

Basic concepts in dentistry

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Introduction

These basic concepts will cover the following points:

- 1 – Introduction to usual dental terminology.**
- 2 – Minimal knowledge of some of the materials most used in dentistry.**

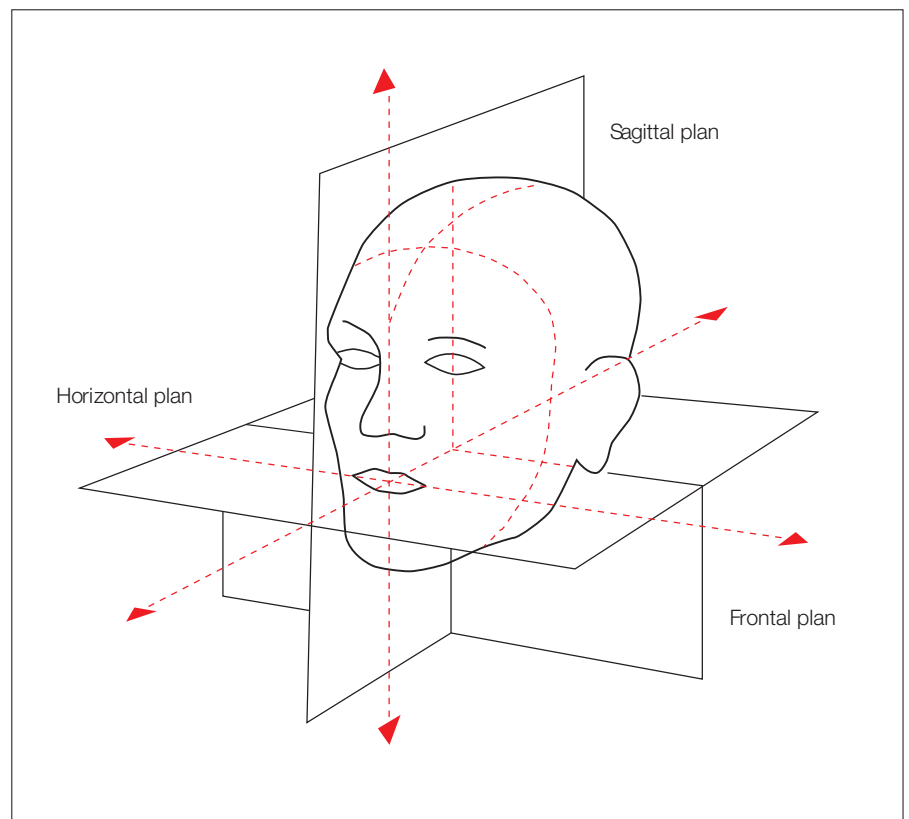
We need to be aware of the importance of studying and learning from this manual in order to be able to "sell" rather than waiting for our customers to "buy".

As a computer salesman uses specific terminology (hardware, bits, diskette, etc.), a dental salesman must also use specific terminology. Besides the terminology, he needs also to know the products, their usage and instructions in order to demonstrate them appropriately.

The study of this manual is vital to become a good "professional" dental salesman.

Geometrical plans

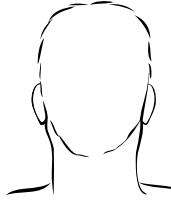
We will start our study of dental terminology by superposing the three geometrical plans to the human skull.





Anterior Frontal Plan

Used to determine the midline, bipupillary line, smile line and labial commissures.
This plan, used together with the transverse plan, divides the oral cavity in quadrants.



Posterior Frontal Plan

This plan is used to study the posterior view of the dental arches.



Sagittal Plan

Used to register the protrusive movement, the maxillary-mandibular relationship and the location of the different prosthetic points, as at the temporomandibular joint.



Frontal or Coronal Plan

Used to study the surfaces of the dental arches and the mandibular movements.

How many teeth do we have?

Throughout a lifetime, we go through two different sets of teeth:

The first ones, temporary, are called "primary teeth".

The primary teeth are twenty, 10 at each level. They stay until the child is approximately twelve years old, they are replaced by a second set of teeth consisting of 32 teeth, sixteen at each level.

Teeth can be classified as follows:

1 – Anterior teeth

Anterior teeth are, at each level:

- 2 Centrals
- 2 Laterals
- 2 Canines

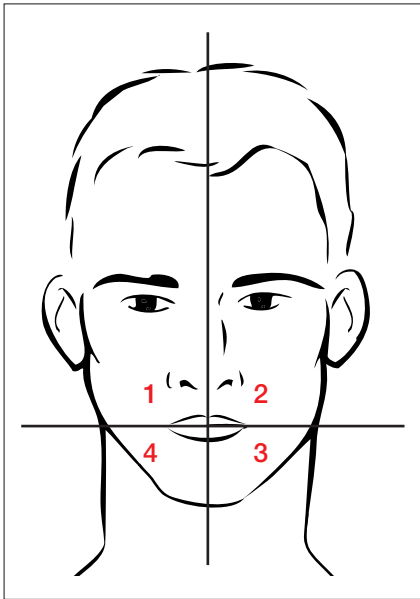
2 – Posterior teeth

Posterior are, at each level:

- 4 Premolars (1st and 2nd)
- 6 Molars (1st, 2nd and 3rd)

The third molar is called wisdom tooth and appears later; very often it doesn't appear at all.

Teeth nomenclature



Two lines are drawn in the frontal plan in order to divide the dental arches in quadrants:
2 upper and 2 lower.

The quadrants are named and numbered:

- 1 – Upper right**
- 2 – Upper left**
- 3 – Lower left**
- 4 – Lower right**

Teeth are numbered from 1 to 8 in each quadrant, from the central (1) to the 3rd molar (8). The number of the quadrant is placed before the tooth number.

This will give:

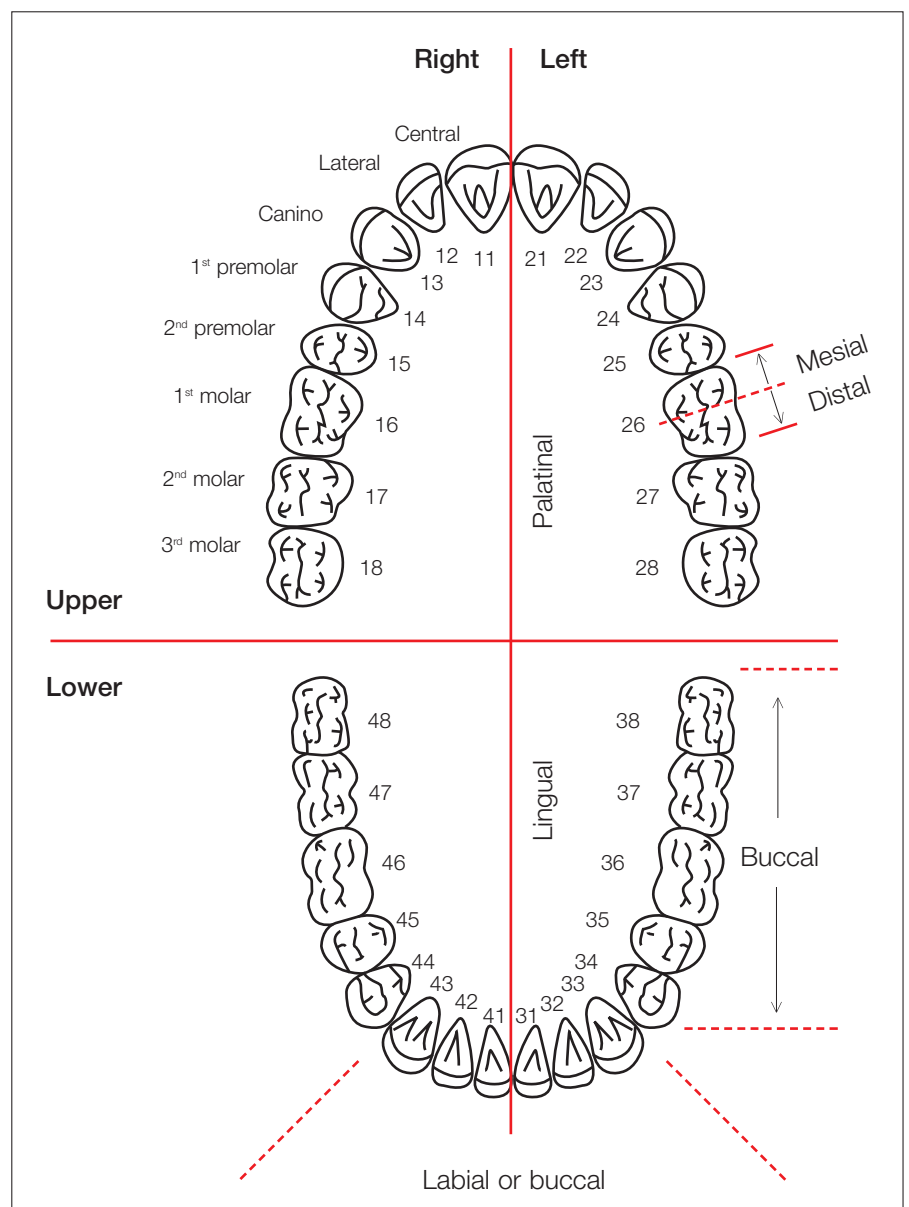
	Right	Left
Upper	18 17 16 15 14 13 12 11	21 22 23 24 25 26 27 28
Lower	48 47 46 45 44 43 42 41	31 32 33 34 35 36 37 38

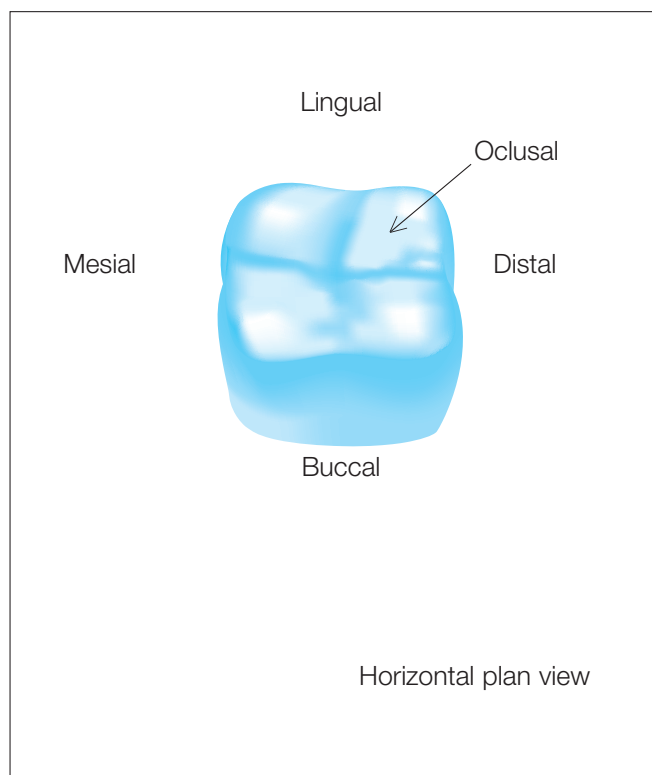
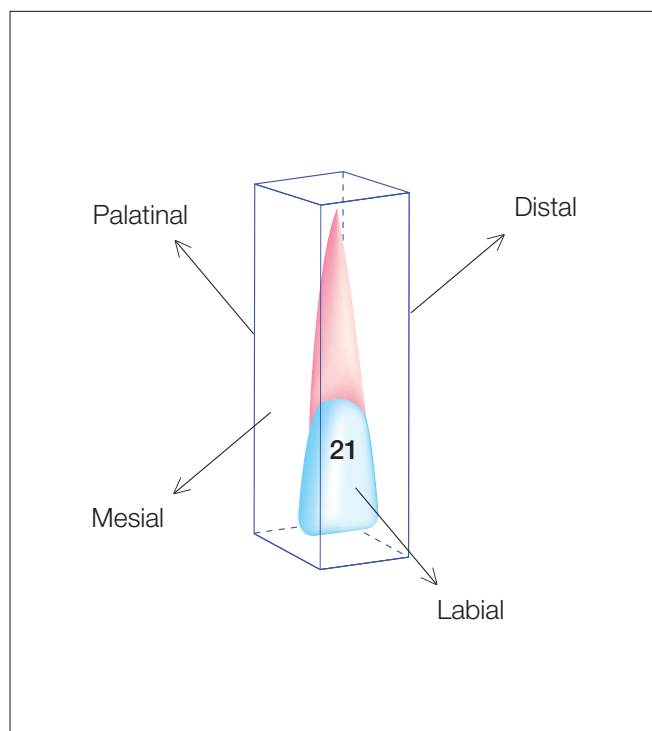
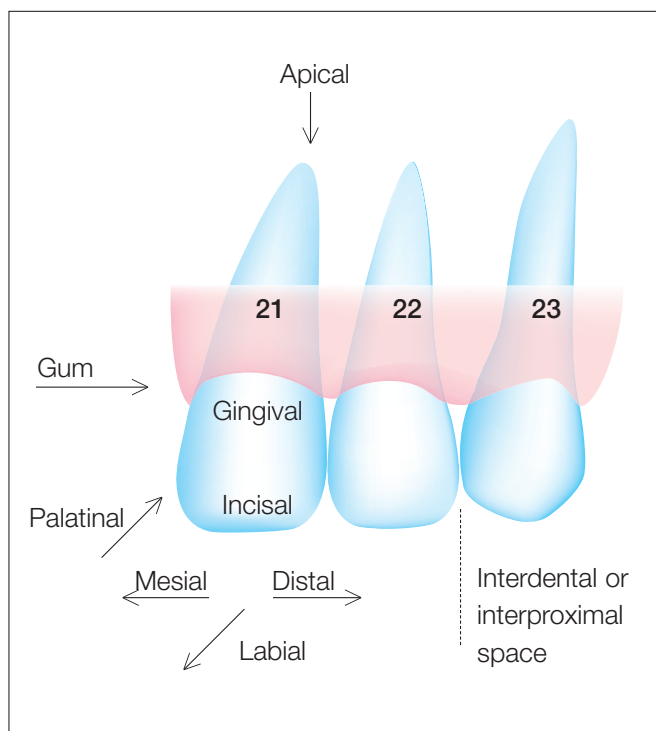
Anterior	{	Central
		Lateral
		Canine
Posterior	{	1st Premolar
		2nd Premolar
		1st Molar
		2nd Molar
		3rd Molar

Teeth nomenclature

Beside the numerical identification, the following terminology is also used to determine the different surfaces of the teeth:

Labial or buccal:	anterior teeth, the surface of the tooth towards the lips.
Buccal:	posterior teeth, the surface of the tooth toward the cheek.
Lingual:	lower arch; the surface of the tooth toward the tongue.
Palatal:	upper arch; surface of the tooth toward the palatal.
Mesial:	for all teeth, the surface of the tooth facing the midline.
Distal:	for all teeth, the surface of the tooth facing backwards.
Occlusal:	for the premolars and molars, the masticatory area.
Incisal:	for anterior teeth, the cutting edge.
Contact point:	where the teeth touch.
Interdental or interproximal space:	free space between the teeth.

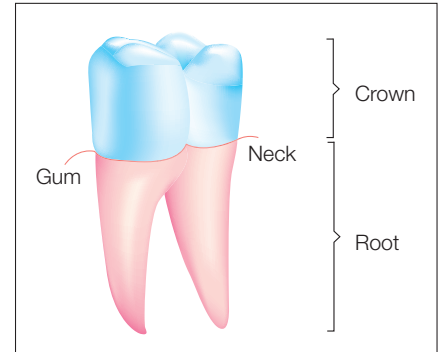




Tooth description

A tooth is made of three parts:

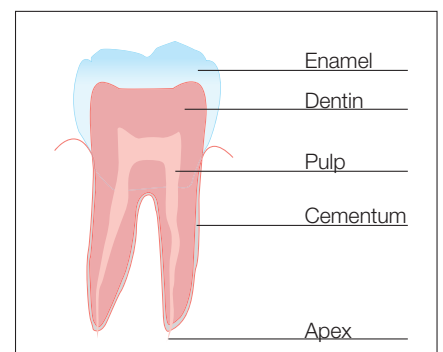
- **Crown**
visible part of the tooth
- **Cervical part or “neck”**
at the gingival level
- **Root**
non-visible part of the tooth



Sagittal plan view

The tooth consists of:

- **Enamel**
- **Dentin**
- **Pulp**
- **Cementum**



Enamel

- Enamel is the hardest tissue in the whole body.
- It is mainly composed of inorganic matter (hydroxyapatite crystals forming prisms).
- It is transparent.
- It is unsensitive.
- It covers the whole crown.

Dentin

- It is made of inorganic matter (hydroxyapatite, approx. 45%), organic substance (approx. 30%), H₂O (approx. 25%).
- It is striated with small conducts named dentinal tubules.
- It gives the tooth its colour.
- It is sensitive.
- It is covered by enamel at the crown and by the cementum at the root.

Pulp

- The pulp is situated at the centre of the tooth. It is a soft tissue constituted by nerve endings and vessels that branch through the dentinal tubules. It is vulgarly called "the nerve"
- it is very sensitive.

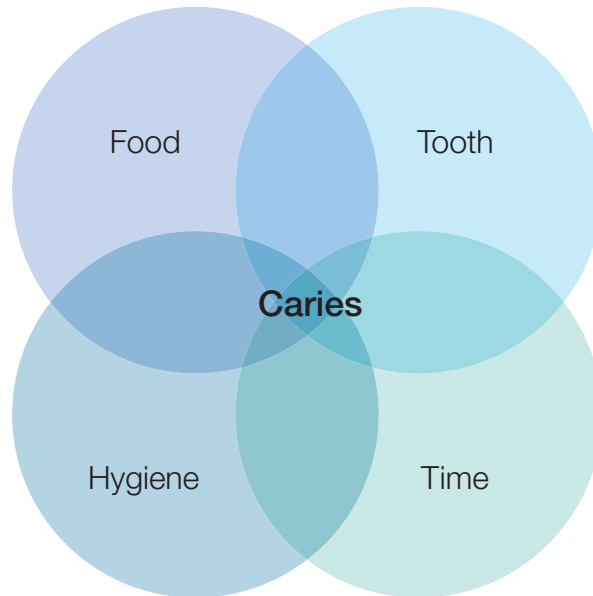
Cementum

- Cementum is a hard tissue that covers the root dentin.
- It is yellowish.
- It is sensitive.
- In teeth supporting greatest pressure (occlusal load) there is a greater amount of cementum (cementumosis). In these cases the extraction of the tooth can be laborious.

Tooth decay (dental caries)

Tooth decay is probably the most common ailment in the World. Approximately 70% of the population worldwide is, or has been affected by this illness.

Tooth decay is caused by the following interactions:



According to the most widespread theory, the interaction between these four factors is the main reason for tooth decay.

- **Food:** Rich in sugar and carbohydrate (forming dental plaque).
- **Hygiene:** Poor dental hygiene (not removing dental plaque).
- **Tooth:** No tooth no caries.
- **Time:** Tooth decay is a degenerative process needing time.

Phases of dental caries

- 1 – Food and micro-organisms stucked between the teeth cause the dental plaque.
- 2 – The plaque evolves and produces acids.
- 3 – These acids produce mineral loss of the enamel (demineralization).
- 4 – Enzymes and micro-organisms destroy the tooth.

Retentive areas

It is necessary to have food stucked between the teeth to develop the previous stage.
We can distinguish two retentive areas : natural and artificial.

Natural

- Interproximal spaces.
- Deep pits and fissures.
- Irregularities of tooth position and/or teeth alignment.
- Abnormal crown shape.
- Cavities.

Artificial

- Orthodontic treatments.
- Removable partial or full dentures.
- Fixed prosthesis (crowns and bridges).

Tooth decay stages

Being a degenerative process, tooth decay undergoes different stages.

Depending on the tooth hardness, it can be an acute progressive process causing fast destruction. In other cases it can be a slow process.

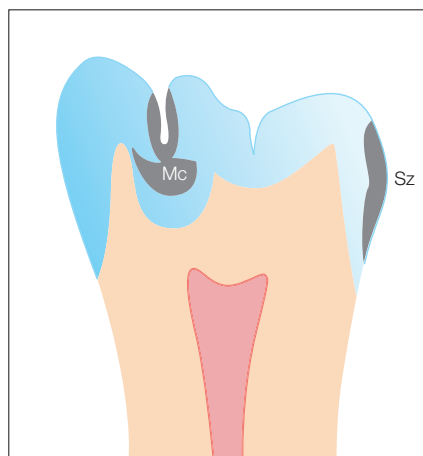
Contained caries could also be observed when a tooth is extracted. The adjacent tooth is marked (spots) but, since the surface can be cleaned, caries loose their destruction speed. The tooth surface gets harder (tricalcium phosphate crystals, bigger than those of normal hydroxyapatite, precipitates).

The loss of enamel shine, becoming slightly porous, is the main characteristic of tooth decay.

White opaque (chalk-like) or dark (dark brown or dark yellow) colour spots appear.

Tooth decay advance produces an inverted cone shape due to the difference of hardness between enamel and dentin.

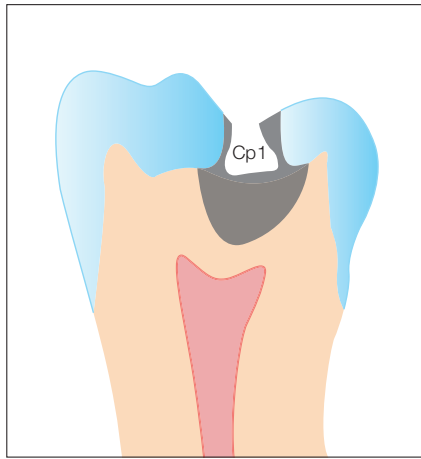
Caries stages from enamel to the pulp.



First Stage: S.Z. = Surface Zone. It affects enamel. It is not sensitive.

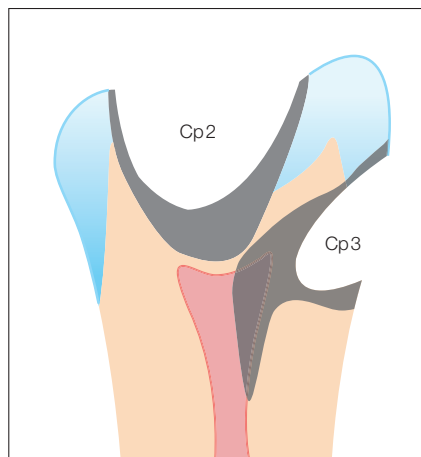
Second Stage: M.C. = Medium Caries. It affects enamel and dentin. It is slightly sensitive.

Third Stage: D.C. I = Deep Caries I. It affects enamel and dentin. It could be considered as M.C. too, as the second stage, but the dentin lesion is more important. It is very sensitive.



Fourth Stage : D.C. II = Deep Caries II. It affects enamel, dentin and pulp. It is very sensitive and painful.

Fifth Stage : D.C. III = Deep Caries III. The pulp is entirely affected. Pulp necrosis comes after. The tooth breaks. It is not sensitive because of the pulp necrosis.



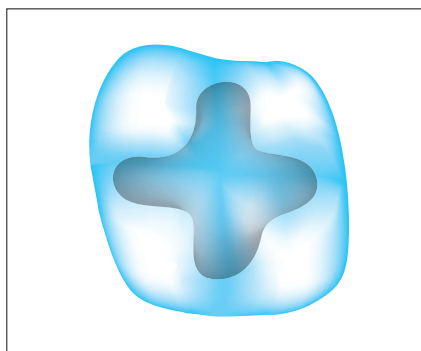
Caries classification

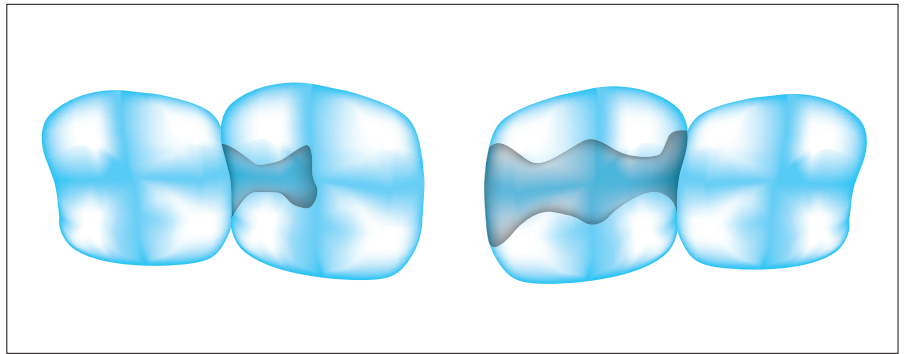
Dental caries can be classified by their situation in the oral cavity; they are not the same in anterior and posterior teeth.

Posterior teeth dental caries, horizontal plan view:

Class I

Generally located on the occlusal surface of molars and premolars (one surface).





Class II

These are located on the occlusal and proximal surfaces of premolars and molars (2 or 3 surfaces).

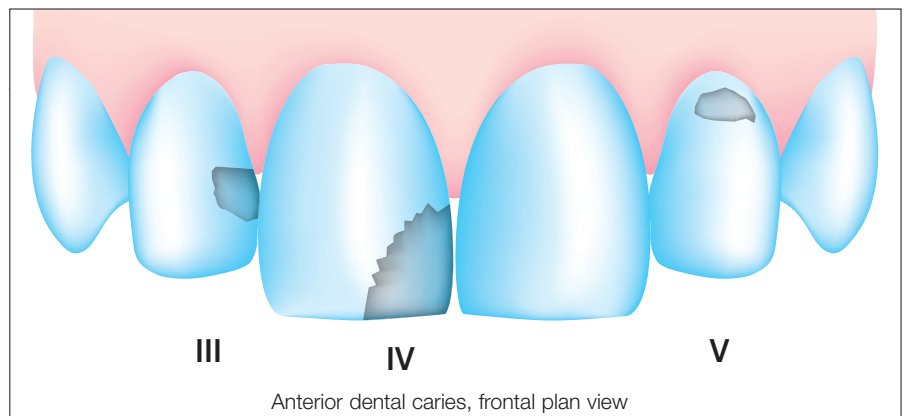
These cavities can be simple (2 surfaces):

MO = mesio occlusal

DO = disto occlusal

or):

MOD = mesio-occlusal-distal



Class III

Located in the proximal areas of anterior teeth.
Usually two teeth are affected.

Class IV

Caused by trauma (fall, blows, etc.) at the inciso-proximal angle.

Class V

Located in the cervical area, they are also called cervical caries. They can also be located in posterior teeth. Most of the time, the dentin is exposed.

Dental treatment procedures

Dental treatment are classified in four basic procedures:

- **Restorative dentistry**
- **Prosthetic dentistry or prosthesis**
- **Surgery**
- **Orthodontic**

Focus will be made only on two procedures:

Restorative dentistry

Restorative dentistry concerns all treatments made in order to preserve the teeth. including mainly fillings but also the following fields:

- **Aesthetic dentistry:**
Dealing with aesthetic cases such as teeth colour change, irregular tooth position, etc...
- **Endodontics:**
Treatments related to the pulp (devitalization, the removal of pulp).
- **Periodontics:**
Treatment of the supporting structures of the teeth (gingiva, periodontium).
- **Preventive dentistry / profilaxis:**
Trying to avoid dental caries by means of prevention (tooth fissure sealing, fluoride therapy) and good hygiene instructions.

Dental fillings

Due to the inability of the tooth to create new tissues and replace infected ones, it is necessary to restore the tooth using appropriate materials and techniques.

While speaking of filling treatments we distinguish between:

- **Anterior fillings**
- **Posterior fillings**

Cavity filling and preparation differ from one to the other.

In dentistry, cavity is the artificial shape made to the tooth in order to restore it and its function within the masticatory apparatus.

The steps needed to place a dental filling are known as operator procedures. The most important are:

1. Cavity opening
2. Removal of remaining caries.
3. Creating a retentive shape.
4. Pulpal-dentin protection.
5. Enamel acid-etching (if composites are used ; see other possibilities).
6. Placement of restorative materials.
7. Finishing and polishing.

1 – Cavity opening

Creation or widening of the opening to allow access to the tissue.

Systems

- High-speed turbines (up to 400.000 rpm) or medium speed contra-angles (up to 120.000 rpm, usually 30.000-40.000 rpm).
- Water cooling.
- Diamond and tungsten carbide burs are used.
 - > Round.
 - > Pear shaped.
 - > Taper (conical, cylindrical)
 - > Inverted cone.

2 – Removal of caries

Removing and cleaning of the infected tissues. Absolutely no caries should remain within the cavity preparation. Excavation instruments are used.

3 – Creating retentive form

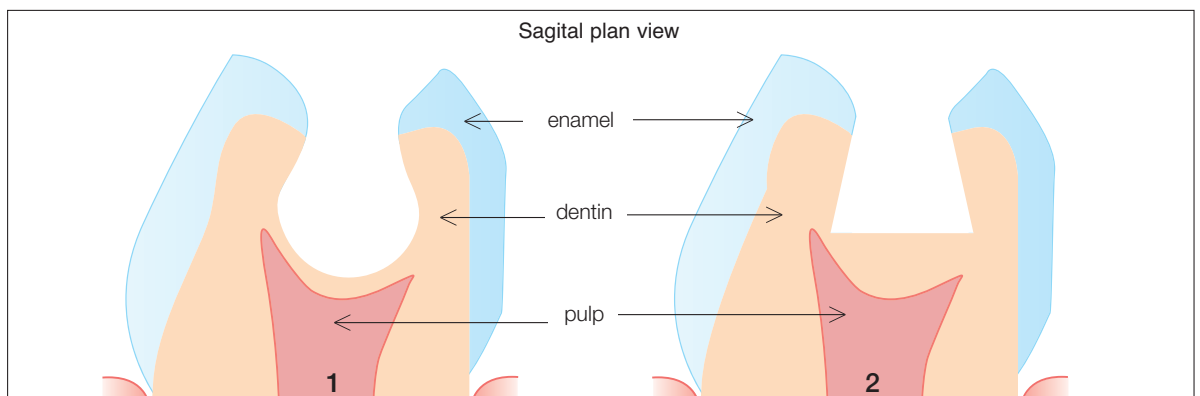
Creation of shapes appropriated to retain the filling material. These shapes differ from one school to the other but they also differ depending on the filling material.

Two types of cavities:

1. Adhesive cavity:

Rounded shape, allows a greater material adhesion. Enamel acid-etching is required.

2. Conventional cavity:



Some dentists combine both techniques in one cavity.

After preparing the cavity, cleaning is needed.

This operative procedure is done several times during the restoration, especially before the pulpar-dentin protection.

4 – Pulpar-dentin protection

Protecting the dentin and pulp from pathogenic elements that could irritate the pulp.

Depends on the depth of the cavity, pulpar condition, type of restoration and other factors.

For temporary restorations generally calcium hydroxide is used as a base.

For definitive restorations the dentist will use dentin bonding agents or glass ionomer cements to protect the pulpar-dentin complex.

In deep class II cavities, with a pulpar lesion, the dentist will decide if he keeps or removes the pulp. In this case he will use endodontic instruments to remove the pulp.

It is done manually using:

- Reamers (to open the root canal)
- Barbed broaches (to remove the pulp)
- K-Files or Hedstroem files.

It can be also done mechanically with rotary endodontic instruments. These are different systems designed by different manufacturers. Each system consists of several types of rotary files, meaning that these files or endodontic instruments are used with a contra-angle. These contra-angles work with an electric engine that allows the professional to control the speed and the torque. Nowadays the use of these instruments is very common.

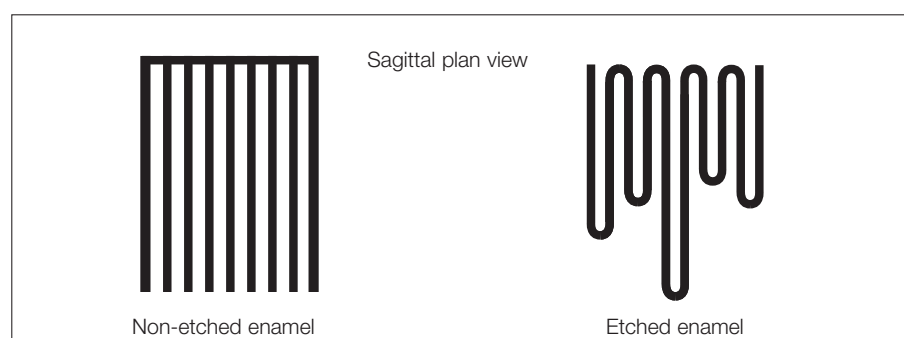
Once done the root canal will be sealed with:

- Gutta percha points.
- Cement for root-canal.

Before permanently sealing the root-canal system, it can be cleaned with chemical agent.

5 – Enamel acid-etching

The enamel can be etched with 37% phosphoric acid gel in order to create a greater bonding surface area (greater physical and chemical retention). In the following drawing, we can see the effect of phosphoric acid on the enamel.



6 – Application of the specific material

There are different filling materials taking the cavity class and the aesthetic in considerations.

The recommended materials are:

Cavity class	Material
I	Composites Amalgams
II	Composites Amalgams
III	Composites
IV	Composites
V	Composites Glass ionomer

Manufactures instructions must be followed to manipulate and apply the different materials.

7 – Finishing and polishing

In order to obtain satisfactory results all fillings must be finished (trimming of spare material) and polished to obtain a smooth surface.

We use:

- Polishing paper and plastic disks and strips.
- Polishing rubber or silicon cups.
- Polishing agents.

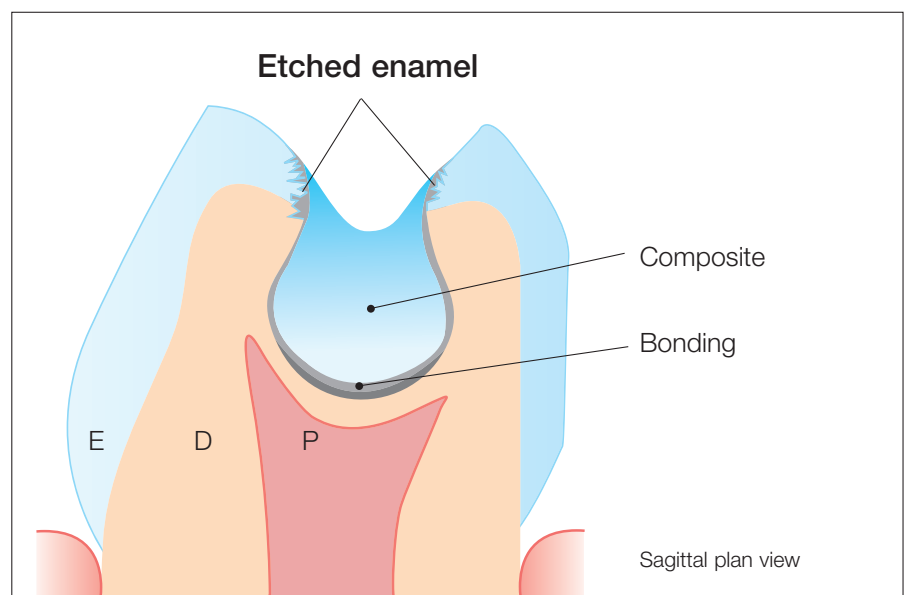
Contra-angle driving mode at slow speed (max. 40.000 rpm) is used along with water.

Finishing and polishing composite fillings are essential to avoid a rough surface where nicotine, coffee, etc, could be retained and therefore changing the colour of the restoration.

Composite fillings

Composite fillings (tooth coloured aesthetic restorations) are done following the steps described previously.

In this drawing, we can observe the different layers of the applied materials.



Composite resins are used for all types of reconstructions.

1st Step

After drilling and trimming the cavity, we proceed to isolate the tooth from the oral cavity. Once this is done, we will rinse the cavity with water and air-dry it.

2nd Step

This is the operative time in which we will etch the cavity (enamel and dentin) with phosphoric acid in a concentration of 34% to 37%. The phosphoric acid will be left for 15 or 20 seconds, never more than 30 seconds.

This step could be omitted if the adhesive used is a self-etching adhesive. These types of adhesives include an acid resin that etches the dental surfaces as they bond.

Due to the acid, retentive areas are created at the enamel prisms as well as at the dentin tubules and at the peripheral dentin. The adhesion of the material to the cavity is improved.

The acid can be either gel or liquid. The gel is easier to apply and control. It is applied with a brush or straight from the syringe cannula. It must be rinsed off the cavity with water at least twice the time left to etched and then, air-dried.

3rd Step

Following the manufacturer instructions, the adhesive agent called liquid resin or “bonding” is placed on the whole cavity, on top of the etched enamel and dentin.

This bonding allows a better adaptation of the fillings since it is too viscous and could not penetrate the rough enamel surface or the dentin tubules. Bondings are made of the same material as fillings but in a liquid state.

Generally there is no need of mixing with other components since they are monocomponents and harden with an halogen light (HL).

4rd Step

Composites are placed into the cavity, trimmed to the final shape, hardened and polished straight ahead.

They are made of a resin matrix, filler particles and a catalyst.

Matrix resin is made out of organic resins, generally Bis GMA (reaction between biphenyl A and diglycidyl methacrylate) or aliphatic acrylate (generally urethane).

Nowadays manufacturers are seeking and even producing new types of matrix that, instead of contracting while hardening, expand. This fact reduces the polymerization shrink of the composite, which is the main problem of this filling material.

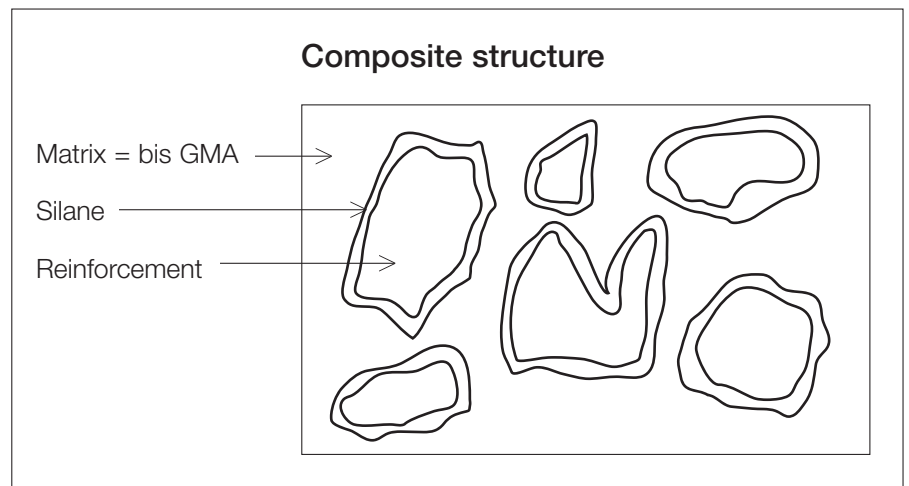
The matrix is not very resistant used on its own. All types of composites have reinforced inorganic particles such as quartz, boron silicate and pyrogenic silica added to their composition. This low resistance to pressure, abrasion and stress, has been fought by the manufacturers by adding inorganic components in the organic matrix. This means that the matrix will be a framework of an inorganic molecule surrounded by organic resin.

This new composites are named ORMOCER (Organically Modified Ceramic).

The aim of these inorganic components is to increase :

- **Pressure resistance**
- **Abrasion resistance**
- **Hardness**

These differently sized reinforced particles are included in the matrix resin by means of an adhesive known as silane.



These particles can be symmetrical or asymmetrical shaped like splinters, sheets, sticks or rounded pearls.

Composites can be classified according to the size of the particles:

Macrofills particles

The size of the reinforced inorganic particles fluctuates between 1 and 100 microns.
1 micron = one millionth of a meter. Symbol = μ . These types of particles are no longer used.

Microfills particles

The size of this type of particles is located between 0.5 and 10 microns. Some manufacturers use 0.04 micron particles of pyrogenic silica (SiO_2), they use pre-hardened particles of matrix and SiO_2 as reinforced particles.

Hybrids

Mix of macro and microfills, the range of particle size is less than 1 micron to 80, the majority has 1-10 microns size.

Hybrids were developed for cavities where a great resistance is needed, as found in class I, II and IV.

The particle average size is different if anterior or posterior.

Nanofills

Recently a new type of smaller particles has been developed. These particles are smaller than the microfills and are called nanofills. The size of these particles fluctuates between 10 and 500 nanometers (nm). These particles are so small to allows a greater concentration of particles in the resin composite, increasing therefore the molecular mass or weight. The physical and mechanical properties will improve, and the polymerization shrinkage will be reduced

A nanometer is a unit of measurement that is one billionth of a meter.

If we compare the four groups :

Particle type	Weigh %	Indication
Macro	Up to 40	Anterior Teeth
Micro	40 - 60	Anterior / Posterior
Hybrid	60 - 86	Anterior / PosteriorMicro
Nano	78	Anterior / Posterior

Composites can polimerize or harden in two ways:

Auto polymerization (self curing composites):

A chemical reaction occurs after mixing the base material with a catalyst. They have a fixed manipulation time.

Photopolymerization:

With monocomponent materials, no mixing is needed as they polymerize when a curing light is applied to them (HL). They do not have a fixed working time.

Light curing composites are commonly used nowadays. There are also other photopolimerizable materials, such as calcium hydroxide cements.

The curing light used is a visible light (blue) with a wavelength of approximately 440 to 520 nanometres (nm). Nanometre = thousandth part of 1 micron (nm).

A thickness of 1 mm is polymerized in approx. 10 seconds up to a maximum of 4-5 mm in 60 seconds.

Photopolymerization advantages are:

- Easy to use, more comfortable
- Greater working time
- Time saving
- 100% usable material
- Better curing of materials
- Minimum curing time
- No mixing, monocomponent materials

Amalgam fillings

Sometimes called "silver fillings", amalgam fillings are mostly used for posterior teeth.

They have been used in dentistry for almost 100 years.

Amalgam definition:

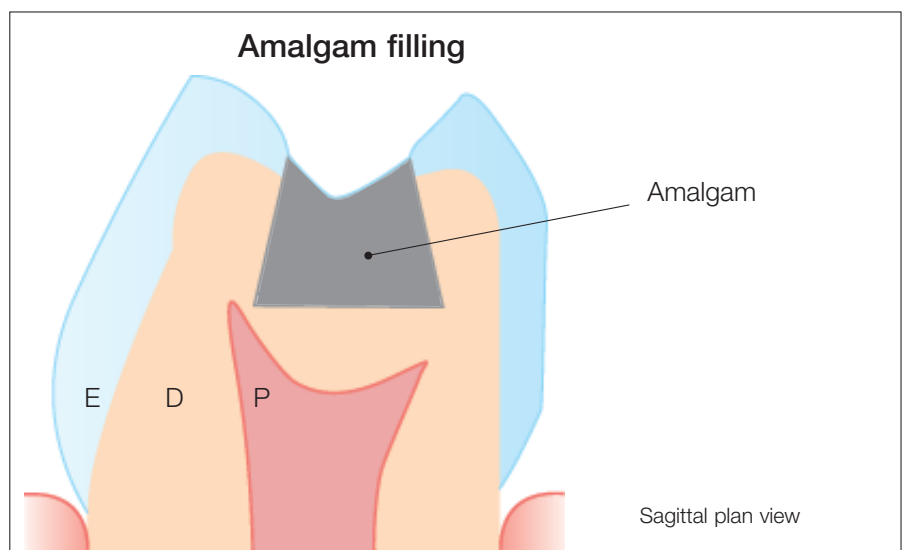
It is an alloy of one or several metals with mercury.

It is seldom used on anterior teeth for aesthetic reasons.

The working technique is very similar to composite fillings, even though there are differences.

The main difference is the shape of the cavity. Due to the way of condensing amalgams, adhesive cavities are used for amalgam fillings.

Neither acid etching technique is used for conventional amalgam fillings, since no adhesion is created between amalgam and tooth. Amalgam is fixed to the tooth by means of oxidation and corrosion.



1st Step

The first step is to isolate the tooth from the oral cavity.

2nd Step

If we want to use the adhesive amalgam system, the second step, after deciding which system to use, will be preparing the cavity in order to receive the adhesive material (cements, conventional adhesive systems or adhesive systems for metal). In any case we will use an acidic substance in order to prepare the tooth structure.

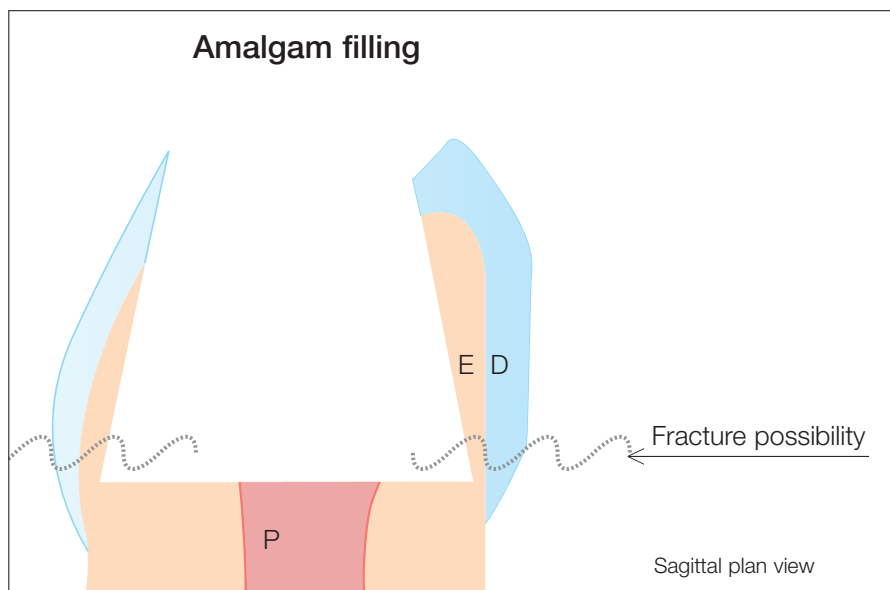
The adhesive technique prevents the corrosion of the amalgam, sealing the cavity by means of the adhesive system or the cement adhesive characteristics.

The amalgam is placed immediately over the adhesive cement.

3rd Step

Depending on the size of the cavity, cement can be placed in order to support the amalgam. Different types of cements are described later on. Some dentists use composite instead of cement.

Where endodontic has already been done, damage to the tooth can occur (Cp III).



Amalgam filling. A destroyed cavity with very thin walls.

4th Step

Following the previous steps, an amalgam will be placed.

The amalgam is carried in small amounts in an amalgam-carrier. It is then condensed with conical or cylindrical instruments named amalgam-puggers and trimmed with the so-called carvers.

Once it is trimmed to the final shape, the amalgam will harden.

Amalgam can not be polished before 24h from its placement.

The range of working time is:

- Minimum 3 minutes
- Maximum 15 minutes

This range can vary depending on the intensity of the mix.

We can classify the amalgam by:

- Type of particles in it.
- Composition (% of the components).

Composition:

It is an alloy compound of:

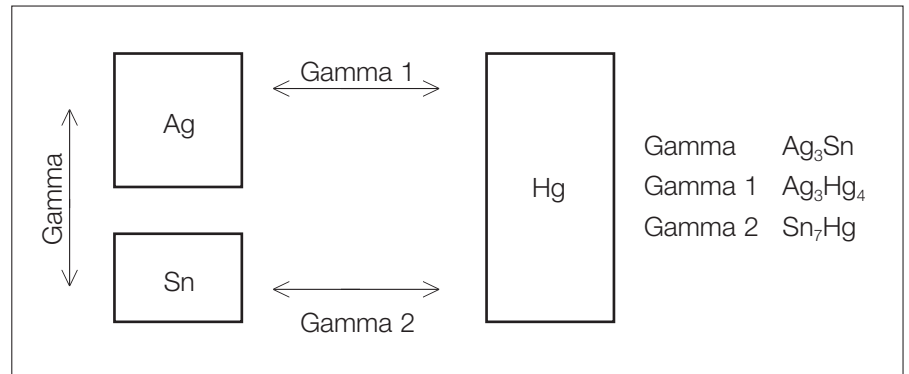
Silver = Ag
Tin = Sn
Copper = Cu

It can also contain other materials such as palladium (Pd), zinc (Zn), indium (In), etc.

Mercury (Hg) must be added in order to make it work.

Chemical reaction

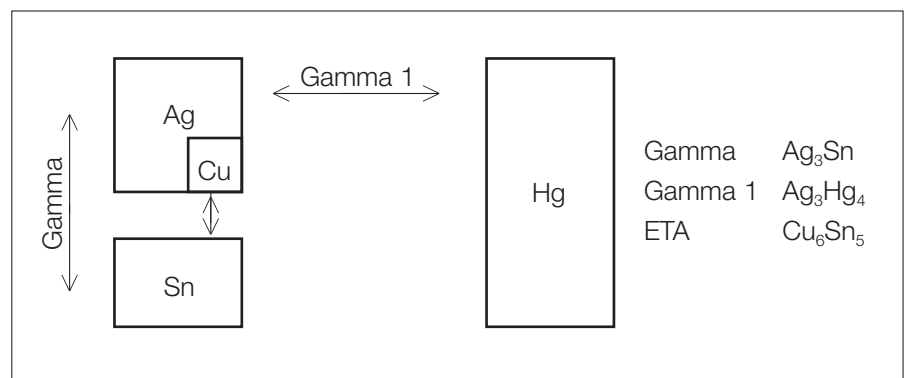
Amalgams show the following phases:



Conventional Amalgam

Since the Gamma 2 phase (Sn-Hg reaction) is responsible for most of the amalgam problems, they launched the so-called Non-Gamma-2 amalgams (NG2).

Copper (Cu) was incorporated to the Non-Gamma-2 amalgam in order to react with the tin, preventing the Gamma 2 phase.



Non-Gamma-2 amalgams:

Advantages :

- Less corrosion due to the replacement of the Gamma 2 phase.
- Less values for Flow and Creep.
- Greater shape stability.
- Better compressive strength values.
- Less marginal breakdown.
- More intense shine.

Flow = strength producing a small deformation, generally of 0.1% or 0.2%.

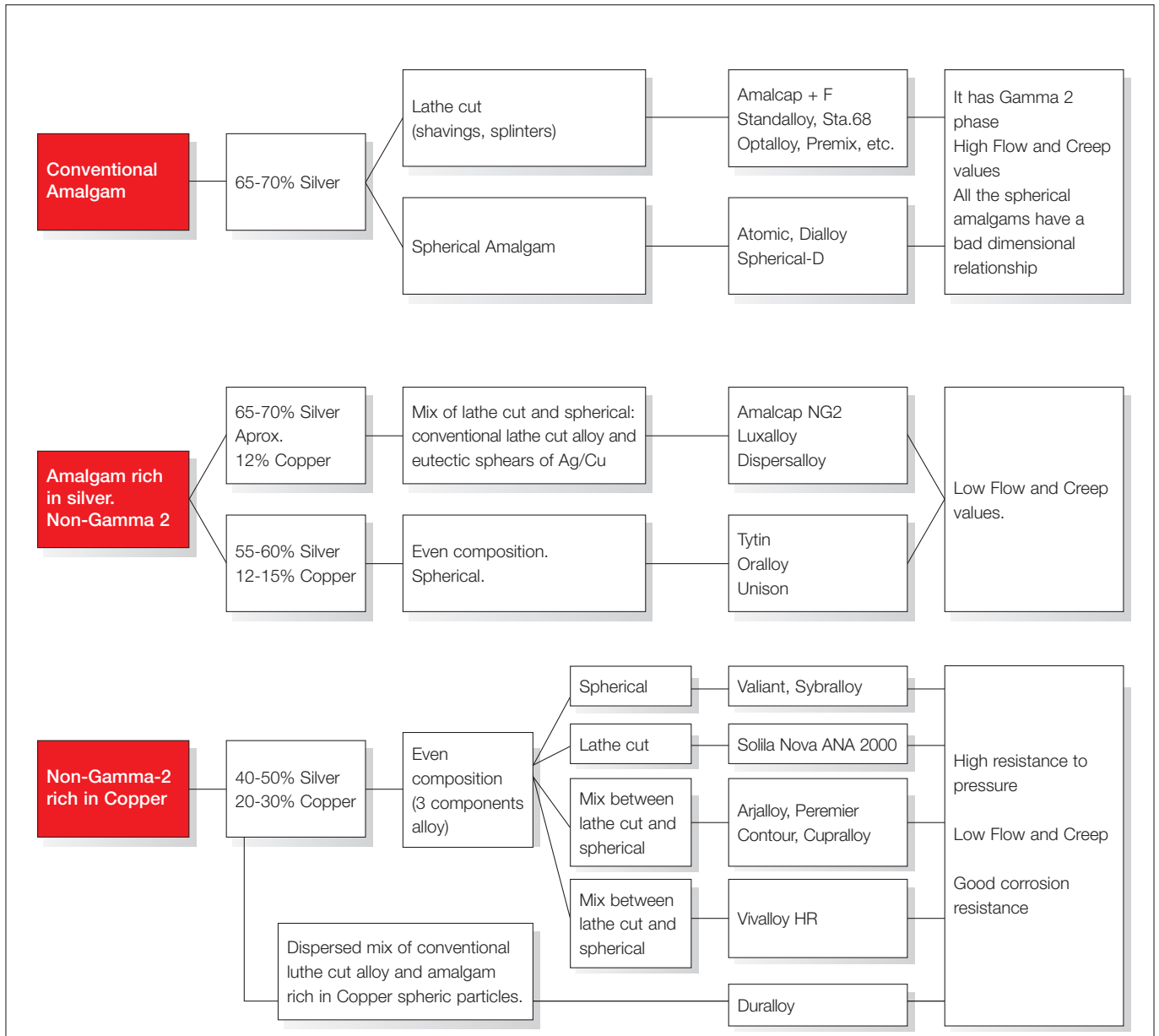
Creep = material deformation under a constant or static load.

The smaller the Flow and Creep values, the better !

Classification according to the particles:

- Lathe cut, chips' shape particles can be conventional or NG2.
- Spherical particles can be conventional or NG2.
- A mix of lathe cut and spherical particles:
 - Lathe cut approx. 3/4
 - Spherical approx. 1/4

Classification according to the composition:



Dental amalgams are marketed in two forms:

- Alloy powder (Ag, Sn and Cu) to mix with mercury.
- Predosed capsules containing determined proportions of the alloy and of mercury.

Before, the powder presentation was mixed by hand but nowadays, it is done by a triturator.

The capsules are shaken for 5-7 seconds. There is no need for an other manipulation.

Capsules' advantages:

- Easy to use.
- Unalterable mixing quality.
- Time saving.
- Material saving, less waste.
- More comfortable.
- Greater hygiene.

There are different capsule shakers.

Aesthetic dentistry

Aesthetic dentistry or cosmetic dentistry is a branch of Restorative Dentistry that comes from the USA.

Aesthetic dentistry generally solves problems on anterior healthy teeth affected by:

- Enamel Hypoplasias (enamel malformation)
- Enamel Amelogenesis (enamel malformation)
- Discoloured Enamel (caused by medicines)
- Malpositions, etc.

There are two techniques:

- Direct
- Indirect

The direct technique is the one used by the dentist in his consulting room. He creates false veneers with composites over the enamel. There is another direct technique that bleaches the discoloured tooth by means of a chemical process.

The indirect technique is made by the dental technician. He makes the veneers at the laboratory so the dentist can cement them into the mouth. When this technique is used, the prothesist doesn't use any composites but rather resin or ceramic (porcelain).

Nowadays the aesthetic factor is so important that patients demand it for the posterior teeth also. New aesthetic and reinforced resin composites have been developed and are used for direct restorations. If indirect treatment are needed, the laboratory technicians can also use porcelain or reinforced laboratory resins.

Other materials, indications

Other materials like cements are used in Restorative Dentistry as well as in prosthesis.

Composition and characteristics of the cements

Cements		Composition	Characteristics (+) positives (-) negatives
Zinc phosphate	Powder	Zinc phosphate Magnesium Oxide	(+) Great pressure resistance Good density. Waterproof.
	Liquid	Orthophosphoric Acid	(-) It gives off some heat and it is acidic
Carboxylate	Powder	Like Zinc phosphate	(+) Does not give off heat. Is not acidic
	Liquid	Polyacrylic Acid	(-) Hard to work
Zinc oxide eugenol	Powder	Zinc Oxide	(+) Sedative. Does not irritate the pulp
	Liquid	Eugenol + EBA (Ethoxy Benzoic Acid)	(-) Never under composites It gets dissolved by the eugenol
Glass ionomer	Powder	Silicon Oxide Aluminium Oxide	(+) Adheres to the dentin. Does not irritate
	Liquid	As the carboxylate Some trademarks incorporated solid polyacrylic acid to the powder.	(-) Opaque color (do not use in class V)

Coating cements:

Regular fillings = Zinc Phosphate
Polycarboxylate
Glass-ionomer
Zinc Oxide Eugenol (just with amalgams)

Deep cavities = Zinc Oxide Eugenol
Glass-ionomer

Cements as filling materials:

For class V = Glass-ionomer

Provisional = Zinc Oxide Eugenol

For prosthesis cementation:

Vital teeth = Polycarboxylate
Zinc Oxide Eugenol
Glass-ionomer

Non-vital teeth = Zinc Phosphate

Prosthesis

Prosthesis replace a part or a whole organ by means of a device that does not belong to the organism.

When it is impossible to restore a tooth that has to be extracted, it must be replaced in order to keep the masticating apparatus in fonction.

The dentist studies the case and plans to place the device in the mouth. The person in charge of the laboratory work is the prosthetist.

There are two types of prosthesis:

- Removable.
- Fixed.

Removable prosthesis

Removable prosthesis include all prosthesis that are placed without any kind of joint to the organism and that can, under certain circumstances, be removed

This dental area involves:

- Complete dentures.
- Partial dentures.

Complete dentures are prosthesis made to replace all teeth in one arch or at least 95% of them. Complete dentures are made in full acrylic (resins) and generally, the teeth are made out of resin or ceramics. The steps are:

Clinic

First Session

- An impression is taken
(Shape and situation of the mouth in negative)

Second Session

- It is controlled
- New impressions

Third Session

- It is tested
- It is corrected, if necessary

Fourth Session

- It is placed in the mouth.

Laboratory

- The impression is poured with a material that hardens to produce a positive model of the mouth.
- Shape is given with wax for the proper dimension of the mouth.

- Definitive shape is given
Work is still done with wax

- It is finished with resin

Partial dentures are made for patients who have lost 4 to 8 teeth in one arch. It is a metallic frame in which the teeth are placed; it is fixed to the remaining teeth by means of clasps or hooks.

These kind of prosthesis are frequently made for economical reasons, when the patient can not afford a fixed prosthesis.

Fixed prosthesis

Prosthesis will be fixed by means of cements in the mouth.

There are two types of fixed prosthesis:

- Crowns (tooth caps)
- Bridges

Crowns are used when just one tooth needs to be restored. Crowns can be:

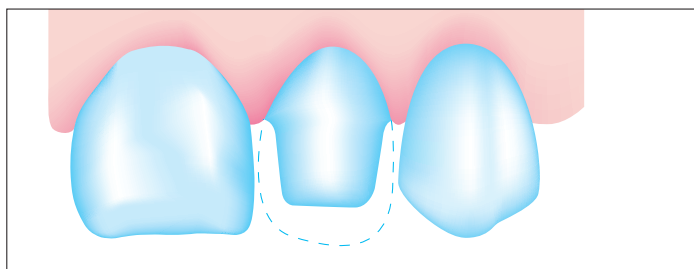
- Veneers
- Jackets

Veneer crowns have a metallic support; only the labial or buccal surface is made with resin.

Jacket crowns do not have a metallic support. It can be made of resin or ceramic.

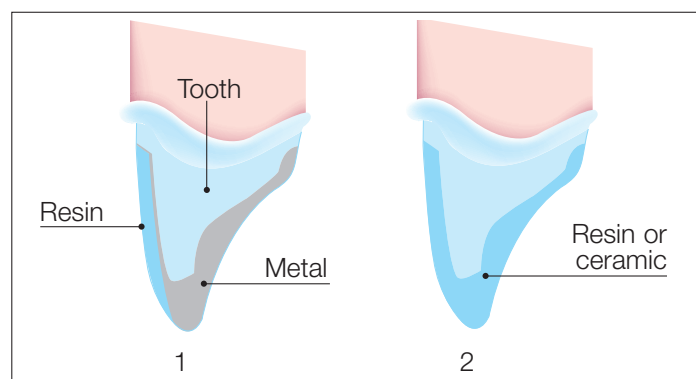
In order to make this kind of work, the dentist must reduce the tooth surface (abutment tooth). When there is not enough tooth structure, a core must be made up either with composite or amalgam.

Buccal view of a tooth reduced for a crown.



Sagittal plan view

1. Veneer Crown
2. Jacket Crown

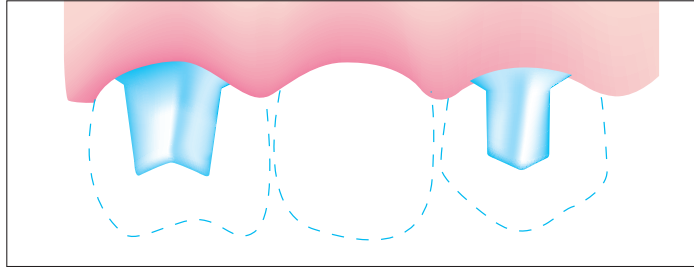


Bridges are made when few teeth are lost.

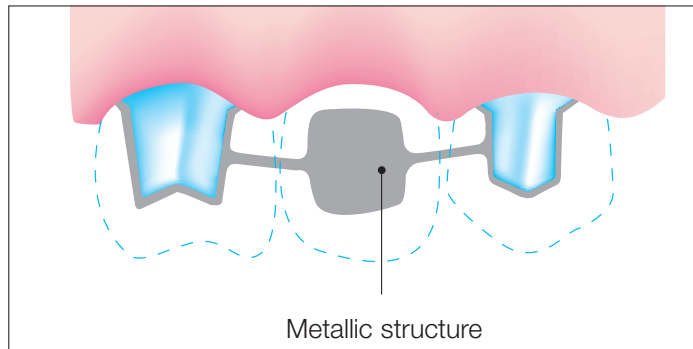
The adjacent teeth are prepared to receive crowns that will support the structure. It is the same process as for crowns.

A one-piece metallic structure is made and covered with the appropriate material. See figures' sequence.

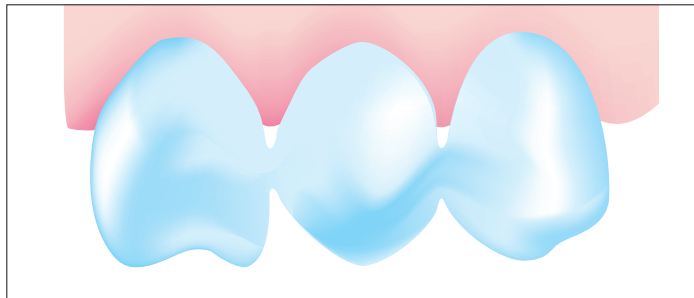
Vestibular view. Two pillar crowns for the bridge.



Vestibular view. Metallic structure of the bridge.



Vestibular view. Bridge finished.



Steps to follow:

Clinic

Laboratory

First Session

- Teeth reduction
- Impression

- Pouring dental cast in the impression.
- Wax modelling.
- Cast of the metallic structure.

Second Session

- Trying out the metallic structure

- Coating with the indicated material (Resin or ceramic)

Third Session

- Placing in the mouth.



Impression materials

In this part, we are going to study the impression materials used by the dentist.

Removable Prosthesis = Alginate
Silicones

Fixed prosthesis = Silicones
Hydrocolloid

In order to record any kind of impression, a support for the material is needed, this support is called a tray. These trays have the shape of the arch, lower or upper, and differ in size. Without them, it is impossible to record any impression.

Alginates

These products are available in powder, made of seaweeds, they have also different types of agglutinates (calcic sulphate, for instance). They are mixed with water and their working time is inferior to 2 1/2 minutes.

They must be poured in cast before 24 h since the alginate contracts once it hardens.

It is the most popular material for impressions, only used for removable prosthesis.

Silicones

They are much more accurate than alginate and are used basically for fixed prosthodontic.

Silicone is a type of rubber that hardens when mixed with a catalyst.

They are available as paste and their working time depends on the amount of catalyst added to the paste. Their consistency can be fluid or dense.

First an impression is recorded with the dense silicone; once it is hardened another impression is recorded over the first one, with a fluid silicone.

There are different types of silicones (addition curing, polysulphides, mercaptans) with different characteristics.

Hydrocolloids

As the alginates, these products are made of seaweeds, but they can be re-used.

They are presented in a viscous form that gets its consistency for impression after placing it in a water bath at different temperatures.

This is the most accurate of all the impression materials.

Trays must be cooled in water since the hydrocolloid is manipulated at an approximate temperature of 50° C. If the trays were not cooled the patient would be injured, and the setting process of the hydrocolloid would be accelerated.

They must be poured in cast before 24h; the ideal situation is to pour it just after the material setting.

Glossary

A

Aesthetic

The branch of philosophy dealing with beauty and taste.

– **Aesthetic dentistry**

Discipline within Dentistry in which the primary focus is the modification of appearance of a patient's oral cavity and surrounding structures (Cosmetic Dentistry, Dental Art).

Alveolar

Relating to the jaw structure containing the tooth sockets; for instance: alveolar abscess, alveolar arch, alveolar ridge, etc.

Alveolar process

Thickened ridge of bone that contains the tooth sockets.

Alveolus

Sockets in the jaws in which the roots of teeth are held in the alveolar process of maxilla with the periodontal ligament.

Angle

Point or line of intersection of 2 or more surfaces.

– **Axial angle**

Any line angle parallel with the long axis of a tooth. For instance: mesio-buccal, distolingual.

– **Cavosurface angle**

The angle formed by the junction of the wall of a tooth's cavity preparation and the surface of the crown of the tooth.

– **Line angle (of a tooth)**

The junction of two surfaces of the crown or of a tooth cavity. For instance: mesio-occlusal, disto-labial, mesio-incisal, etc.

– **Vertex**

Formed by the joint of three or more surfaces; for instance: disto-bucco-occlusal, mesio-labio-incisal, etc.

Anterior

Located at the front part of the human body. Term frequently used to distinguish the six frontal teeth in each jaw.

Apex

The highest point of a conical object. End of the root of a tooth.

Apical

Related or located at the apex.

– **Apical zone**

Zone situated at the highest point of the tooth (apex).

– **Apical foramen / orifice**

Opening at or near the apex of the root of a tooth, through which the vascular, lymphatic, and neural structures supplying the pulp pass.

Articulation

Joint (temporomandibular joint). Contact relations between the occlusal and incisal surfaces of the teeth during the occlusal movement of the jaws.

Axial

Relating to, characterized by, or forming an axis of a structure or a part of it. In Dentistry it is applied to all the lines, angles, surfaces or walls parallel to the major axis of the teeth.

B

Bicuspid

A tooth having two cusps or points at its occlusal surface (premolars). Human beings have eight bicuspids, two on each side of the upper and lower jaw.

Buccal

Of or related to the mouth cavity.

- **Buccally**

Toward the inside of the cheeks.

- **Buccal surfaces**

Teeth surfaces toward the cheeks. Applied to molars and premolars.

- **Bucco lingual**

Dimension measured from the cheek to the tongue. For example: bucco lingual diameter.

- **Bucco linguallly**

Relating to the cheek and the tongue.

C

Canal

Part of the pulp cavity extending from the pulp chamber to the apical foramen.

Cementum

Bone type tissue covering the external part of the teeth's roots.

Cervix

A neck-shaped or narrow anatomical structure. In Dentistry it is a narrowed zone between the crown and the root of a tooth.

- **Cervical**

Relating to a neck or a cervix.

- **Cervically**

Toward the neck or the cervix.

- **Cervical edge**

The portion of the crown closer to the cervical line.

- **Cervical line**

Anatomical designation for the cementsoenamel junction, the dividing line between the crown and root portions of a tooth.

- **Cervical line curvature**

Cervical line deviation in relation with the vertical axis of the tooth or the incisal or occlusal plan.

Cingulum

The lingual lobe of the anterior teeth, in both upper and lower jaws. Made of enamel.

Contact

Tangency of two surfaces.

- **Contact area**

Tangency area caused by the proximal abrasion of a tooth that enters in contact with an other tooth.

- **Occlusal or incisal contact**

Contact between the upper and lower teeth when the jaws are closed.

- **Proximal contact**

Contact of the proximal surfaces of two adjoining teeth.

Crown

Part of a tooth covered by enamel and projected beyond the gum line.

- **Bell-shaped crown**

Crown of a tooth having an exaggerated occlusogingival contour.

- **Anatomical crown**

Upper, enamel-covered part of a tooth.

- **Clinical crown**

Portion of a tooth exposed beyond the gingiva.

Coronal

Of or related to the crown.

Cuspid

Elevated point in the masticatory surface of a tooth. Also the tooth provided with one cuspid (canine tooth).

D

Decay

Disintegration process located on a calcify tissue.

Deciduous

Falling off or shed at maturity, like the teeth of the first dentition.

- **Deciduous teeth**

The 20 teeth of the first dentition, which are shed and replaced by the permanent teeth (also named temporary teeth or milk teeth).

Dental Caries

Progressive and localized destruction of the enamel, dentin and cementum of the teeth.

Dentine

The chief substance of the teeth, surrounding the tooth pulp and covered by enamel on the crown and by cementum on the roots

- **Cementodentinal junction**

The surface at which the cementum and dentine of the root of a tooth are joined. Also called dentinocemental junction.

- **Cementoenamel junction**

The line, at which the cementum covering the root and the enamel covering its crown meet, designated anatomically as the cervical line.

Dentition

Natural teeth, considered collectively, in the dental arch. The type, number, and arrangement of a set of teeth.

- **Primary dentition**

Deciduous teeth.

- **Permanent dentition**

The 32 teeth of the second dentition.

Decalcification

Loss of calcium salts from a bone or tooth.

Distal

Anatomically located far from a point of reference, such as an origin or a point of attachment. Situated farthest from the middle and front of the jaw, as a tooth or tooth surface.

- **Distally**

Direction from the midline of the face, following the curve of the dental arch.

E

Edentulous

Without teeth, partial or totally.

Enamel

Hard, calcareous substance covering the exposed portion of a tooth

Erosion

Tooth erosion is a gradual loss of the normal surface of the tooth due to a combination between abrasion and chemical processes. It can occur at the cervical area causing dense and polished surfaces. (See: abrasion, wear out).

F

Facial

Of or concerning the face.

Term used to name the buccal and labial surfaces of the teeth.

Fissure

Long narrow opening; a crack or cleft on a sulcus at the enamel's surface of the tooth. These fissures tend to appear along the lines of the development sulcus.

Free gingiva

Portion of the gingiva surrounding the tooth and not directly attached to the tooth surface.

Foramen

Natural opening or passage.

G

Gingival

Of or related to the gums.

– **Gingivally**

Toward the gingiva.

– **Gingival sulcus**

Located between the tooth and the free gingival margin, the crevice surrounding the tooth.

Gum

Firm connective tissue covered by a mucous membrane enveloping the alveolar arches of the jaw and surrounding the base of the teeth. Also called gingiva.

I

Incisal

Pertaining to the cutting edge of an anterior tooth.

– **Incisally**

Toward the cutting edge.

– **Incisal edge**

Edge formed by the union of the labial and lingual surfaces of the anterior teeth.

Incisive

Having the power to cut. Humans have 8 incisive, two at each side of the midline, in the upper and lower jaws.

Interdental

Located between the teeth.

Interproximal

Situated between adjoining surfaces.

Interproximal space

The pyramidal or triangular space between adjacent teeth in which the contact point is at the vertex of the pyramid. The proximal surfaces make the sides of the pyramid and the alveolar ridge its base, this space is full with the gingival tissue, called gingival papilla.

L

Labial

Of or related to the lips.

- **Labio-lingual**

Referring to a section from labial to lingual.

- **Labio-lingually**

From the lips to the tongue.

- **Labial surface**

Vestibular surface of an anterior tooth.

Lingual

Of or relating to the tongue.

- **Lingually**

Next to or toward the tongue.

- **Lingual surface**

The oral surface of a mandibular tooth that faces the tongue, opposite to its vestibular surface.

Lobe

One of the largest divisions of the crown of a tooth, formed by a distinct point of calcification.

M

Mandible

Lower jaw bone.

- **Mandibular**

Related to the lower jaw.

- **Mandibular tooth**

Each tooth located at the lower jaw.

Maxilar

Upper jaw bone.

Maxillar

Of or related to the upper jaw or maxilla.

- **Maxillar**

Each tooth located at the upper jaw or maxilla.

teeth

Mesial

Of, in, near, or towards the midline of the face. Situated towards the middle of the front of the jaw along the curve of the dental arch.

- **Mesially**

Toward the median line.

- **Mesial surface**

In a tooth, the closer surface to the midline.

Mesio-distal

Dimension or diameter from mesial to distal.

– **Mesiodistally**

From mesial to distal.

Midline

Each of the vertical lines of the sagittal plan.

– **Midline face**

Medial line or plan of the body.

Molar

One of the biggest tooth of the masticatory apparatus having a crown with multiple cuspids. A human being has twelve molars, three on each side, at the upper and lower jaws.

O

Occlude

To fit close together; to close tightly; to obstruct or close off.

Occlusal

Of or related to the contacting surfaces of opposing teeth, especially the biting or chewing surfaces.

– **Occlusally**

Toward the occlusal surface.

– **Occlusal surface**

Belonging to the masticating surfaces of the premolar and molar teeth.

– **Occlusal plan**

An imaginary surface related anatomically to the cranium and touching theoretically the incisal edges of the incisors and the tips of the occluding surfaces of the posterior teeth. It is not a plan in the true sense of the word but it represents however the mean of the curvature of the surface.

– **Occlusal wear**

Disappearance of the opposite surfaces of the teeth as a consequence of the mastication or due to a frictional contact between these surfaces.

P

Periodontics

Branch of dentistry dealing with the study and treatment of periodontal disease.

Periodontum

Specialized tissues surrounding and supporting the teeth. This includes connective tissues of basement membrane, ligaments, cementum and alveolar bone.

Pit

Natural hole or depression in the body or in an organ. The pits are found mainly at the lingual surfaces of the anterior teeth and at the occlusal surfaces of premolars and molars.

Prosthesis

Artificial device used to replace a missing body part, such as a limb, a tooth, an eye, or a heart valve.

Proximal

In intimate relation with something; the closest, next or previous. Surface of the tooth closest to the adjacent tooth.

– **Proximal surface**

The tooth surface closer (mesial or distal) to the adjacent tooth.

Pulp horn

Elongation of the pulp of the tooth that extends towards the cusp.

S

Sagittal

Belonging or situated in the antero-posterior midplan of the body.

Saliva

Serous, mucous or mixed secretions of the salivary glands secreted into the oral cavity by several ducts (parotid, submaxillary and sublingual glands secretions).

Sulcus

Groove, trench, or furrow; general anatomical term for such a depression.

- **Development groove**

One of the fine lines found in enamel, marking the junction of the lobes of the crown in their development. Also called developmental line.

- **Triangular groove**

Developmental groove found in the triangular fossae of the posterior teeth.

- **Root developmental groove**

Developmental groove going along the root.

- **Supplementary groove**

Other developmental grooves.

T

Tooth

Secured to the mandible by the alveolar process and the gum it is a calcified organ used for several functions: mastication, phonation, deglutition.... having an influence on the facial outlines.

Tuber

Small rounded prominence or nodule inside or outside an organ or tissue. Small cuspid.

Tubules

Undulating tubules existing in the dentine. They radiate from the pulp to the amelodentinal and cemento-dentinal junction.