

## **Computer Aided Articulation (CAA) Electronic Movement Recording meets Virtual Articulation and CAD/CAM**

Over the last 150 years one of the main problems in prosthetic dentistry was the reproduction of the mandibular movement with articulators. The history of mechanical articulators led to highly sophisticated instruments for recording of anatomical data and its transfer to fully adjustable devices. With the change from mechanical to digital dentistry the capabilities to record the function increased dramatically. With these electronic registration methods it is possible not only to record the individual function but also to reproduce this function in virtual articulators in a more precise way as ever before.

The occlusal design and/or positioning of denture teeth determines considerably the function of a fixed or removable prosthetic restoration. Both the stability and the chewing achievement of the prosthetics depends on the functional integration of the denture into the stomatognathic system of the patient. In addition, often one causes illnesses like TMJ Disorders by an insufficient functional adjustment of the individual occlusal guidance.

The combination of electronic registration by the ARCUSdigma system and the transfer of these data to the MultiCAD Virtual Articulator (MVA) gives us the possibility to reproduce the real patient's movements electronically for the first time ever. As an additional advantage it is no longer necessary to measure any anatomical data as with a facebow transfer. With the introduction of the KaVo Transfer System (KTS) as a non-anatomical coordinate system it is possible to record the mandibular movements independent from anatomical landmarks, reference axes and reference planes. Only the upper incisal point and the occlusal plane of the maxilla are used as references. With a bitefork and mounting stand this position is transferred into the articulator. This position is a non-anatomical coordination to the virtual axis system of the KTS and the virtual articulator. The data file of the recorded mandibular movement is used to calculate settings for a mechanical articulator or to reproduce these movements with a virtual articulator. In contrast any mechanical articulator can only be set to an individual horizontal condyle inclination (HCI) and Bennett angle with average curvatures but not to the individual trajectories itself. This limitation can be solved by virtual articulation.

The clinical cases show very clearly the differences in mandibular movement and dynamic occlusion between individual settings for the horizontal condyle inclination (HCI) and the fully individual reproduction of the condylar trajectory.

The system components ARCUSdigma, PROTAR articulator and virtual articulator of the MultiCAD system will be presented. On the basis of exemplary clinical cases and their treatment plans the integration of the different components is shown. A practical demonstration with a patient shows the simple and practical workflow.