IN CLINICAL PRACTICE, incorrectly inclined occlusal planes and functionally inadequate restorations are a common scourge. A possible reason is the (often imprecise) analysis of patient information. In an effort to make this process less prone to error, the author has developed a novel transfer approach, the PlaneSystem®. It determines the occlusal plane and any associated asymmetries individually for each patient based on the ala-tragus plane and natural head posture (NHP), and transmits the real position to the CAD/CAM system. This allows possible compensations to be detected prior to developing a treatment plan for laboratory or chairside restorations, minimizing or completely eliminating any sources of error, particularly during data transfer, that might otherwise occur when planning or fabricating a dental restoration.

**Patient Analysis**
Scientific studies, e.g., Xie et al., have identified the connecting line from the lower edge of the nasal wing to the center of the tragus, the so-called ala-tragus line, to be a more reliable reference for the occlusion line than Camper’s plane or the Frankfurt horizontal plane. A second important point of reference within the author’s method of transfer is the natural head posture (NHP). A 5-year study by Cooke® and a 15-year study by Peng® have shown that patients’ natural head posture varies by only one to two degrees when looking directly into his or her own eyes as they stand upright in front of a mirror. The NHP is related to a patient-independent reference frame that allows patient-specific variations in spatial orientation to be reproduced, a feat made possible by the PlaneSystem® developed in cooperation with Zirkonzahn.

The PlaneSystem® consists of the PlaneFinder®, the PSI-3D real and virtual articulator, the PlanePositioner® and the special CAD-PlaneTool PSI-3D software (Figure 1). It is 100% compatible with the digital workflow of the Zirkonzahn CAD/CAM system, including the 5-TEC milling system (Figure 2). The PlaneFinder® detects not only the NHP but also the inclination from the registered position, i.e., the zero-degree line (occlusal line angle). The models are positioned in the PSI-3D articulator using the PlanePositioner® based on the angle identified. The PSI-3D articulator was designed with special geometries to simulate patient-specific rotating, sliding and closing movements of the jaw as they occur during mastication.

**The Process**
**STEP 1.** First, align the PlaneFinder parallel to the ground.

**STEP 2.** The mirror is set at eye-level and the height is adjusted (Figure 3). By putting her index fingers on the support device she is stable and able to look in the mirror with a relaxed lower jaw position (Figure 4).

**STEP 3.** The orientation angle is set to 90°, thus checking the position and its reproducibility. The lateral orientation angles must be set at the level of the ear canal entrance/tragus/zygomatic arch. The patient stabilizes again by means of the index fingers and has her lower jaw slightly open. Two points are marked on the patient’s skin parallel to the horizontal lines.

**STEP 4.** This position is fixed on the tray by means of registration material and without having moved the patient.

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**Fig 1.** The PlaneSystem®.

**Fig 2.** Zirkonzahn’s 5-TEC milling system.

**Fig 3.** The mirror is set at eye-level and the height is adjusted.

**Fig 4.** The patient places her index fingers on the support device for stabilization and looks into the mirror with a relaxed lower jaw position.

**Fig 5.** Two points are marked on the patient’s skin parallel to the horizontal lines.

**Fig 6.** This position is fixed on the tray by means of registration material and without having moved the patient.
adjusted by the PlaneTray. The patient leans her incisors on the tray, looks in the mirror, and stabilizes with her index fingers. This position is fixed on the tray by means of registration material and without having moved the patient (Figure 6).

**STEP 6.** The midline is marked on the tray and on the model (skeletal midline, raphe) and compared with the midline determined at the tray (Figure 7 through Figure 9).

**STEP 7.** A point for the swath is marked at the bottom edge of the nostrils and on the centre of the tragus. According to the skeletal class the tragus point may vary (upper/lower margin). The lateral orientation angles have a scale where the angles can be read. The swath is set parallel to these points and the degrees are determined. The process of occlusion (which can be descending or ascending) is determined for the registered position. The angle may be modified on the adjustable PlanePositioner (Figure 10).

**STEP 8.** For an uninterrupted digital workflow, the data received and the corresponding coordinates in three-dimensional space must be correctly matched. This can be done with the S600 ARTi structured-light optical scanner and the virtual articulator implemented in the Zirkonzahn modelling software. The scanner acquires data from PSI-3D articulator, both of the models and of the articulator itself, and transfers the data directly to the software’s virtual articulator.

**STEP 9.** The next step is the actual design step (Figure 11 and Figure 12). Ideally, the physiognomy of the patient is taken into account during this step. This is made possible by the Face Hunter 3D facial scanner, which basically works like a camera—one click will digitize a face within three-tenths of a second and create a photo-realistic 3D representation. In combination with the CAD/CAM Reality Mode module, the software generates a very good, photo-realistic representation of the virtual restoration. Since most people tend to be “visual types,” a visualization of the final restoration based on the actual patient situation makes for much more reliable planning in the interest of all parties involved and thus provides a solid foundation for high-quality restorations.

**References**

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