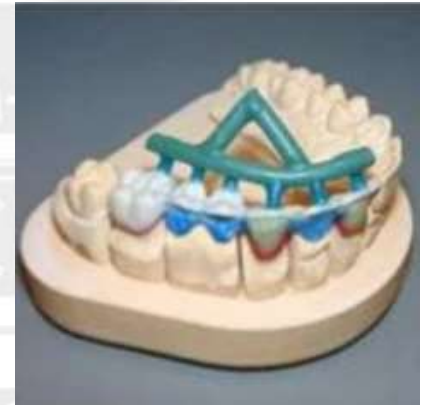
A sprue former is made of wax, plastic or metal. The thickness is in proportion to the wax pattern. A reservoir is attached to the sprue or the attachment of the sprue to the wax pattern is flared. The length of the sprue is adjusted so that the wax pattern is approximately  $1/4^{\text{th}}$  from the other end of the ring. Sprue should be attached to the thickest portion of the wax pattern.





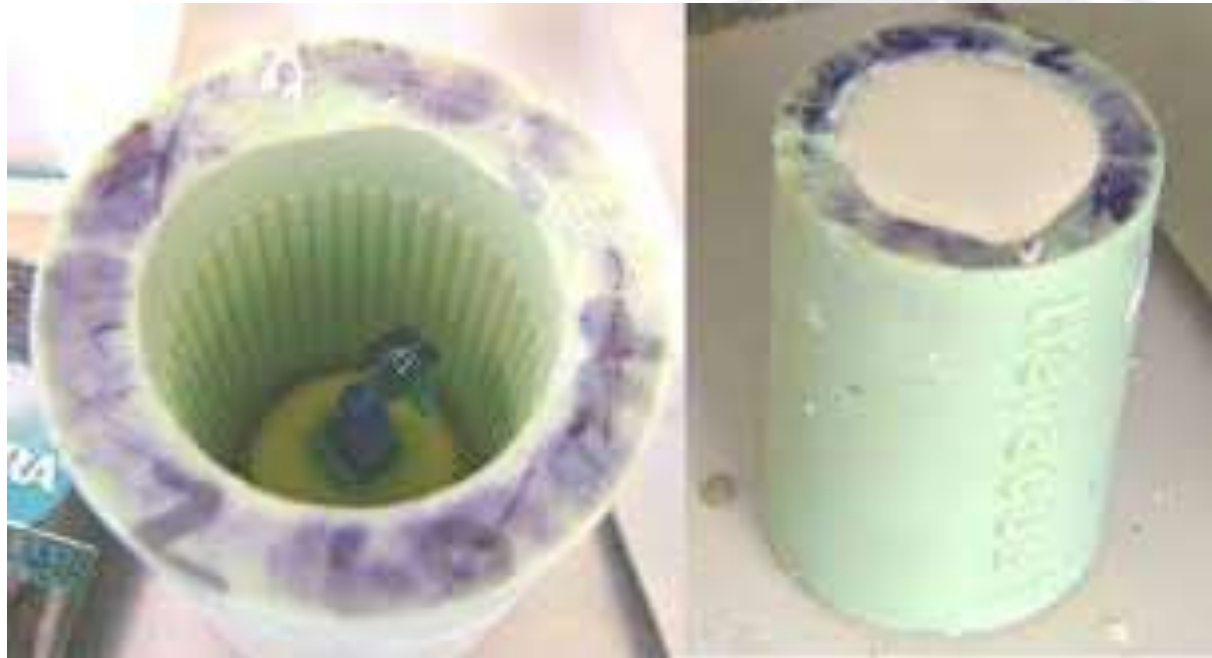
# Functions of Sprue

- To form a mount for the wax pattern.
- To create a channel for elimination of wax.
- Forms a channel for entry of molten alloy.
- Provides a reservoir of molten metal which compensates for alloy shrinkage during solidification.





# Investing the pattern



- Ring liner placement
- Assembly of casting ring
- Investing





# Casting ring lining

## ❑ Ring liner placement

A ring liner is placed inside of the casting ring.

## ❑ Types of ring liners:

- Fibrous ceramic aluminous silicate
- Cellulose (paper)
- Ceramic cellulose combination

## ❑ Functions of the ring liner:

- Allows for mold expansion (cushion effect)
- Permits easy removal of the investment after casting.





# Investing

- 1. Apply wetting agents (to reduce air bubble) on the wax pattern.
- 2. Seat the casting ring into the crucible former, taking care that it is located near the center of the ring.
- 3. Mix the investment (in a vacuum mixer) and vibrate.







# Investing

- 4. Some investment is applied on the wax pattern with brush to reduce trapping air bubbles.
- 5. The ring is reseated on the crucible former and placed on the vibrator and gradually filled with the remaining investment material.
- 6. It is allowed to set for 1 hour.







# Heating the mold

- Wax elimination (burnout) and thermal expansion
  1. The crucible former is separated from the ring.
  2. The heating should be gradual, to 400 °C in 20 minutes, maintain it for 30 minutes.
  3. Over next 30 minutes, the temperature is raised to 700°C, for a further 30 minutes.





# Casting – process and equipment

**Casting** – it is the process by which molten alloy is forced into the heated investment mold.

It uses 2 basic requirements:

- Heat source (to melt the alloy)
- Casting force (to force molten alloy into mold)





# Casting

Casting force can be done by use of following different type of force:

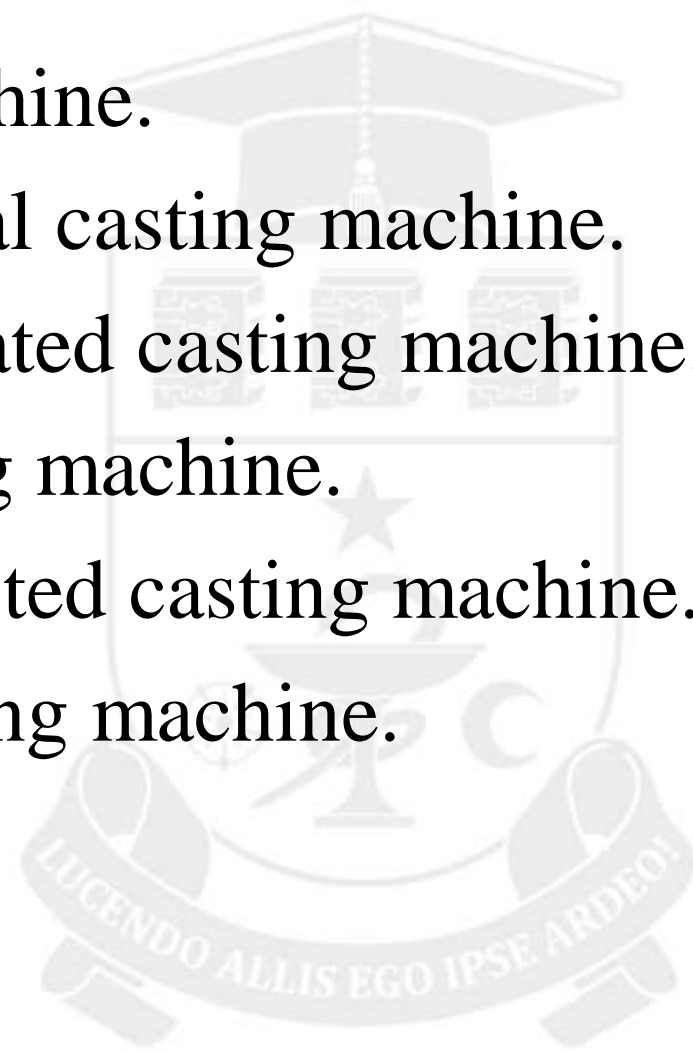
- Vacuum force
- Air or Gas Pressure
- Centrifugal force





# Casting machines

- ❑ Air pressure casting machine.
- ❑ Torch melting/Centrifugal casting machine.
- ❑ Electrical resistance –heated casting machine.
- ❑ Induction melting casting machine.
- ❑ Vacuum or pressure assisted casting machine.
- ❑ Direct –current arc melting machine.





# Divesting

- It refers to removal of casting from the investment mold ( recovery of casting).
- ❑ A pneumatic chisel may be used to remove the investment.
- ❑ The casting is held in a sandblasting machine to clean the remaining investment from its surface.





# Trimming

- The sprue is sectioned off with a cutting disc.
- The casting is trimmed, shaped and smoothed with suitable bur or stones.





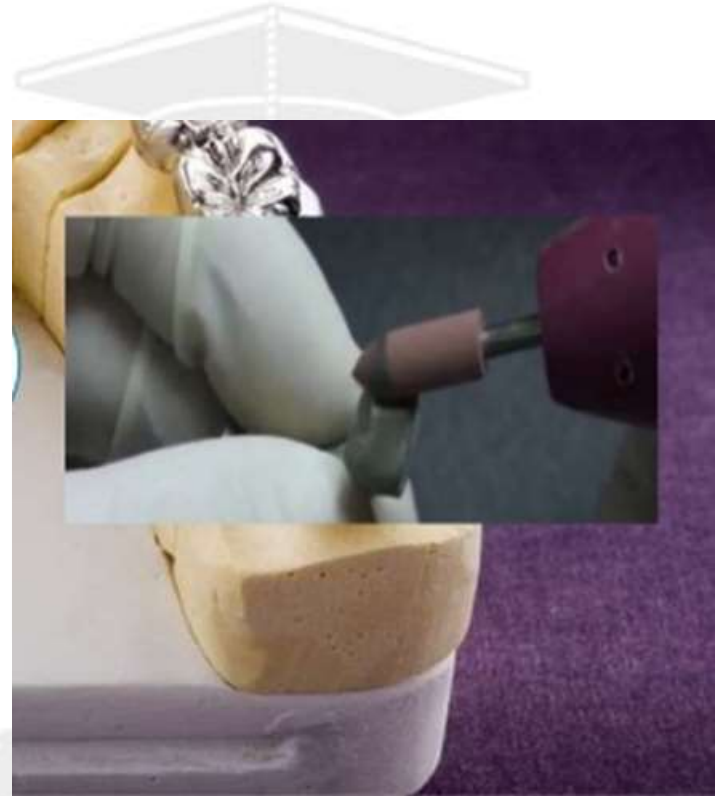
# Polishing

Minimum polishing is required if all the procedures from the wax pattern to casting are followed meticulously.

It should be completed in a systematic sequence.

Principles in finishing the casting:

1. High speed
2. Excessive pressure should be avoided
3. Definite sequence of finishing
4. Clean polishing wheel should be used





# Steps of casting process

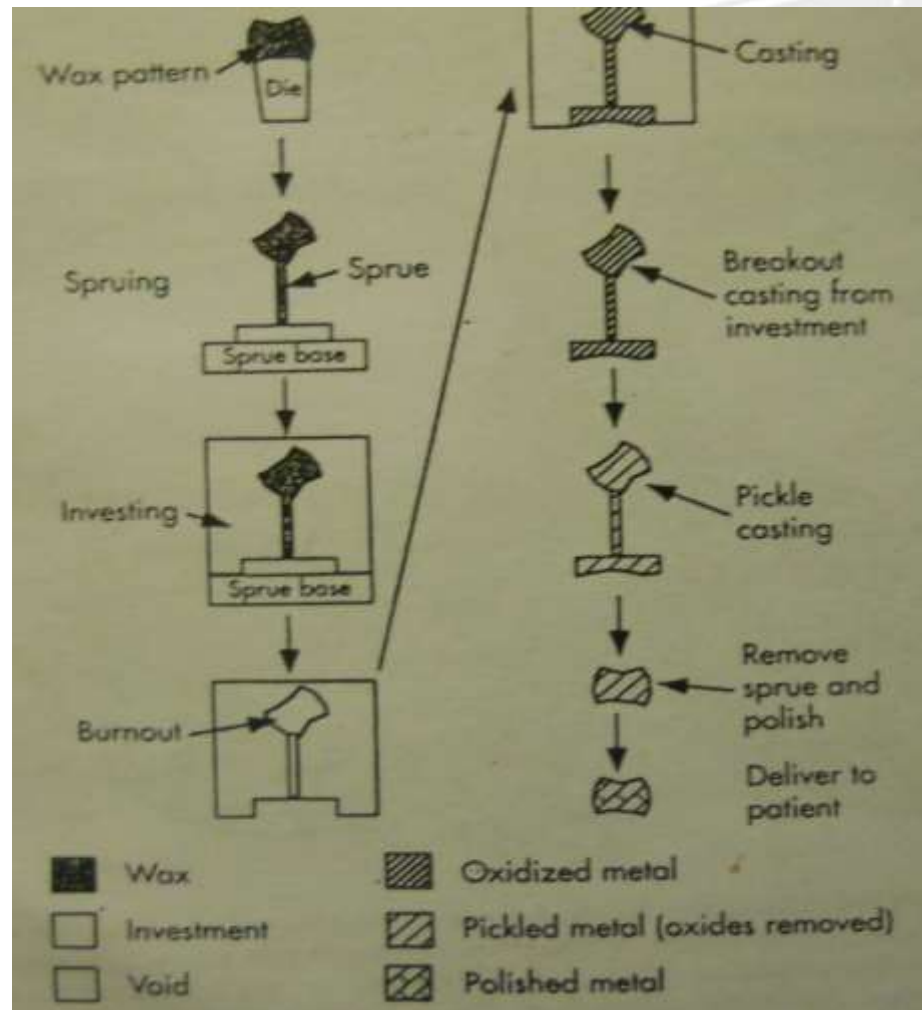
- Developing a wax pattern
- Spruing the pattern
- Investing the pattern
- Heating the mold
- Casting
- Cleaning, processing and finishing the casting.





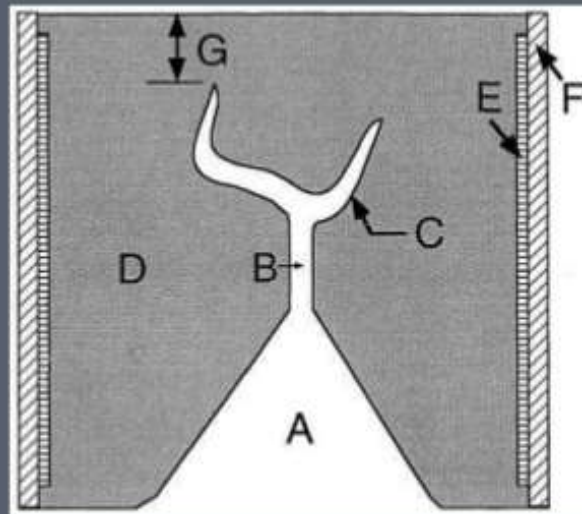


# The casting process





# Diagrammatic representation of a dental casting mold



DIAGRAMMATIC REPRESENTATION OF A DENTAL CASTING MOLD: A, CRUCIBLE FORMER; B, SPRUE; C, CAVITY FORMED BY WAX PATTERN AFTER BURNOUT; D, INVESTMENT; E, LINER; F, CASTING RING; G, RECOMMENDED MAXIMUM INVESTMENT THICKNESS OF APPROXIMATELY 6 MM.



**Thank you for your attention!**

