

# Egyptian Prosthodontic Association (EPA Newsletter)

## Is “Ideal Occlusion” Still Relevant in the Digital Era?

### Rethinking Occlusal Philosophy in the Age of CAD/CAM and Virtual Articulators



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#### Introduction

For decades, the concept of *ideal occlusion* has been a cornerstone of fixed prosthodontics. Rooted in classical gnathological principles, it emphasized precise cusp–fossa relationships, harmonious mandibular movements, and strict occlusal schemes such as mutually protected occlusion.

However, the rapid evolution of digital dentistry—particularly CAD/CAM systems, intraoral scanners, and virtual articulators—has challenged many traditional paradigms. Today, clinicians are increasingly asking: **Are we still striving for “ideal occlusion,” or merely “acceptable function” in a digital workflow?**

#### The Classical Concept of Ideal Occlusion<sup>1</sup>

Traditionally, ideal occlusion was defined by:

- Stable centric contacts in maximum intercuspation
- Coincidence of centric relation (CR) and centric occlusion (CO)

- Anterior guidance with posterior disclusion
- Absence of occlusal interferences during excursive movements

These principles were developed in an era dominated by mechanical articulators and analog techniques, where achieving precision required meticulous manual adjustments.

#### The Digital Disruption<sup>2</sup>

Digital dentistry has fundamentally altered how occlusion is recorded, designed, and delivered.

Key Transformations:

- **Intraoral scanners** capture static occlusal relationships with high resolution (fig. 1)
- **Virtual articulators** simulate mandibular movements using average or patient-specific values (fig. 2)
- **CAD software** automatically generates occlusal morphology based on algorithms (fig. 3)



Fig. 1: Intraoral scanner



Fig. 2: Virtual articulator



- **Milling and 3D printing** produce restorations with minimal human intervention (fig. 4)

The result: **efficiency has increased—but at what cost to occlusal accuracy and individuality?**

### Limitations of Digital Occlusion

Despite technological advances, several concerns remain:

#### 1. *Static vs Dynamic Occlusion*

Most digital systems primarily record static intercuspation, often failing to accurately reproduce functional movements.<sup>2</sup>

#### 2. *Average Value Articulation*

Many virtual articulators rely on mean anatomical values rather than true patient-specific dynamics, potentially compromising individualized occlusion.<sup>2</sup>

#### 3. *Algorithm-Driven Morphology*

Occlusal anatomy is frequently generated by software libraries, which may not reflect the patient's neuromuscular adaptation or functional envelope<sup>3</sup>.

#### 4. *Loss of Clinical Judgment*

Overreliance on digital outputs may reduce the clinician's critical role in occlusal adjustment and verification.<sup>3</sup>

### Shift in Philosophy: From “Ideal” to “Adaptive” Occlusion

Modern evidence suggests that the stomatognathic system is highly adaptive. Rather than requiring a rigid “ideal,” many patients function well within a range of occlusal schemes.<sup>3,4</sup>

Emerging Concepts:<sup>3,4</sup>

- **Physiologic occlusion over mechanical perfection**
- **Patient-specific functional harmony** rather than textbook definitions
- Acceptance of minor discrepancies if asymptomatic
- Focus on **comfort, stability, and longevity** rather than idealized contacts

This has led to a paradigm shift: **From “ideal occlusion” → to “clinically acceptable and biologically adaptive occlusion.”**

Evidence-Based Perspective<sup>4,5</sup>

Recent literature highlights that:


- There is **limited clinical evidence** linking minor occlusal discrepancies to prosthetic failure
- Many successful restorations do not meet strict gnathological criteria
- Patient adaptation often compensates for occlusal imperfections



Fig. 3: CAD software



Fig. 4: Milling Vs 3D



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However:

- Gross occlusal errors (e.g., high spots, interferences) still contribute to complications such as:
  - Fracture of ceramic restorations
  - Cement failure

Temporomandibular discomfort

Clinical Implications for Fixed Prosthodontics<sup>5</sup>

What Should Be Maintained:

- Stable occlusal contacts in maximum intercuspation
- Proper anterior guidance in esthetic zones
- Elimination of harmful interferences

- Verification using clinical tools (articulating paper, shimstock)

What Should Be Reconsidered:<sup>5</sup>

- Rigid adherence to CR = CO in all cases
- Overcomplicated occlusal schemes in routine restorations
- Blind trust in CAD/CAM-generated occlusion

Integrating Digital and Analog Wisdom<sup>5</sup>

The most predictable approach today is a **hybrid philosophy**:

- Use digital tools for **precision and efficiency**
- Apply clinical expertise for **functional validation**
- Customize occlusion based on:
  - Patient history
  - Existing occlusal scheme
  - Type of restoration (single crown vs full mouth rehab)

In full-mouth rehabilitation, traditional occlusal principles remain more critical than in single-unit restorations.



## Conclusion

“Ideal occlusion” is no longer an absolute target but a **guiding concept**. In the digital era, success in fixed prosthodontics depends less on achieving textbook perfection and more on delivering **functional, comfortable, and biologically compatible restorations**.

The real question is not:  
“**Is this occlusion ideal?**”  
but rather:  
“**Is this occlusion working for this patient?**”

## References

1. Buduru S, Finta E, Almasan O, et al. **Clinical occlusion analysis versus semi-adjustable articulator and virtual articulator occlusion analysis.** *Medicina Pharmaceutica Reports.* 2020;93(3):292–296.
2. Zakkour JD, Montero J, García-Cenador B, et al. **Digital Analysis of Occlusion in Fixed Partial Implant Prosthesis: How to Overcome Age-Related Changes in the Stomatognathic System.** *Prosthesis.* 2024;6(1):119–134.
3. Esposito M, et al. **Digital Protocol to Record Occlusal Analysis in Prosthodontics: A Pilot Study.** *Journal of Clinical Medicine.* 2024.
4. Li LL, Zhao YJ, Chen H, et al. **Accuracy of intercuspal occlusion in 3D reconstruction with dental articulator position method.** *Chinese Journal of Stomatology.* 2020.
5. Ionescu AC, et al. **Digital Quantification of Occlusal Contacts: A Methodological Study.** *International Journal of Environmental Research and Public Health.* 2021;18(10):5297.



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