



NAME : DR. GODFREY ONWUBOLU, PhD, FBCS, CEng, PEng

**TOPIC : ECONOMIC COMPETITIVE ADVANTAGES OF 3D PRINTED
REMOVABLE ORTHODONTIC APPLIANCES IN DIGITAL DENTISTRY
OCTOBER 22, 2021**

ABSTRACT

This seminar presentation will cover the digital design techniques; review material and printer options for 3D printing for these commonly orthodontic devices; and recognize when and where to utilize 3D printing techniques properly. The common question that clinicians generally ask is whether they will see a return on their investment after purchasing an intraoral scanner. The seminar presentation will show using some figures that either clinicians or labs can easily realize return on investment (ROI) within a short time. Consequently, such adoption of digital dentistry techniques can become Economic Competitive Advantages (ECAs) for both Dental Clinics and Labs settings.

COVERAGE

- ▶ 1. Introduction
- ▶ 2. Commercially available Dental CAD systems enhance the capabilities of Digital Dentistry
- ▶ Open-certified resins allow for several options
- ▶ 3. Commonly used Dental 3D printers
- ▶ 4. Economics of Digital Dentistry technology support the need to adopt them.
- ▶ Closure
- ▶ 5. Acknowledgements

1. Introduction

- ▶ CREHS Inc. is a Canadian based company
 - ▶ *Providing Global Digital Solutions in Health Services*
 - ▶ Vision: Creating opportunities and contributing to health and wellbeing through digital technologies.
 - ▶ In today's practice of medicine and dentistry, digital technologies have changed the protocols of how things are done, and there is need for professionals to align their practices to this paradigm shift that has revolutionized ways of doing business.
- 

1. Introduction

- ▶ CREHS Inc. provides digital solutions in healthcare (Medical, Dental and O&P) services.
- ▶ Owns a digital dentistry laboratory having 21st Century digital technologies mainly from Dentsply–Sirona: inEos X5 lab scanner; inLab SW; inLab Mill; and SprintRay 3D printer. Company has chosen Digital Healthcare field because it is the technology of today and tomorrow.

Current healthcare provisions at CREHS:

- ▶ Digitally providing orthodontic devices and restorations to local dental clinics



Design options for orthodontic devices

There are known and proven commercial software available for Dental CAD (computer-aided design). Knowledge of this is very useful.

Dental Labs will use one of the following:


- 3Shape
- exoCAD
- Dental Wings
- Dentsply Sirona inLab SW

In some case, labs will own more than one to complement their strengths.

Material options for 3D printing commonly orthodontic devices

There are open-certified materials that can be used across a number of 3D printers. Knowledge of this is very useful.

For \$19 per month, you can use open-certified materials which your 3D printer was not originally designed to use. Here are some common resins in this class:

- SprintRay
 - NextDent
 - DENTCA
 - KeyStone
 - Bego
 - Dreve
- 

SprintRay Materials



Open-Certified



3D printers commonly used for Digital Dentistry

There are several 3D printers in the market.

Knowledge of this is very useful.

There are basically laser-resin types, or DLP-resin types. Here are some printers commonly used:

- EnvisionTec
- Asiga
- SprintRay
- Formlab

Basically each of these will have their own slicing software to prepare design models for 3D printing.



Scan–Design–3D print: Workflow

The Ortho devices (Occlusal splints and Retainers) we are considering follow the basic route of Scan—Design—3D print.

Doctors can opt to own their Scan—Design—3D print (SDP) suite or outsource.

Labs can receive STL files from scans from the clinics, then design and 3D print.

For Occlusal splints it is necessary to use *bite registration* for the design.

Intra-oral scanners

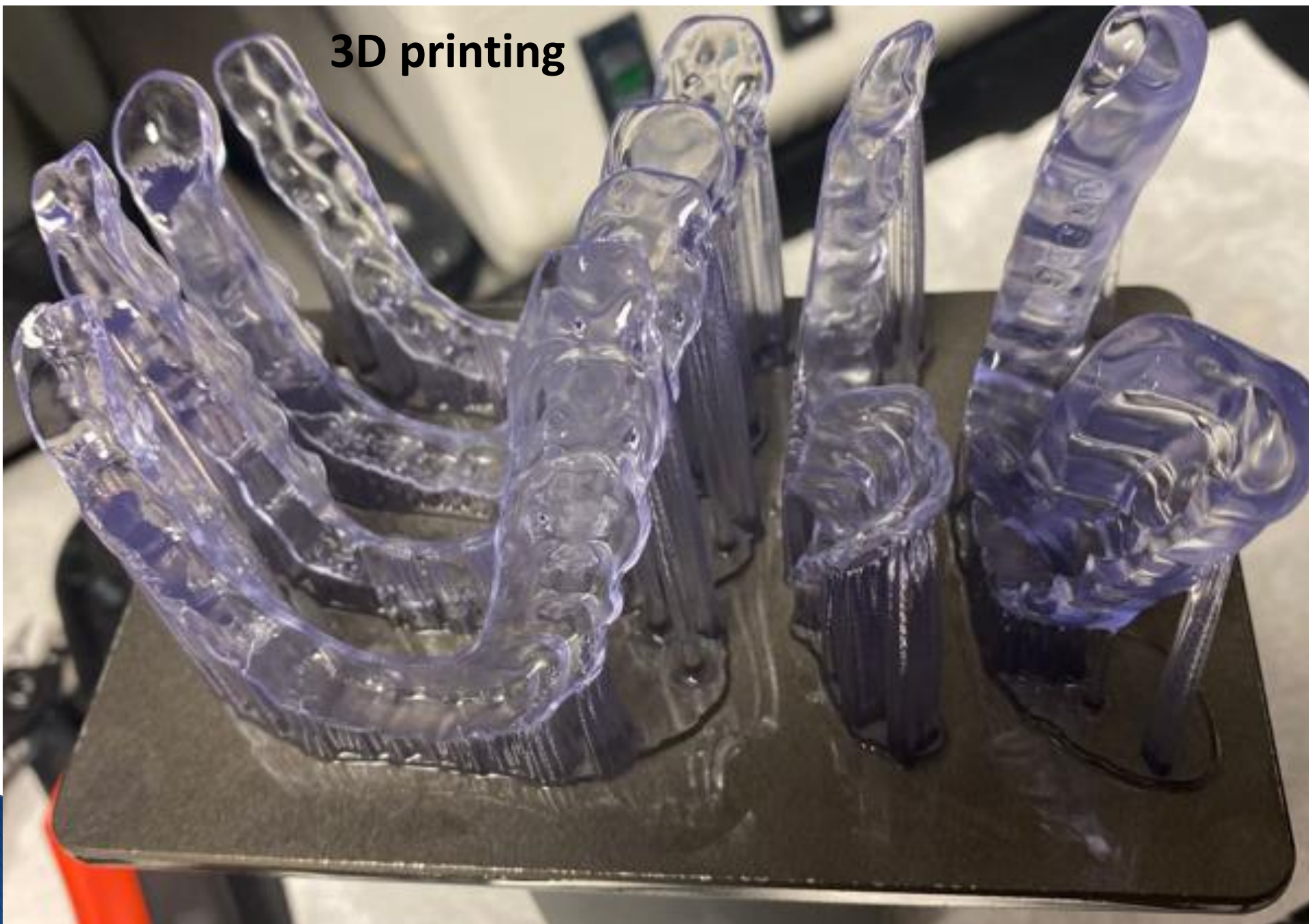
nd speed.
gle tooth
ow more



Design



3D printing



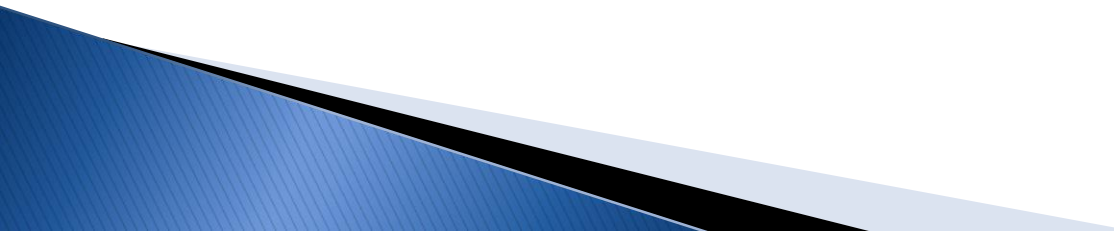


**Ortho appliance ready
for customer**

Some Reasons Why This Workflow is not used by Practitioners

- Scanners are too expensive.
- CAD software is too expensive.
- 3D printers are too expensive.

Yes, they are expensive, but we will see with some numbers that with the right volume, practitioners (clinicians or labs) can easily realize return on investment (ROI) within a reasonable time.



Return on investments for using 3D printers in Clinics and Lab

PREPARED BY: DR GODFREY ONWUBOLU, CEng, PEng

CENTRE FOR REHABILITATION AND SERVICES, BRAMPTON

Cost per 3DP Appliance:	\$30		
Monthly Equipment Cost *:	\$380		
Occlusal Guards Delivered Per month:		10	
Outsourcing Cost (Lab: \$150):	\$150	\$1,500	
Patient Fee (Clinic: \$500)	\$500	\$5,000	
Monthly Printing cost:		\$300	
Monthly Equipment Cost (\$385):		\$380	
Monthly Total cost:		\$680	

Opportunities for Clinics

Profit with 3D Printing:				
(A) OPPORTUNITIES FOR CLINICS				
Annual Profit with 3D Printing:				\$51,840
Monthly Profit with 3D Printing:				\$4,320

Clinics have a choice between Printing in-house or Outsourcing

(A1) CLINICS DECISION MAKING: WHICH ROUTE?

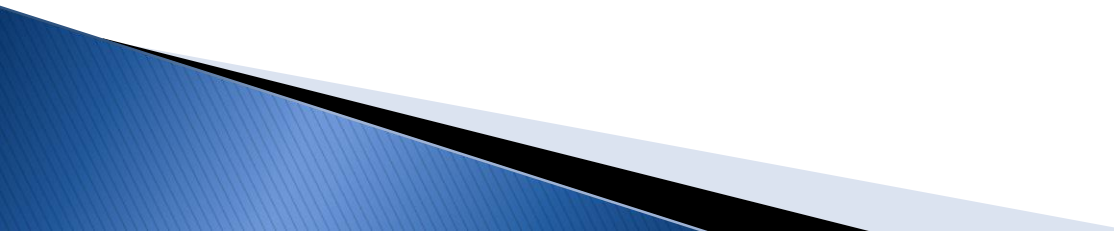
Comparing Profit between Printng and Outsourcing:

(Difference) =		\$9,840		
Annual Outsourcing cost =			\$18,000	
Annual Printing cost =			\$8,160	
Annual Savings comparison between 2 methods			\$9,840	

Opportunities for Dental Labs

(B) OPPORTUNITIES FOR DENTAL LABS

Annual Printing gross =	\$18,000
Annual Printing cost =	\$8,160
Annual Printing profit =	\$9,840



Conclusions

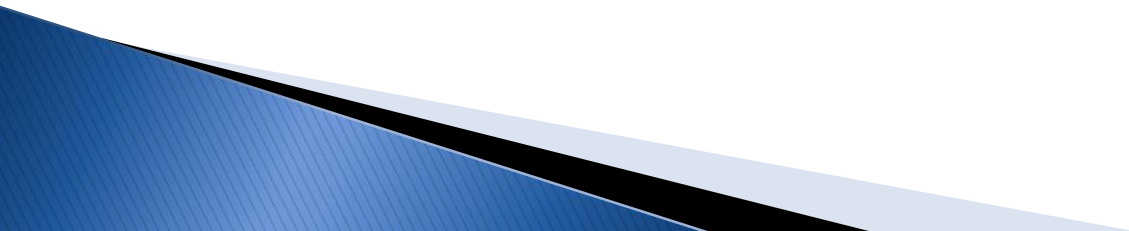
From dental laboratory perspective, starting from the time of receiving digital impressions or converting the cast models into digital forms using a lab scanner, through the design, to the stage of 3D printing of these devices, labs can deliver realized prostheses to their clients same- or next-day for only a few dollars in materials cost. On the other hand, dental clinics can own their design software and 3D printer without sending these cases to the labs, and do not have to wait until the next day, again for only a few dollars in material cost.

In both cases, practitioners can realise ROI within a reasonably short period if they have the customer base

CLOSURE

Thank you for your time!

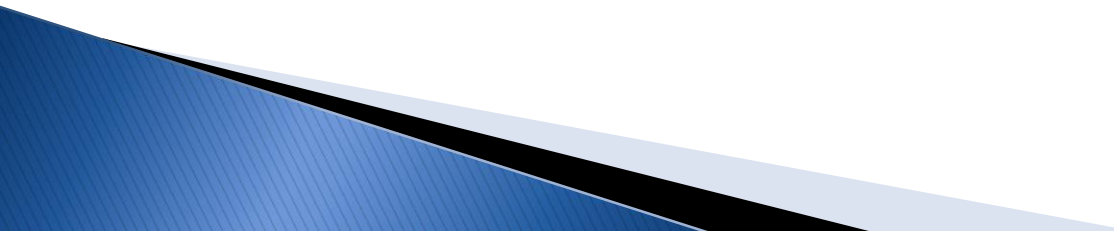
Questions?



ACKNOWLEDGEMENTS:

I would like to thank Mr. **Ettore Palmeri** for inviting me to this occasion. I would also like to thank Dr. Femi Adegun and Dr. Leroy Clarke who are my colleagues at Centre for Rehabilitation and Health Services, for the teamwork. Our staff at CREHS are appreciated for all that they do.

Presented By: Dr Godfrey Onwubolu
Ph.D, FBS, C.Eng, P.Eng



Contact:

Dr. Godfrey Onwubolu,
Centre for Rehabilitation & Health
Services (CREHS) Inc.

51 Queen Street East, Suite 2,
Brampton, ON Canada, L6W 2A7

Website: www.crehsinc.com

Tel: 905-451-5979; 416-886-8132

<https://crehsinc.com/aboutus/>

[e-mail:](mailto:godfrey.onwubolu@crehsinc.com)

godfrey.onwubolu@crehsinc.com

onwubolu@gmail.com