Instruments for tooth preparation (enamel, dentin and carious dentin)

JÚLIA DR. NEMES

Definition of the toothpreparation

- **PREPARING THE TOOTH FOR FILLING** are called ***TOOTH (CAVITY) PREPARATION***

-Instrument

-Knowledge, Rules

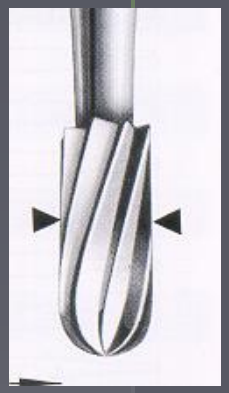
7. week 1-th MIDTERM 20 of March

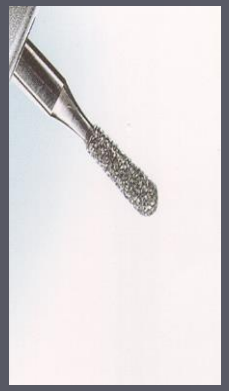
Thursday 8:50-9:35

in this Room (I. Női Klinik)

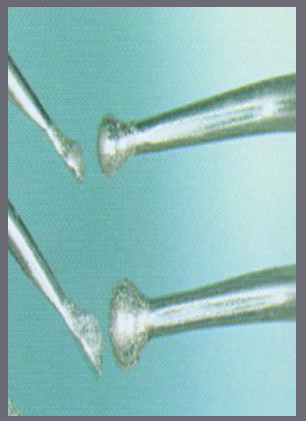
after the Conservative lecture

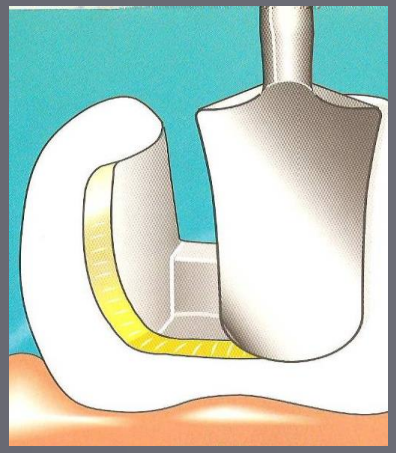
Possibilities for preparation





- Hand instruments
- Rotary cutting instruments
- Oscillating instruments
- Laser
- Chemical-mechanical caries removing
- Air abrasion



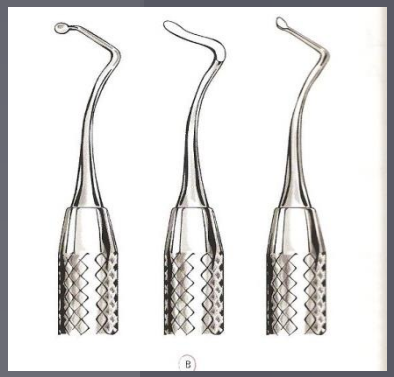


Hand Instruments G.V.Black classification

Nowdays hand instruments are not used for primer preparation.

- Advantage: not caused iatrogen damage
- Disadvantage: very low effectivity

- Instruments for enamel preparation:
  - Chisel (Black)
  - Hatchet
  - Gingival margin trimmer *
- Instruments for dentin preparation:
  - Excavator (spoon*, hoes and hatchet)



Most of them are paired instruments!

Characterisation of the hand instruments 3 (or 4) data

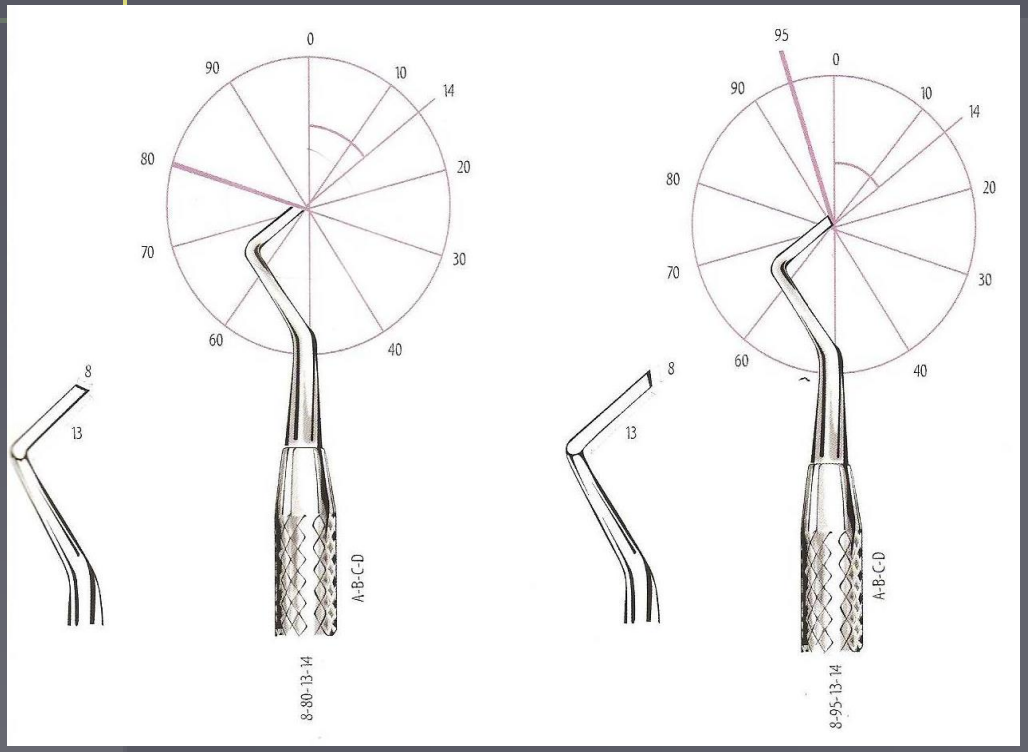
- Width of the blade (in tenths of a millimeter o,1 mm)
- Blade length (in mm)
- Blade angle (in clokwise centigrade)

Exception: Gingival margin trimmer 4 data!

Primary cutting edge angle

(in clockwise centigrades.)

Gingival margin trimmer 4 data!



A Width of the blade (in tenths of a millimeter o,1 mm 8)

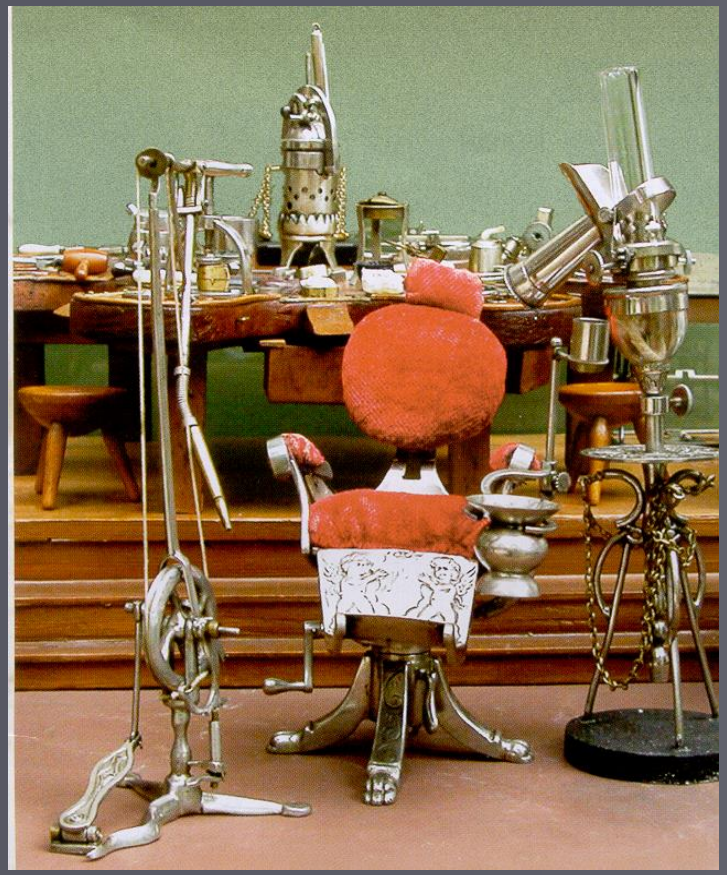
B Primary cutting edge angle (80)

C Blade length (in mm13)

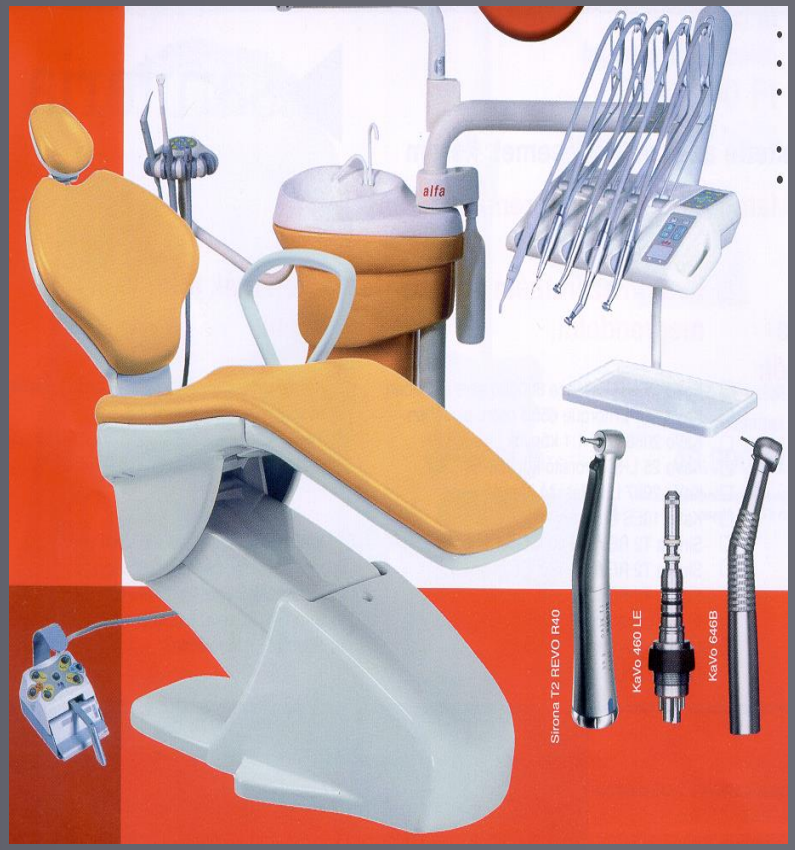
D Blade angle: in clockwise centigrade

Paired instruments

Rotary (powered, driving) cutting equipment (hand, foot, electric, turbina, micromotor, airmotor)



Foot engine 1871



Dental unit

Rotary cutting instruments
DEVELOPMENT

- IN DRIVING (in equipments)
- IN CUTTING INSTRUMENTS (burs)

- Driving: hand
  - foot engine 1871 Morrison (700 rpm)
  - electric driving: elektric engine, mikromotor
  - air driving: turbina, airmotor

Turbine

Handpiece (only contraangeled)

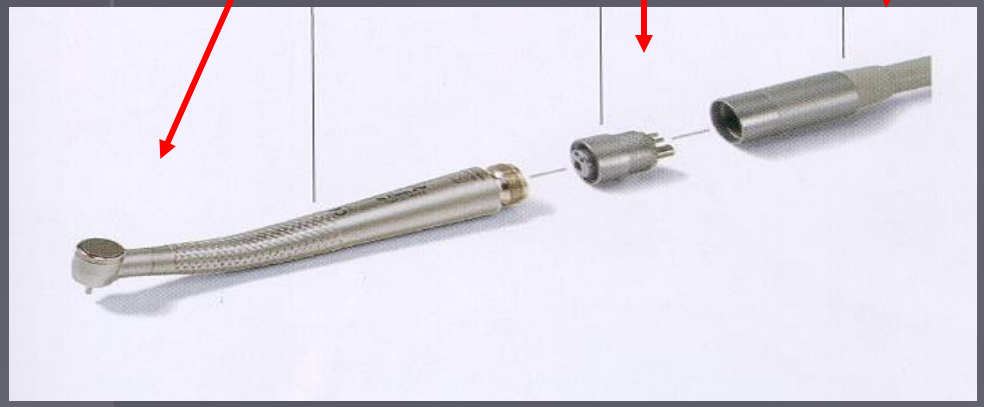
compressed air

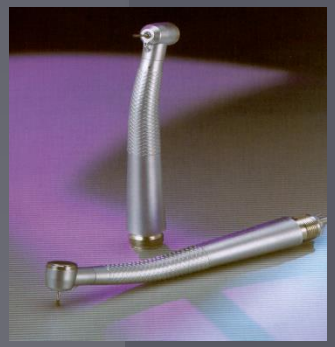
Turbine

Kuplung

Hose

Wheels run on bearing





Handpiece

Kuplung

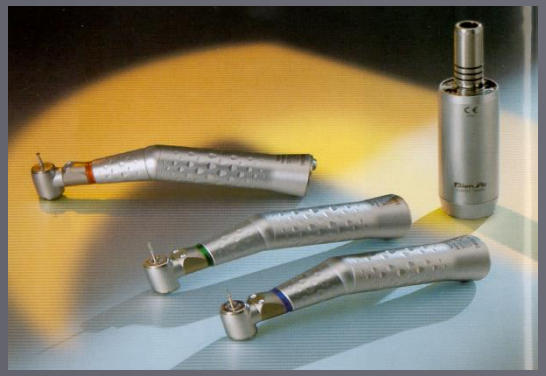
Hose

Micromotor

Handpiece(straight, and contraangeled)

direct current (electric) or compressed air (air motor)

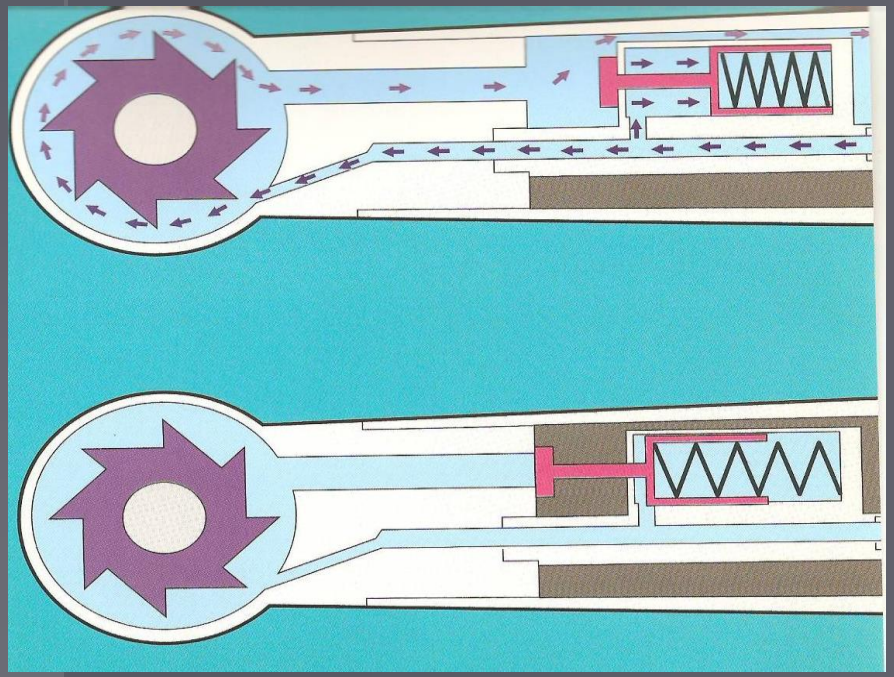
Micromotor



Handpiece Micromotor

Hose

Turbine (vheels are in the head of handpiese)



Vheels are in the head of cont-raangle-handpiece.

When turbine is in operation, some of the drive air flows into the vheels and then into the valve, opening the exhaust-air passage.

Immediatly the turbine is switched off, the valve seals the exhaust-air, preventing the aspiration of contaminated aerosol.

TURBINE
(1956)

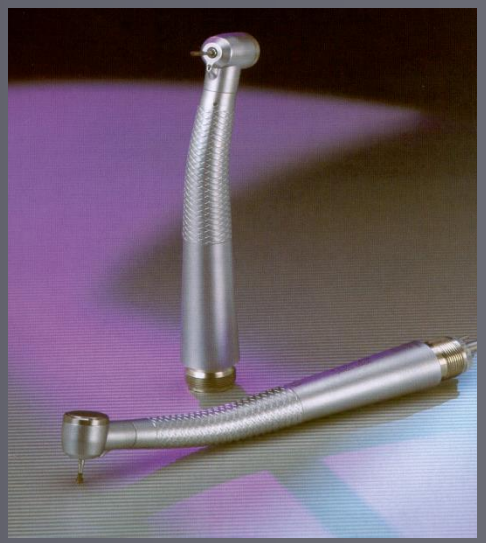
- Speed:
  -free running speed:
  300-450.000 rpm
  -speed for load: half of the free running speed
- Direction of the running can't be changed!
- Speed for load: change

Air-bearing-, ball-bearing turbine (ceramik ball)

Air-bearing

310.000 rpm

2,5 bar



Ball-bearing

with ceramic balls

440.000 rpm

3,5-4 bar

MICROMOTOR (1966)

- Electric micromotor:

  max. revolution: 40.000rpm
- Direction of the running can be changed!
- Speed for load is constant!

- Air-motor:

  max. revolution: 25.000rpm
- Direction of the running can be changed!
- Speed for load is constant!

Changing of the revolution in case of micromotor (Akcelerator, Reductor)

	Electric motor	Air motor
Blue ring 1:1	4.000-40.000	5.000-25.000
Red ring 1:5	20.000-200.000	25.000-125.000
Green ring 5:1 7,4:1 2,8:1	800-8.000	1.000-5.000

Cooling:

- out or inner

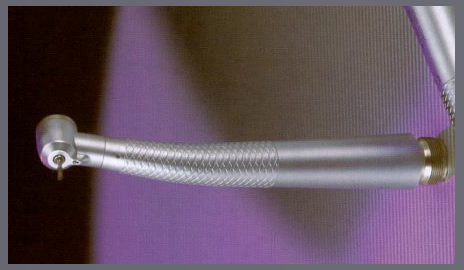
Surgical and endodontical handpieces (Driving moment!)

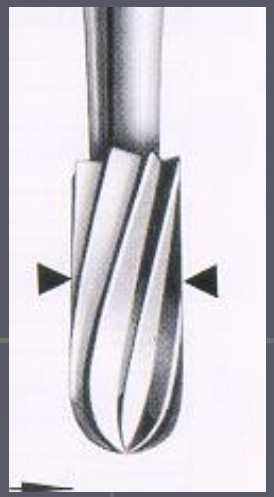
Handpieces:

- can be
  - straight handpiece
  - contra-angled handpiece
    - latch-type burs
    - friction grip (FG) type burs

Function of the handpieces

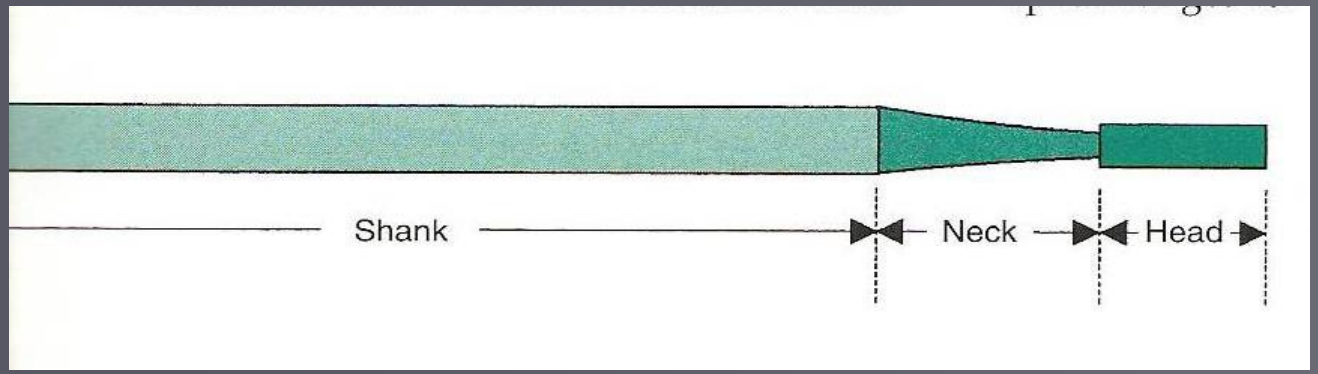
- holds the rotating instrument, and
- transportes the power for rotating instrument.





Rotary cutting instruments
burs, diamonds (abrasives)

Consist of: shank, neck and head.



Every (one) has his own function!

Functions of the shank, neck and head of rotary cutting instruments

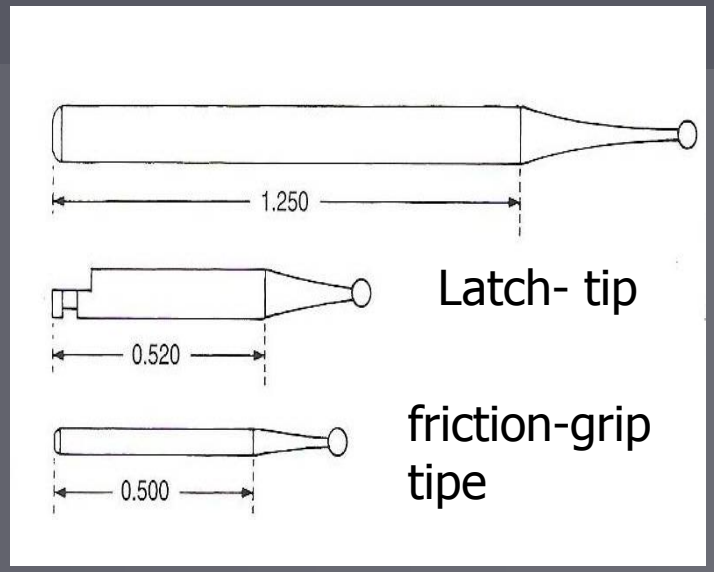
- Shank: fits into the handpiece: length, crosssection and the end-shape can be different.

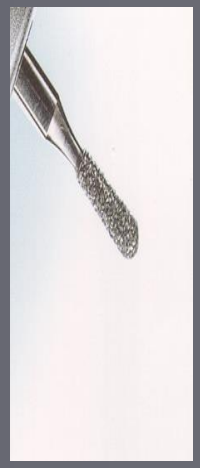
  Shape: straight handpiece, latch tip, and friction-grip tipe contraangle handpiece

- Neck: transmit the rotational and translational forces to head.

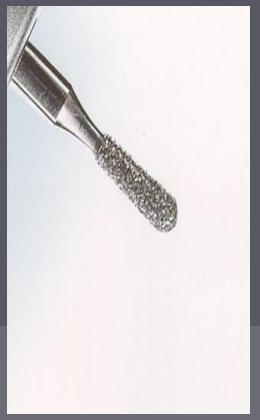
  It has taper form, and the taper can influence the visibility, the access and the strength.

- Head: makes the preparation. The shape and the material of the head depends on the work (enamel, dentin, or carious dentin)





Head of the rotary cutting instruments



- Rotary cutting instruments: according to the material of the head can be: diamond and metall burs.

- Diamond: is an abrasive instrument, consist of three parts.

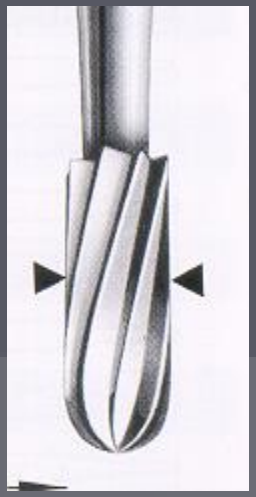
  The metal blank, that holds the diamond grits and the bonding material. Size of the diamond grits can be different.

CONSTRUCTION of the diamond bur

- size of the diamond grit (color code)
- the bonding material

- Using diamond for preparation with grit size >ISO 524 (cc. 45µm and surface roughness >30 µm,) we always has to finish the prepared surface!

Head of the rotary cutting instruments



- Metal (Bur): has bladed cutting edges.

  Steel burs: cut the dentin at low speed well, but not good for enamel preparation!

  Carbide burs: perform better at all speeds. It is possibility to use both into the enamel and dentin!

CONSTRUCTION of the metal bur

-number of the blades:The more are the number of the blades, the smoother is the prepared surface.

Blades:

bur: (4,6,8, 10) excavating bur

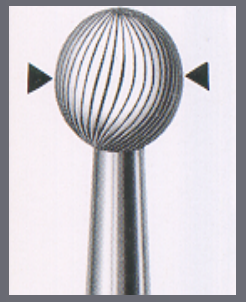
finishing bur (12, 16,18,30)

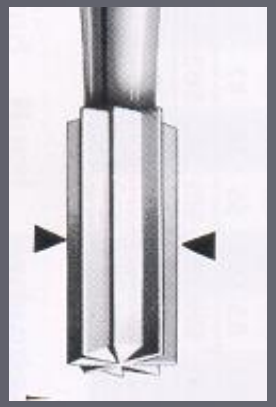
-direction of blades

straight or axial

spiral

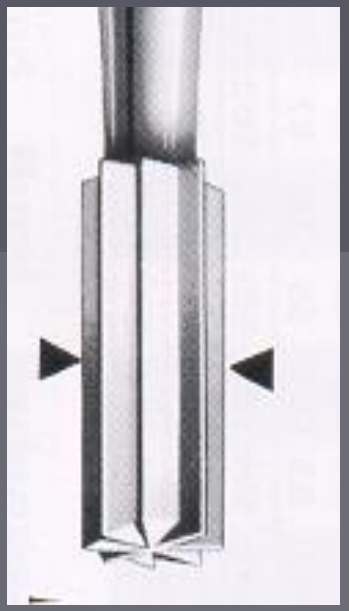
Both can be manufactured with or without crosscuts.





Shape of the burs and diamond

- Round
- Straight fissure
- Tapered fissure
- Pear-shaped
- (Inverted cone)
- Flame



SIZE of the bur

- **SIZE**: The largest diameter of head in 1/10 mm.

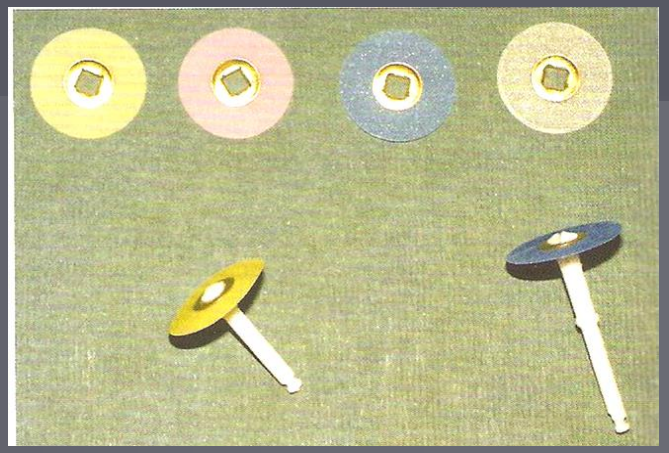
-005 diameter : 0,5 mm
-010 „ 1,0 mm
-016 „ 1,6 mm
-023 „ 2,3 mm

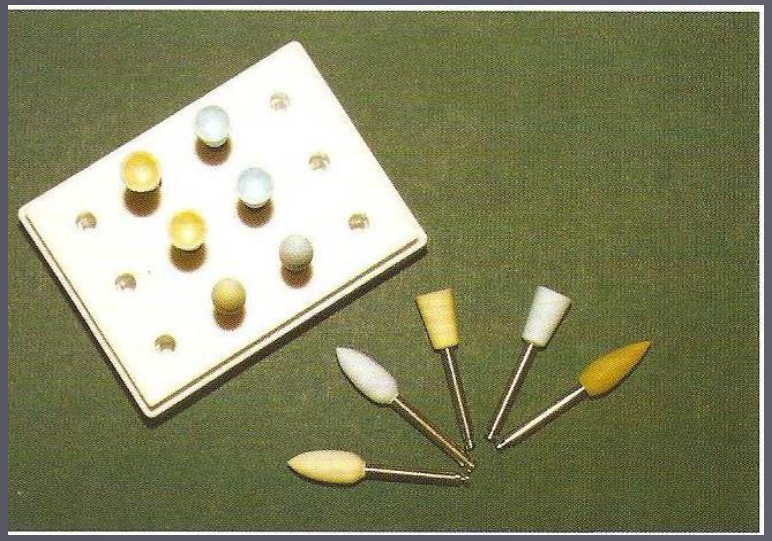
The bigger is the diameter of the bur, the smaller speed can we use, to achieve the suitable effect (output).

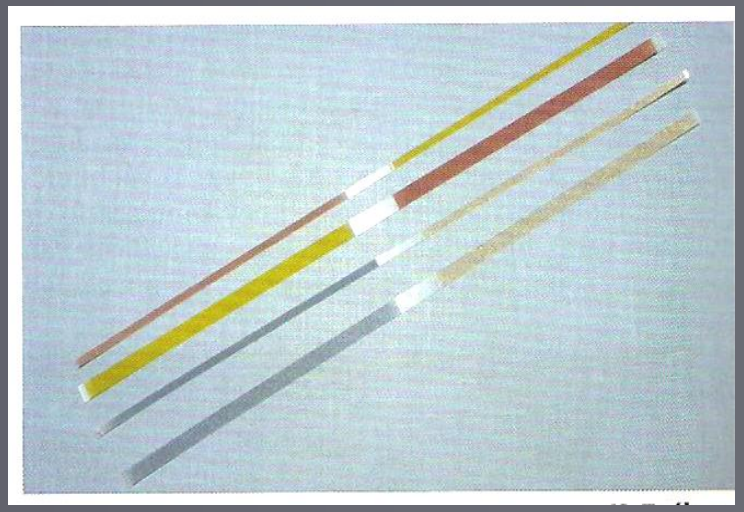
Recommendation for instrument choice

- Speed
- Burs
  - the material
  - the shape
  - the size
- For Preparation/Finishing

Finishing and polishing the compositfilling

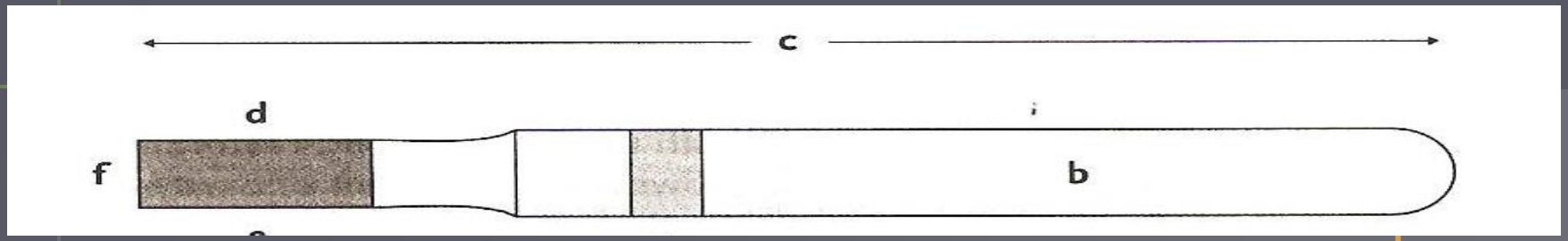






FINISHING POLISHING AMALGAM FILLING

International standard for selection of burs
ISO 6360



A B-C D E F

ISO 806 314 225 524 016

FG end or

Latch-type end

- A: material of the head (3 figures)
- B: shank of the bur
  C: overall length
  } 3 figures
- D: shape of the bur (3 figures)
- E: construction of the bur (3 figures)
- F: size of the bur (3 figures)

Preparation for direct restoration

Steps, instrument, speed

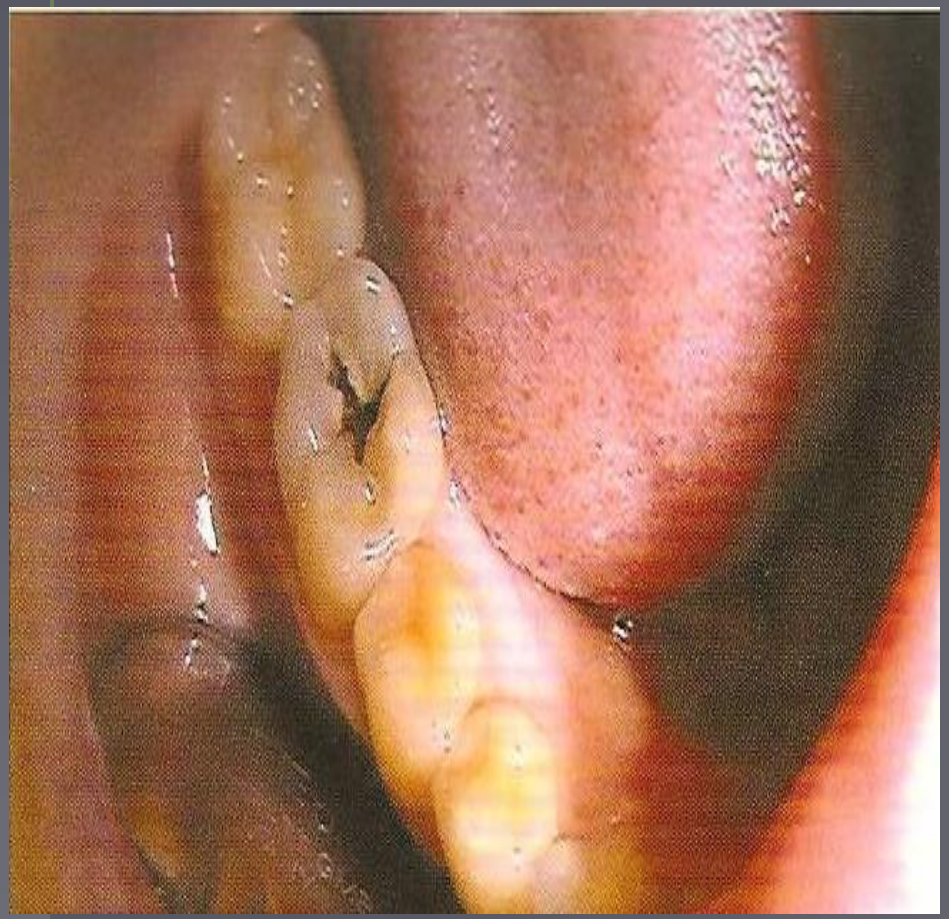
Primer preparation: turbine, micromotor (akcelerator) 170-200.000 rpm
- Material: diamond ISO 806
- Shank and full length: FG end, normal ISO 314
- Shape: pear, fissure round ISO 233,234, ….
- Grained: middle (blue) ISO 524
- Size: depends on.. ISO 008-014

Removing of caries: micromotor (blue) 4.500-6.000 rpm
- Material: steel, or hardmetal ISO 310, 500
- Shank and full length: latch-type, normal ISO 204
- Shape: round ISO 001direction!
- Size: different ISO 008-014

Finishing: micromotor (akcelerator) 10.000-40.0000 rpm
- Material: diamond, metal
- Shank and full length: FG end
- Shape: similar to be used in primer preparation
- Construction:diamond: fine, ultra, extra fine grit (red, yellow white)

hard metal: 16,18 cuttig edges

Primer preparation: Turbina, Mikromotor (akcelerator)170-230.000
Diamond bur
Sekunder preparation: Caries removing Micromotor (blue)
Steel or hardmetall bur



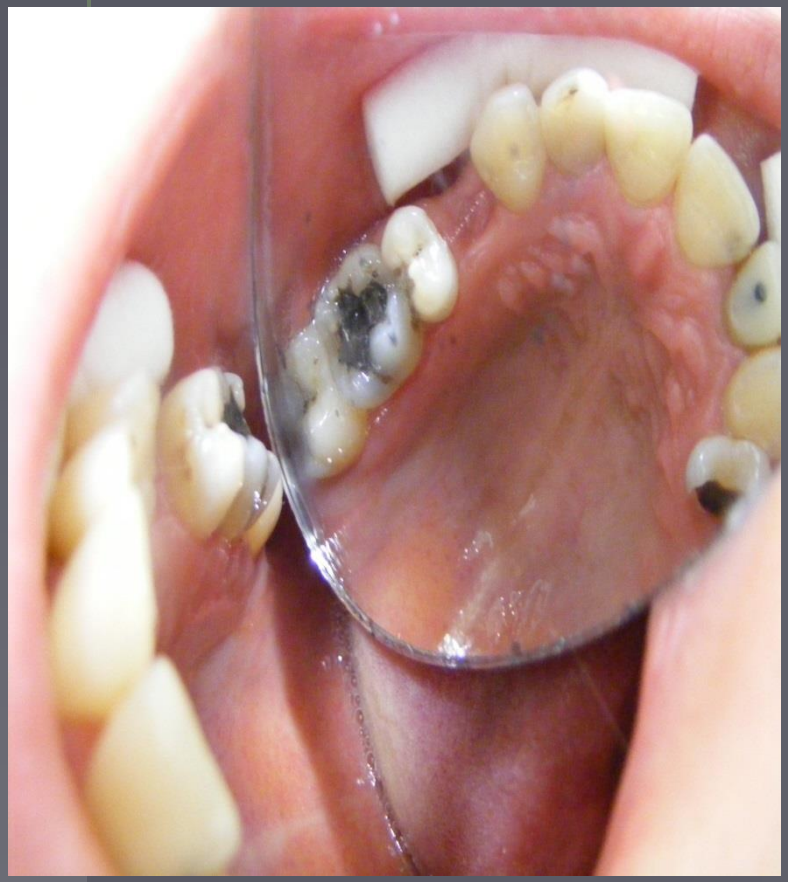
Removing of old filling

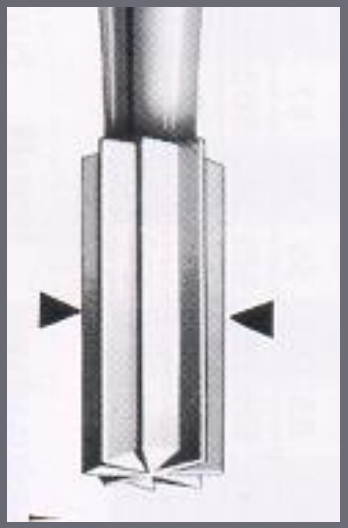
- Material:

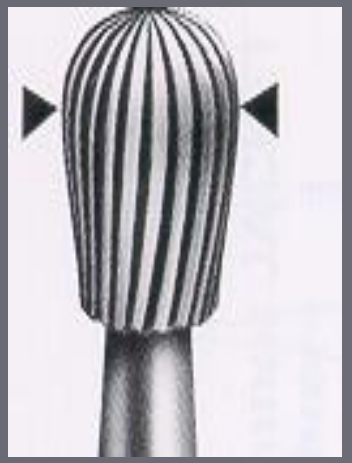
amalgam: hard metall
(rubber dam or exhaustor)

komposit: hard metall or diamond

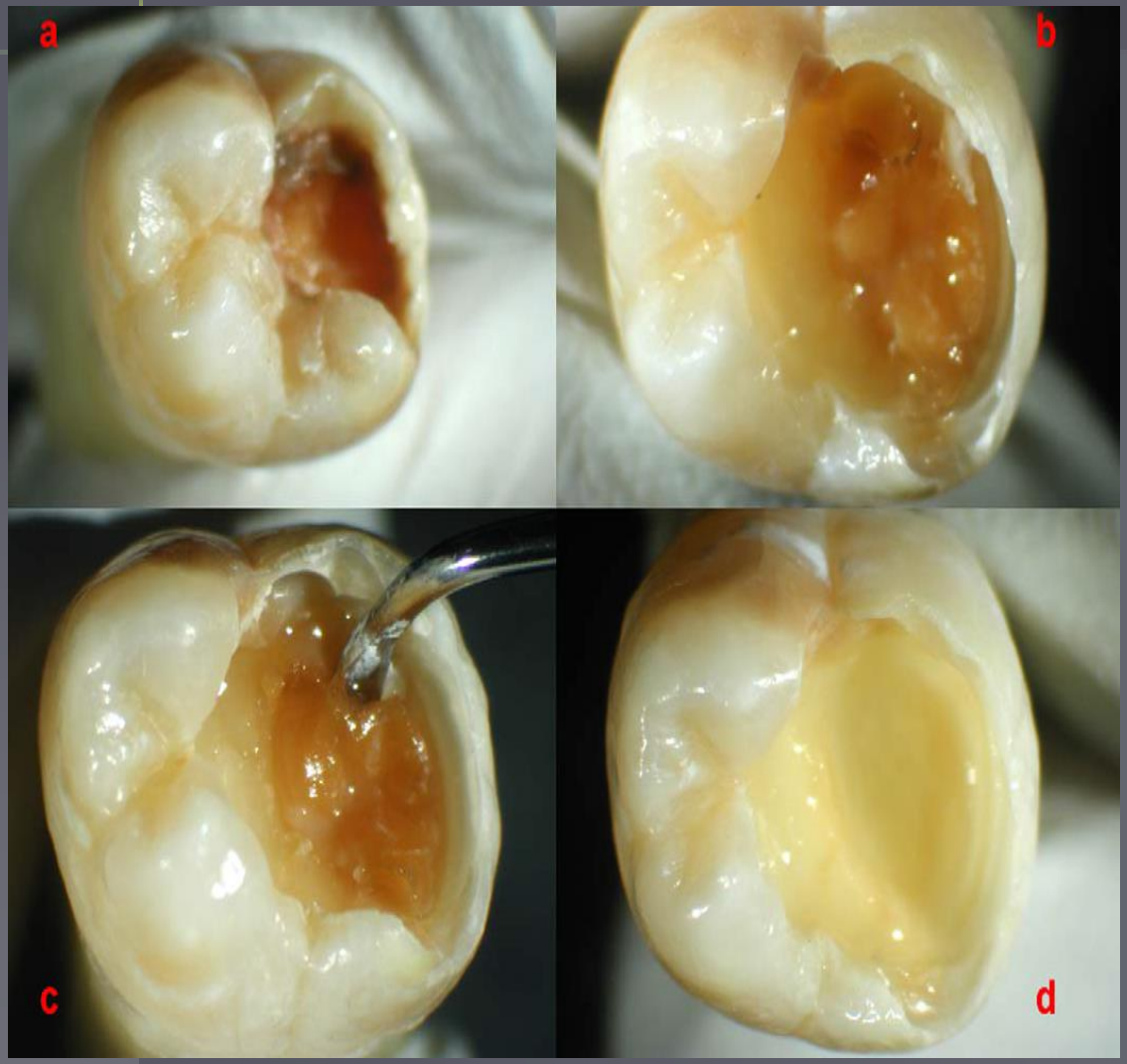
Primer preparation: Turbine, Micromotor (akcelerator)170-230.000
hard metall bur
Sekunder preparation: Removing caries Micromotor (blue)
Steel or hard metall bur







Caries excavation using a spoon-shaped hand excavator



- (a) Original cavitated mandibular molar,
- (b) carious dentinen with peripheral sound dentine exposed after enamel removal,
- (c) infected dentine excavated with hand instrument, and
- (d) completed caries excavation with "scratchy" sound dentine remaining.