

## Variations in Class II Cavity designs for Silver Amalgam

→ **Class II caries:** Smooth surface caries, found on the proximal surfaces of bicuspids and molars.

→ *Initiation of class II caries:* cervical to the contact

→ Various approaches:

✓ *Occlusal:*

- Most common
- Proximal association with occlusal caries
- Esthetics
- Convenience

✓ *Buccal/lingual approach:* large embrasure with caries; at gingival third

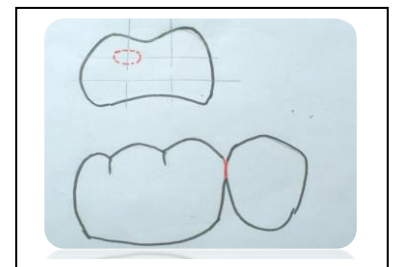
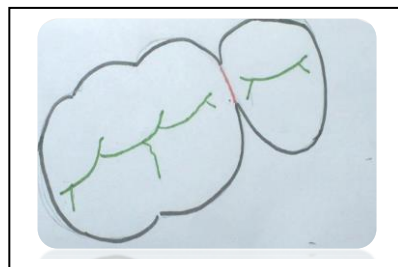
✓ *Direct approach:* when adjacent tooth is missing.

→ Note:- *Functional cusp:* Maxillary molars- Palatal  
Mandibular molars- Buccal

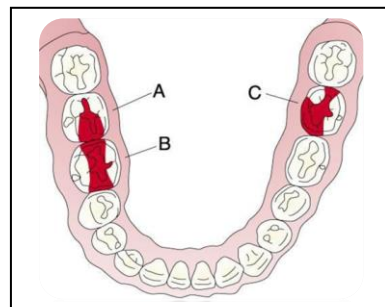
*Non functional cusp:* Maxillary molars- Buccal  
Mandibular molars- Palatal

*High stress bearing areas:* Mesial of molars and distal of premolars

*Low stress bearing areas:* Distal of molars and mesial of premolars



INITIATION OF CARIES - CERVICAL TO CONTACT AREA



## ClassII Design1 CONVENTIONAL

- ✓ Surface involved – Occlusal and Proximal
- ✓ Approach: Occlusal

→ Indications:

- ✓ Large or medium sized carious lesions
- ✓ In areas of *high stress* (mesial of molars and distal of premolars)
- ✓ In patient with high caries index
- ✓ In patient with poor oral hygiene and high plaque index

→ Features:

✓ **Outline form** (*Occlusal outline*):

- Extensive cavity- includes entire occlusal surface (all pits and fissures)
- Smooth flowing curve
- Concept of dovetail
- Isthmus – 1/3<sup>rd</sup> of intercuspal distance
- Flare :
  - Should be such that it breaks contact with adjacent tooth
  - Forms a Butt joint
  - Buccal and lingual walls follow enamel rod directions

(*Proximal outline*):

- *Bilateral truncated cone appearance* : of Buccal and lingual walls; greater contact breaking
- Gingival seat: *flat and supragingivally placed* and break contact with adjacent tooth by 0.5mm
- Linguogingival and buccogingival line angles should be *rounded* and form radius of an arc

✓ Axial wall (in dentin):

- Occlusogingivally- tapered to follow DEJ (0.5-0.6mm within DEJ);  
0.7-0.8mm within DEJ (cementum)
- Buccogingivally- follow outer contour of tooth.  
(for uniform width of gingival seat)

✓ Line angles:

- Axio-pulpal and axio-gingival line angles - *Obtuse and rounded*

✓ Gingival seat: in 2 planes

- In dentin – flat (0.5mm)
- In enamel – gingival cavosurface bevel (15- 20 degrees)
  - It should follow enamel rod direction
  - To remove unsupported enamel

✓ **Resistance form** :

- Box/mortise form: definite line and point angles with *flat pulpal floor*
- Width- 1/3<sup>rd</sup> of intercuspal distance
- Depth: pulpal floor – 0.5mm within DEJ ; axial wall – 0.5-0.6mm within DEJ
- Rounded line and point angles
- Flares
- Taper – towards marginal ridges and buccal and lingual grooves

✓ **Retention form:**

- Irregular outline form
- Dovetail
- Undercuts to the cuspal walls of occlusal cavity and bilateral inverse taper of proximal box

✓ **Convenience form:**

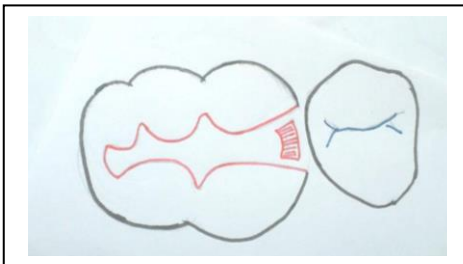
- Adequate isthmus width
- Contact breaking

✓ **Finish of enamel walls:**

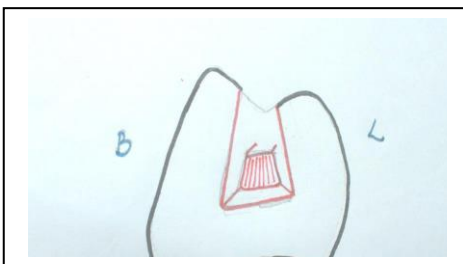
Principles:

- Enamel wall parallel to enamel rod direction
- No unsupported enamel
- Smooth enamel walls
- Cavosurface Butt joint (exception is gingival seat)

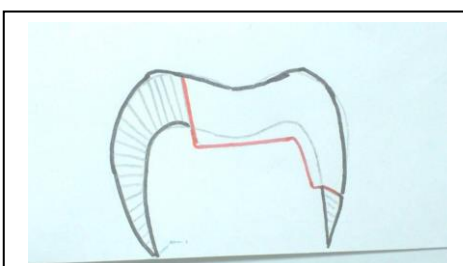
Debridement: Water wash and air dry,  
Mild antiseptic wash and dry (3% hydrogen peroxide)



Occlusal Outline



Proximal Outline



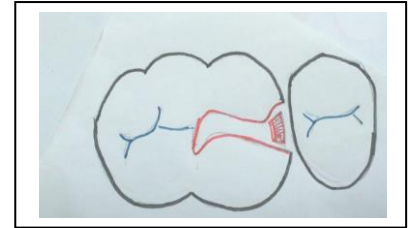
Axial Wall

## ClassII Design 2 MODERN

- ✓ Surfaces involved – Occlusal and Proximal
- ✓ Approach – Occlusal

- ✓ Indications:

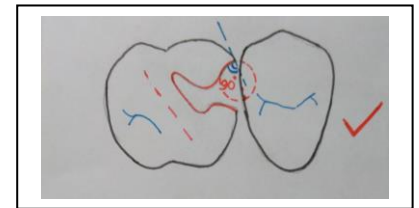
- Minimal to moderate carious lesions
- In areas of *high stress*
- In patient with good oral hygiene and low plaque index
- In patient with low caries index



- ✓ Features :

Occlusal Cavity

- ✓ Half occlusal preparation in lower molars
- ✓ Preserve transverse ridge in lower premolars and oblique ridge in upper molars.
- ✓ *Absence* of dove tail
- ✓ Isthmus width – 1/4<sup>th</sup> of intercuspal distance
- ✓ Pulpal depth- 0.2mm within DEJ



- ✓ Reverse S Curve:

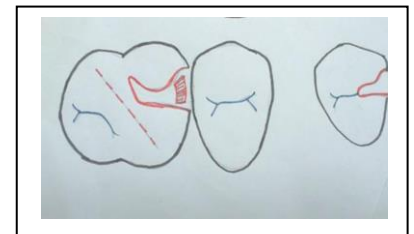
- Forms a butt joint
- Contact breaking with the adjacent tooth buccolingually by 0.2-0.4mm
- Preserves cusp

Proximal cavity:

- *Unilateral truncated cone* ( functional cusp)

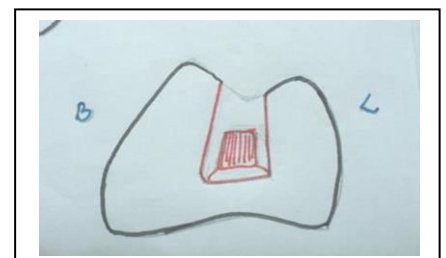
- ✓ Axial wall:

- Convex buccolingually following outer contour
- More tapered occluso-gingivally following DEJ
- Axial depth – 0.5 -0.6 mm within DEJ



- ✓ Retentive grooves:

- Location - *Axiobuccal and Axiolingual line angles*
- Extent- Axiopulpal line angles to axiobuccogingival and axioliinguogingival pulp angles
- Direction - Bisect line angles
- Orientation – Grooves not parallel to each other
- Configuration – Wider gingivally and narrower occlusally
- Dimension – 0.08/0.8 mm diameter

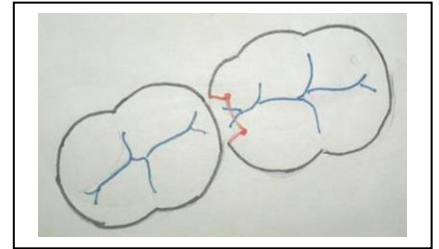


## ClassII Design 3 CONSERVATIVE

- ✓ Surfaces involved – Occlusal(minimal) + Proximal (adjacent marginal ridge + part of triangular fossa)
- ✓ Approach – Occlusal

✓ Indications:

- Very initial caries lesion (involving the marginal ridge)
- *low stress* bearing areas (distal of molar and mesial of premolars)
- Good oral hygiene
- Low caries index and plaque index



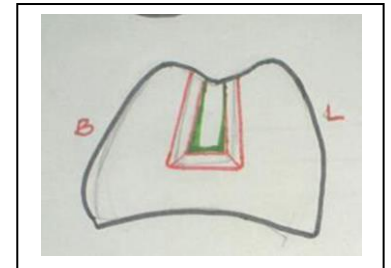
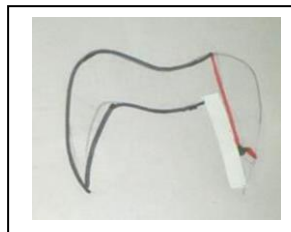
✓ Features –

Occlusal Cavity

- Includes the marginal ridge and part of triangular fossa
- Buccal and lingual wall – placed to form butt joint
- Contact breaking with adjacent tooth; buccolingually by 0.2-0.4mm

*Follow enamel rod direction*

- Axial wall – parallel to the outer contour
- NO PULPAL FLOOR



Proximal Cavity

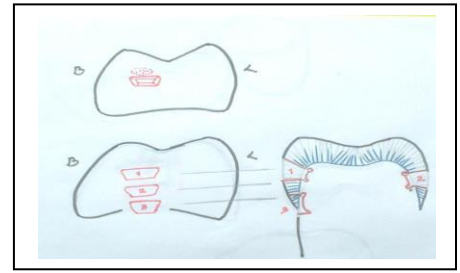
- Unilateral truncated box (inverse taper towards functional cusp)
- Axial wall –
  - Full length (in enamel and dentin)
  - More tapered
  - convex Buccolingually and tapered Occlusogingivally

✓ Auxillary means of retention – *Retentive grooves*

- Location – Axiobuccal and Axiolingual line angles
- Extent – full length ( enamel and dentin)
- Direction – Bisect the Buccoaxial and linguoaxial line angles
- Orientation – not parallel
- Configuration – wider gingivally and narrower occlusally
- Dimensions – 0.8mm round bur
- Additionally – groove placed at axiokingival line angle

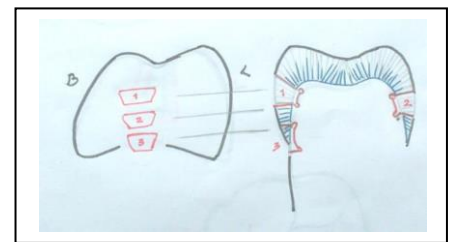
## ClassII Design4 DIRECT/SIMPLE

- ✓ Surface involved – Proximal only
- ✓ Approach - Direct



### ✓ Indications:

- Very initial caries- not undermining the marginal ridge (2mm)
- Adjacent tooth missing
- Teeth with diastema
- Rotated tooth
- Tooth with large embrasures (ovoid/tapered tooth)
- Senile caries
- Patient with good oral hygiene index
- Low caries and plaque index



### ✓ Features

#### → Outline

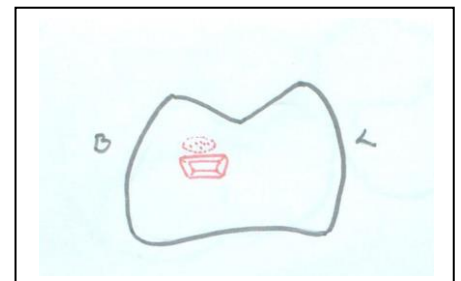
- Trapezoidal ( wider buccolingually; wider occlusally than gingivally)
- Occlusion margin of cavity should be such that, 2mm of marginal ridge is preserved.
- Rounded curves

### ✓ Grooves: At axioocclusal and axiogingival line angles

### ✓ Cavity planes depending on location :

#### → In middle third –

- Occlusal wall – tapered
- Two planes (groove + tapered wall) following enamel rod direction
- Gingival wall- Straight
- 2 Planes (groove + straight wall following enamel rod direction)



#### → In gingival third –

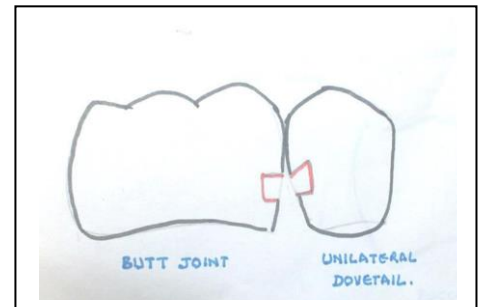
- Straight
- Two planes (groove + straight wall) following enamel rod direction
- Gingival wall- 3 planes (groove and flat plane in dentin + cavosurface bevel following enamel rod direction)

#### → On Cementum:

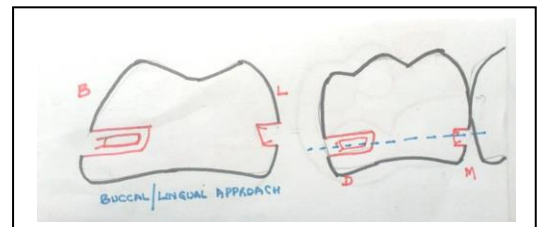
- Occlusal – 2 planes (groove + flat plane, follows enamel rod direction)
- Gingival – 2 planes (groove + flat plane. forming a butt joint)

## ClassII Design5 KEY HOLE PREPARATION

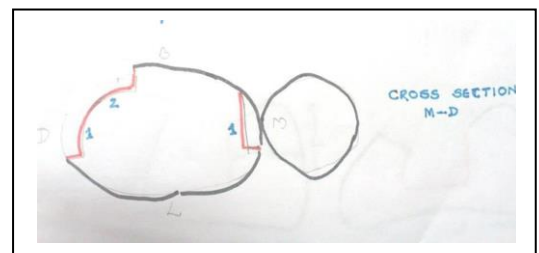
- ✓ Surfaces involved – Proximal (Buccal or lingual)
- ✓ Approach – Buccal or lingual
  
- ✓ Indications:
  - Caries cervical to the contact (intact marginal ridge and lesion not involving contact) – *Cervical lesion*
  - Senile caries/ Cervical caries (Due to gingival recession)
  - Radiation caries
  - No access in the embrasure region – facial and lingual surface is sacrificed
  - Good oral hygiene



- ✓ Features
  - Shape – rectangular/ Elliptical ( four walls and portion of buccal and lingual walls is missing)
  - Groove – on the axiokingival line angle



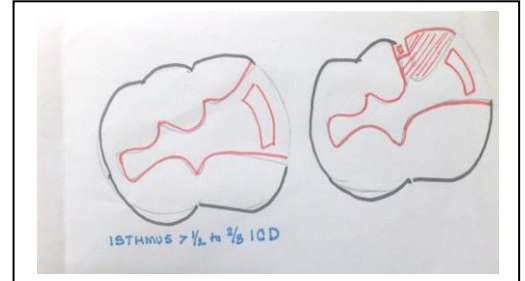
- ✓ Design variations –
  - Single axial wall – both walls forming a butt joint
  - Double axial wall – in wrap-around lesions extends further buccally/lingually



## ClassII Design6 CUSP TIPPING

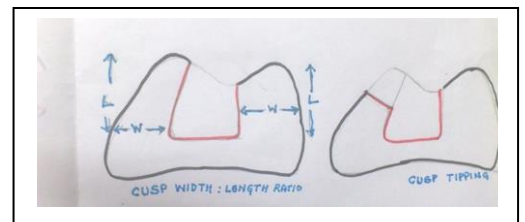
- ✓ Surface involved – Occlusal + Proximal (buccal cusp and lingual cusp - occlusal 2/3<sup>rd</sup>)
- ✓ Approach – occlusal

Isthmus – 1/2 to 2/3<sup>rd</sup> of intercusp distance



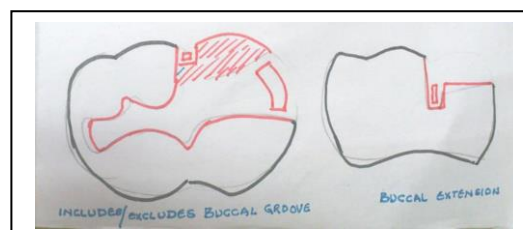
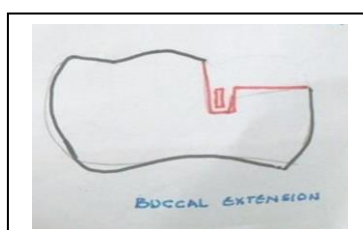
### ✓ Indications:

- Wide classII cavities
- When length: width ratio of remaining cusp is 2:1 or greater
- Cusp undermined
- Cusp fractured
- Core build-up/foundation/interim restoration
- Where cast restoration is not indicated



### ✓ Features

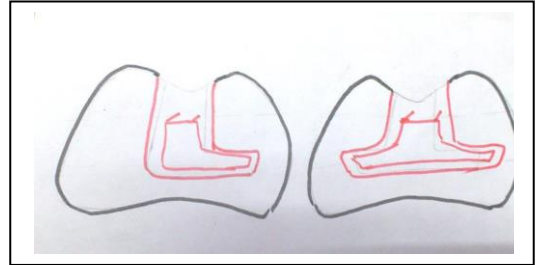
- *Similar to Design1 and Design2 along with cusp reduction,*  
(Functional cusp- 1.5 to 2mm, non-functional csp- 1 to 1.5mm)
- Reduction –
  - Cusp sloping towards midline
  - Include/exclude the groove
  - Cusp tipping – increases resistance form of teeth by preventing fracture
- To improve retention :
  - *External box* – adjacent to the tabled cusp
  - *Slot* on gingival seat





**ClassII Design7**  
**COMBINATION OF DESIGN 2 + DESIGN 5**

- ✓ Surface involved – Occlusal and Proximal (Buccal and lingual – gingival 1/3<sup>rd</sup>)
- ✓ Approach – Occlusal
  
- ✓ Indications:
  - Geriatric patients (cemental caries)
  - Radiation caries
  - Hypoplastic teeth

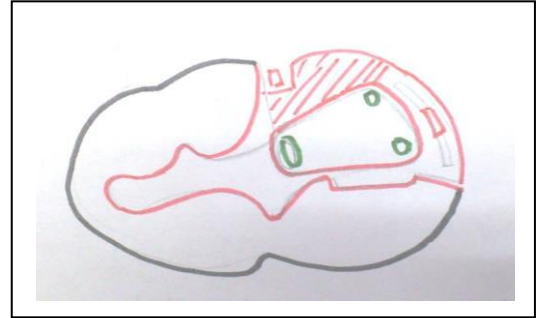


- ✓ Features
  - Similar to design 1 and 2
  - With extension in gingival third towards buccal/lingual surface
  - L-shaped / inverted T-shape

## ClassII Design8

### CORONORADICULAR RESTORATION

- ✓ For endodontically treated tooth that DOES NOT requires a post, (Intraradicular support)
- ✓ Surface involved – Occlusal and Proximal (Buccal and lingual)
- ✓ Approach – Occlusal



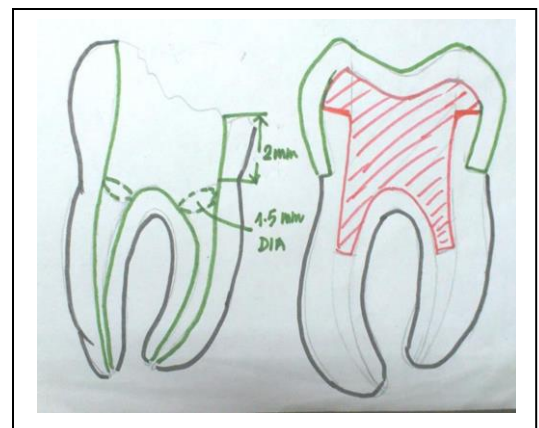
#### ✓ Indications:

- Root canal treated teeth in which at least two opposing walls of pulp chamber are 2mm in height.
- Coronally – diameter of root canal is at least 1.5mm
- When post is not required
- Acts as foundation restoration/Core-build up
- When prognosis of teeth is not favourable endodontically/periodontically

#### ✓ Features -

- Design 1 (occlusal + proximal box)
- Design 6 (cusp tipping)

- To enhance retention –
  - External boxes
  - Slots
  - Retentive grooves
  - Ledges



- Intrapulpal/intraradicular retention –

- Adequate bulk of pulp chamber with two adequately standing walls
- 2-3mm of coronal end of root canal
- 1.5mm root canal diameter at coronal third

