CADCAM Preparation

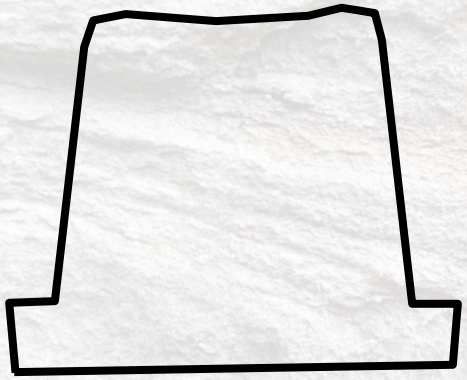
All Ceramic
Preparation

- Rounded internal and external line angles
- No bevels
  - Can fx during try-in fracture
  - Much higher stress on porcelain bevel & surrounding tooth structure, particularly under function Dejak B et al, JPD 98:89 (2007)
- Increased divergence of prep walls if adhesively cementing
- 1.5-2mm occlusal reduction
  - Feldspathic: 2mm
  - eMax: 1.5-2mm Martin N, Jedynakiewicz N, Dent Mater 15:54 (1999); Fasbinder D, JADA 137:22S (2006)/ Walther W et al, Dtsch Zahnartz 49:914 (1994) lithium disilicate
- 1mm axial reduction

All Ceramic
Preparation: Divergence

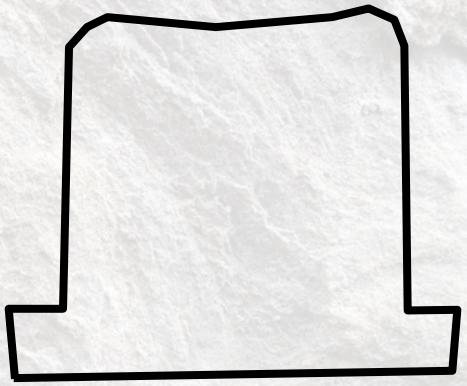
more divergence helps seating

12º



Marginal gap = 53 μm

4º



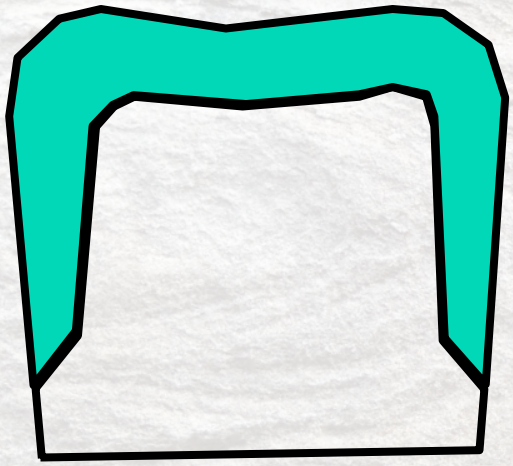
Marginal gap = 66 μm

Statistically different Nakamura T et al, Int J Pros 16:244 (2003)

Increased taper (35º) did not reduce retention for adhesively bonded restorations el-Mowafy et al, JPD 76:524-529 (1996)

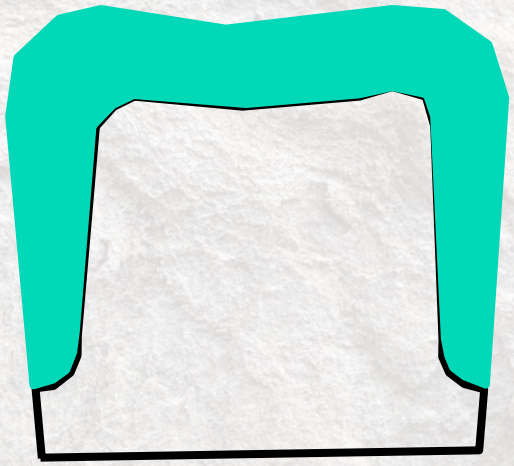
All Ceramic
Preparation: Margin Design

Bevel



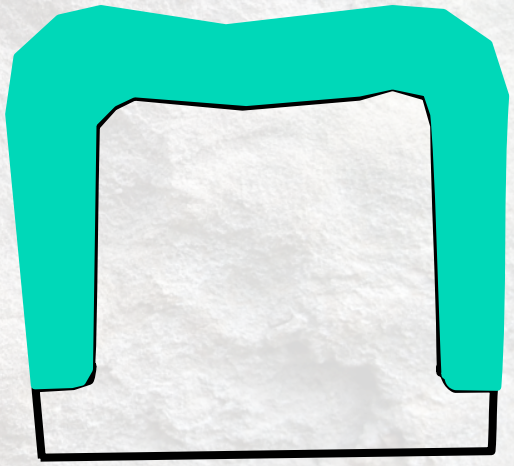
Marginal gap = 102 μm

Chamfer



Marginal gap = 91 μm

Shoulder



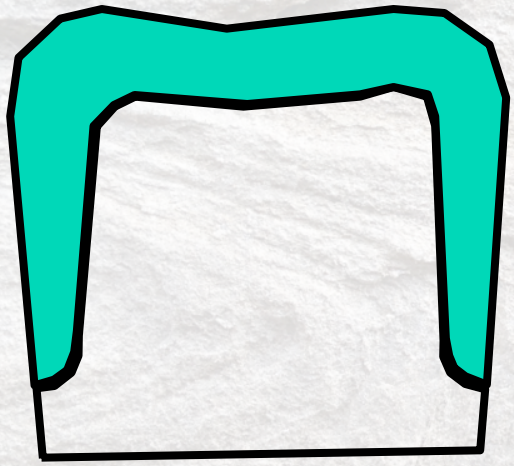
Marginal gap = 77 μm

No stat difference Tsitrou E et al, J Dent 35:68 (2007)

All Ceramic
Preparation: Margin Design

want rounded internal shoulder or heavy chamfer

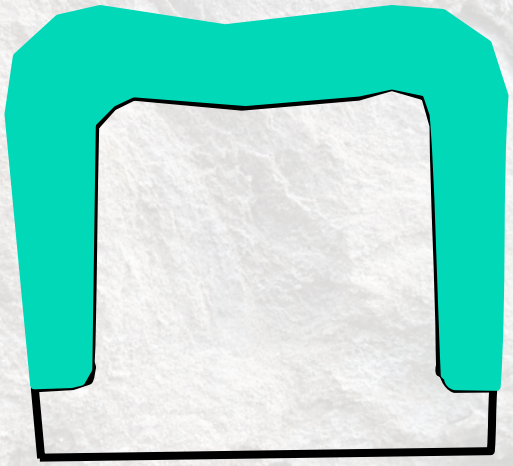
Chamfer



Avg Marginal gap = 66 μm
Range = 12 - 257 μm
% sites > 100 μm = 13.4%

gaps

Shoulder



Avg Marginal gap = 46 μm
Range = 15 - 79 μm
% sites > 100 μm = 2.9%

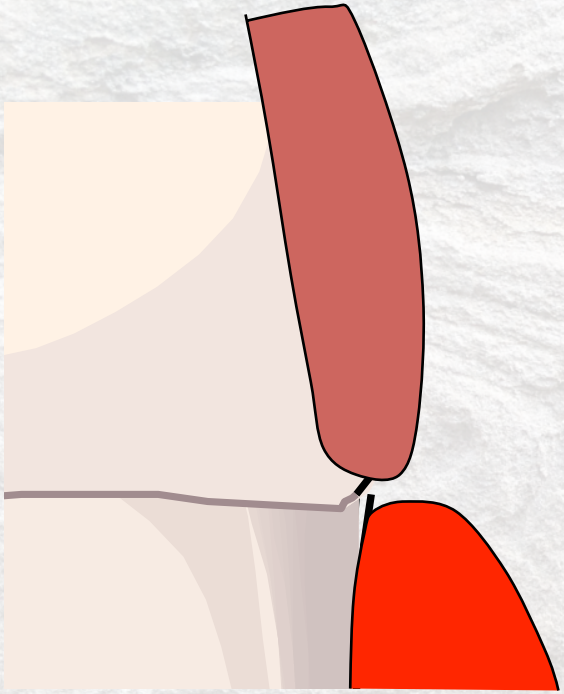
No stat difference Akbar J et al, J Pros 15:155 (2006)

Margins

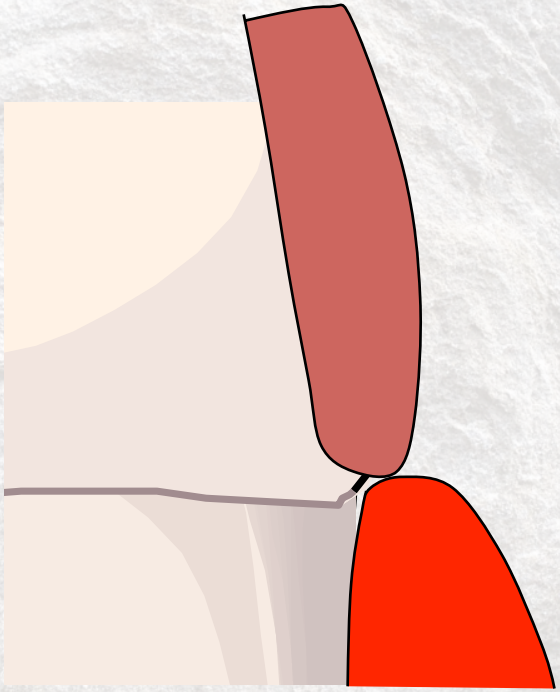
Smooth margins improve restoration adaptation

Margin Location

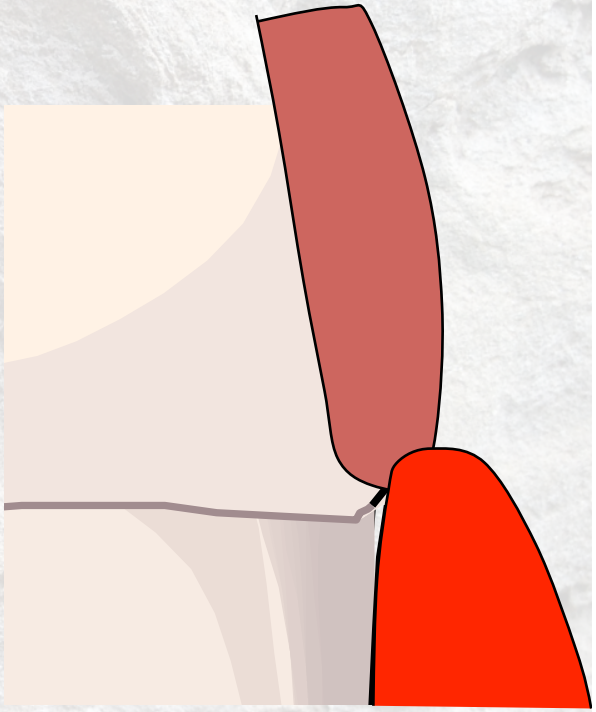
Supragingival



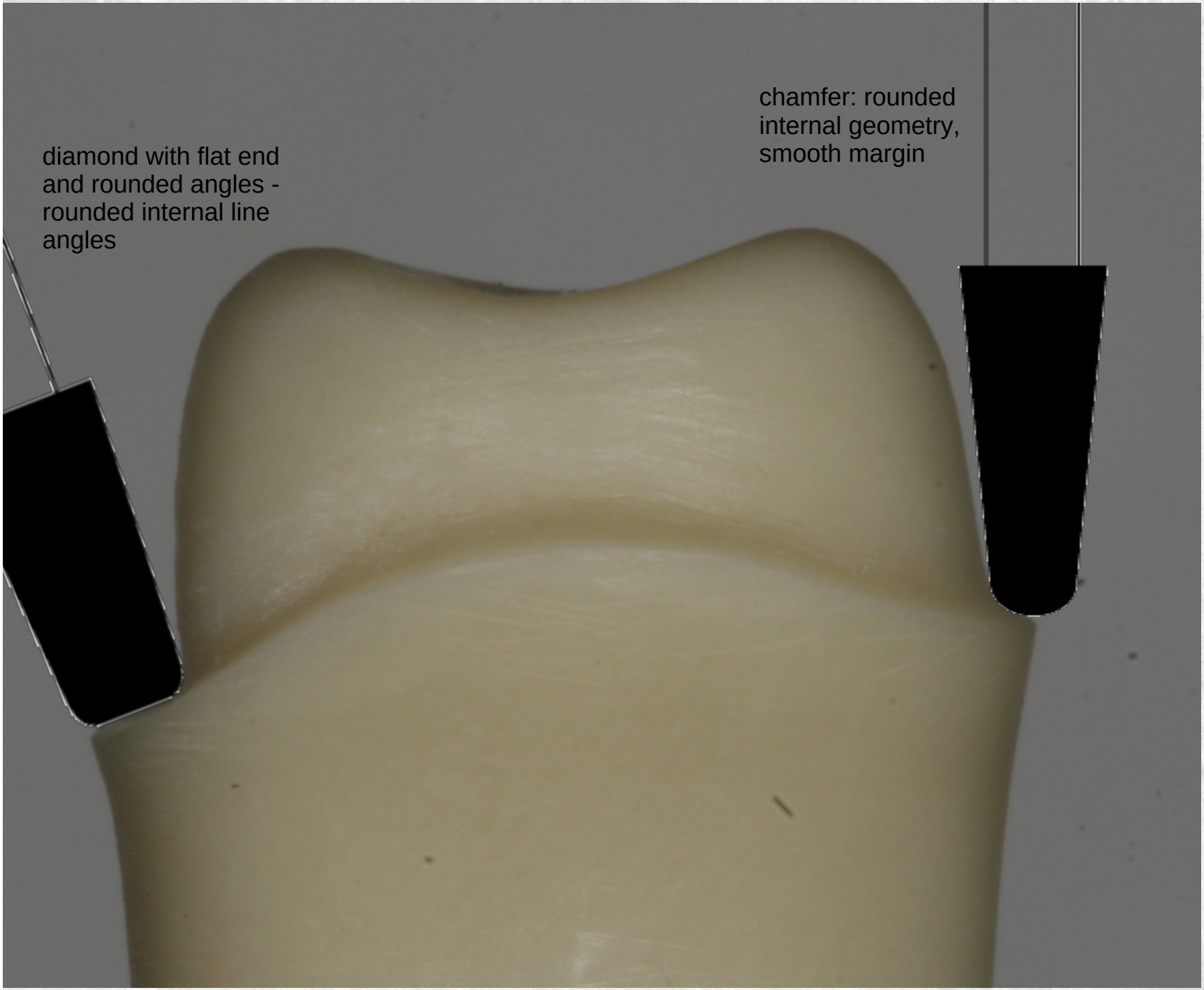
Equigingival



Subgingival



Isolation and Hemostasis

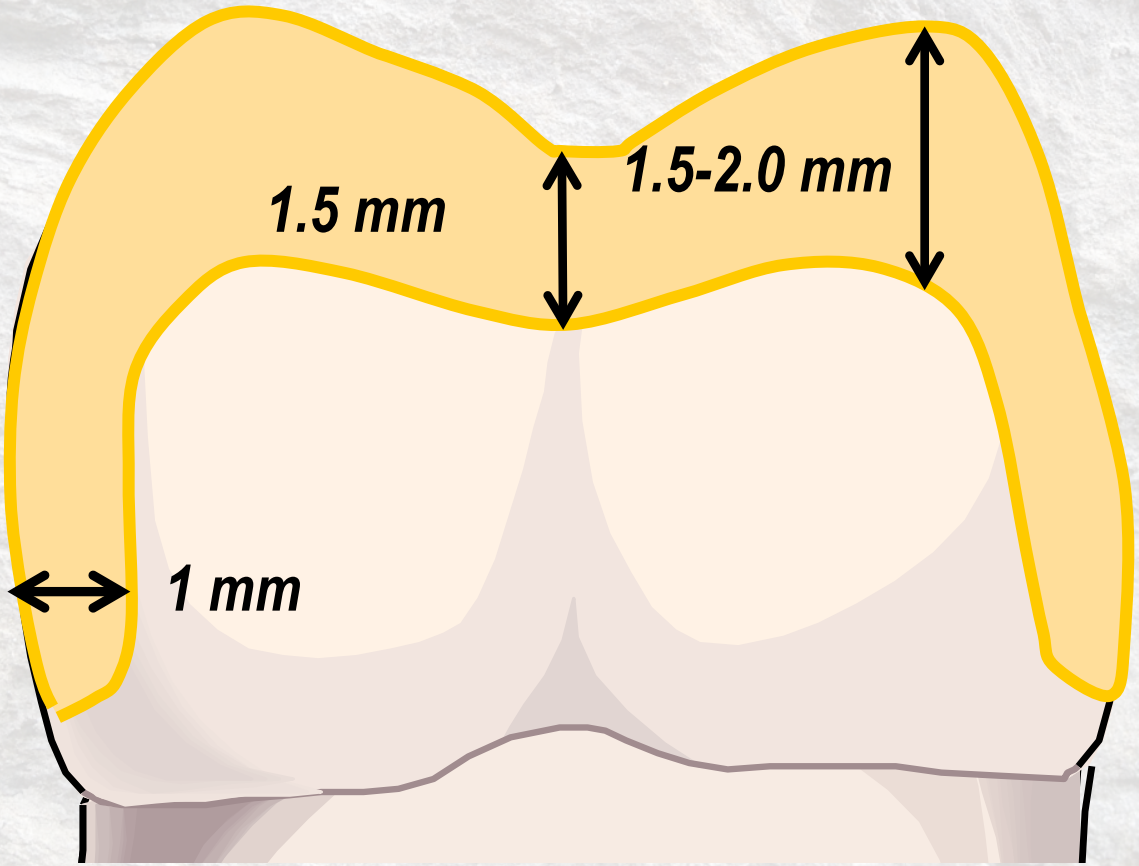

diamond with flat end and rounded angles - rounded internal line angles
chamfer: rounded internal geometry, smooth margin

Occlusal Reduction

Sufficient space is critical for strength of the restoration

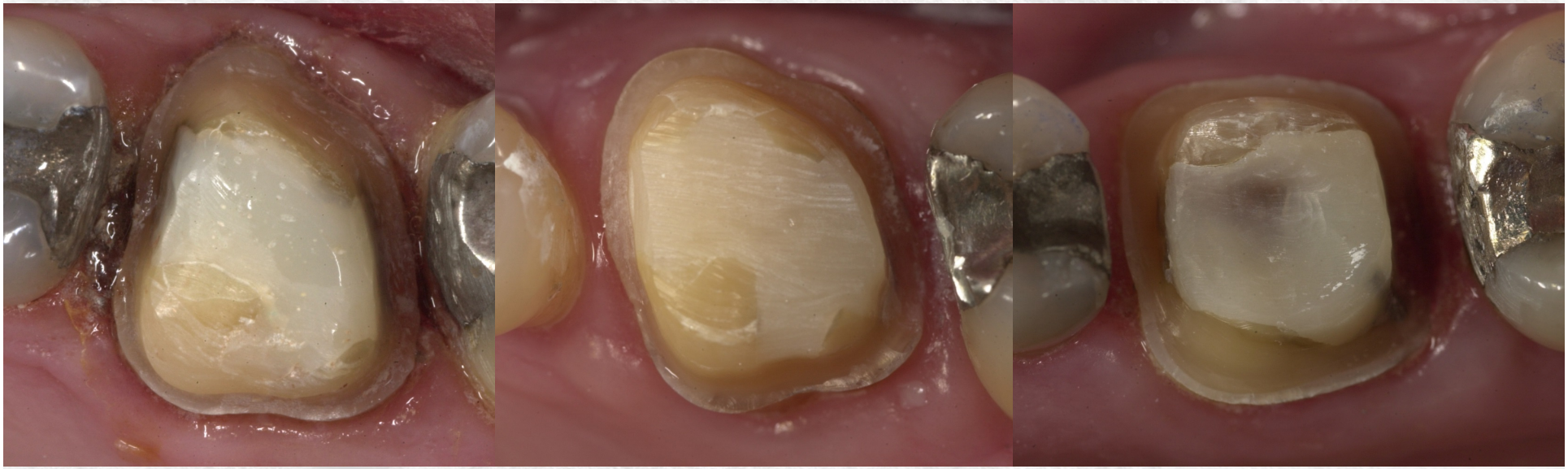
eMax (lithium disilicate): 1.5-2mm occlusal reduction

Feldspathic porcelain: 2mm occlusal reduction

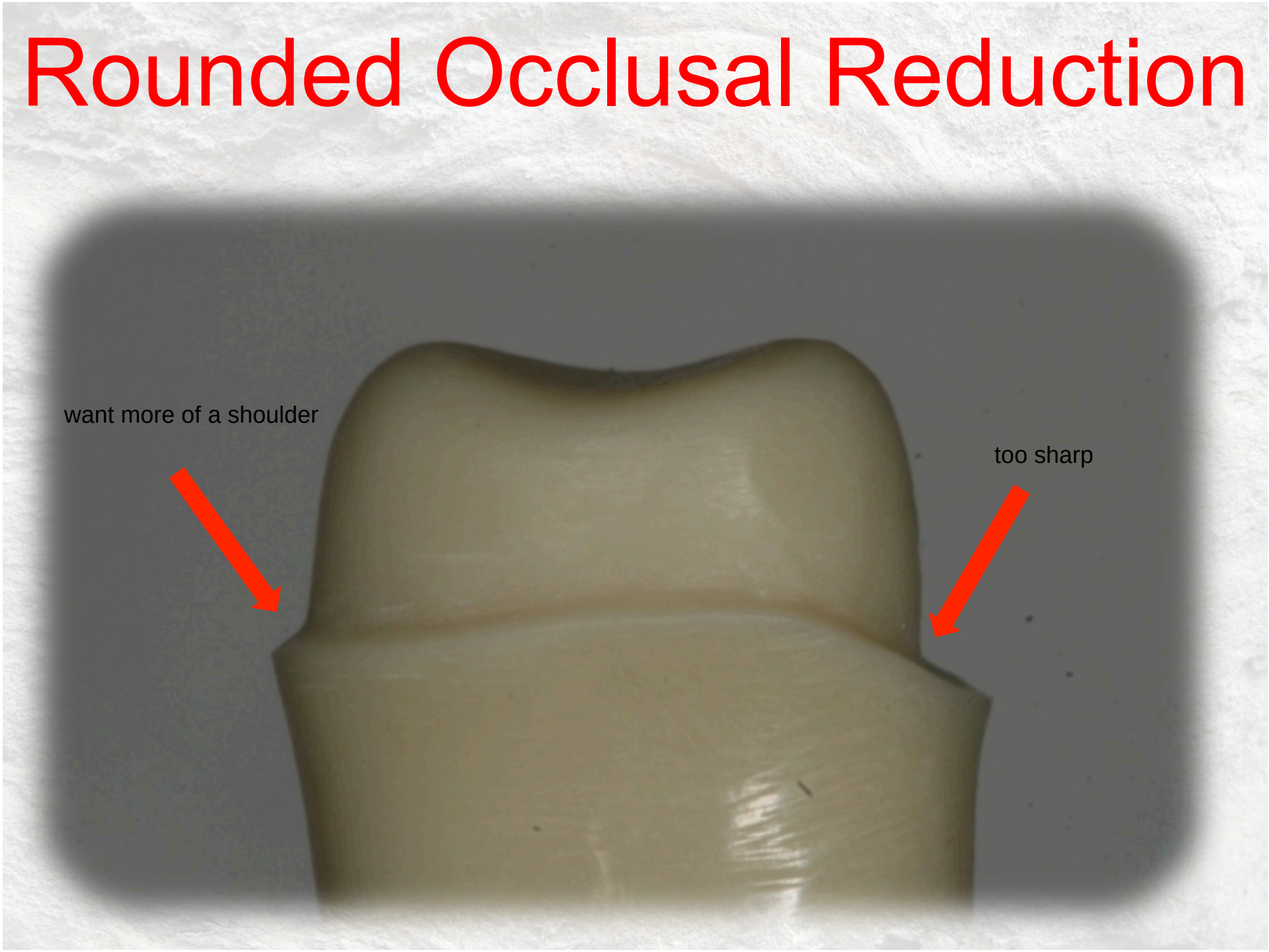


Axial Reduction: Taper

- No less than 6^{o} of taper!!
- More taper (up to 35^{o}) OK for adhesive retention
  el-Mowafy et al, JPD 76:524-529 (1996)
  - Crown is bonded to the prep; does not require mechanical resistance/retention form

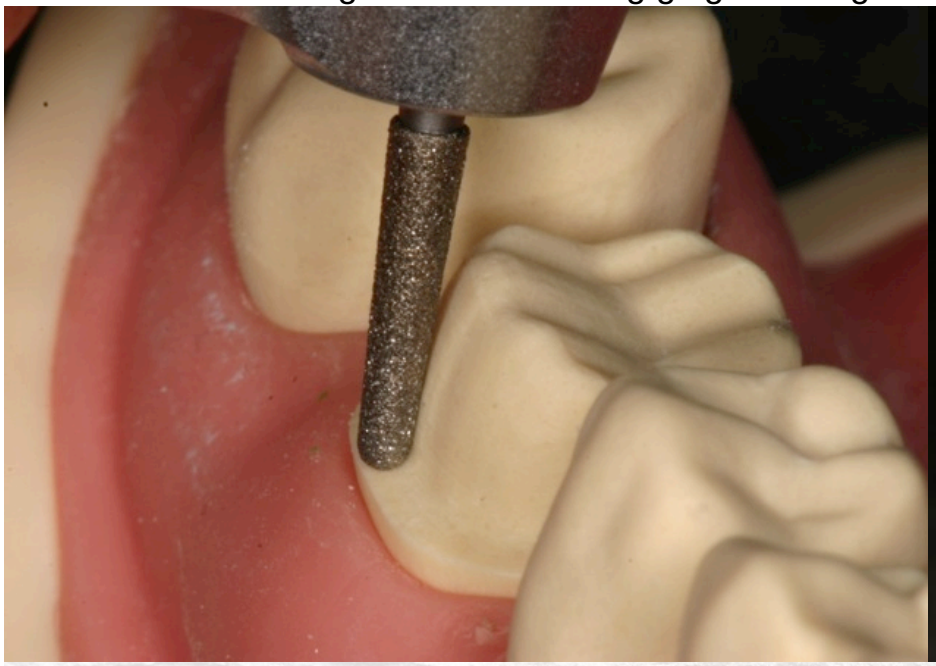


Rounded Occlusal Reduction

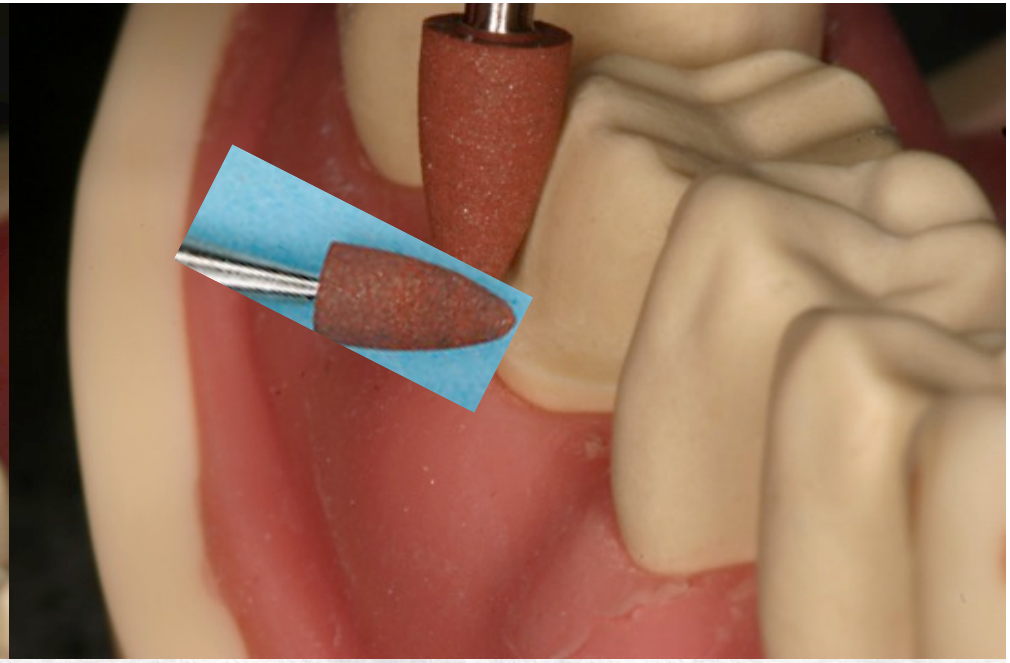


Rounded Occlusal Reduction

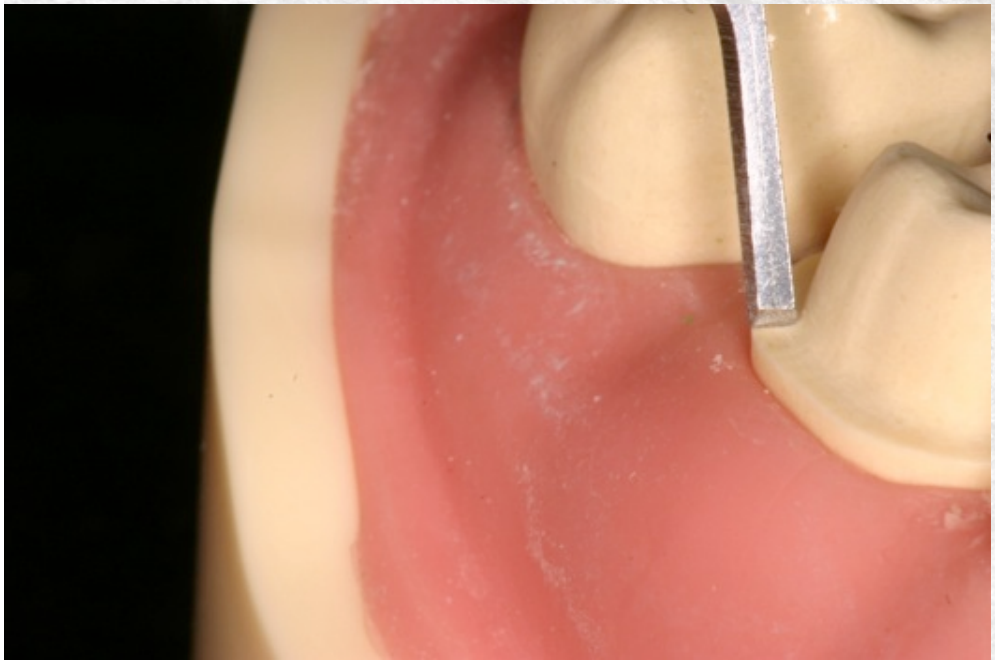
rounded internal line angle. smooth flowing gingival margin



smooth and blend



8856-016



“Brownie” polishing point

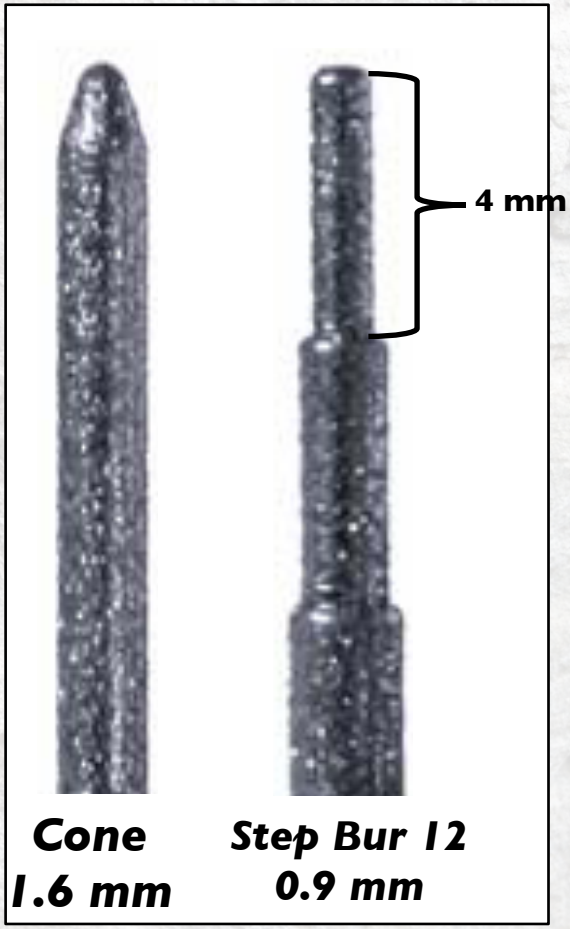
Hand instruments

might make line internal line angle sharp

Milling Diamonds

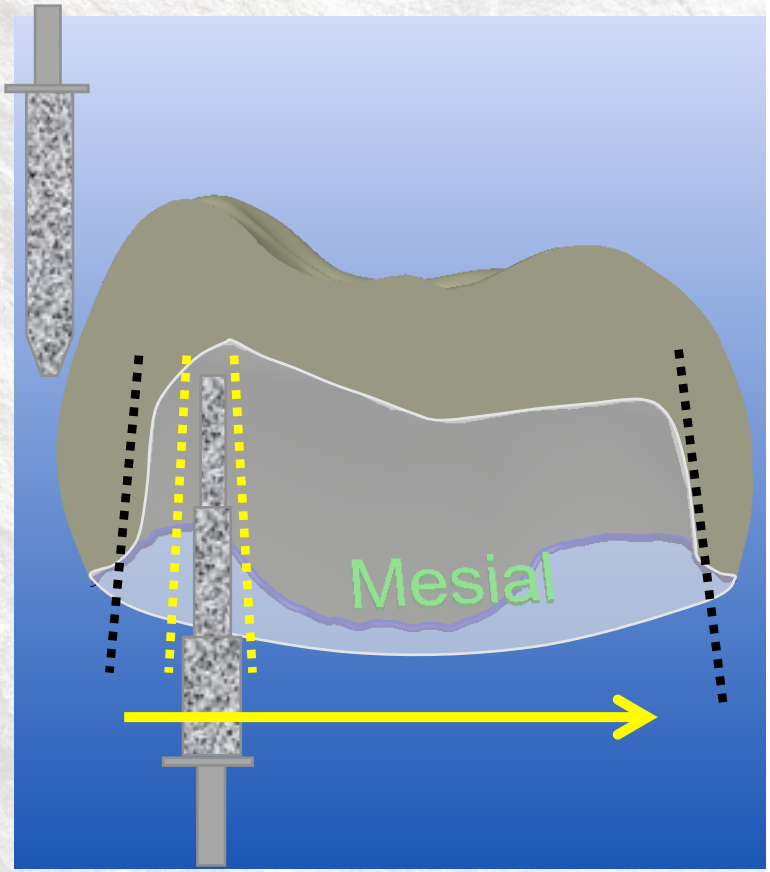
- Step Bur -> mills the internal surface (fit)
  - 0.9 mm tip diameter
  - 4.0 mm length to each step
- Cone -> mills the external surface (contour)
  - 1.6 mm diameter
- Dimensions of the diamonds restrict access to very acute angles and small, angular areas

intaglio



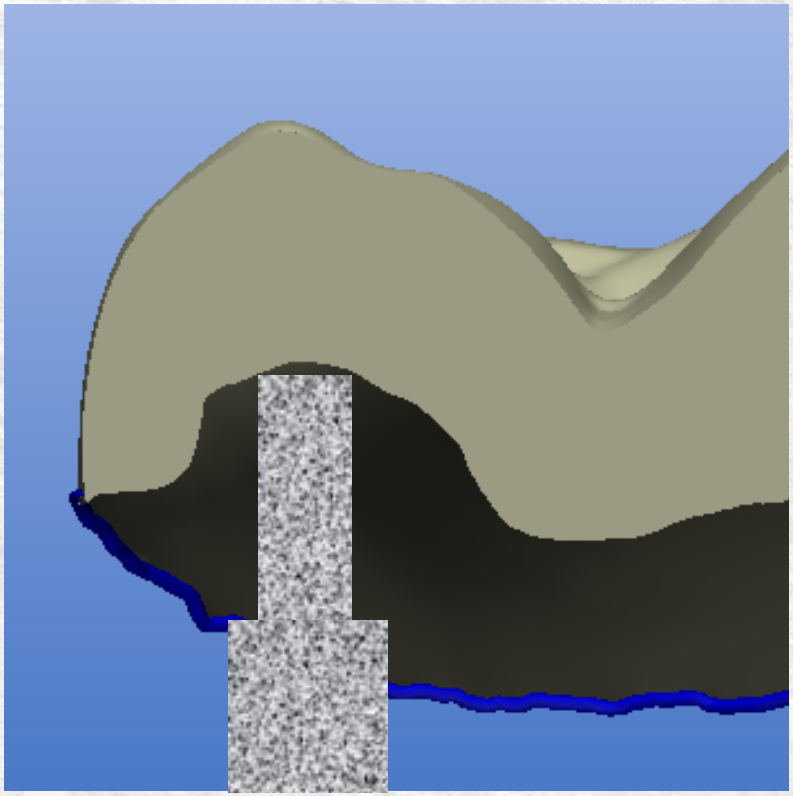
Milling Function-Specific

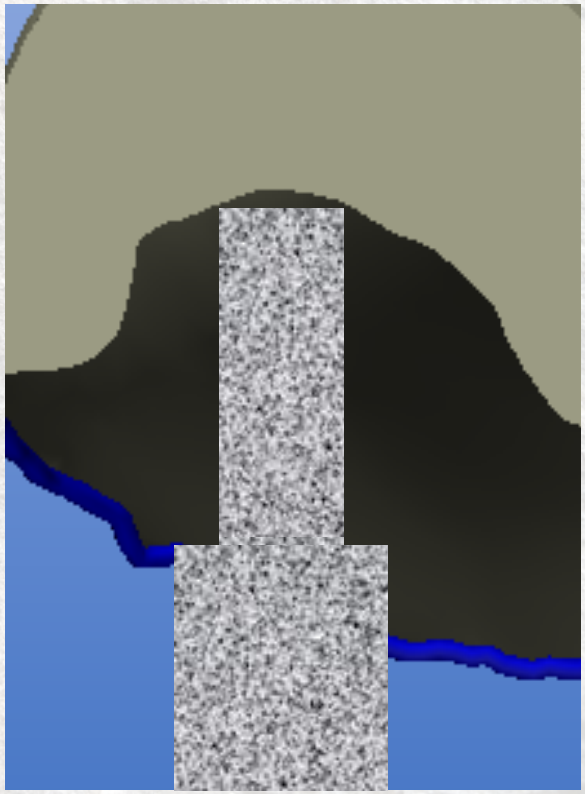
- Step bur has a built in taper
  - All preps should have minimal taper of 4-6^{0} equivalent to step bur
- Bur mills in a constant direction
  - Vertical walls with no taper may be over milled from larger step on bur shank
  - Arcs more efficiently milled than steps and angles



Milling Function

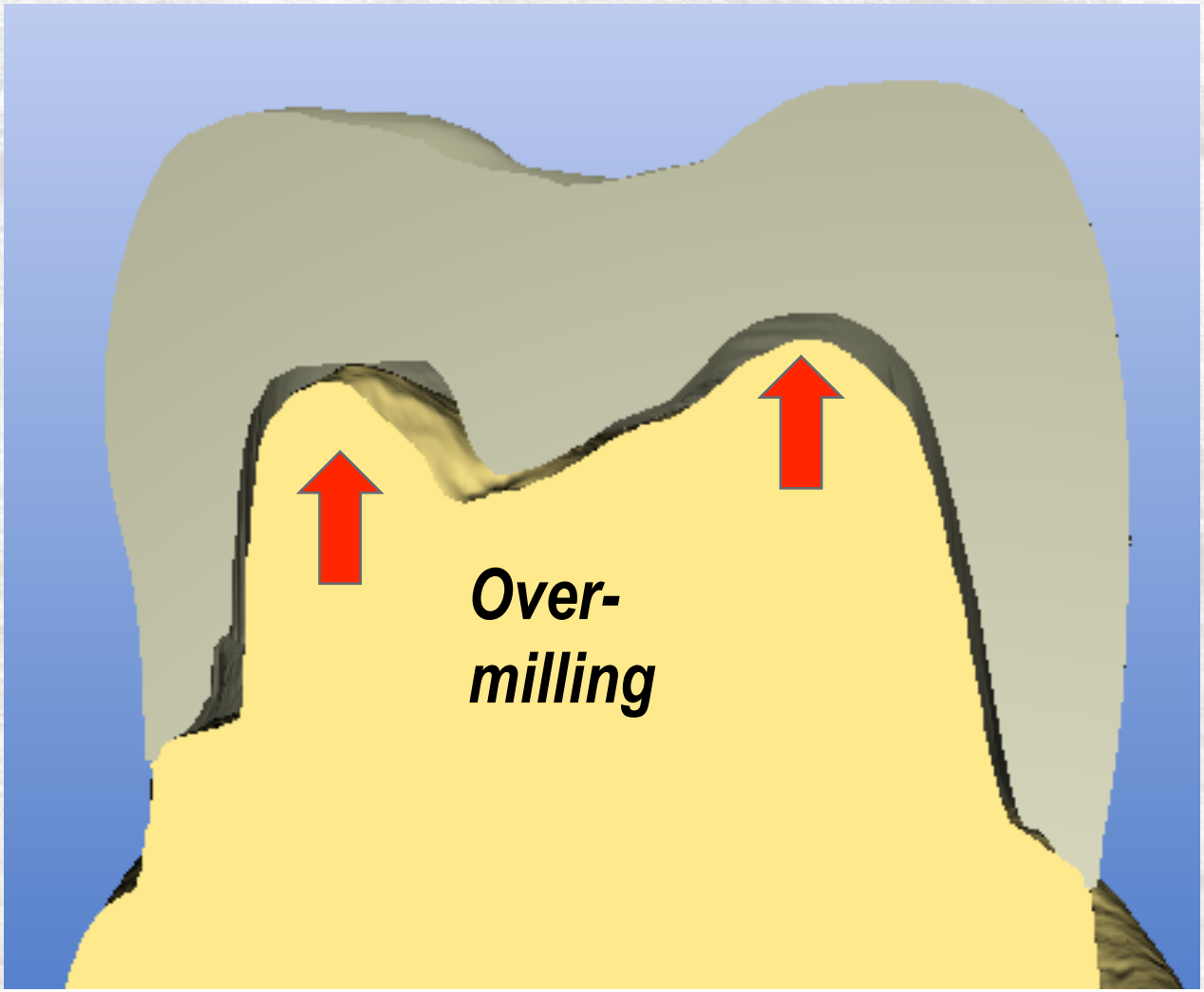
- Diameter of the step diamond is too large for the internal geometry of the preparation
- Computer must calculate a path to under-cut or over-cut the prep
  - It will affect the internal adaptation
- This is a function of ANY CAD/CAM system





Milled Restorations

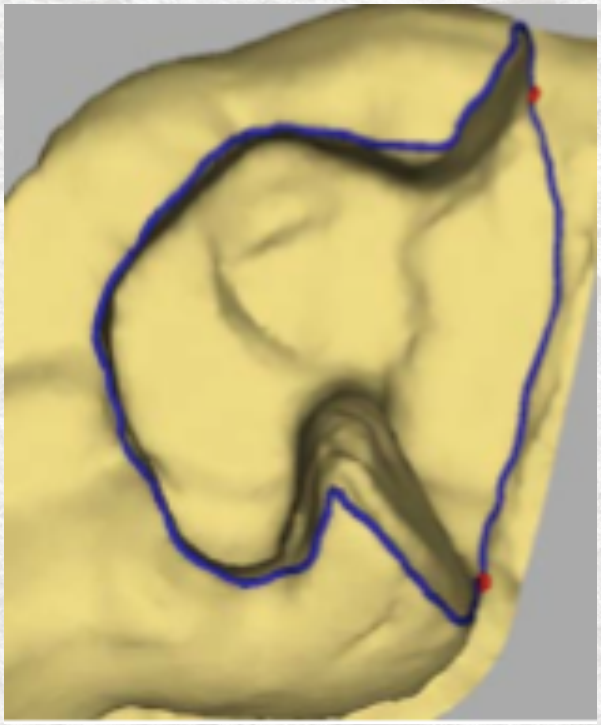
Angular preparation geometry causes the step bur to over-mill
This may lead to thin areas that are prone to fracture in function

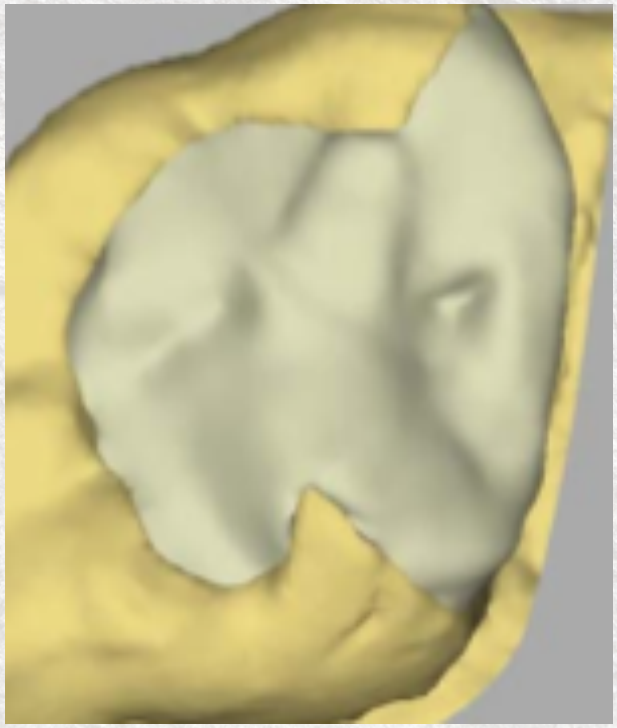


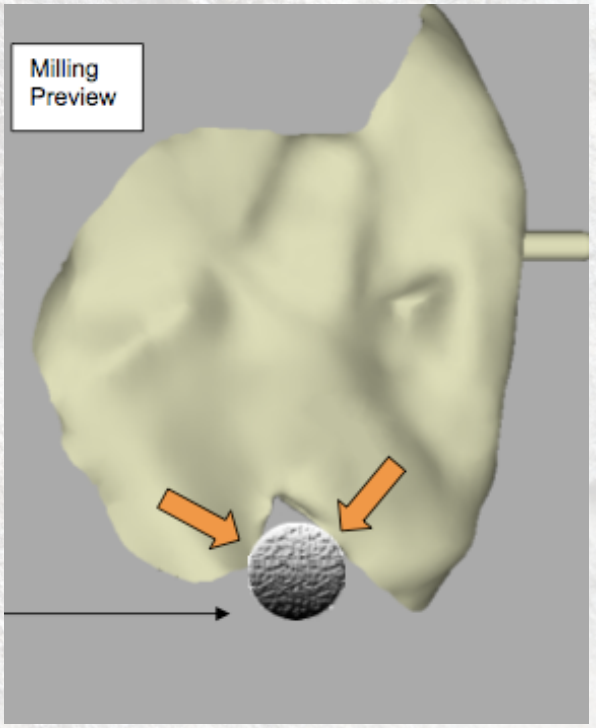
if undermilled, restoration wont seat all the way

Milled Restorations

Angular preparation geometry causes the step bur to over-mill
This may lead to thin areas that are prone to fracture in function





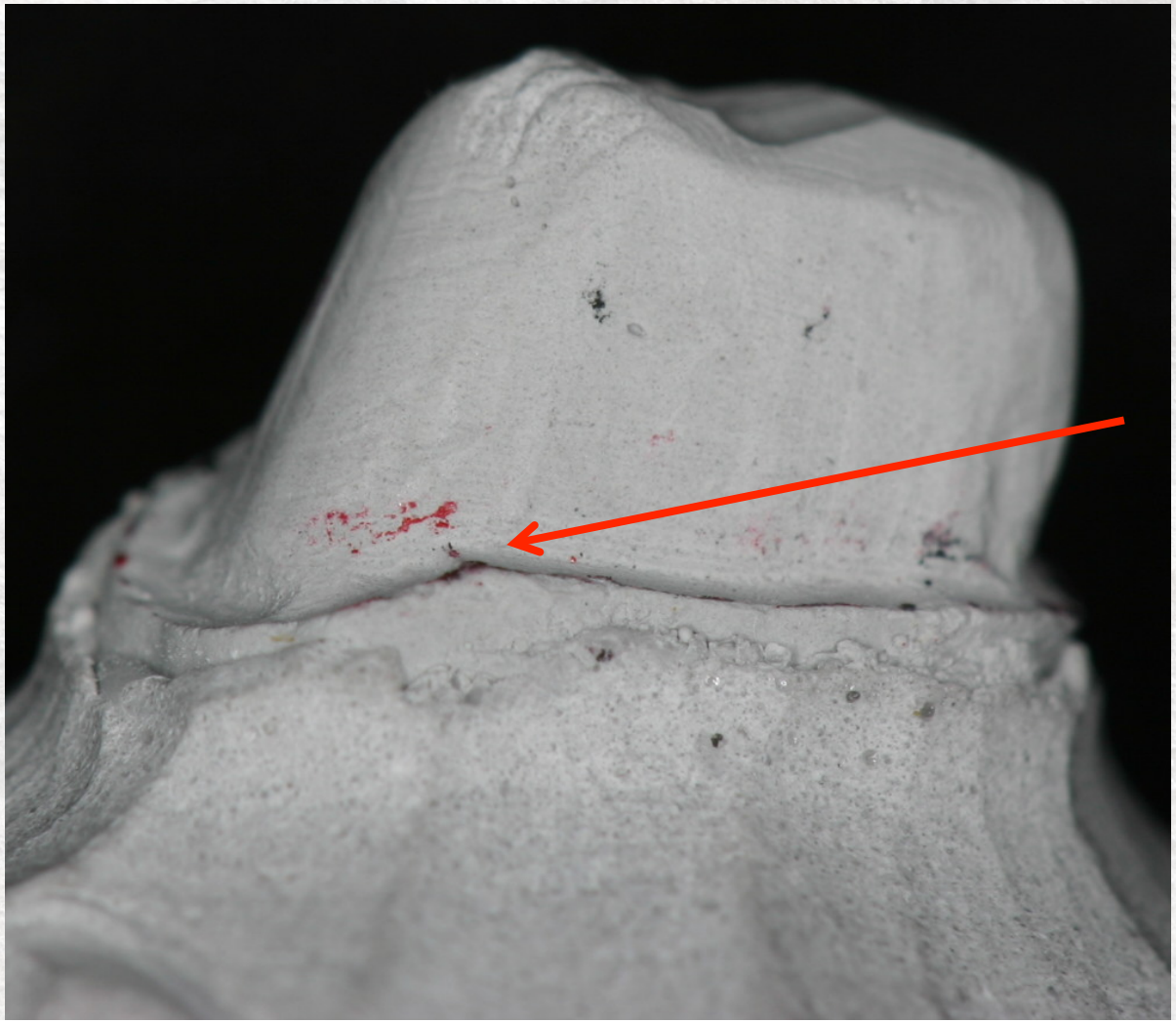


Example of too tight of radius

Milled Restorations

Angular preparation geometry causes the step bur to over-mill

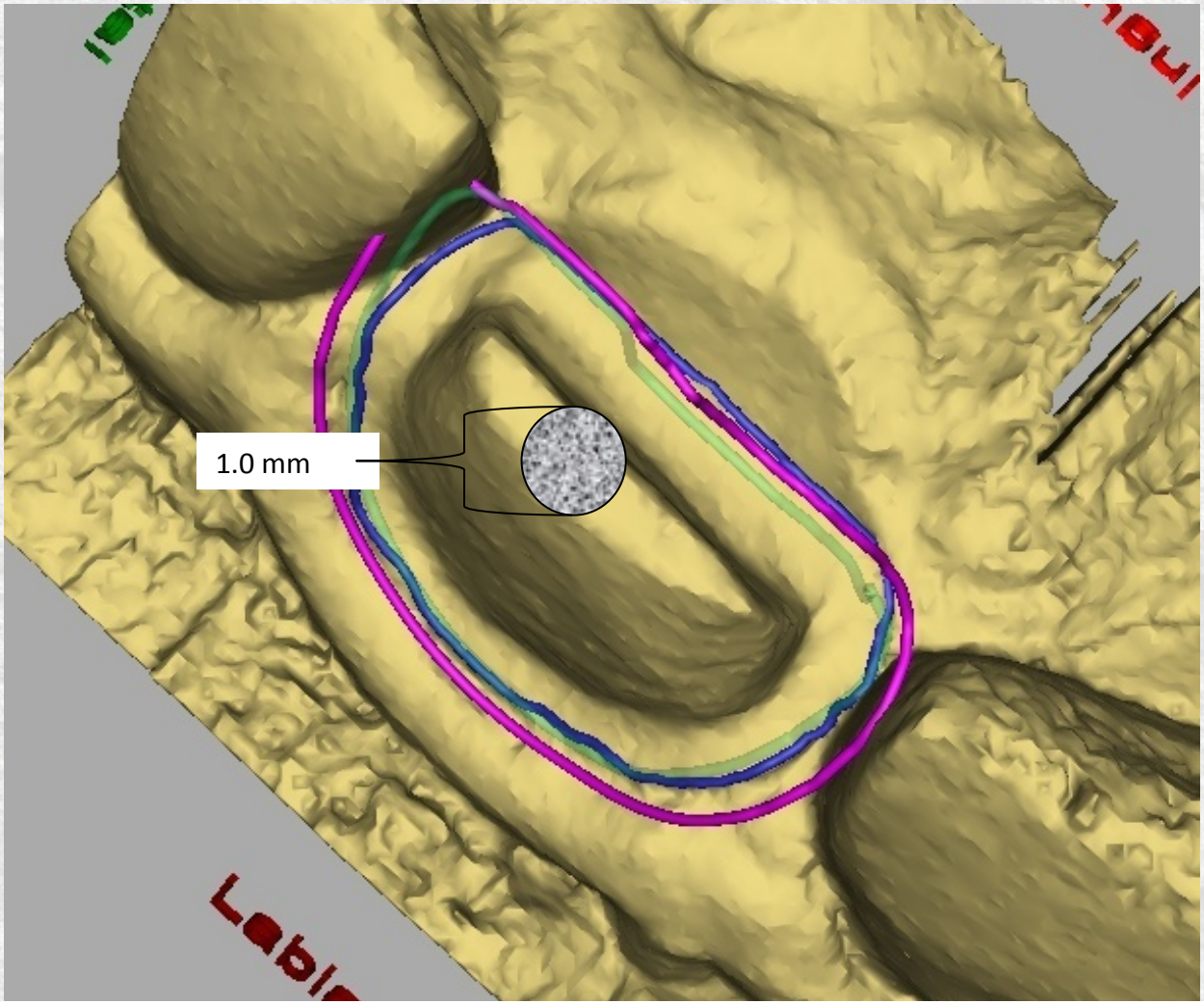
At margin this may lead to undermilling and poor marginal fit



Example of sharp of change in marginal contour

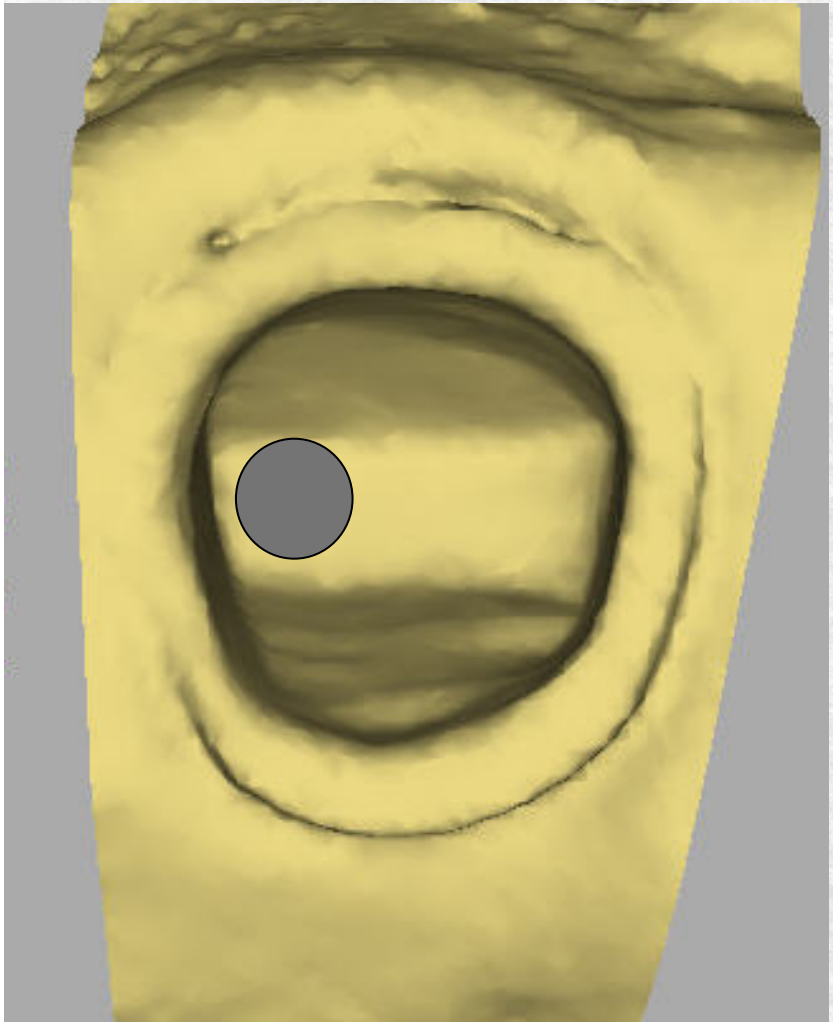
Milled Restorations

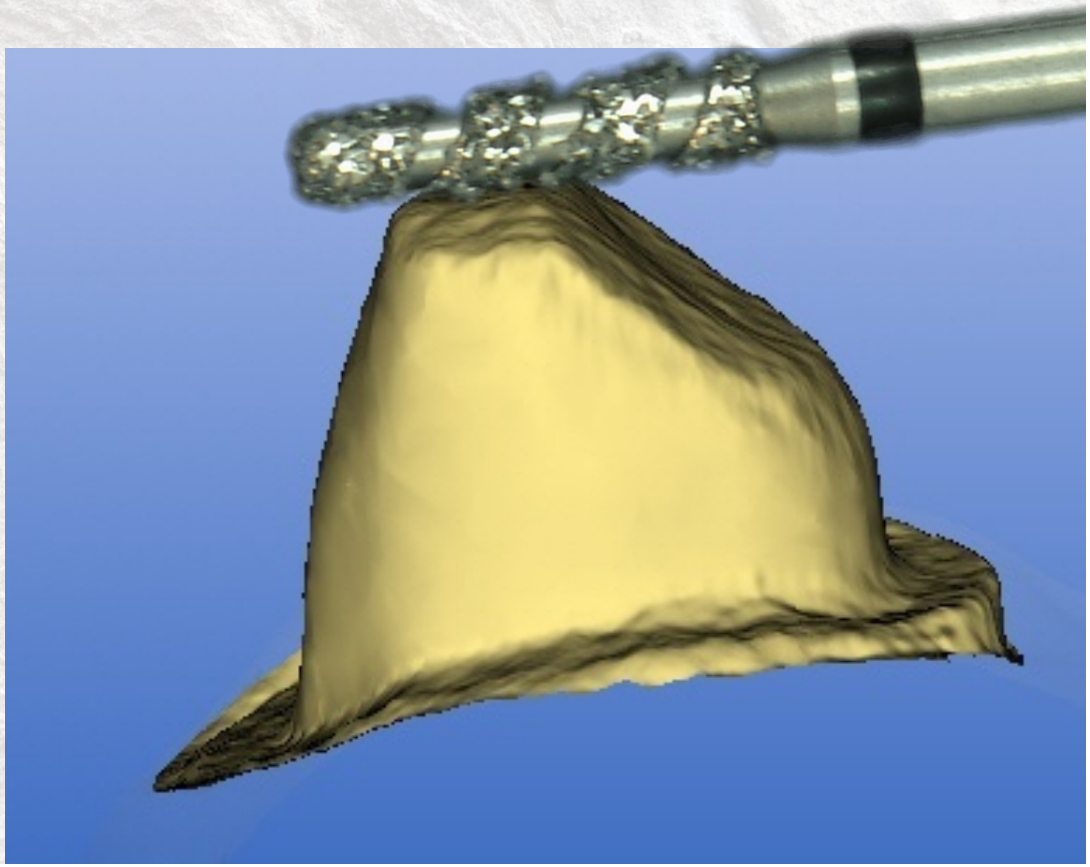
Angular preparation geometry causes the step bur to over-mill
This may lead to thin areas that are prone to fracture in function



Milled Restorations

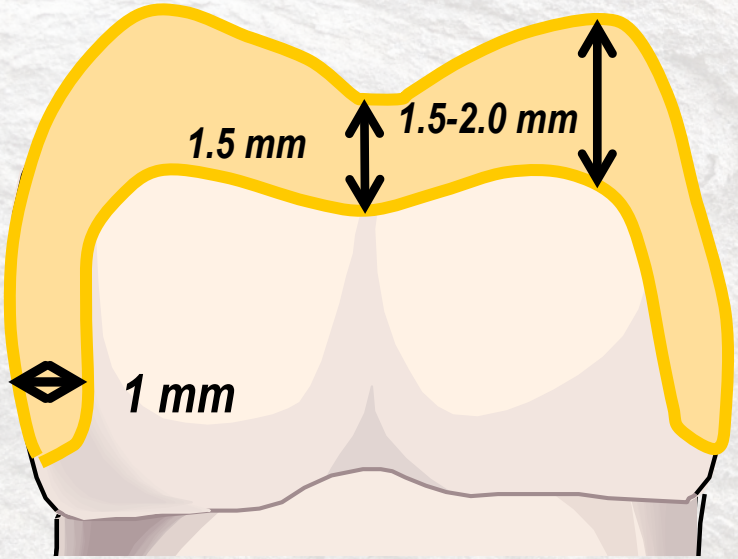
Angular preparation geometry causes the step bur to over-mill
This may lead to thin areas that are prone to fracture in function

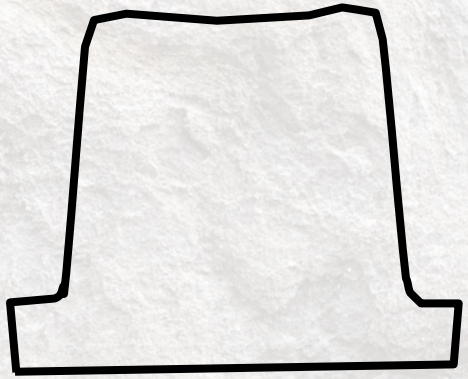


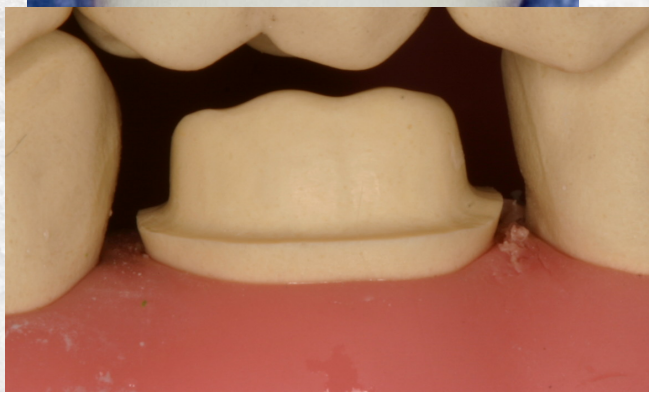


Keys to CADCAM Preparations

- Adequate reduction
- Tapered axial surfaces at least 6 degrees
- Rounded internal & external line angles
- Smooth and flowing prep geometry; no abrupt changes
- Crisp external cavosurface margins, ideally placed supragingival

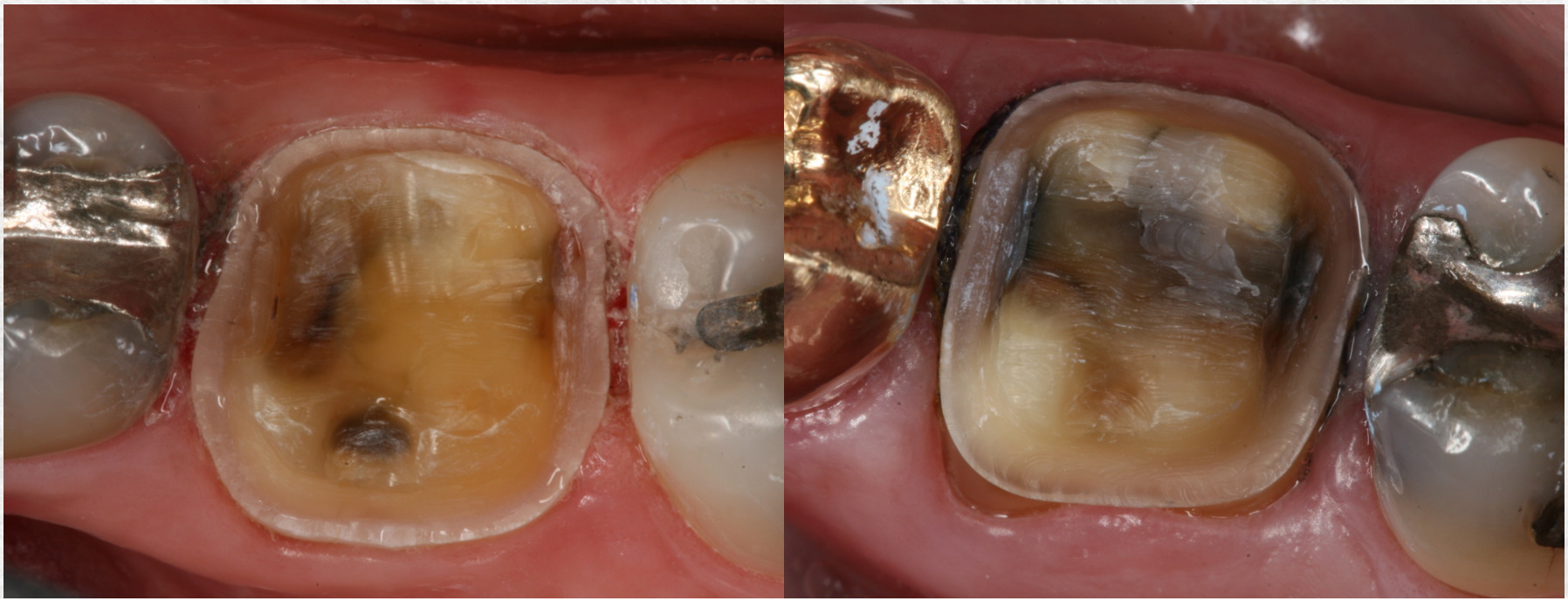






CADCAM Preparations

- Spend time on achieving excellent preps rather than saving fair to poor preps with extensive editing
- More efficient to correct prep rather than edit and then compensate in adjusting the restoration
- Use the monitor (20X) to evaluate prep; must be willing to alter the prep for optimum results



Successful All-ceramic Restorations are an exercise in crack mitigation

- Prep dimensions-no thin margins
- Prep geometry – taper, rounding
- Finishing
- Restoration design-no deep fissures