

DIGITAL FIXED RETAINER ACCURACY

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AIM: An The aim of this study was to check the accuracy of casted digital fixed retainers.

MATERIALS AND METHOD: This study was conducted on 20 upper and lower arches after fixed orthodontic treatment. A 3Shape Trios 3 intraoral scanner was used to scan upper and lower arches and to register the bite. Digital models were imported in 3Shape Appliance Designer software for design and preparation (Figure 1 a-b-c).

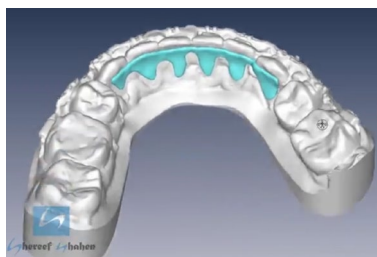


Figure 1 a

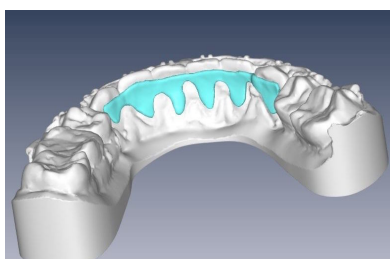


Figure 1 b

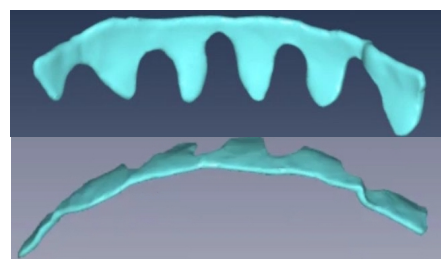


Figure 1 c

A shell was created with 0.6 mm thickness and path of insertion occluso-posterior. The created shell was exported in STL surface mesh format for three-dimensional printing. The STL files were imported in 3D Creation Workshop software to create support on non-fitting surface for printing. Bed of nails were added to support shell anatomically and base plate support to connect all of them to prevent deformation. Any supporting pin violating retainer border was removed. (Figure 2 a-b)



Figure 2 a



Figure 2 b



Figure 3

After preparation for printing the retainer and its support were sliced to be ready for sending to printing hardware. Printing was done by Mogassam 3D printer using resin cast material. Common sprues were added to the printed base plate support. Investment was done inside casting ring and wax burnout. Casting was done using Ni-Cr casting alloy. Then the laser scan was carried out for the casted retainer. Fitting surface was sandblasted to create mechanical retention. (Figure 3)

Coupling agent was used to create also chemical retention. (Figure 4) After bonding another scan was done. 3D fully automated superimposition was done by Viewbox software to compare the digital retainer version fused to digital model with the bonded real-life retainer scan. Moreover, a comparison between the digital retainer version to the real-life casted version was performed to check the accuracy. After superimposition, the differences were produced in rainbow color coded from 0 to 1 mm.



Figure 4

RESULTS: The difference between digital retainer version to the real-life casted version was in blue zone (near zero) while digital retainer version fused to digital model to the bonded real-life retainer scan showed some differences less than 0.1 mm in non-fitting surface. These differences were mainly detected at the supporting pin contacts with retainer, maybe due to finishing procedure. This difference was not clinically significant as it did not affect the fitting surface.

CONCLUSIONS: The described digital fixed retainer seemed to be accurate for the routinely clinical use.