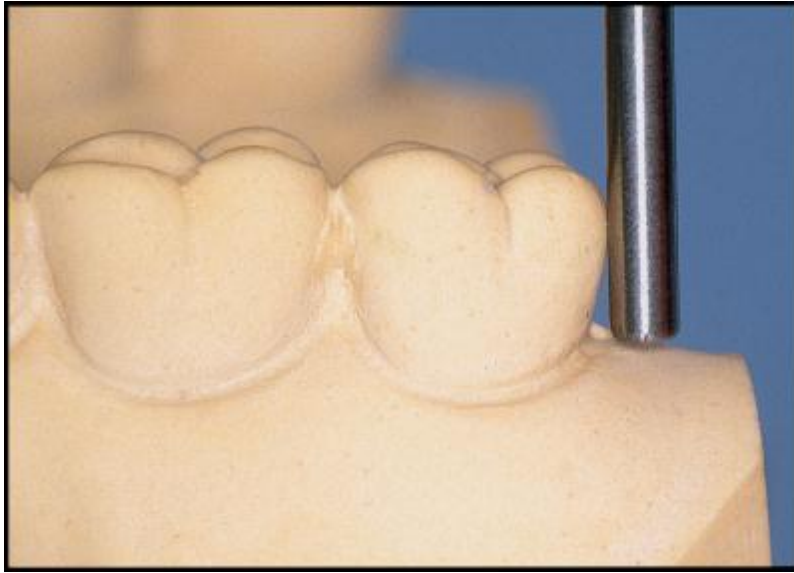
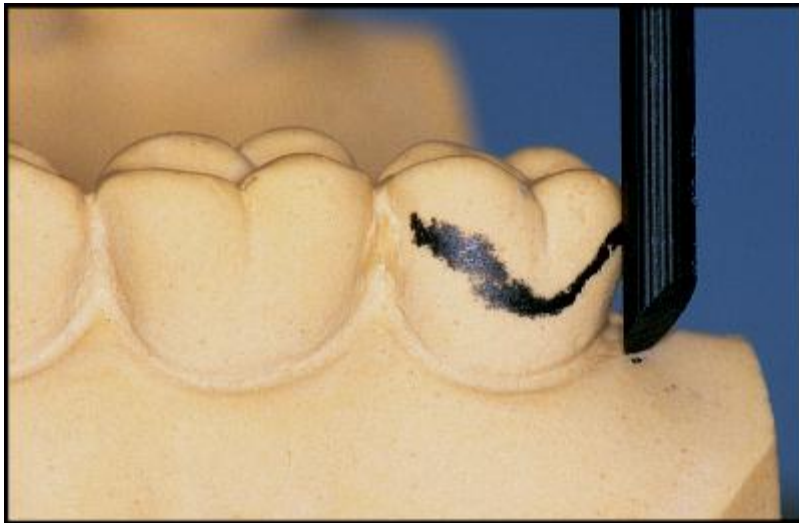


SURVEYING STUDY MODELS



ANALYZING ROD

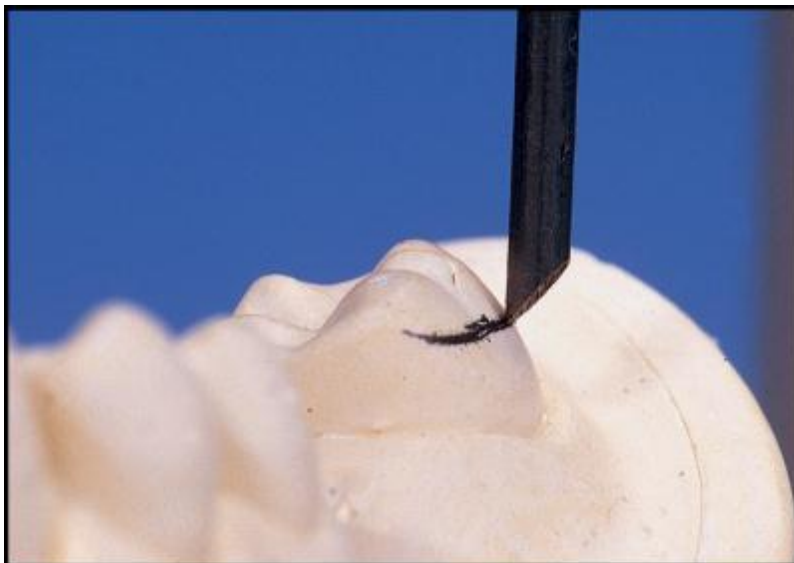
This metal rod is placed against the teeth and ridges during the initial analysis of the cast to identify undercut areas and to determine the parallelism of surfaces without marking the cast.



GRAPHITE MARKER

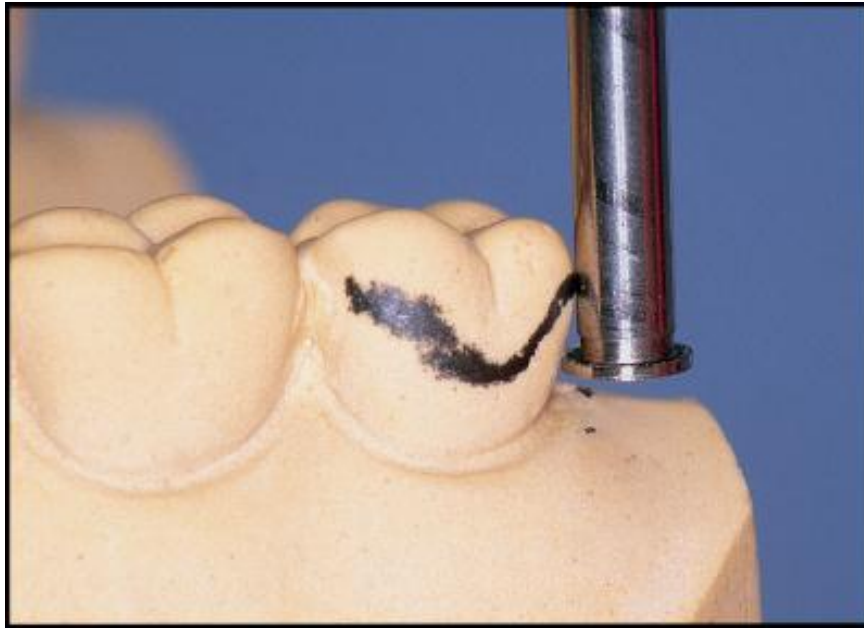
The graphite marker is moved around the tooth to identify and mark the position of maximum convexity (survey line) separating non-undercut from undercut areas.

When surveying a tooth, the tip of the marker should be level with the gingival margin allowing the side of the marker to produce the survey line as shown in the illustration.



POSITION OF MARKER

A false survey line will be produced if the tip of the marker is incorrectly positioned. In this example there is not, in fact, an undercut area on the tooth although an incorrect surveying technique has indicated one. If this false line is used in designing an RPD, errors will arise in the positioning of components, especially clasps.



UNDERCUT GAUGES

Gauges are provided to measure the extent of horizontal undercut and are available in the following sizes: 0.010", 0.020", and 0.030" (0.25 mm, 0.50 mm and 0.75 mm). By adjusting the vertical position of the gauge until the shank and head contact the cast simultaneously, the point at which a specific extent of horizontal undercut occurs can be identified and

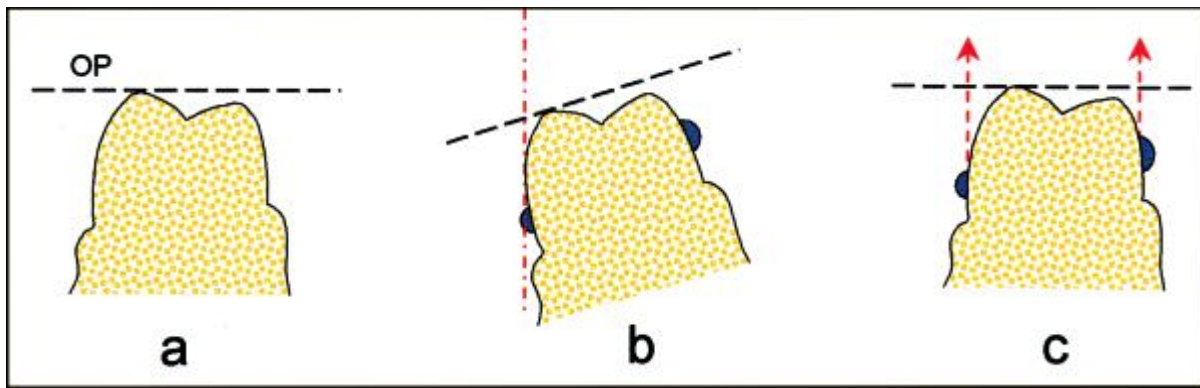
marked. This procedure allows correct positioning of retentive clasp arms on the tooth surface



VISUALIZING AMOUNT OF UNDERCUT

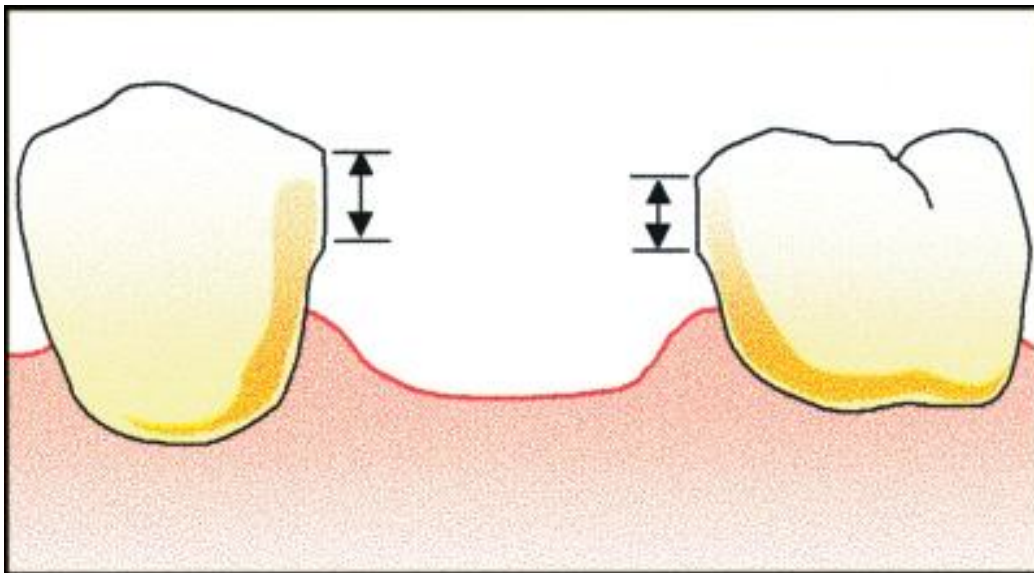
The cast is positioned with the occlusal plane horizontal. The teeth and ridges are then surveyed to identify undercut areas that might be utilized to provide retention in relation to the most likely path of displacement. The position of the survey lines and the variations in the horizontal

extent of undercut associated with them should be noted. The amount of undercut can be judged approximately from the size of the 'triangle of light' between the marker and the cervical part of the tooth, or measured more precisely by using an undercut gauge. An assessment can then be made as to whether the horizontal extent of undercut is sufficient for retention purposes



CAST TILT TO OBTAIN UNDERCUTS

To obtain retention, undercuts must be present on teeth relative to the horizontal survey. It is a misconception to believe that changing the tilt of the cast will produce retentive undercuts if none exist when the cast is horizontal.



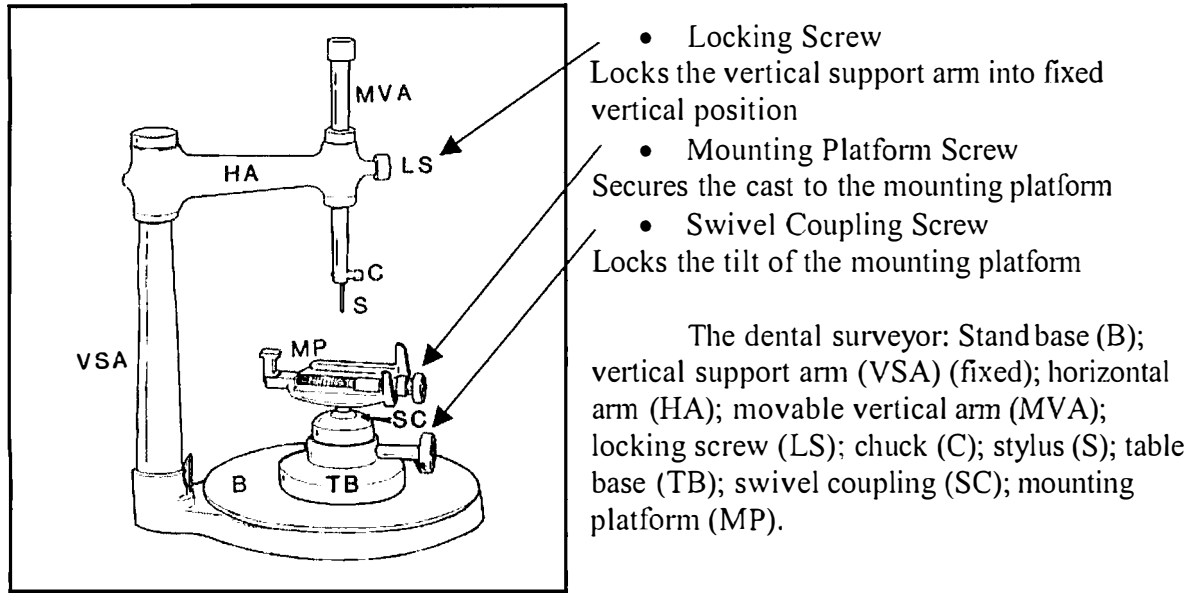
PARALLEL AXIAL SURFACES

Two or more parallel axial surfaces on abutment teeth which can be used to limit the path of insertion and improve the stability of a removable prosthesis. Guide surfaces may occur naturally on teeth but more commonly need to be prepared.

Tripoding

Dental Surveyor:

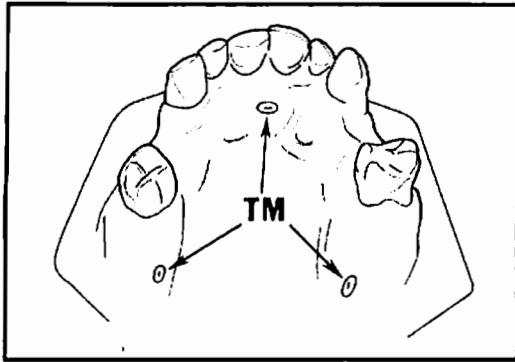
There are three main controls manipulating surveyor components when surveying a cast:



Tripoding:

Removable partial dentures rely on mechanical retention dependent on parallel and undercut surfaces. Deviations as small as ten one-thousandths of an inch are critical to their design. Because slight variations in cast orientation can result in large changes in location of height of contour and necessary undercuts, it is critical that the RPD can be reliably reoriented to the plane which resulted in the most favorable path. Tripoding allows the cast to be so oriented any time the need arises. There are several ways to tripod casts.

Cross Marks:



Three tripod marks should be widely separated and must be made with the vertical arm (LS) and the mounting table (SC) locked in position.

- Most common method.
- May be difficult to find vertical level to allow widely spaced crosses on cast surface without interfering with design elements.
- Can require time to match the crosses at same vertical height for reorientation.

Method:

Tripoding:

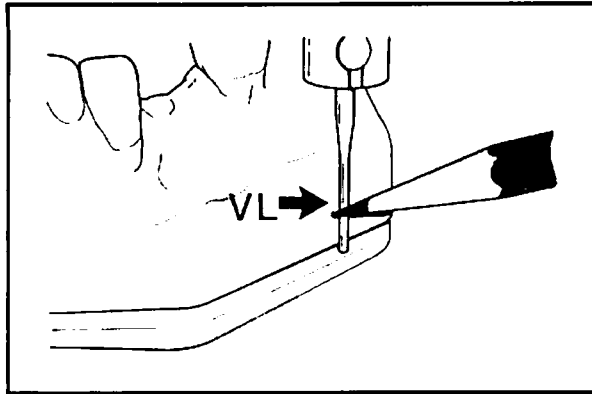
1. After desired tilt is selected, lock it in by tightening SC.
2. Loosen LS of vertical arm to find a vertical position that allows three widely spaced points to be placed at same vertical level on cast. Highlight in red by making cross. Crosses cannot be placed on teeth. Advantageous to place crosses away from design drawing.
3. When vertical position of vertical arm determined, lock LS.
4. With MP, LS, and SC locked, mark cast in three widely spaced locations. Can be done with graphite marker, or can be scored into cast with .030" undercut gauge (three stripes).

Reorienting:

1. Place cast in mounting platform and clamp by tightening MP. Leave this control alone.
2. With SC loosened, experiment with tilt until it seems the crosses are level.
3. Holding the cast in the mounting platform with one hand, loosen the LS of the vertical arm and adjust the arm with analyzing rod to level of crosses.
4. Continue to refine the tilt of the cast and the vertical height of the vertical arm until the analyzing rod contacts the three crosses at the same vertical level. Lock both the LS and SC.
5. Recheck contact of analyzing rod with three crosses without unlocking screw.
6. Cast is now previously recorded favorable tilt.

Base Lines:

- Easy to place tripod lines on base of cast.
- Analyzing rod stands away from surface of sides of cast base, not flush against it, and parallel mark can be skewed by angulation of pencil.
- Therefore accuracy may be influenced.



Tripoding may be accomplished by drawing a vertical line (VL) parallel to the side of the analyzing rod on three sides of the cast. The three lines should be as widely separated as possible

Method:

Tripoding:

1. Determine the most favorable tilt
2. Lock SC.
3. Loosen LS and adjust so lower straight portion of analyzing rod is adjacent to lateral side of cast base. Lock LS.
4. Using analyzing rod as a ruler, draw vertical line on one surface of cast base.
5. Reposition table base to position two other widely separated lateral base surfaces can be marked by adjusting the vertical arm until analyzing rod can be used as ruler for marking vertical lines.

Reorienting.

1. Replace cast in mounting platform and clamp by tightening MP.
2. With both SC and LS loosened, adjust cast tile until lines of base are all parallel with analyzing rod.
3. LS is not locked and can be moved up and down to assess parallelism of lines.
4. When all three base lines are parallel, lock SC.
5. Cast is now at previously recorded favorable tilt.

Cemented Post:

- Probably the most consistently accurate method.
- Initially most time consuming during tripoding, but quickest when reorienting cast.
- Location of post may interfere with maxillary design elements.

Method:

Tripoding:

1. Drill hole perpendicular to horizontal cast plane with a No. 8 round bur to a depth of 10 mm in the center of the cast.
2. Place long shank slow speed bur (used is fine) in chuck of vertical arm and tighten.
3. After favorable tilt is determined, lock LS and position cast under vertical arm to allow insertion of bur into prepared hole.
4. Fill hole with super glue or cold cure resin.
5. Loosen LS and lower bur into the prepared hole.
6. Allow cement to set.

Reorienting:

1. Replace cast in mounting platform and clamp by tightening MP.
2. Position vertical arm with empty and loosened chuck at vertical position to accept cemented post.
3. Loosen SC and maneuver cast into position allowing post to be inserted into chuck.
4. With SC still loose, tighten chuck. As the post is tightened in the chuck, the loosened swivel coupling is directed to the original favorable tilt position.
5. Tighten SC
6. Cast is now at previously recorded favorable tilt.