Crown and Bridge Master Model

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Introduction

This presentation will demonstrate the laboratory procedures which are required to produce a full arch master model with removable dies. This technique is applicable for the production of a master model which will be used for the laboratory fabrication of either single or fixed partial denture restorations.

Procedure

The first step is to take the final impression, which has been properly disinfected, and thoroughly wash it under running water to remove the disinfectant and any residual saliva or blood. The impression is then thoroughly dried with compressed air.

A full length strip of boxing wax is adapted to the border of the impression tray so that a base with sufficient thickness to prevent fracture will be produced. The wax strip must be long enough to provide an overlapping seam. Melted wax is then used to secure the boxing wax to the tray and to seal any gaps.

Following this, a debubblizer solution is either sprayed or brushed onto the impression. The purpose of the debubblizer is to improve the wettability of the impression and to reduce the risk of incorporating air bubbles when the improved stone is introduced. The impression is again thoroughly air dried.

When mixing the improved stone, it is important to follow the manufacturer’s instructions for the volume of water and the weight of the powder. The water is placed in the vacuum mixing bowl first, followed by the entire amount of the pre-weighed powder. The powder is thoroughly incorporated into the water and gently spatulated to a creamy mix.

The bowl cover is attached to the bowl and then the bowl assembly is coupled to the vacuum mixer. The stone is mixed for a few seconds before the vacuum tubing is attached. Mixing continues under full vacuum pressure for approximately 30 seconds before the tubing is removed. The stone mixture is now ready for pouring.

When pouring an impression, it is important to not incorporate any air bubbles. A simple method is to introduce a small amount of the stone into the heel of the impression on the opposite side from the area of critical detail. The impression is held on an angle against the vibrator allowing the stone mixture to gradually flow through the coronal areas. Additional increments are added until there is sufficient volume of stone to entirely coat the coronal areas of the impression.

More stone mixture is added until the stone covers all the critical detail. At this point, the remainder of the stone mixture can be poured in slowly directly from the bowl. The completed pour-up is placed on the work bench, maintained in a level position and allowed to completely set before proceeding.

Once set, use a lab knife to remove the boxing wax from the border.

The lab knife is then inserted between the tray border and the model and a light torquing force is applied. This procedure is repeated in several areas around the periphery until the tray gradually lifts up and can be removed from the stone model. Excessive torquing force should be avoided to prevent the fracture of thin teeth.

To make a sectional model, debubblizer is again applied to the impression and air dried. Using a smaller volume of water than was used for the full arch model, sufficient stone is added and thoroughly hand spatulated to produce a smooth heavier consistency mix.

The filling procedure is repeated and small increments are vibrated into the impression until the desired coronal areas are filled. For a sectional model it is only necessary to fill one quadrant or part thereof.

A large quantity of stone mixture is now added to provide a thick base. This final addition must be performed quickly because there is limited working time with this heavier mix which is rapidly approaching its initial set.

The lab knife is used in the same manner to separate the impression from the fully set sectional model.

At this point, work can resume on the master model. The model trimmer is used to produce a flat base and to remove excess peripheral stone.

Similarly a large abrasive wheel mounted on a lathe is used to remove excess stone on the lingual and palatal aspect to form a horseshoe shape with no raised borders.

The next step is to use the pindex machine to provide removable dies. Place the model on the pindex platform and use the laser light as a guide for drilling the dowel holes. Position the model so that the light is projected onto the middle or slightly to the lingual of a tooth which is located in the section of the model distal to the proposed master die. A dowel in this area will permit either anchorage to the base or removal from the base if sufficient force is applied. When the desired location of the dowel is selected, the pindex platform is pushed downward to activate the drill located below the platform which will produce the dowel hole. The pindex base must be fully depressed to maximize the length of the dowel hole.

The procedure is repeated for the tooth or teeth which will be the removable dies.

Generally speaking, the remaining section of the model does not need to be removed from the base. However two widely spaced dowel holes are made so that these dowels can provide anchorage to the base.

Inspection of the base demonstrates the location of the four dowel holes that were used for this case.

A drop of cyanoacrylate cement, which is Superglue, is placed in each dowel hole to provide a secure attachment of the brass dowel head to the stone model.

Use a tissue to remove excess adhesive.

A round or bullet shaped carbide bur in a straight handpiece is used to form a shallow countersunk channel on the buccal aspect of the dowel followed by a similar channel on the lingual aspect. The channels extend just beyond the most anterior dowel of the sections which will be removed from the base. The stone which will be subsequently added to form a base will lock into these channels and will prevent rotation of the removable sections on the base.

To further enhance the stability of the single tooth removable die, an additional groove is placed on the buccal aspect from the center of the dowel to the border and another is placed on the lingual. This cross pattern of channels ensures accurate re-positioning of the die on the base and optimal resistance to rotation.

Prior to forming a stone base, a separating medium is applied with a spray or a brush. A mix of yellow stone is prepared and used to completely fill a flexible plastic base former.

In order to prevent the incorporation of air bubbles, additional stone is placed on the model base and around the dowels.

The master model is then inverted and gently placed in the middle of the stone base former. If the proper consistency of stone has been used, the master model should rest on the stone and not sink in.

When the stone base has completely set it can be removed from the base former.

Use a large carbide bur on the lathe to lower the level of the stone on the inner side. This will facilitate making saw cuts through the master model.

The next step is to carefully reduce the stone base on the model trimmer until all the dowels are exposed. At the same time the excess peripheral stone base is also trimmed.

To permit the easy removal of single dies or sections, a suitable carbide bur is used to create a shallow countersunk hole around the head of the dowel.

Draw a line from the center of the master die to the location of the dowel on the base as a guide for where to make saw cuts.

A thin saw blade is used to make a saw cut through the interproximal area, being careful to leave a thin section of die stone beyond the preparation margin for trimming purposes, as well as to avoid damage to the margin. Make sure to cut approximately parallel to the red line. The second saw cut should slightly converge towards the first so that the die can be removed.

At this point, light tapping on the end of the dowel with a blunt instrument should be sufficient to remove the die.

Gross trimming of the die can be accomplished with a suitable round end or bullet shaped carbide bur in a straight handpiece, leaving a thin layer of stone beyond the margin.

For the novice operator, it is generally safer to complete the final trimming with a scalpel.

Use a sharp red pencil to mark the cavosurface margin. This allows the margin to be clearly visible during all stages of the wax-up procedure.

The application of a stone hardener makes the master die more resistant to abrasion which can occur when the wax pattern is being trimmed. The hardener is lightly applied to all aspects of the die including the root area.

When the stone hardener has dried, die spacer can then be applied. In this case, three layers of die spacer will be applied in order to achieve an overall 20 – 40 micron thickness. The first step is to shake the bottle to ensure thorough mixing. It is important that the die spacer have a low viscosity to permit the application of a thin layer. If the die spacers have thickened, the addition of a suitable thinner is required. A uniform layer is applied first to the occlusal aspect and then carried down the axial walls to end a few millimeters short of the prepared margin.

When the first layer has dried, a second layer of a different colour is applied. A different colour visually assures complete coverage of the first layer.

After drying, a third layer is then applied using the same colour that was used for the first layer. The master die is now ready for the wax-up procedure.

Article Reviewed By

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