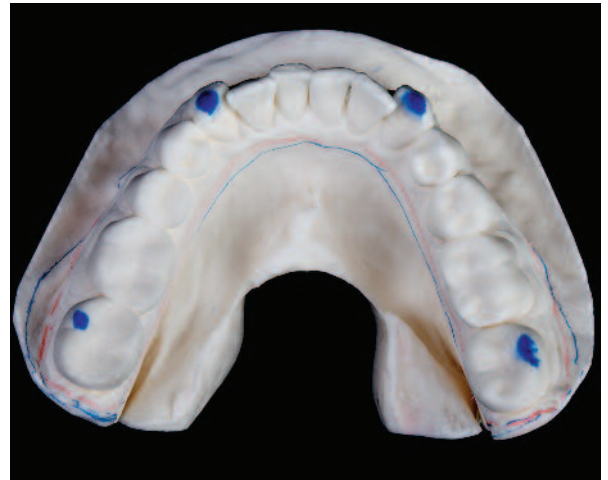


# The custom impression tray: fabrication and utilization

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A dimensionally accurate impression is one of the primary determinants for a precise fitting indirect restoration. The clinical success of the indirect restoration requires a precise working model and thus depends upon the accuracy of the final impression.<sup>1</sup> The use of custom fabricated trays with elastomeric impression materials can improve the accuracy of the working model.<sup>2</sup> There are a myriad of materials and techniques available for custom tray fabrication, including autopolymerizing and heat-activated acrylic resins, thermoplastic resins, and visible light-cured resins. The techniques for custom tray fabrication also vary and range from direct intraoral techniques to indirect laboratory procedures on a primary model.

The design and use of the custom tray offers distinct clinical advantages compared to the stock tray. First, dimensional changes that occur during the



**Figure 1:** Evaluate the stone model for potential undercuts and design the form and dimension of the tray. Diagram with a margin liner pencil the boundaries of the wax spacer (red), borders of the custom tray (blue) and the occlusal stops (blue).



**Figure 2:** Heat and adapt layers of base plate wax to the diagnostic model to obtain a 2 to 4 mm thickness following the predetermined guide marks. Occlusal stops are made with a scalpel blade (No. 12 disposable Bard Parker) and positioned to provide a tripod-like stability.

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polymerization of elastomeric impression materials are proportional to the thickness of the material.<sup>3</sup> Custom tray design can provide dimensional accuracy and stability by providing a uniform thickness of material throughout the tray.<sup>2,4,5</sup> Utilization of stock trays can result in variations in thickness of the material and the potential for dimensional changes and inaccuracies in the model.<sup>2,4,6</sup> Second, the custom tray rigidity reduces the potential for distortion of the impression in comparison to the flexible stock trays.<sup>7,8</sup> Flexible trays can increase the potential for the impression material to pull away from the adhesive during polymerization of the material and removal from the oral cavity.<sup>9</sup> Reports also indicate that tray flexure can contribute to impression and cast distortion.<sup>5,10,11</sup> Finally, the custom tray design controls the size and conserves the volume of material required for the impression, reducing the cost of the impression material used for each impression. A streamlined design can reduce discomfort to the patient during the impression procedure because of the smaller design size and reduced volume of material. Furthermore, reducing the volume of elastomeric material utilized can minimize the polymerization-induced shrinkage while offsetting the additional economical costs of the tray fabrication.

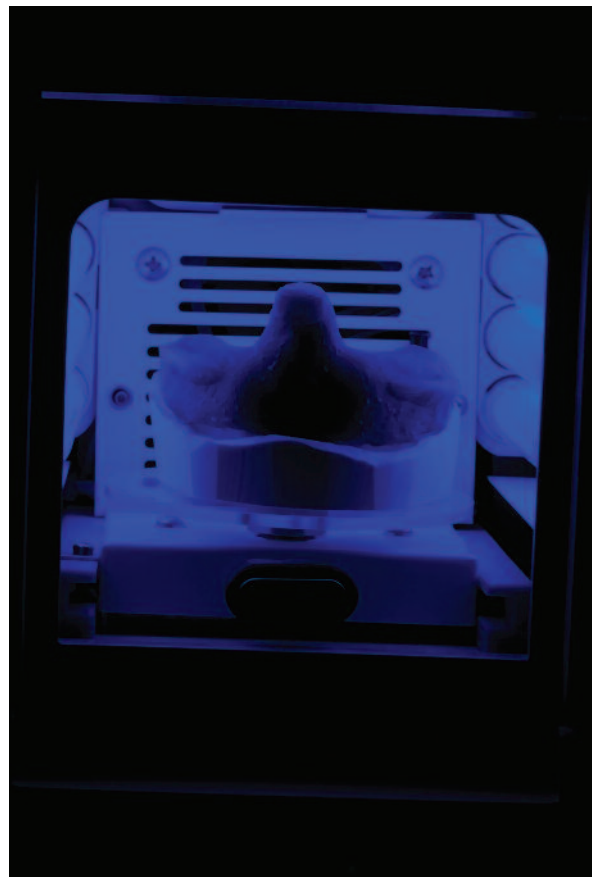
### Consideration factors for fabrication and utilization of the custom impression tray

Visible light-cured resins exhibit dimensional stability immediately after curing, thus allowing immediate clinical use after fabrication.<sup>5,12</sup> Research indicates that autopolymerizing acrylic resins should be fabricated 24 hours before the impression procedure.<sup>5,13</sup> The dimensional stability of elastomeric impression materials is considered to depend on the bulk of material which is the distance from the inner surface of the tray to the surface of the impression.<sup>4,14,15</sup> Elastomeric impression materials are considered most stable when they have a uniform thickness of 2 to 4 mm.<sup>16</sup> Incorporating dental and/or tissue stops can provide a uniform impression material thickness of approximately 2 to 4 mm.<sup>17,18</sup>

Adapting the visible light-cured resin material directly over the wax spacer may leave a wax residue remaining in the tray. This residue contamination can interfere with adhesion of elastomeric impression materials to the impression tray. Even a small release of the impression



**Figures 3a to 3c:** The light-cured material is applied over the spacer and carefully adapted to the pre-determined design. After adapting the material to the anticipated boundaries, the excess material is excised using a scalpel blade (No. 12 disposable [Bard Parker]). (a) A central handle and detachment wings are shaped and contoured. (b,c) These posterior lateral detachment wings provide axial traction for a uniform removal of the tray.



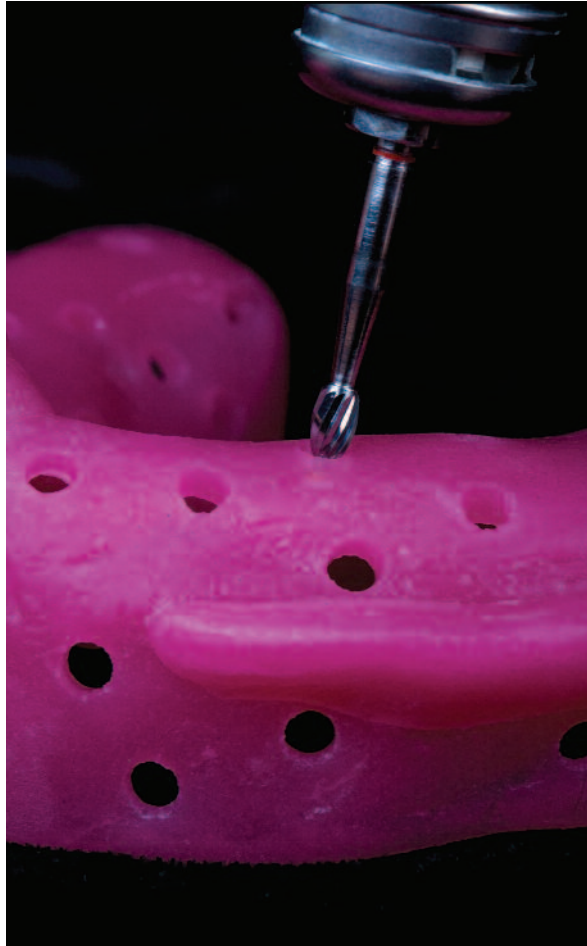
**Figures 4a and 4b:** After an air barrier coating (Triad air barrier coating [DENTSPLY]) is applied over the tray material, the custom tray is placed in the light-curing unit and undergoes 2 polymerizations of 5 minutes each.

material can cause a distortion in the impression, so this is critical. Surface cleaning of the tray using boiling water, pressurized steam and/or a wax remover is suggested. Another recommended method involves burnishing tin foil over the wax spacer.<sup>19</sup>



**Figures 5a and 5b:** The polymerized custom tray, while still on the diagnostic model, is immersed in boiling water for several minutes. The spacer wax is removed and the air barrier is applied to the internal surface of the tray and placed in the light-curing unit for an additional 5 minutes to cure the interior surface. After pressure steaming the internal surface, a wax remover is applied to the internal surface of the tray to remove any residual wax residue.

It is essential that the impression material be securely attached to the tray, especially during removal of the set material from the oral cavity. Surface preparation of the custom tray can significantly affect the retention of the impression material and can improve adhesion between



**Figure 6:** The tray is evaluated on the diagnostic model and any sharp edges or irregularities are smoothed with a tungsten carbide bur (H251Q [Brasseler USA]). To improve retention of the impression material, perforations are made with a carbide bur (H379 [Brasseler USA]).

impression material and tray. Methods for improving retention/adhesion include: perforating or roughening of the custom tray surface with tungsten carbide burs and application of adhesive solutions.<sup>20,21</sup>

Adhesive drying times of less than 15 minutes reduced the bond strength values of the elastomeric impression materials to the custom tray. To obtain durable and stable adhesion between elastomeric impression material and tray, the drying time after application of adhesive should be at least 15 minutes.<sup>21,22</sup> Also, it is important to remember that each adhesive is specific to the impression material (ie, a polysulfide adhesive can not be used with an addition silicone impression material).



**Figure 7:** Completed visible light-cured custom tray.

### **Fabrication and utilization of the visible light-cured custom impression tray**

The main objective in tray construction is to provide a rigid tray for retention of the impression material. The aforementioned consideration factors can provide insight into the optimal fabrication and utilization of the custom tray. A visible light-cured resin material (Palatray XL [Heraeus Kulzer]) was selected for its rigidity, high dimensional stability, ease of manipulation, and unrestricted working time. Also, this material provides the ability to be ideally contoured prior to curing, thus eliminating prolonged finishing times. Other visible light-cured resins include Individo Lux (VOCO), Triad (DENTSPLY International), and Fastray LC (Bosworth Products).

Fabricating an indirect custom impression tray requires planning, a diagnostic model, and laboratory procedural time. Figures 1 to 10c illustrate the laboratory fabrication and clinical utilization of the visible light-cured custom impression tray that can be used to obtain a precise and predictable final impression.

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*Figure 8: Evaluation of the custom tray in the patient's mouth for proper extension, stability and orientation.*



*Figure 9: A thin layer of adhesive is applied to the internal surface of the tray and should extend several millimeters beyond the borders of the tray. The adhesive is allowed to dry for at least 15 minutes prior to the impression procedure.*

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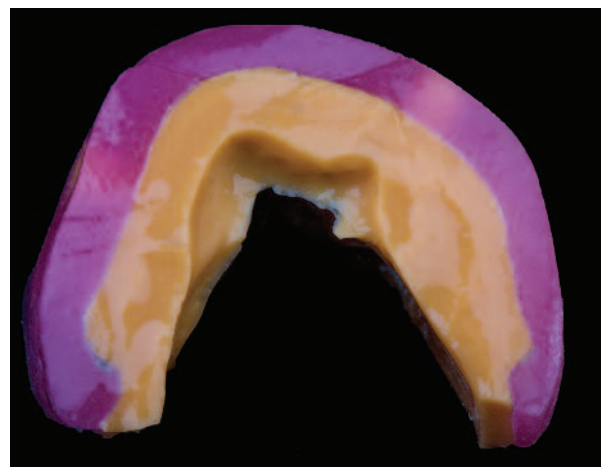
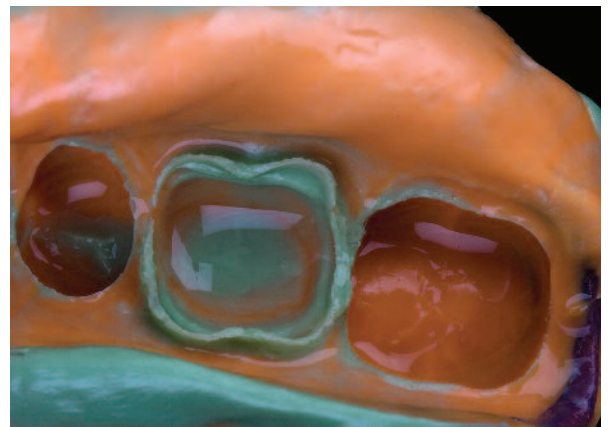
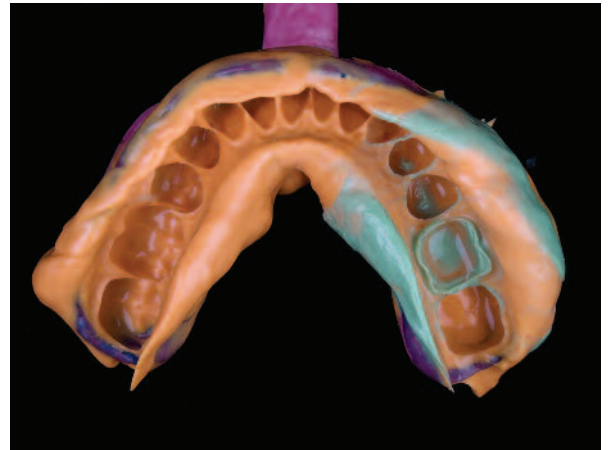
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**Figures 10a to 10c.** A precise, predictable, and dimensionally accurate elastomeric impression is obtained using a visible light-cured custom tray (a,b). Cross-sectional view of the custom impression tray, illustrating a uniform thickness of material throughout the tray (c).