



Scientific Review for Straumann®

Benefits of Original Components.

PROSTHETIC COMPONENTS FROM THIRD-PARTY MANUFACTURERS – A LONG-LASTING ALTERNATIVE?

Why you should insist on original components

In recent years, more and more third-party manufacturers have copied prosthetic components and claim compatibility with those of the original implant systems. At first glance the design of these *non-original* abutments seems to be equivalent to the corresponding *original* abutments. In fact, however, there are differences which cannot be discovered from the outside inspection, but can be visualized in a cross section of the implant-abutment system. Moreover, there are parameters that explain why these *non-original* abutments are not 100% identical to the *original* abutments. Every manufacturer defines exact dimensions and tolerances for the fabrication of its implants, abutments as well as for the implant-abutment connection. These tolerances are not known to any of the manufacturers of *non-original* abutments. Third-party manufacturers therefore need to measure the individual parts from the original manufacturer to determine the dimensions of the implant-abutment interface. They can only estimate the tolerances of the individual parts. This fact may have consequences on the performance of *non-original* abutments. Several studies have investigated the difference between *original* and *non-original* abutments and have come to interesting conclusions.

HIGH PRECISION OF THE ORIGINAL COMPONENTS

A study showed that an abutment which does not match perfectly into the implant can potentially lead to abutment screw loosening and, subsequently, to fractures of the abutment, screw or even the implant (Kano et al. 2006).

In another study, screw loosening was assessed by comparing three different *non-original* abutments to the Straumann *original* abutments (Kim et al. 2012). All abutments were mounted onto Straumann® Tissue Level Implants and then tested in an in vitro fatigue test set-up. For two of the three non-original systems, the test resulted in fractures of the implant or of the abutment. Only one of the *non-original* abutment systems survived the test but lost significant torque. This finding indicates loosening of the abutment screw. Only the *original* Straumann abutment did not show any loosening or fracture of the abutment in this test set-up.

Another study evaluated the rotational misfit of *original* implant-abutment connections compared to non-original abutments. Assessed were CAD/CAM-manufactured *original* and *non-original* abutments from two manufacturers, each connected to reduced-diameter implants. The study showed a significantly higher rotational misfit for the abutments of one of the tested third-party manufacturers on Straumann implants compared to the original Straumann implant-abutment system. For the abutments of the second third-party manufacturer, the test could not be performed since all abutments were oversized and did not match properly into the CrossFit® connection of the Straumann implants. The study further concluded that *non-original* abutments differ from the *original* abutments with regards to design of the connecting surface, shape, dimensions and material. *Non-original* abutments also have a higher rotational misfit (Gigandet et al. 2012). Recently, the micro-mobility of the implant-abutment interface for *original* and *non-original* abutments was evaluated (Keilig et al. 2013). Standard CAD/CAM Straumann abutments and abutments from two third-party manufacturers were mounted on Straumann implants before being exposed to a fatigue test. The *non-original* abutments showed a much higher variability in the mobility of the implant-abutment interface compared to the *original*

components. The consequence of this finding is that, in the best case, *non-original* abutments show micro-mobility comparable to the *original*, but a certain portion of them can have higher micro-mobility. This finding demonstrates a compromised precision fit for a certain portion of the third-party abutments. Hence, the major outcome of this study is the higher predictability in precision fit when using *original* components compared to the use of *non-original* components.

In conclusion, the mechanical studies presented show higher rotational misfit, stronger effect of screw loosening and greater variance in precision fit of *non-original* components when compared to the corresponding *original* components. All these differences may result in unexpected failure modes and may have an adverse effect on clinical performance.

HOW DO ORIGINAL STRAUMANN PROSTHETIC COMPONENTS PERFORM CLINICALLY?

Most long-term clinical studies in dental implantology assessed the performance of the endosteal implant whereas only very few studies have documented the performance of the prosthetic components such as abutments. Three long-term clinical studies strongly support the Straumann® Dental Implant System, with documented success of the Straumann secondary prosthetic components. Over a period of 10 years, the technical and mechanical complications rate of prosthetic restorations were documented (Wittneben et al. 2013). In this retrospective study, prosthetic restorations on all 388 surviving Straumann® Tissue Level Implants were assessed. After 10 years, only 3% (n=13) of the secondary prosthetic components showed complications. These rare complications

were: loosening of the occlusal screw in 2.5% (n=10) of the cases and fracture of the occlusal screw or loosening/fracture of the abutments in less than 1% (n=3) of the cases. A prospective 10-year clinical study reported only 1.5% (n=2) mechanical complications of the prosthetic parts on 132 dental implants (one loose assembly screw which was observed twice in one patient) (Fischer et al. 2013). No fracture of an abutment, abutment screw, or assembly screw was reported during the 10 years of functioning.

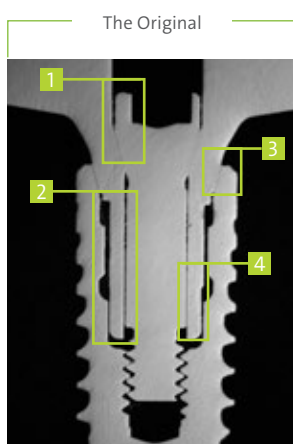
In a 20-year study, in partially edentulous patients, 95 Straumann implants were documented (Chappuis et al. 2013). Mechanical complications related to prefabricated components were observed in 3% (n=3) of the cases. These were a fractured abutment in a fixed dental prosthesis with one cantilever in one patient, and screw loosening in two patients. In addition there are case reports of situations where patients with *non-original* components were seeking help after technical and biological complications with their implant-borne prosthesis which has been made elsewhere in the world. Very often third-party components showed visible morphological differences compared to the *original* components. The mechanical properties and clinical performance can be significantly affected by these differences (Mattheos et al. 2012).

In conclusion, the system of the *original* implant and corresponding *original* abutment was technically superior to results achieved by third-party abutments. Above all, the *original prosthetic* components showed excellent long-term success and survival in clinical situations. In contrast, no clinical data exist for the *non-original* components and therefore, long-term performance has not been proven. Finally, it is in the best interest for your patients to use perfectly matching components which come with a proven clinical success over a long period of time.

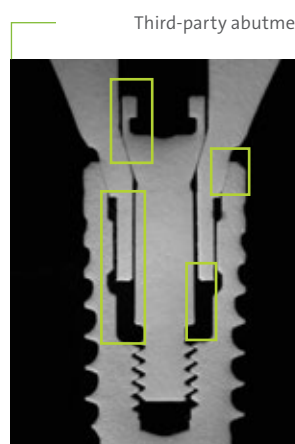
Compatible is not original.

Features ► Benefits

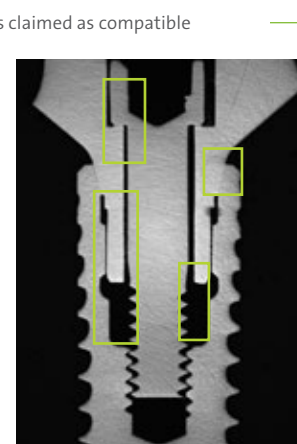
- 1 Conical screw head
 - No peak stresses
- 2 Radial contact surfaces
 - Precise guidance
- 3 Tight conical implant-abutment interface
 - Sealed connection
- 4 Deep implant-abutment engagement
 - High stability



Straumann® CARES® Ti Abutment on Straumann® RC 4.1 Implant



CAD/CAM Ti abutment competitor A on Straumann® RC 4.1 Implant



CAD/CAM Ti abutment competitor B on Straumann® RC 4.1 Implant

Section cuts of the abutment/implant interface show obvious differences between the original and third party abutments.

Which one do you trust in?

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