Research & Table Clinic Day 2020 Structured Abstract

TITLE: Effect of Print Angulation on Dimensional Reproducibility of 3D-Printed Models

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IS THIS A COMPETING PRESENTATION:
NO

SELECT RESEARCH / SCHOLARLY TOPIC:

CLINICAL SCIENCES (benchtop - Dental Materials, etc)

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Effect of Print Angulation on Dimensional Reproducibility of 3D-Printed Models

OBJECTIVES:

To measure/compare dimensions of 3D-printed models made from the same STL file and fabricated using a variety of printer/resin types at different angulations.

METHODS:

A MASTER maxillary model was fabricated, scanned, and five, co-planar pillars were added using software to act as reference points (one anterior, and bilaterally (2 mid-arch, 2 posterior-arch). 3D-printed models were made from this STL file, using a variety of resins/printers at 0°, 30°, and 90° (vertical) to the build plate: FL Gray resin (FormLabs2), SR Gray Resin (MoonRay-S) (**SR-MR**), SR Tan Model (MoonRay-S), Denta Model (UV Max, ASIGA), FotoDent Model (Planmeca-Creo) (**FDM-P**), SprintRay Model (MoonRay-PRO), Polar-White PLA Filament (CelRobox) (**PW**), Verodent Mod 670 (Objet Eden 260VS). Six replications were made for each condition. Scanned images of each model were attained using a desktop scanner (MX472, Cannon), images were imported into software (Image Pro), and distances between reference points were determined: Cross-arch (X-ARCH): average between the 2 lateral mid-arch points and between posterior points; Anterior-Posterior (AP): average between anterior and midpoint, and midpoint and posterior (both sides). Software measured distances between the same points on the MASTER STL file. Two 1-way ANOVAs (Dunnett's post-hoc analysis (MASTER as control)) compared X-ARCH and AP dimensions of the MASTER STL file to those of each resin/printer combination for each print angulation (pre-set alpha 0.05).

RESULTS:

For X-ARCH, **FDM-P** was significantly less than the MASTER at all print angulations, **SR-MR** was lower at 30° and 0°, and **PW** as lower at 0°. For AP, **FDM-P** was significantly less than the MASTER at all print angulations, **SR-MR** was lower at 90° and 0°, and **PW** as lower at 90°.

CONCLUSIONS:

For the most part, print angulation did not result in generation of 3D printed models whose X-ARCH or AP dimensions were significantly different from those of the MASTER STL file.

LEARNING OBJECTIVES:

1. **Print angulation is performed to optimize build plate area and production**
2. **Print angulation can affect printed restoration surface smoothness**
3. **With exception of one product (FDM-P), angulation was shown not to significantly affect X-arch or Anterior-posterior model dimensions, compared to the STL file that generated the model, regardless of print media or printer.**