

Egyptian Prosthodontic Association (EPA Newsletter)

Tracking the Truth: Are Jaw Motion Analyzers Missing Piece in Prosthodontics?



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In prosthodontics, precision is everything. We work tirelessly to restore function, esthetics, and harmony in the stomatognathic system, yet even our most carefully designed restorations can sometimes fall short. How often have you delivered what seemed like a flawless case, only to have the patient return with discomfort, clicking, or “that one spot” that just doesn’t feel right?

The reality is, our traditional records, like articulated models, centric relation registrations, and static scans give us only a snapshot of a dynamic system. But what if we could see the jaw in motion, analyze it, and plan accordingly?

What Are Jaw Motion Analyzers?

Jaw motion analyzers (JMAs) are digital systems designed to capture and track the movement of the mandible in real time, often in three dimensions. Using a combination of sensors, cameras, and/or ultrasound technology, they provide data on how a patient chews, speaks, or opens/closes their mouth. This information can then be visualized and analyzed by the clinician to check occlusal schemes, articulator settings, and even prosthetic design.^{1,2}

Whether ultrasound based, like the early models of ARCUSDigma II, or optical systems like Modjaw (Figure 1) or Zebris (Figure 2), JMAs are gaining popularity, particularly in academic and high-tech private practice settings. They aim to bridge the gap between traditional occlusal principles and modern digital workflows by allowing clinicians to see the patient’s unique functional patterns.^{3,4}

Clinical Workflow of Jaw Tracking Systems

The digital workflow begins with a thorough clinical evaluation, including intraoral scans, CBCT imaging if needed, and a detailed functional assessment. Jaw movements are recorded in real time, such as lateral excursions (Figure 3), protrusion (Figure 4), and opening paths, this analysis helps identify functional disturbances like asymmetrical movement, deflections, or lack of occlusal guidance. Based on these findings, a therapeutic mandibular repositioning is digitally planned (Figure 5), and exported as STL files,



Figure 1. Modjaw



Figure 2. Zebris JMA

which are used to design customized intraoral appliances using CAD software (Figure 6).⁸ These appliances are 3D printed in biocompatible materials and delivered with minimal chairside adjustments. Patients comply with a well-structured follow-up program to assess symptom improvement, adjust the appliance, and monitor parafunctional behaviors. This streamlined, data-driven workflow enhances precision, speeds up treatment delivery, and facilitates interdisciplinary collaboration.^{7,8}

Why Should Prosthodontists Care?

For years, our specialty has emphasized a deep understanding of jaw function. But capturing that function with precision has always been a challenge. JMAs offer several potential benefits:

- More personalized occlusion
- Improved diagnostics
- Enhanced full-mouth rehabilitation planning
- Better lab communication

In short, JMAs give us functional data, not just esthetic or structural information. And in prosthodontics, where small discrepancies can have big consequences, that can be paradigm altering.⁵

The Barriers to Adoption

So why isn't every prosthodontic office equipped with a jaw motion analyzer? Despite their potential, JMAs come with some notable hurdles:

- Cost
- Learning curve
- Clinical practicality
- Workflow integration

Perspectives from the Field

Some clinicians swear by JMAs, especially in advanced or rehabilitative cases:

"We use it in all our full-arch reconstructions, it's like GPS for the jaw. Once you've seen the patient's movements live, it's hard to go back to static records."

Others are more cautious:

"The tech is incredible, but right now, it feels like more data than we can act on. Until it's easier to integrate, it's a luxury, not a necessity."

Looking Ahead

Jaw motion analyzers represent the next frontier in truly customized care. They remind us that the masticatory system is dynamic, individual, and often unpredictable. As digital prosthodontics evolves, integrating functional analysis with esthetics and structure will likely become the standard, not the exception.⁶

But we must also proceed with intention. Technology should support clinical judgment, not overwhelm it. The goal isn't to digitize for the sake of novelty, it's to deepen our understanding and improve outcomes.

So, are jaw motion analyzers the missing piece in prosthodontics? For some cases, absolutely. For others, perhaps not yet. But one thing is clear: the more we can track, understand, and respect the natural movement of the jaw, the better we can serve our patients, not just in how their teeth look, but in how they work.

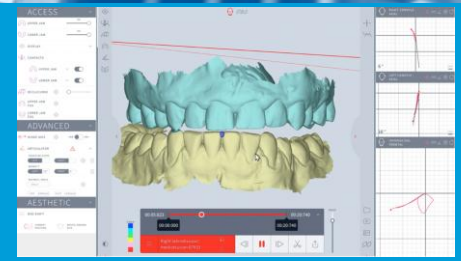


Figure 3. Lateral excursive record, courtesy of Buduru et al⁸

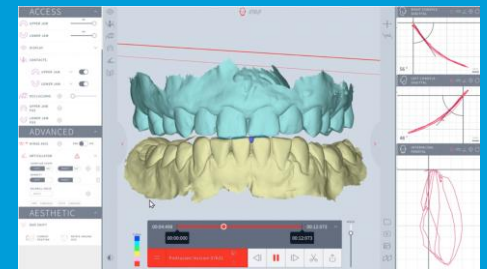


Figure 4. Protrusive record, courtesy of Buduru et al⁸

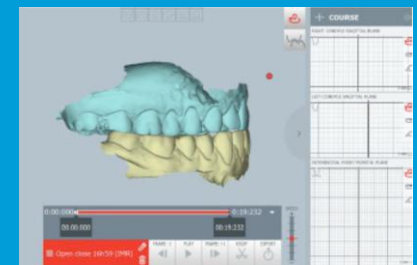


Figure 5. Therapeutic position, courtesy of Tecco et al⁷

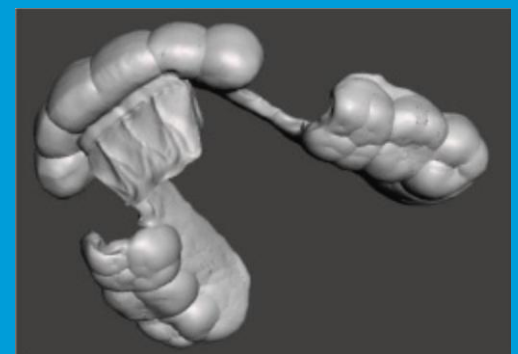


Figure 6. Bite appliance, courtesy of Tecco et al⁷

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