



# **Wear Study of Stratasys TrueDent™ Denture Teeth**

**WHITE PAPER  
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To produce long-lasting, aesthetic dentures and temporaries, an appliance's polymer material must show adequate resistance to wear, which is caused by a tooth's contact with antagonist teeth and food. Wear is a multifactorial phenomenon and caused by Attrition and Abrasion. Attrition refers to the wear caused by the direct contact of antagonist teeth while Abrasion is caused by the sliding action of one tooth across another, with the force being transmitted through the layers of food.

In 2022, Dr. John A. Sorensen, DMD, PhD, FACP, a professor in the Department of Restorative Dentistry and Director of Research for the Graduate Prosthodontics Program at the University of Washington, conducted a study on the wear resistance of various denture teeth, including TrueDent dentures created by Stratasys.

This study provides evidence that Stratasys TrueDent monolithic dentures possess the necessary wear resistance making them a reliable choice for permanent and temporary dentures.

## Materials and Method

In the study, Stratasys TrueDent denture teeth were subjected to testing alongside other commercially available denture teeth produced through milling and 3D printing. A prefabricated IPN denture tooth from Dentsply Sirona was used as the control group. The primary focus of the study was to evaluate the wear resistance of the denture tooth polymer resulting from attrition and abrasion.

The study was conducted with an Oral Wear Simulator (OWS), a machine that simulates both teeth movements and the oral environment. By utilizing the OWS, the wear process was accelerated, allowing for more efficient evaluation and analysis.

The wear of the teeth was measured after 100,000 and 200,000 cycles in the OWS, which is equivalent to 2-years and 4-years of denture function, respectively. The wear facets were evaluated by measurement of maximum depth of wear in the Abrasion region and Attrition region of the wear facets. The average maximum depth of wear was calculated with ten specimens per group of denture tooth material tested.







## Results

After 100,000 cycles of Abrasion (Fig 3). and Attrition (Fig 4)., TrueDent was not significantly different from Ivotion and Rodin Sculpture. However, it exhibited significantly less wear than Dentca and Flexera.

Figure 3: Abrasion 100,000 Cycles

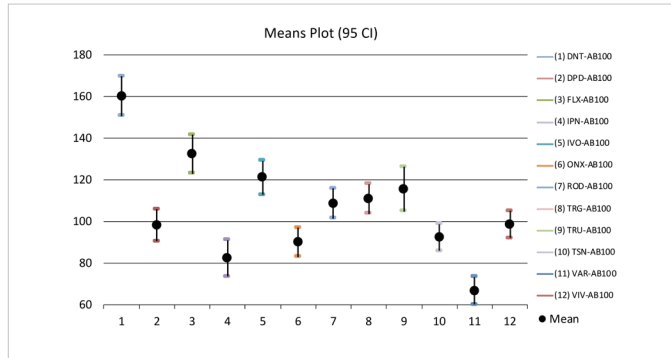
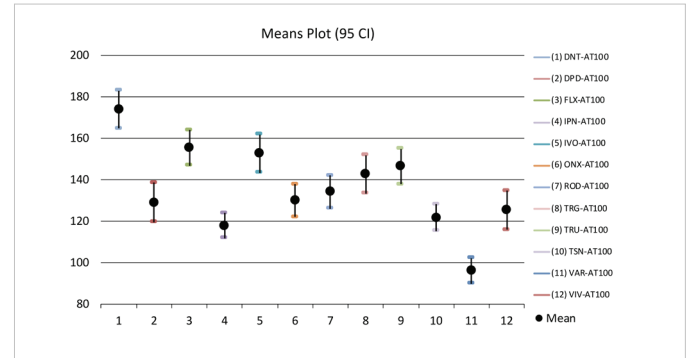


Figure 4: Attrition 100,000 Cycles



After 200,000 cycles of Abrasion TrueDent was not significantly different from Ivotion, Rodin Sculpture, Flexera, OnX and SR Vivosit. However, it exhibited significantly less wear than Dentca (Fig 5).

Figure 5: Abrasion 200,000 Cycles

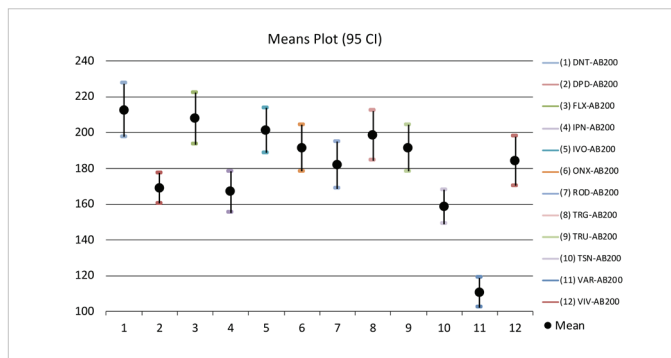
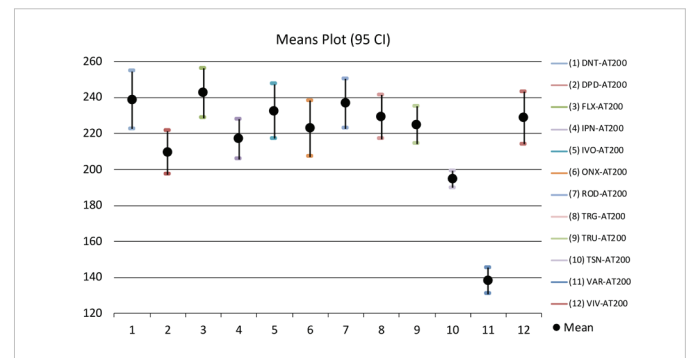
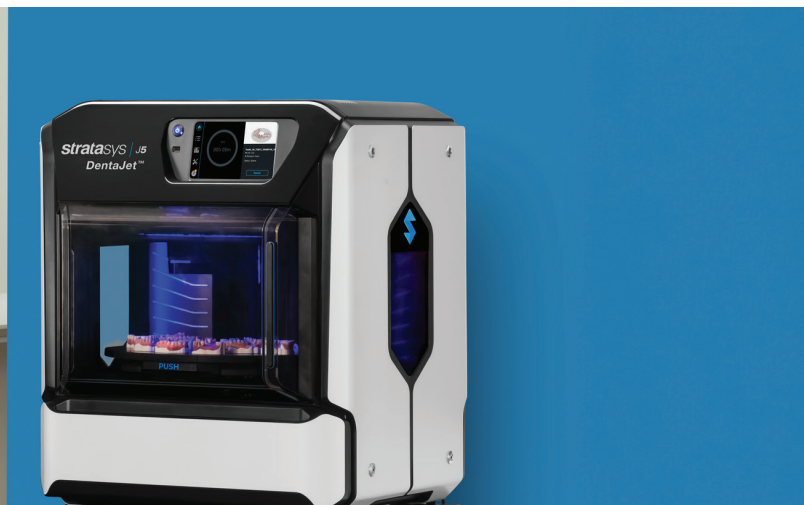


Figure 6: Attrition 200,000 Cycles



At 200K cycle of Attrition TrueDent was similar in wear to the IPN denture tooth and not different than Dentca, Flexera, Ivotion, OnX, Rodin Sculpture, SR Vivosit (Fig 6).

Dr. Sorenson noted that TrueDent, especially because it's paired with Stratasys **PolyJet technology** on the **J5 DentaJet 3D printer**, is uniquely positioned for marketplace success.



**Table 1. Denture tooth polymer systems tested.**

Code	Brand	Manufacturer	Composition	Fabrication System
DNT	Denture Tooth Material	Dentca	Methacrylate-based	Printed
DPD	Lucitone Digital IPN 3D Premium Tooth	DentsplySirona	photopolymerized resin	Printed
FLX	Flexcera Smile Plus	Desktop Healtheth		Printed
IPN	IPN Denture Tooth	DentsplySirona	Methacrylated oligomers	Factory
IVO	Ivotion - Monolithic with shell geometry	Ivoclar	Crosslinked PMMA	Milled
ONX	OnX	SprintRay	Highly cross-linked PMMA tooth material	Printed
ROD	Rodin Sculpture 3D resin	PacDent	Nanoceramic hybrid	
TRU TRG	TruDent Denture Tooth Material Version 1. Standard surface Version 2. Glossy surface	Stratasys Polyjet	Ceramic Nanohybrid Resin	PolyJet Printed
TSN	Trusana	Myerson		Printed
VAR	VarseoSmile Crown Plus	Bego	Methacrylated oligomers	Printed
VIV	SR-Vivodent DCL Milling Disk	Ivoclar	Ceramic filled hybrid resin	Milled

## TrueDent

### True Aesthetics Made Possible

TrueDent is a patented FDA cleared (Class II) resin developed for 3D printing of permanent full and partial dentures and temporary crowns and bridges on the J5 DentaJet platform. It enables batch production of highly aesthetic, monolithic, multicolor dental appliances on a single mixed part, high-capacity tray.

If you would like to experience  
TrueDent dentures firsthand,  
[Click here to request a sample.](#)



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