

## SURVEYED CROWNS as RPD ABUTMENTS

### **Clinical Relevance:**

Teeth planned as RPD abutments often require restoration due to large or inadequate existing restorations, caries, occlusal plane discrepancies, endodontic therapy, or existing contours at odds with the desired framework design requirements. Many times abutments will require fixed prosthodontic treatment to remedy these situations.

Fixed restorations are fabricated with requirements of the future RPD in mind. Crown contours must provide guiding planes, ideal survey lines, adequate reduction for rest seat preparations, and undercuts in appropriate locations for retentive clasps. To do this, the other natural teeth in the arch should have RPD preparations completed at the designated path of insertion/dislodgement. ***AFTER*** this is done, the proposed crown can be prepared and restored in harmony with this established scheme. It is easier and more reliable to make the crown in the lab to match the existing mouth preps, most critically the guiding planes, than to try to cut multiple parallel surfaces intraorally to match the crown.

The first step in planning for surveyed crowns is always the formulation of an RPD design.

Modifications may have to be made as restorability and prognosis of teeth change during preliminary treatment, but an overall design should be established to guide treatment decisions. The needs of the final restoration, the RPD, drive decisions regarding preparatory treatment.

**Please read description of the surveyed crown process with illustrations found in the Stewart text, pp. 291-296.**

*In this exercise, first, RPD mouth preparations will be done on ivory teeth, then crown preparations and surveyed crown wax patterns will be completed to demonstrate the process of surveyed crown fabrication.*

### **Clinical Scenario:**

Our patient is missing 19, 20, 23-26, 30, and 31. It is assumed that 17 and 32 are absent as well. He has a full complement of maxillary teeth that need no restorations or other treatment.

19 and 20 were extracted some time ago. Since the edentulous space went unrestored, 18 has drifted and is tipped mesially.

21 has a large DO amalgam and a CL V composite extending over most of the buccal surface.

Recently it became necessary to extract 30 and 31 and now the patient is motivated to replace the missing teeth.

### Design:

If #18 is prepared with a mesial guiding plane at the present mesial tilt, there will be a large open gingival space between the proximal plate and the mesial surface of the tooth that is likely to cause food entrapment and periodontal complications.

If an MO rest is placed on 18 at the present mesial tilt it will exert downward stress acting as a cantilever unsupported by the rest of the tooth. This would certainly not provide a stabilizing influence on 18, and could cause even more destructive movement.

A surveyed crown can be fabricated to improve both the proximal guiding plane and placement of the occlusal rest, and can orient the occlusal table of the tooth in better harmony with the arch's occlusal plane. The tooth itself is still tilted, so the rest is not ideally directing forces along the long axis. However, placing the rest closer to the tooth center is a significant improvement.

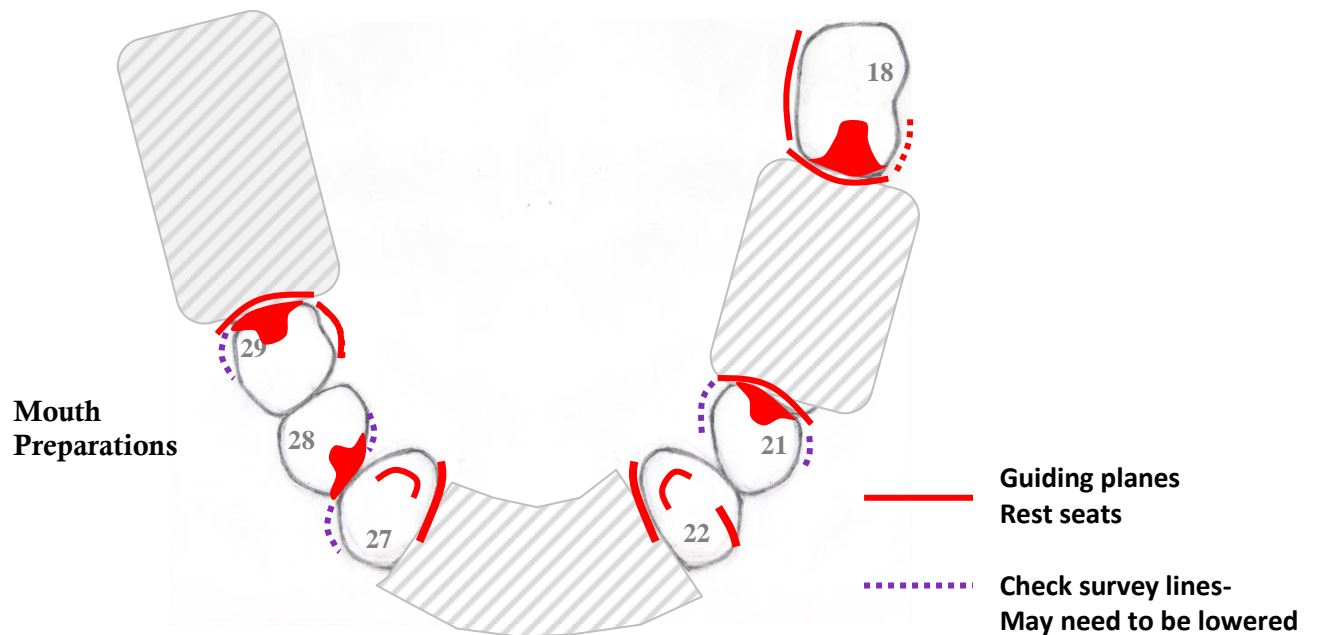
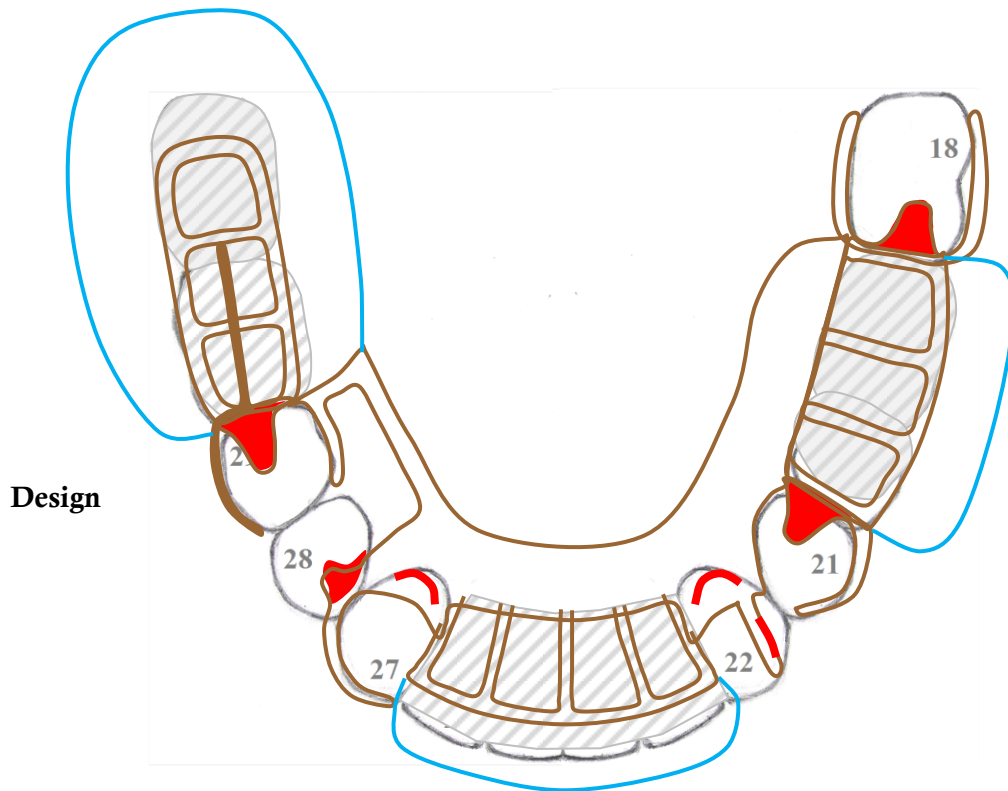
Alternative treatment option: Orthodontic treatment to upright 18 is also an option, but can take an extended period of time and cost is often an issue.

A surveyed crown is also planned for 21 due to current inadequate restorations.

Since this is a Class II configuration, the required number of RCA is three in a tripod pattern. Modification spaces may call for more RCA for good retention. Clinically, the tall mesial guiding planes of the canines would probably provide enough retention without the circlet clasp on 27. However, to get the optimum preparation practice, it has been added for this exercise. Likewise, an incisal rest seat is added to 22 for practice only.

PROPOSED TOOTH PREPARATIONS:			
<b>Guide plane locations</b>			
tooth	surfaces	tooth	surfaces
18	M, L	29	D, L
21	D, L		
22	ML		
27	ML		
<b>Survey line modifications</b>			
tooth	surfaces	tooth	surfaces
18	MB		
21	DB		
22	ML		
29	DB		
<b>Rest preparation locations</b>			
tooth	surfaces	tooth	surfaces
18	MO	29	DO
21	DO		
22	A+Ging		
27	A+Ging		
28	MO		
<b>Opposing tooth modifications</b>			
tooth	surfaces	tooth	surfaces
<b>Retainers</b>			
tooth	surfaces	type	undercut
18	DB	circlet	.010
21	MB	circlet	.010
29	MB	WW	.020
<b>Planned Operative/Fixed Prosth Procedure</b>			
tooth	restoration		
18	Surveyed Crown		
21	Surveyed Crown		
<b>Kennedy classification:</b>			
C II, mod 2			
<b>Axis of rotation:</b>			
18 → 29			

## Surveyed Crowns: CI II, mod 2 Mandibular RPD Case



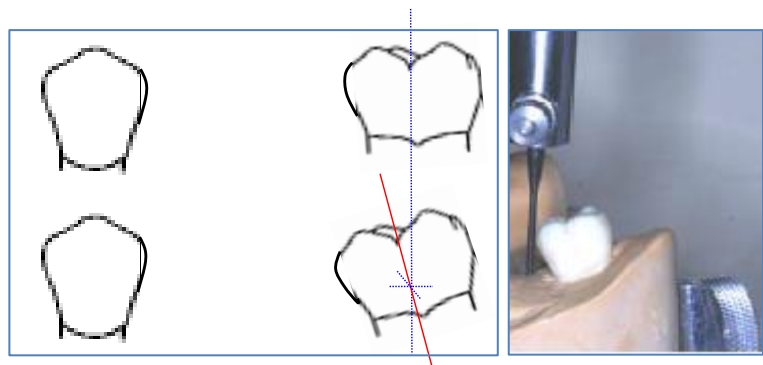
## CASE PREPARATION

You will be issued two sets of ivory teeth—18, 21, 22, 27, 28, and 29. Prepare two mandibular casts with these teeth.

Before pouring cast, tilt 18 with the crown to the mesial and the root to the distal, simulating a mesially drifted tooth. Make this tilt pronounced.



The tilt should be between  $15^{\circ}$  to  $20^{\circ}$  from the normal upright position as illustrated at the right.



Because of the mesial tilt of 18, a significant amount of stone will have to be removed to get down to the mesial CEJ.



Dupe one of the casts in alginate to make a study model/design cast.

Survey the design cast at a neutral orientation with the occlusal plane level. Draw the design and indicate the areas that need to be adjusted for mouth preparation of an RPD in red. Be sure to include all areas needing adjustment for reciprocation and circumferential clasp shoulders.

## SEQUENCE OF STEPS FOR SURVEYED CROWN EXERCISE:

### Phase I-RPD Mouth Preparations-Grade 3

- Prepare two casts with ivory teeth. They must be mountable in phantom head.
- Dupe one cast to make study model. Survey, tripod, and design the study model. You must have this design model finished and ready for inspection before you can start RPD mouth preps. This is the first grading step on Project 3.
- Perform RPD mouth preps on one ivory cast. Get feedback from instructor and signature.
- Perform RPD mouth preps on second ivory cast. Chose ivory cast with best set of RPD mouth preps. Orient on survey table, survey the ivory teeth with graphite, and have it graded, Project 3.
- During this phase, prepare rest seats and guiding planes on 18 and 21 when you do the other preps in the arch. Do not start crown preps yet.

### Phase II-Preps and Wax Patterns for Surveyed Crowns-Grade 4

- Perform crown preparations on 18 and 21 for full coverage gold crowns. The crown prep for 21 will be along the long axis of the tooth. However, because 18 is tipped, its crown prep will not be oriented along the long axis of the tooth, but instead in orientation with the guiding planes of the RPD mouth preparations. Your crown preps should allow for occlusal rest seats and placement of guiding planes on distal of 21, and mesial and lingual of 18.
- Get crown preps graded, step 1 on Project 4.
- Fabricate wax patterns on prepped ivory teeth using dark inlay wax. Place cast on survey table and use powdered wax on crown wax surfaces to trace survey lines with analyzing rod. Use the wax knife to carve guiding planes on the distal of 21, mesial and lingual of 18. When using wax knife, carve away wax in very small increments to avoid tearing the wax pattern.
- Present for grading oriented properly on survey table. Guiding planes of wax patterns should be parallel with other guiding planes on ivory teeth in arch. Wax patterns should be dusted with powdered wax and visible survey lines made with analyzing rod.

**When prepping 18 for crown, don't orient bur along long axis of the tooth.**

- Try to keep bur perpendicular to path of insertion of RPD.

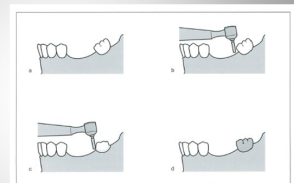


Fig. 18-8. Proximal adaptation may be corrected using properly designed feed materials. (a) The mandibular arch is shown with the upper arch in occlusion. (b) The tooth preparation is oriented to correct adaptation. (c) The position of the bur is shown. (d) The bur is oriented perpendicular to the path of insertion of the RPD. The resulting crown shows the correct adaptation and contact.

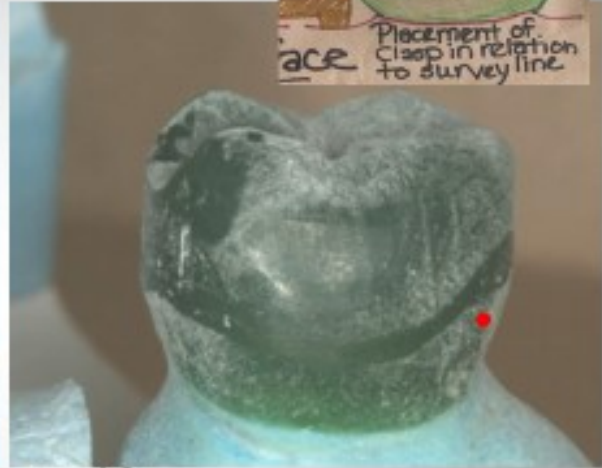


# WAX PATTERNS FOR SURVEYED CROWNS

## Buccal Survey Lines



- 21
  - DB low for shoulder of circlet clasp.
  - Blended with distal GP
  - MB high for undercut



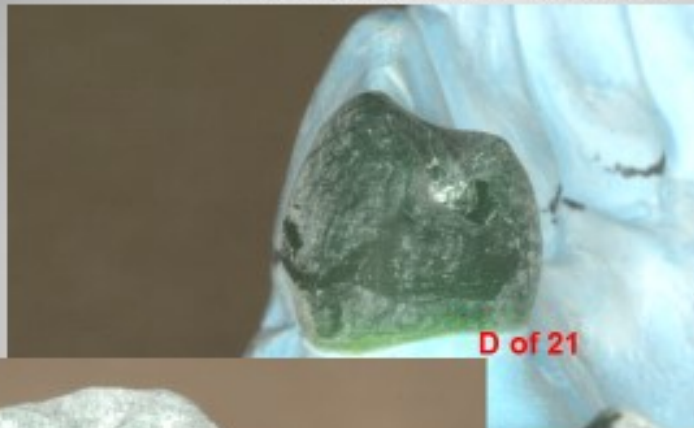
- 18
  - MB low for shoulder of circlet clasp.
  - Blended with mesial GP
  - DB high for undercut

## Proximal Guide Planes: Buccal View



- Distal 21 and mesial 18 parallel, and should be parallel with GP of 22, 27, and 29.

## Proximal Guiding Planes: Proximal View



- 2/3 height of proximal surface
- Blends into buccal and lingual surface to lower survey lines.



## Lingual GP and Survey Line



- 18 has guiding plane from top to bottom of middle 1/3 of lingual surface.
- 21 has low survey line at junction of middle 1/3 and gingival 1/3.
- Gingival third has natural tooth contour.