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### Comparison Between Three Scan Abutments and the Effect on Determining the

**Implant Axis Using an Intra-oral Digital Scanner**

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**Introduction**

At present, there is an increasing use of digital scanning technology for taking impressions before implant-supported prosthesis. This uptick is due to the many benefits associated with digital impressions, including: 1) reduced distortion from impression materials and plasters, 2) less chair time, 3) the acquisition of a 3-dimensional picture of the preparation, 4) improved patient comfort, and 5) the ability to take completely passive impressions.1,2,3,4

There are two possible methods of taking a digital impression: extraorally – the lab itself scans either the impression or the model, or using an intraoral scanner, chairside.5 Yet, many dentists continue using traditional impression methods for implants.6,7,8,9

The marginal fits of digitally scanned impressions are equivalent to those from conventional impressions. Both methods yield similar marginal fits, both for single crowns as well as full mouth reconstruction. In the case of impressions for implants, digital impressions are more exact for single crowns, however, cross-arch scanning for multiple unit bridges remains questionable. Hence, for multiple units, even proponents of digital impressions believe conventional impression-taking techniques have advantages over digital methods.10

For software to recognize the scan files, it must accept or convert a digital STL-type (stereolithography) file, which allows access to all the programs. This type of file is an algorithm that transmits the 3-dimensional scan with a high degree of accuracy, from which the final work can be designed.11

The transfer abutments (impression coping) are made from polyether ether ketone (PEEK) plastic or titanium type 5, and are screwed into the implant and scanned. The scans convert information about the implant’s position in the mouth into a computerized, virtual STL file. The geometry of the scanned abutment is important for accurately conveying the position of the implant, *i.e.,* its position relative to adjacent teeth and the opposite jaw from all dimensions, M-D, B-L, and G-I. Many implants are now marketed with the appropriate impression abutment. The various scanners have a library of the numerous abutments from which they can make an appropriate selection, based on the implant and the scanned information. Each abutment has its own unique geometry, so it is important to indicate which abutment we used for the purpose of digital impression. Data from the digital model is transferred to a CAD/CAM machine that produces the prosthetic. The scan data allows the software to define the long axis of the implant, as well as the rotational axis and the implant’s vertical position relative to the occlusal plane, so that the future restoration can be appropriately fabricated.12,13

The connection between the implant and the abutment (and therefore, also between the implant and the scanning body) can be either an external or internal hexagonal design.

According to a study by Sialdat et al.14, abutments attached to implants by an internal hexagon show less rotational movement. This study also concluded that the marginal fit of the prosthetic is better than that of those with a external hexagonal design. In our study we used standard implants with internal hexagon connections, as well as the matching impression abutments.