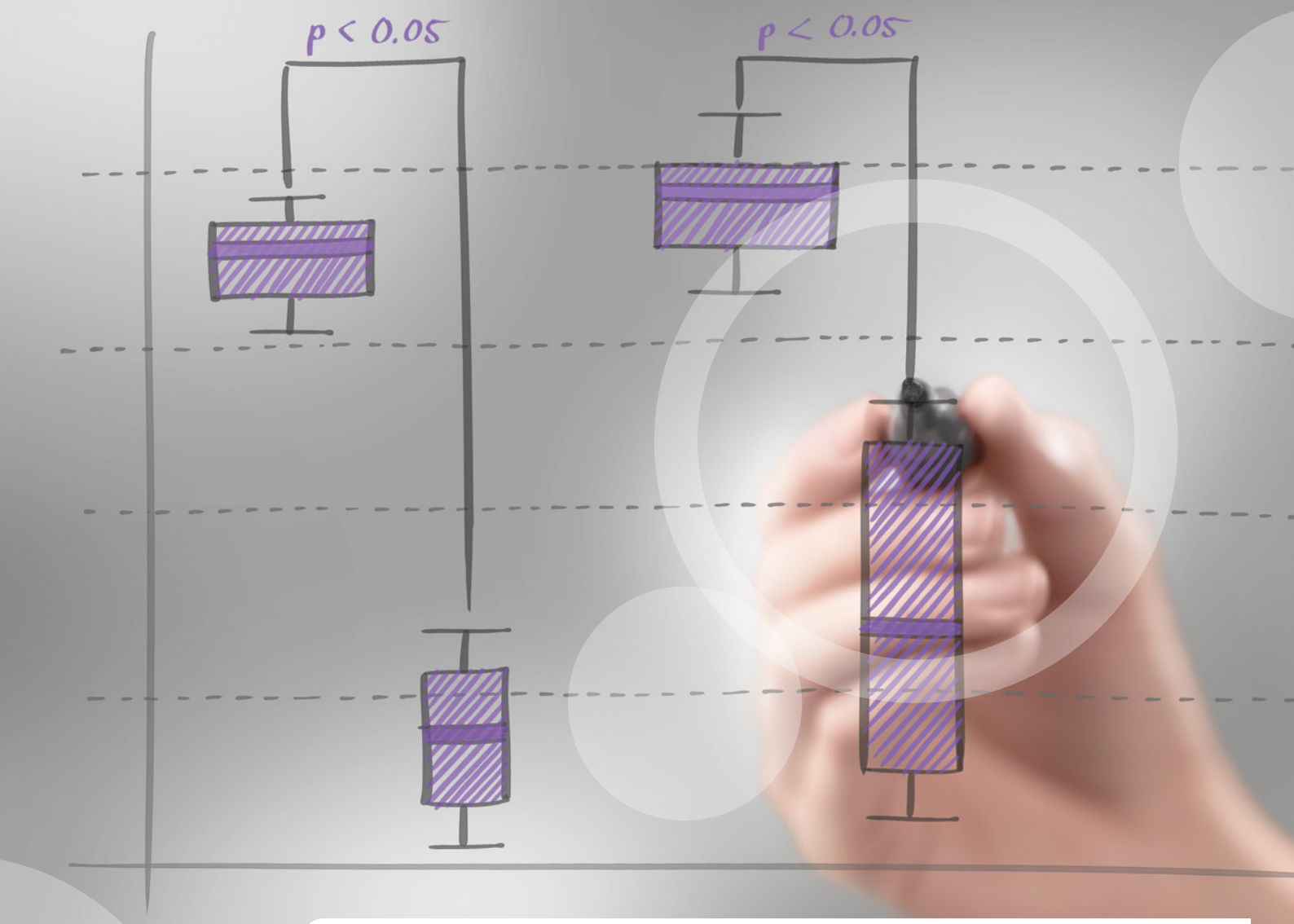
dima®
Scientific Information



dima Print Teeth & Temp

In-vitro study – University of Erlangen, Germany
Elastic Modulus and Flexural strength of a new 3D Print Material

An essential part of being successful in dental treatments is the provisional stage. Here clinicians can plan, modify and preview future treatment results. Therefore it is necessary to have an excellent material to make temporary crowns and bridges, offering aesthetics and functionality.

The benefits of 3D printing temporaries are considerable for patient and clinician. With dima Print Teeth & Temp, a temporary crown or bridge can be printed in less than an hour, with low monetary costs and high accuracy, providing excellent mechanical properties.

The present study compares the mechanical properties of the new dima Print Teeth & Temp with milled and conventional provisional crown and bridge materials under dry and wet conditions, comparable to the aqueous milieu in the oral cavity.

Giving a hand to oral health.

KULZER
MITSUI CHEMICALS GROUP

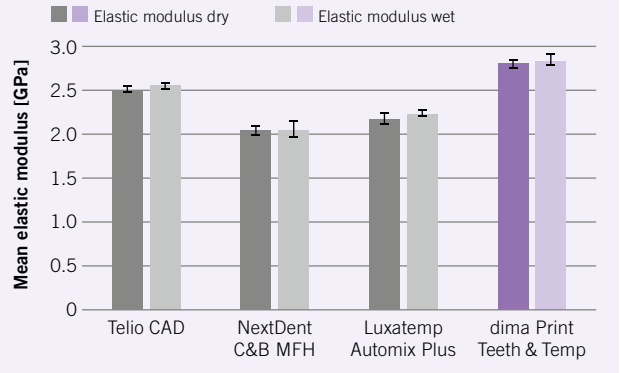
In-vitro study – University of Erlangen, Germany
Elastic Modulus and Flexural strength of a new 3D Print Material

Objective
The aim of the in-vitro study was the investigation and comparison of elastic modulus and flexural strength of four provisional crown and bridge materials.

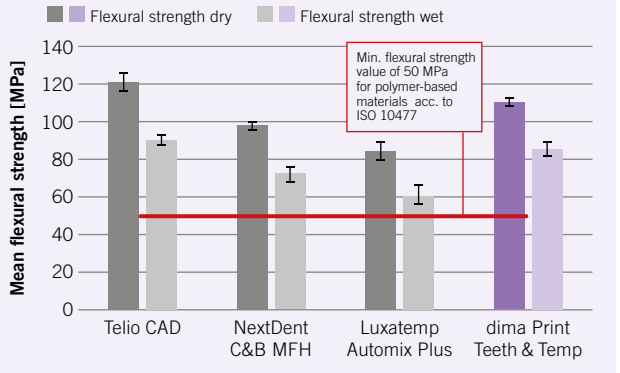
Materials and Methods
Four different provisional crown and bridge materials were tested: two 3D print materials, one pre-polymerized CAD/CAM block material, and one conventional self-cure material in Automix syringes. Specimens from the two 3D print materials, dima Print Teeth & Temp (Kulzer) and NextDent C&B MFH (NextDent), were manufactured according to their respective instructions for use. Thus, specimens were printed with the cara Print 4.0 (Kulzer) and the NextDent 5100 (NextDent) 3D printer, respectively. For NextDent C&B MFH tests were performed on vertically and horizontally printed specimens. Due to better comparability with the vertically printed dima Print Teeth & Temp specimens, this report will only take into account the vertical measurements. Specimens from the pre-polymerized CAD/CAM block material were cut from a Telio CAD disc (Ivoclar Vivadent), and specimens from the self-cure auto-mix material were prepared with Luxatemp Automix Plus (DMG) with the help of a tungsten-carbide mold. Flexural strength was measured with a universal testing machine (crosshead speed 1 mm/min) in a 3-point bending set-up following ISO 10477:2018. Determination of elastic modulus was performed with a universal testing machine (crosshead speed 1 mm/min) in a 3-point bending design. Both parameters were measured under dry conditions (23 °C) and under wet conditions (37 °C). The acquired data were statistically analyzed using two-way ANOVA and Student-Newman-Keuls posthoc test ($\alpha = 0.05$)

Results

dima Print Teeth & Temp shows the highest elastic modulus



dima Print Teeth & Temp shows excellent flexural strength



All tested materials show an increased elastic modulus when tested under wet compared to dry conditions. In Luxatemp Automix Plus and dima Print Teeth & Temp this increase was statistically significant. Dima Print Teeth & Temp showed the highest elastic modulus of 2.85 ± 0.05 GPa under wet testing conditions. There is a statistically significant decrease in flexural strength in all tested materials when comparing wet conditions to dry. Telio CAD showed the highest flexural strength of 90.91 ± 2.48 MPa under wet conditions, followed by dima Print Teeth and Temp with 85.13 ± 3.51 MPa.

Conclusion
In this study dima Print Teeth & Temp demonstrates excellent mechanical properties in bending and elasticity tests.

Comment
This study demonstrates that dima Print Teeth & Temp is a reliable and strong temporary material, that constitutes an excellent alternative to conventional and milled materials in its mechanical properties. It brings with it the benefits of the digital workflow, facilitating accurate and highly predictable results, with short production times and, should a temporary be lost or damaged, dependable reproducibility. Dental technicians will also appreciate that 3D-printing temporaries, rather than milling them, frees up milling capacities for more profitable jobs.

Source
Lohbauer U: Test report 2021 “Elastic Modulus and Flexural strength of a new 3D Print Material”. University of Erlangen-Nuernberg, Germany. Unpublished data. Data on file. The study was abbreviated, summarized and commented and all diagrams and titles have been established by Kulzer.

A6141 EN 01/2023 ORT