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Custom Total Occlusal Convergence Angle Sticker Fabrication

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Abstract: This article describes a method of fabricating a custom total occlusal convergence angle sticker with photo editing software and label stickers. The custom total occlusal convergence angle sticker can help clinicians achieve an accurate degree of taper during axial wall reduction of tooth preparation.

Several studies have reported that differences in visual acuity affect the accuracy of tooth preparation, especially depth, distance, and total occlusal convergence.^{1, 2, 3 and 4} Adequate geometric design of a tooth preparation is an essential factor in retaining fixed dental prostheses.⁵ In regard to crown preparations, retention is dependent on the total occlusal convergence (TOC) angles of the prepared tooth.⁶ Many studies have shown the disparity of TOC angles between actual clinical preparations of teeth and textbook-recommended values.^{2,}

4 and 7 Aleisa et al⁷ demonstrated that while the minimal TOC angle of 5 degrees was recommended with a range of 4 to 14 degrees as acceptable, dental students tended to prepare a tooth with greater TOC angles; mean values of 19.2 degrees mesiodistally (MD) and 23 degrees buccolingually (BL) for vital teeth and 12.8 degrees MD and 22.5 degrees BL for nonvital teeth. Predoctoral students prepared teeth with excessive taper.^{2, 5, 7, 8 and 9} The recommended TOC values are not easily achieved under intraoral conditions.¹⁰

Because of limitations in hand-eye coordination, angle judgment by direct comparison can improve the accuracy and quality of tooth preparations.¹¹ The purpose of this article is to demonstrate the fabrication of a custom TOC angle sticker with photo editing software and label stickers to help clinicians evaluate the TOC angle by direct comparison.

Technique

1. Open a graphic software program (Adobe Photoshop CS2; Adobe Systems). Go to 'file' and click 'New' to create a new file (prep guide). Other graphic software programs and other computer platforms would perform differently to achieve these steps.
2. Insert the value of the image size as 300 pixels (width) × 300 pixels (height) with 72 pixels/inch (resolution). Set the contents as 'Transparent' (Fig. 1).

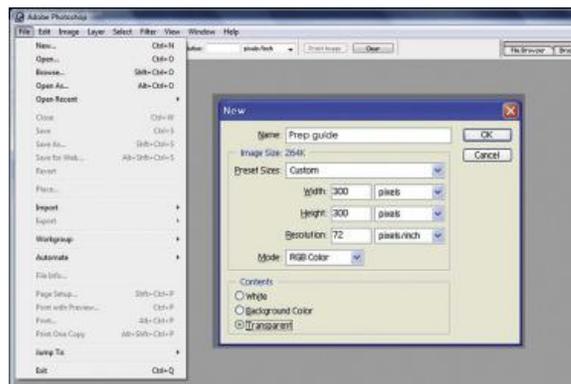


Figure 1. Screen capture showing how to create new picture file with adequate dimension.

3. Go to 'Layers' at the right corner and then press the right click of a mouse on the background area (B) to duplicate it and create both Layer 1 copy and Layer 1 copy 2 (Fig. 2). The purpose of this step is to create 2 layers for further steps.

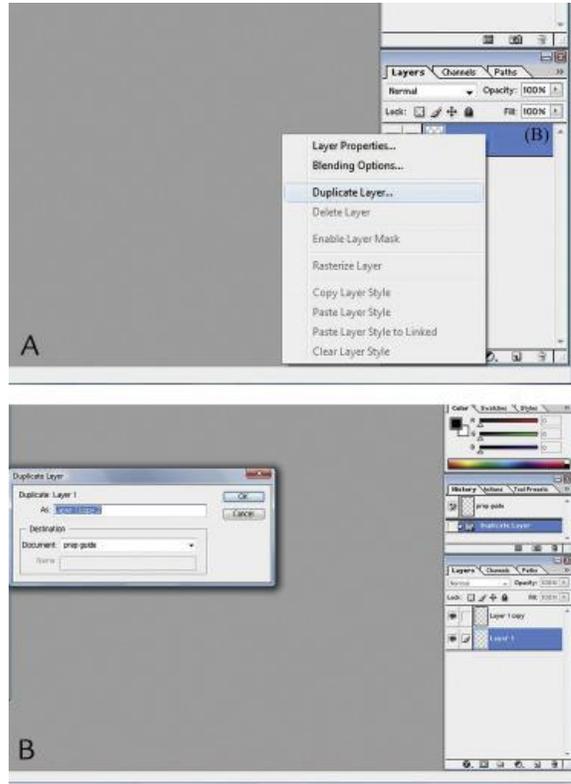


Figure 2. Screen capture. A, Duplication process. B, Creating layers.

4. Click a brush tool on the left panel. Then select a brush size, which can be changed according to personal preference (Fig. 3).

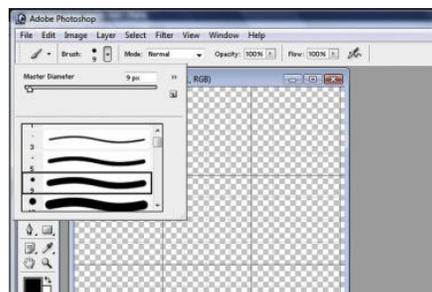


Figure 3. Screen capture showing how to select brush size for drawing lines.

5. Draw a vertical line on the Layer 1 copy. Then switch the layer as Layer 1 copy 2 and draw another vertical line on that layer ([Fig. 4](#)). To make a vertical line, a shift key should be held while the line is drawn.

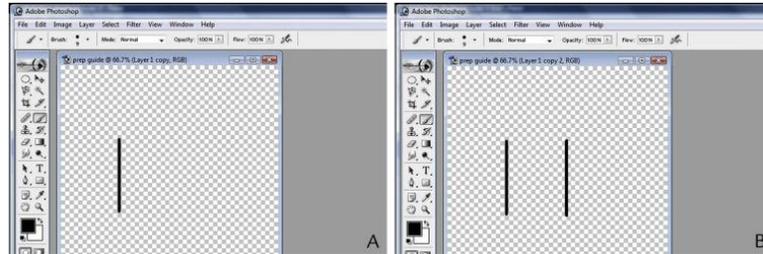


Figure 4. Screen capture. A, Drawing lines on layer 1 copy. B, On layer 1 copy 2.

6. To make a 20-degree TOC angle sticker, click the Layer 1 copy and go to 'Edit' to open the 'Free Transform' feature ([Fig. 5](#)). Input a value of 10 as a rotational angle (Δ) on the Layer 1 copy, Note that half the desired TOC angle value is selected and inserted ([Fig. 6A](#)).

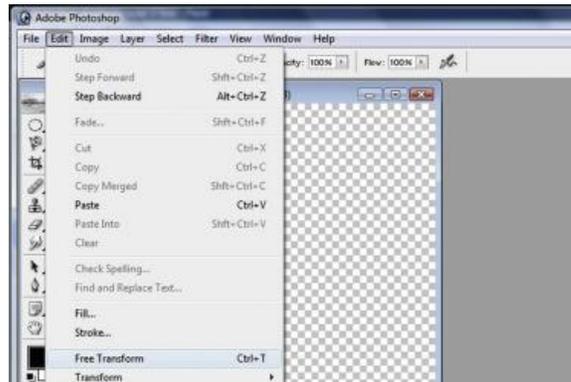


Figure 5. Screen capture showing accessing 'Free Transform' feature.

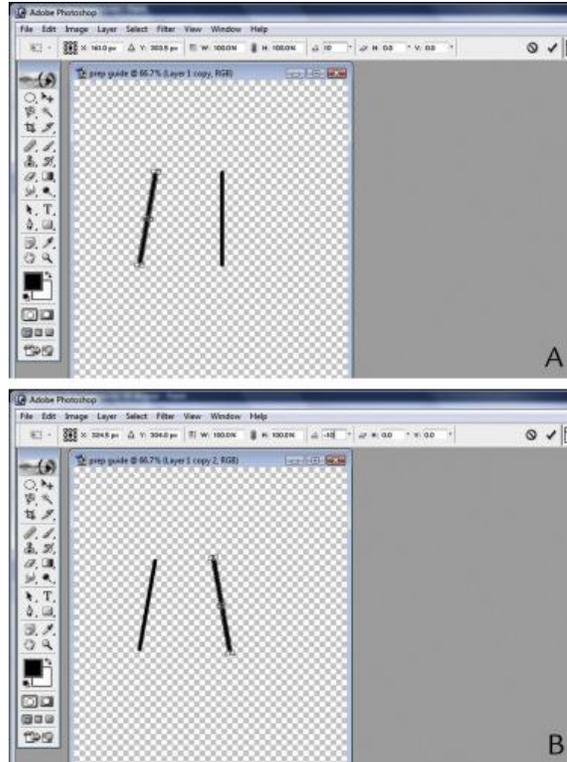


Figure 6. Screen capture showing how to rotate line to proposed angle. A, Positive value for layer 1 copy. B, Negative value for layer 1 copy 2: Note the mark (✓) to perform action of rotation.

7. On the Layer 1 copy 2, open the 'Free Transform' feature and input a value of negative 10 (-10) as a rotational angle (Δ). Make sure that the negative value of the angle is inserted to make a proper convergence angle (Fig. 6B). To execute the 'Free Transform' feature, the check mark (✓) should be clicked at the end. Note that the purpose of steps 7 and 8 is to make a vertical line on each layer tapered to create a proposed TOC angle.
8. Save this picture as a Joint Photographic Experts Group (JPEG) file. Repeat these steps for other TOC angles, such as 6, 10, and 15 degrees.
9. Open a template of a label sticker (Color coding labels 5474; Avery Dennison) and insert the pictures into the circles (Fig. 7)

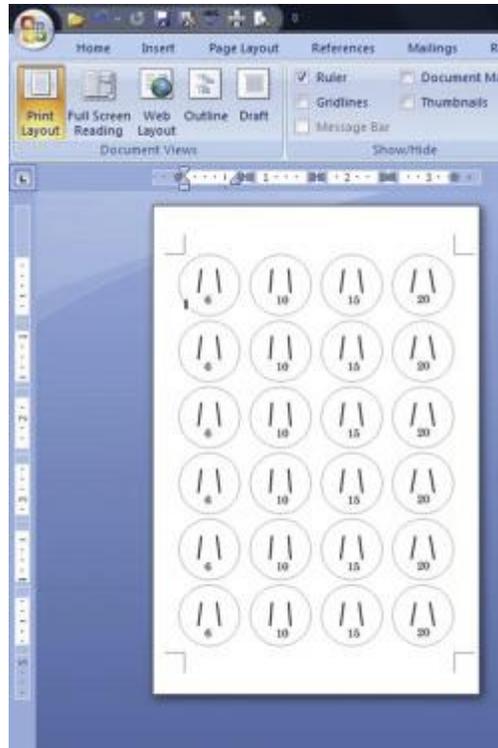


Figure 7. Screen capture showing insertion of pictures into template of sticker.

10. Attach a custom TOC angle sticker on a mouth mirror (#5 one front surface mirror; Hu-Friedy Mfg) and use it for the clinical situation wherein the proposed TOC angle is required ([Fig. 8](#)).



Figure 8. Clinical application of custom TOC angle sticker with mouth mirror.

Discussion

A method of making a custom TOC angle sticker is described. The custom TOC angle sticker can easily be made by means of photo editing software (Adobe PhotoShop; Adobe Systems) and a color label sticker. The advantage of custom TOC angle stickers is that they can be made inexpensively, customized for different clinical situations, and are disposable. Even though most of the acceptable TOC angles range between 10 and 20 degrees, the TOC should be modified and controlled by a dentist based on tooth location, restoration material, and clinical situations. In addition, the custom TOC angle sticker can be easily accessed with any mouth mirror in any direction, helping the clinician evaluate the axial wall taper by direct comparison.

Summary

This article describes a method of fabricating a custom TOC angle sticker by using photo editing software and label stickers. The custom TOC angle stickers can help clinicians evaluate and adjust the TOC angle in the mouth, preventing excessively tapered tooth preparations.

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