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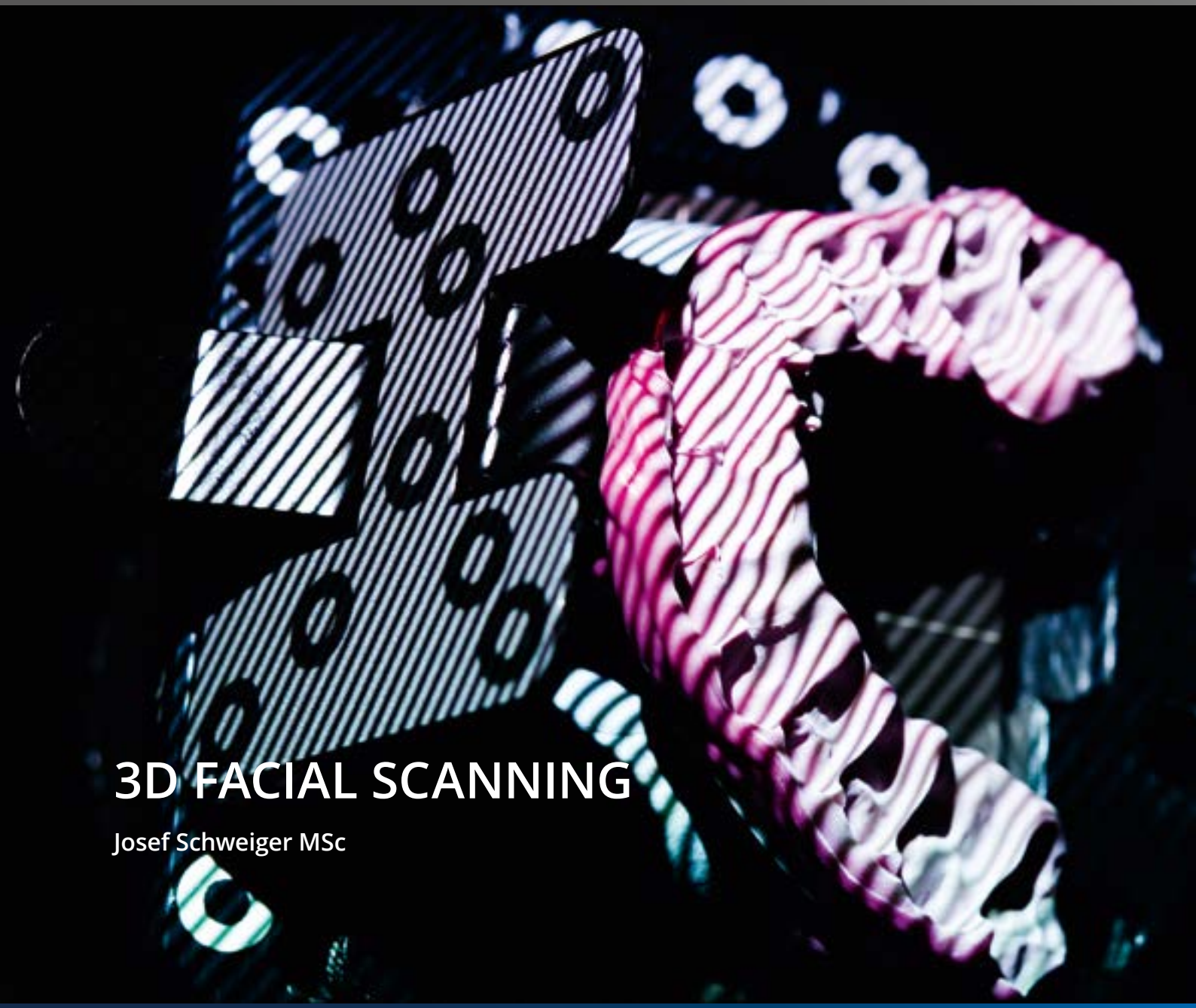

3D FACIAL SCANNING

Josef Schweiger MSc

PRESENTED BY **ZIRKONZAHN**

teamwork media

01 & 02 The Face Hunter – a 3D facial scanner by Zirkonzahn – works on the triangulation principle with structured-light projection.

Digital prosthodontics and facial scanning – perfect tools for dental technology

3D FACIAL SCANNING

Digital dentistry relies, and must rely, on dependable data generation. This is true not only of the acquisition of intraoral data, but also the three-dimensional digitization of the entire face. These data serve as a precise basis for the fabrication of individual dentures by the prosthetic treatment team consisting of the dentist and the dental technician. In an interview with teamwork media GmbH, Josef Schweiger, who holds a MSc in digital dental technology and is the head of the dental laboratory at the Department for Dental Prosthetics of the University of Munich, explains why and for which indications the use of a facial scanner pays off and who can benefit from the purchase of a facial scanner.

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HOMEPAGE

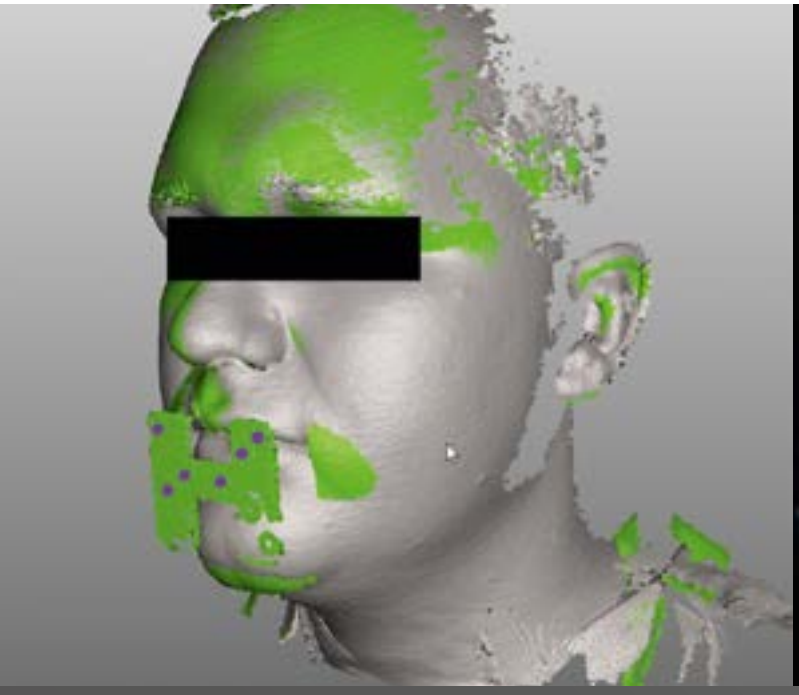
You use a facial scanner almost on a daily basis. How long have you been working with one?

Josef Schweiger: We work with two systems. One is the Priti Mirror by Pritidenta, which was the first system on the market. We have been using this system since 2012, and we already got very good results with that one. In 2015, we added the Zirkonzahn Face Hunter **(Figs. 1 and 2)**. This system and the associated scanning software have been continuously improved; for example, the unit can now import external data such as DICOM data from a CT or CBCT unit or STL data from a laboratory or intraoral scanner.

The software was developed by Zirkonzahn and offers us a great variety of options. This is the platform we use to control the Face Hunter. Of particular interest is the possibility of transferring the correct position of the jaws to the facial scan using a scannable transfer fork. Optical markers on the transfer fork create reference points to link the outside of the face to the upper jaw, and the surface data of the dental arch are correctly positioned relative to the face **(Fig. 3)**. This is a great advantage, because it enables very precise positioning of the jaws within the face.

For which indications do you use the facial scanner? What are the advantages of the face scanner, both in general terms and specifically when treating elderly or edentulous patients?

Schweiger: We now obtain a facial scan of almost every patient who requires more complex treatment. For example, whenever we do two full-arch fixed restorations, or when we do any telescopic or implant-supported dental work – in other words, whenever we are moving in a three-dimensional space that offers no fixed points for orientation and a suitable occlusal plane must be defined. For this purpose, the Face Hunter offers precise referencing options using lines/planes that can be marked up on the facial skull, aligning the plane accordingly; for example, in relation to the Frankfurt horizontal line (or plane), Camper's line, the patient's horizontal



03a & b Optical markers on the transfer fork establish a relationship between the face and the upper jaw.

line or the ala-tragus line **(Fig. 4)**. With the exact alignment, we get to position the occlusal plane exactly where ~~that~~ nature intended it to be. Without a facial scan, however, we have to rely on the dentist to provide us with all this information at high precision by analogue means – and we are not talking about the facebow alone, but especially about the bite fork, with which the occlusion plane can be ultimately transferred to the bite rim parallel to Camper's line.

For me, complex restorations that benefit from the use of the facial scanner also include anterior restorations in general. It is now possible to integrate the facial scan directly into the CAD design, allowing direct feedback from the CAD design to the facial scan. In other words, you can immediately see what the design proposal or prosthetic solution would look like in the context of the facial skull – for example to check whether all axes, lengths, widths and inclinations are correct. The facial scanner thus provides me with a lot of useful information for the anterior segment.

We also routinely use the Face Hunter for elderly or edentulous patients. Especially when all or many teeth are missing, the correct determination of the occlusal plane makes all the difference. In full-arch set-ups, we often observe that the teeth will be set up too shallow and do not run parallel to Camper's line. There are three tell-tale signs for this: One, the occlusal surfaces of the maxillary teeth can be seen while the patient is speaking – this should not normally be the case. Two, the anterior teeth appear protruded. Three, the smile line – the entire anterior aspect of the arch – has a "negative" shape. These mistakes can be avoided with the Face Hunter because it delivers immediate feedback.

A further advantage of the Face Hunter is the possibility of setting up models in the virtual articulator via the facial skull. I particularly appreciate this tool; it allows me to check the actual positions of the jaws in the articulator directly. And this is only possible with a facial scan, which here serves as a kind of virtual facebow. There is no risk of user error because the face is scanned in three dimensions, which means that the sources of error inherent in analogue facebows – for example, facebow screws that are tightened incorrectly – are excluded by design. The "virtual facebow function" via a facial scan is an error-free process **(Figs. 5 and 6)**.

In addition, with elderly patients, if the alignment of the occlusal plane is not correct, the force distribution in terminal occlusion in the main centre of chewing activity will not act at right angles, which will give rise to push forces on the restoration that will ultimately also make it difficult to seat it. A facial scan can be an effective tool to avoid errors in this situation.

Digital full-arch restorations will work best when combined with facial scanning. Facial scans enable virtual wax try-ins as well as the checking of levels and the way masticatory forces are directed near the chewing centre. For this reason, the use of facial scanners in the digital production of full-arch restorations will become increasingly common.

Is the facial scanner ready for routine clinical use?

Unfortunately, development of the Priti Mirror has stagnated on a level where it cannot yet be recommended for practical everyday use. The Zirkonzahn Face Hunter, however, is already fully usable. With this device, we need a maximum of ten minutes for the facial scan of a patient – of course this presupposes a degree of familiarity with the software. The Face Hunter can easily be integrated into the daily workflow.

For whom would the purchase of a facial scanner pay off?

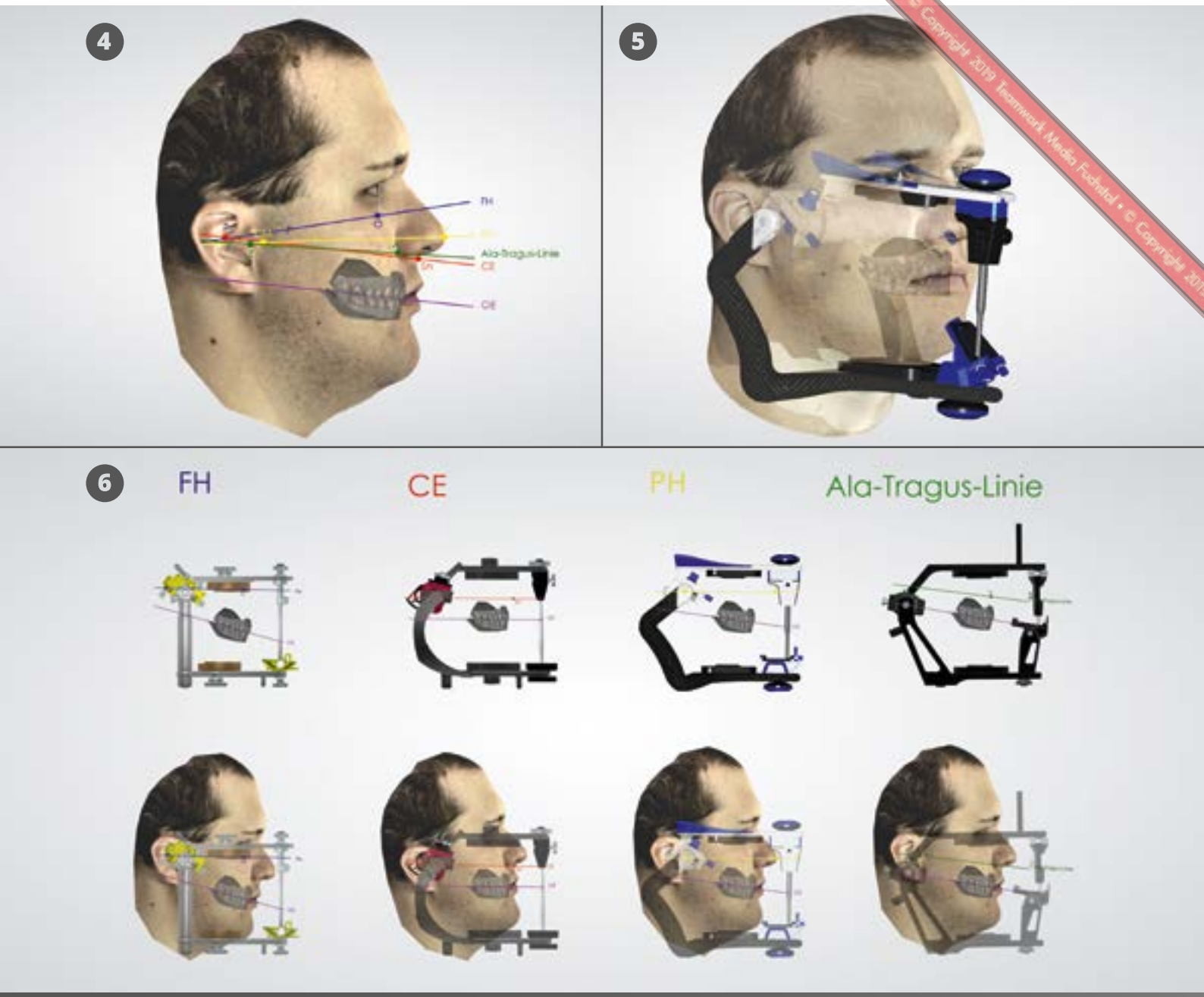
The possibilities of data generation via a facial scan are many, and there will certainly be even more of them in future. Thus, the purchase of a facial scanner can be an interesting proposition for any dental practice. But I could also imagine that we dental technicians could come to the dental practice with a mobile device and perform the facial scan as a service. The technician is legally allowed to perform this; the bite fork could be inserted by a clinical team member.

Facial scans carry an enormous potential in contemporary dentistry. I am convinced that we will soon be able to acquire even more data and that software will be available that facilitate dynamic – read moving – recordings so that we can also simulate the feedback of the CAD design to the muscles that control facial expression. This is why this tool is also very useful in the dental practice – especially if there are multiple treatment providers at the same site. If every patient to get prosthetic treatment receives a facial scan, the investment will also be worthwhile for individual practices.

What is your vision of facial scanner in the dental practice of the future?

First of all, it would make sense for the use of the facial scanner to become routine, so that all data are recorded and the dental technician can access all information digitally. Secondly, the use of the facebow in conjunction with the facial scanner is very useful. This is a large market because many dentists are already working with facebows – and their procedure is often faulty. The use of a facial scanner, on the other hand, ensures error-free arbitrary positioning of the jaws.

Effecting a transfer with the Face Hunter is very simple, because all that is required is to mark corresponding points. A point above the middle of the condyles is market on the left and right of the face. Then either the infraorbital point is marked if using the Frankfurt horizontal line for articulation, or the subnasal point if using Camper's line. You can also select the tip of the nose as a



04 The facial lines can be used to optimize the alignment of the occlusal plane (FH = Frankfurt horizontal line, PH = patient's horizontal line, ala-tragus line, CE = Camper's line, OP = occlusal plane).

05 & 06 The Face Hunter offers the possibility of setting up models in the virtual articulator via the facial skull. The virtual facebow can be used for all common articulator systems.

reference point, in which case you use the patient's horizontal line for articulation. Or you would use the ala of the nose and the tragus, the small cartilage of the auditory canal as reference points. The only disadvantage is that there is currently no established billing code for this service. But the process is so simple and safe – and I find that exciting. ▪

Thank you very much for this interesting interview. ***nb***