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# Voxelprint

3D Resins

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**Technology and accuracy**
driving the future of
dentistry with each print




FGM IMPLANTS

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# Voxelprint

Splint Tough

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## The smart combination that combines **hardness and strength for occlusal plates**




**Voxelprint Splint Tough** proved to be easy to work with and had excellent consistency for printing. It reproduced a previously designed bruxism splint with high fidelity. I consider it an excellent option for clinicians to use in their routine splint printing."



Prof. Dr.
**Luis Fernando Bessel**

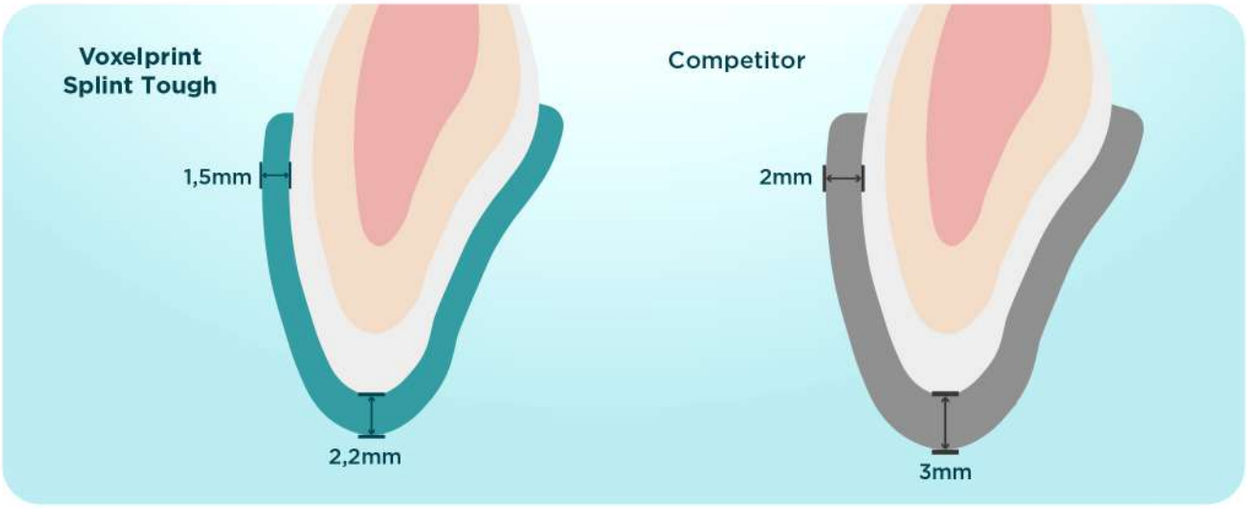
**Voxelprint Splint Tough** is a photopolymerizable and biocompatible resin developed for the fabrication of occlusal plates via additive manufacturing (3D printing).

High **strength** | **Clear** | Greater **yield** | **Multicompatible**

**Indications for Use:** Manufacture of occlusal plates for dental protection in patients with parafunction (bruxism, tightening).

## Reduced Thicknesses | + Comfort

Due to the superior mechanical properties of the material, it is possible to reduce thicknesses of the occlusal plate, offering greater comfort to the patient. In addition, it ensures greater yield – approximately 10% higher compared to those of competitors.




## Product details

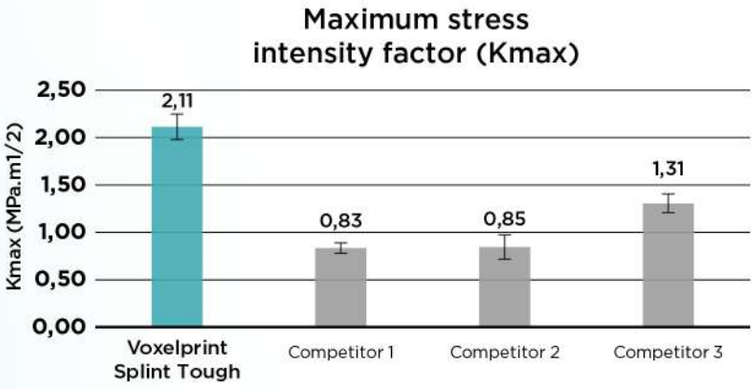
| | |
|---|---|
| Flexural Strength | >50 MPa |
| Water absorption | <25 µg/mm³ |
| Water solubility | <5 µg/mm³ |

## Introduction



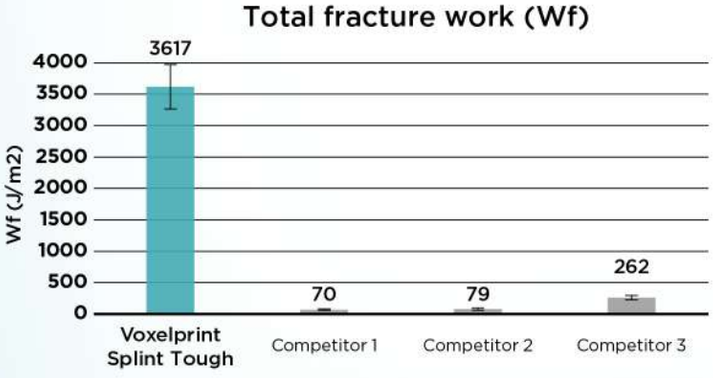
# High Strength

Occlusal plates made with **Voxelprint Splint Tough** resin have high **anti-fracture strength, ensuring prolonged durability.**




**Source:** Internal tests according to ISO 20795-2 : 2013.

A test that measures the resistance of the material to the propagation of cracks when subjected to a load.




**Source:** Internal tests according to ISO 20795-2 : 2013.

A test that measures the energy absorbed until complete rupture, obtained by measuring the area under the force versus the deflection curve through a mechanical test, indicating the toughness of the material.

## Clinical benefits

In practice, the results demonstrate characteristics of the material's ability to resist fracture in patients with parafunction (bruxism and tightening).



**Photo:** Prof. Dr. Marcelo Giordani

Watch the video and see the results



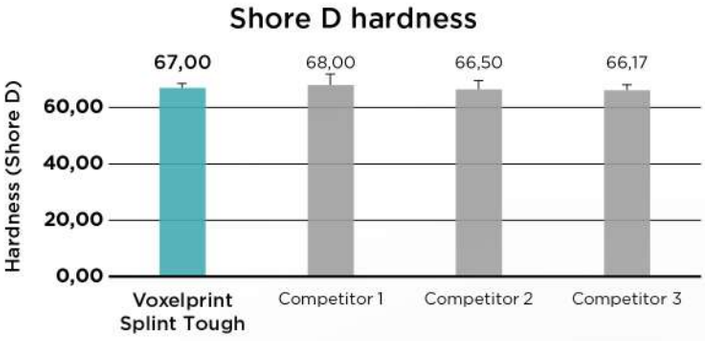
Competitor



Voxelprint Splint Tough

# Ideal Hardness

**Voxelprint Splint Tought** has adequate and **compatible hardness for occlusal plates**, ensuring wear **resistance and material integrity** against occlusal forces.




A test that evaluates the resistance to penetration for polymeric materials.

**Source:** Internal tests according to ASTM D2240-2015.

## Clinical Case

Prof. Dr. Marcelo Giordani



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# Voxelprint ISS Ceramic

INTELLIGENT STABILITY SYSTEM

60% FILLER CONTENT

## The best choice for **long-lasting printed prostheses**




**Photo:** Prof. Dr. Luis Fernando Bessel

**Voxelprint Ceramic** is a biocompatible, light-cured dental composite designed for single-unit prostheses on both teeth and implants.

With a high content of inorganic fillers based on glass-ceramic materials, it offers exceptional mechanical strength along with esthetic versatility, providing a unique luster and outstanding optical properties.

## Indication for use

- Single-unit full crowns (anterior or posterior);
- Inlays, onlays, and veneers;
- Crowns on prosthetic components;
- Artificial teeth for permanent Prostheses.

## Esthetic versatility

**The first resin for 3D printing that features three levels of translucency**, offering high esthetic performance in 11 available colors.

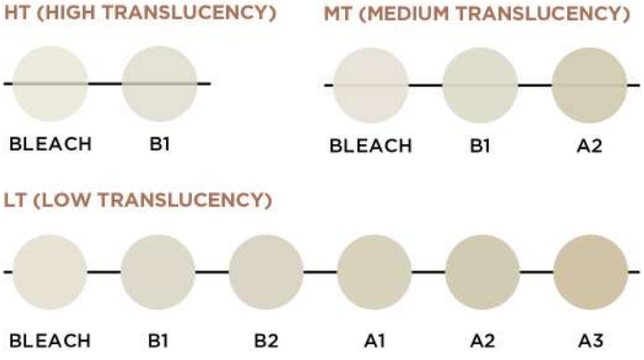





**Photo:** Prof. Dr. Marcelo Giordani

## Unparalleled brightness

- Ease in obtaining and maintaining **brightness** with an excellent polish;
- **Easy customization** with makeup and pigments, providing attractive esthetics and a natural appearance.

“ It looks just like ceramic! This resin is superior to all the others I've ever tested and used." I had used printed resin for post-work. Now, with HT resin, we can use it in cases of previous esthetics! People would ask me why I wouldn't use printed resin for esthetic dental laminates, and I said that the day they made a printed resin with the same optical behavior as ceramics, I would use it. That day has come!”



Prof. Dr.
**Marcelo Giordani**

## Color Stability

Due to the unique **ISS (Intelligent Stability System)**, **Voxelprint** features excellent rheological and color stability, ensuring its properties.




**Voxelprint Ceramic** presents color stability throughout the curing process at different times (T0 = Immediate time/ T10 = 10 min / T60 = 60 min / CAP – high-power curing booth).

## Radiopacity and Fluorescence

Excellent radiopacity that enables greater control in radiographic examinations. Balanced between fluorescence and natural teeth.

## Minimum sedimentation

It presents a rheological behavior that maintains the product homogeneous, even when kept at rest for a long time in the printing equipment.

## Product information

| | |
|---|---|
| Flexural strength | 130 a 165 MPa |
| Vickers microhardness | approx. 42 HV |
| Water solubility | < 2 µg/mm³ |
| Water absorption | < 20 µg/mm³ |

**Source:** FGM Dental Group internal data.

“The Voxelprint Ceramic resin is extremely easy to print, does not emit unpleasant odors, and remains stable in the printing VAT, as well as after long periods of use. Its mechanical characteristics are exceptional, and the polishing process is simple and can be achieved in a few easy steps.”



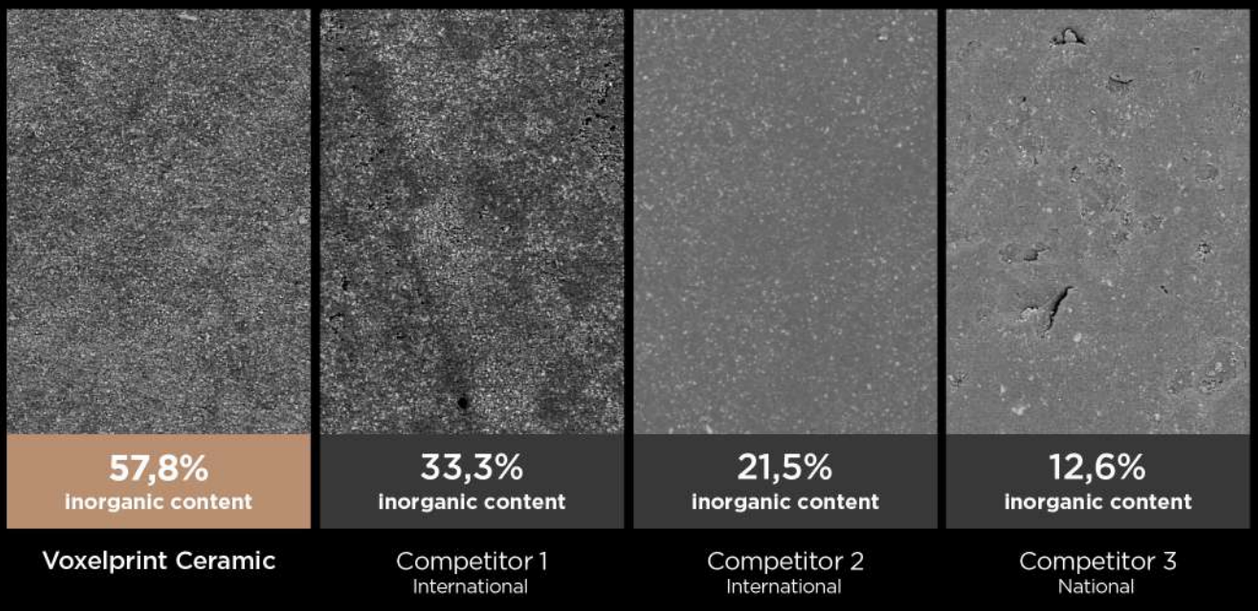
Prof. Dr.
**Raphael Monte Alto**

## High load content

It has a high content of uniformly and homogeneously distributed inorganic components in the polymer matrix. The perfect balance that results in a composite with excellent esthetic and mechanical characteristics.

**Microstructural Analysis**

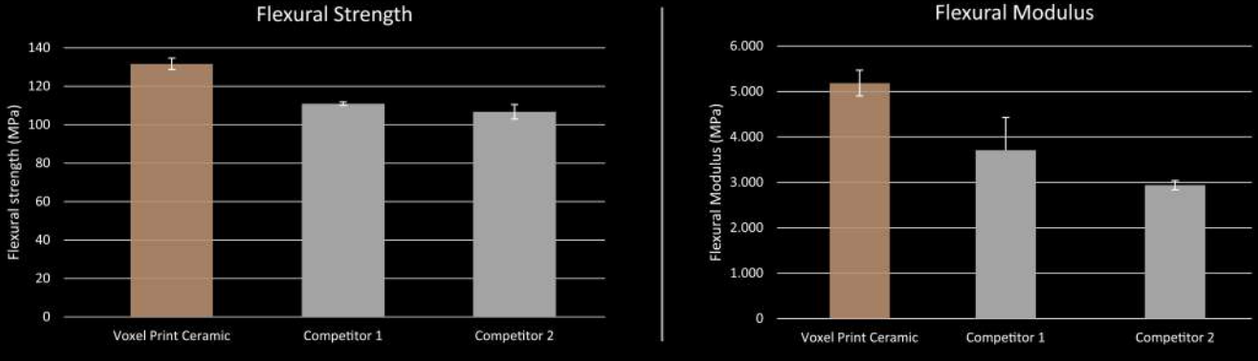
(field emission scanning electron microscopy)




**Source:** Prof. Dr. Rodrigo Reis / Universidade Estácio de Sá/Idomed - RJ.

## Superior mechanical strength

Flexural strength and flexural modulus superior to the main competitors in the market. This clinically results in greater structural integrity, durability, and functionality of the printed prosthetic piece against the challenges of masticatory forces and alterations in the oral environment.




**Source:** Prof. Dr. Rodrigo Reis / Universidade Estácio de Sá/Idomed - RJ.

# High Performance and Longevity

## 10-Year Simulated Aging Study

In this study, the in vitro performance simulating long-term aging (10 years) of crowns printed with Voxelprint Ceramic in relation to fracture resistance and fatigue wear was evaluated.

**Source:** Study conducted by Prof. Dr. Carlos José Soares and team (UFU).



**Image 1.** Positioning of samples for mechanical cycling.

### Fatigue Testing

The samples were subjected to fatigue testing at 2.4 million cycles at a load of 50 N.

Thermocycling was also carried out at 12,000 cycles from 5 to 55 C.

## Analysis of occlusal integrity and wear under fatigue

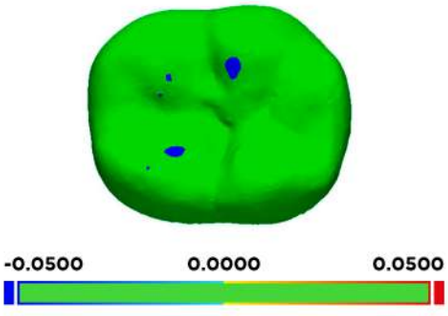



**Image 2.** In blue, the wear occurred at the load application points after the 2.4 million cycles that simulate 10-year aging.

### Surface wear and volume lost after 10-year simulated aging

| | External Surface Deviation (µm) | Volume Loss ($mm^3$) |
|---|---|---|
| **Voxelprint Ceramic** | **145.1 ± 35.6** | **1.0 ± 0.4** |

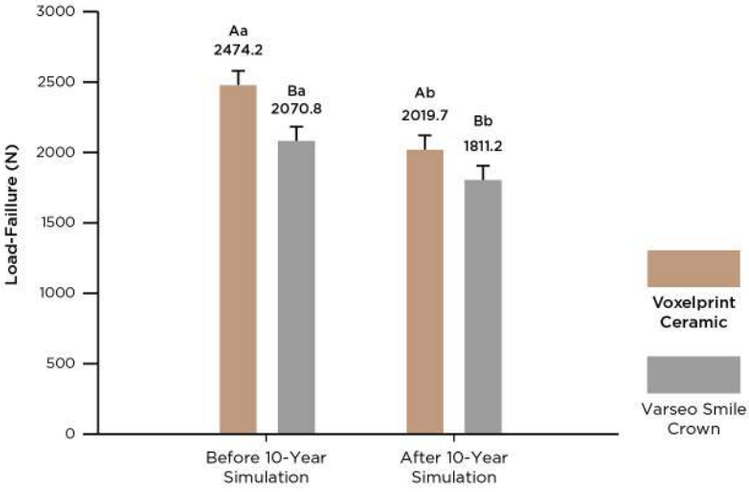
**Table 1.** Mean and standard deviation values for external surface wear (µm) and volume lost ($mm^3$) after simulated aging.

## Clinical benefits

**Voxelprint Ceramic** maintained its structural integrity and presented **low wear** after a 10-year aging simulation. This demonstrates the **stability and strength of the material**, contributing to the longevity of restorations.

**Source:** Study conducted by Prof. Dr. Carlos José Soares and team (UFU).

## Anti-fracture strength




Mean and standard deviation values of the fracture load (N).

**(*)** Different letters signify a significant difference between the groups tested; uppercase letters used to compare the type of resin (p=0.014) and lowercase letters for the effect of simulated aging (p=0.005).

**Source:** Study conducted by Prof. Dr. Carlos José Soares and team (UFU).

# Superior Anti-Fracture Strength

The analysis shows that crowns made with **Voxelprint Ceramic have fracture resistance almost three times higher than the maximum human** masticatory forces of 720 N[1].

1 - Charles H. Gibbs, Kenneth J. Anusavice, Henry M. Young, Jack S. Jones, Josephine F. Esquivel-Upshaw (2002): Maximum clenching force of patients with moderate loss of posterior tooth support: A pilot study, in: Journal of Prosthetic Dentistry, Vol. 88, Nr. 5, P. 498 – 502.

## Clinical Case – 14-month follow-up

Dr. Marcelo Giordani and TPD. Denilson Souza.



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