# CAMLOG® Implant System – facts and figures at a glance

The CAMLOG® implant system – clinically and scientifically established
Precision of fit and excellent long-term outcomes

## Aim

To provide important insights into the scientific documentation of the CAMLOG implant system based on facts and figures.

## Introduction

Only very few implant systems have been systematically and thoroughly documented in the literature. The CAMLOG implant system belongs to these well documented systems because encouraging independent research is fundamental to the Camlog strategy.

For 25 years, the features of the system like the butt-joint Tube-in-Tube connection, the sandblasted and acid-etched Promote surface, the option of platform switching, the outer geometry etc. have been continuously improved based on the scientific state-of-the-art and were evaluated in numerous mechanical, in-vitro, and clinical studies (Fig. 1).

**TAKE HOME MESSAGE:**

1. Clinically well-established implant system
2. Precision and stability of the implant-abutment connection
3. Long-term preservation of soft and hard tissues
4. Covering an extended number of treatment options

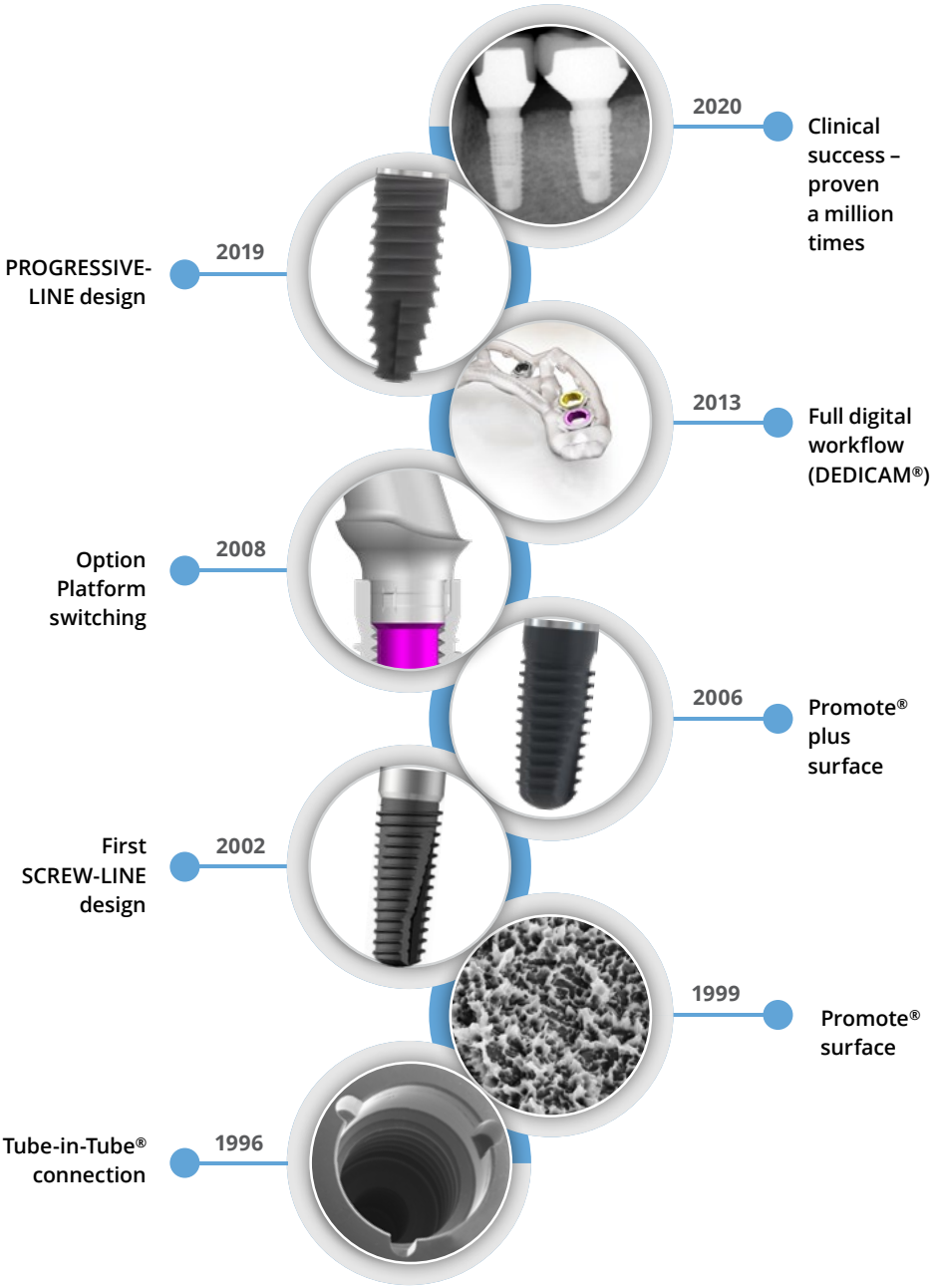


**Fig. 1:** The development of the CAMLOG implant system is based on a solid foundation of scientific research

## Stability and fit of the Tube-in-Tube connection

The implant-abutment connection design influences the rotational, vertical, and angular positioning accuracy of the abutment and long-term stability of the prosthetic restoration.

The design of the well-proven Tube-in-Tube implant-abutment connection with the three symmetrically arranged interlocking grooves and cams was designed biomechanically based on complex finite element analyses (FEM) (Fig. 2).

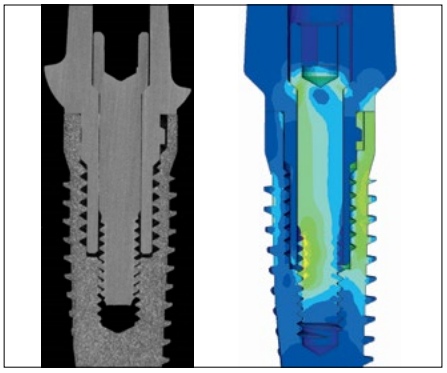

**Fig. 2:** a) Sectional view of the Tube-in-Tube connection
b) FEM: Mises tension at a load with 200N (ISO14801)

Several in-vitro tests have demonstrated the precision of fit and stability of the implant-abutment connection attributable to geometrical design and high-precision manufacturing (1, 2). The Tube-in-Tube connection also demonstrated favorable results regarding their load-bearing capacity (3) and a high fracture strength score after dynamic loading in a chewing simulation (4).

The geometric design of the cam-groove connection was mathematically analyzed and evaluated with the highest positional accuracy (rotation) compared to other designs (5, 6, 7). This theoretical approach was confirmed by a mechanical study with disassembly and re-assembly of the implant-abutment complex showing the least rotational discrepancies for the CAMLOG connection compared to other systems. The vertical displacements were significantly less than in the other conical systems evaluated (8).

Microgaps and its impact, i.e. micro-leakage or bacterial penetration, are the reason to aim for small manufacturing tolerances of all the components in two-piece implant systems but are impossible to eliminate independently of the connection design (e.g. conical, butt-joint) (9, 10, 11). The Tube-in-Tube connection seems to minimize micromovements and pumping effects under dynamic loading resulting in a late bacterial penetration (9).

## Clinically proven success and patient satisfaction

The Promote surface has proven to be effective in various preclinical and clinical studies over years (12). A study investigating different implant systems including more than 6'000 Camlog implants in private practices over more than 10 years showed the highest probability of survival for implants with Promote surface (13). Very positive mid- and long-term treatment successes with CAMLOG implants have been documented in clinical trials for various implant lengths and diameters (13, 14, 15, 16), for various indications and various surgical and loading approaches (17, 18). A recent international multicenter study in daily dental practice reported a high survival rate, excellent stability of hard and soft tissues as well as patient reported outcome measures (PROMs) showing over 99% of satisfaction at 5-year follow-up controls (19) (Fig. 3).

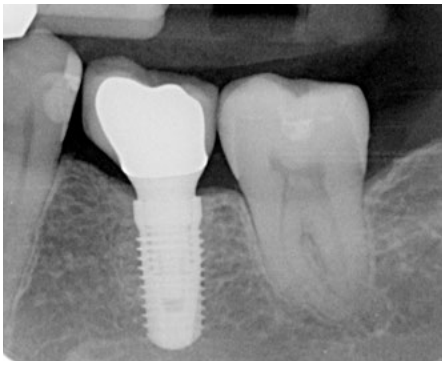

**Fig. 3:** Stable clinical situation of a SCREW-LINE implant 5-year post-loading in regio 36 (courtesy of Dr. S-M. Beschnidt)

## Excellent bone preservation

Preservation of the crestal bone is important for the peri-implant long-term stability. CAMLOG implants showed clinically stable conditions with both platform matching and platform switching abutments (19, 20). However, a positive effect of platform switching could be found in clinical studies with CAMLOG implants. In a prospective randomized clinical study comparing the restoration with platform switching vs platform matching abutment Messias et al. could even identify a slight bone gain with platform-switching of 0.2 ± 0.5 mm 5-year post-loading and a significant mean difference to platform matching restorations. (20). Beschnidt et al. reported in a large prospective study excellent conditions with both platforms together with excellent PROMs (19).

## Guide system accuracy

Template-guided implant placement is a method to ensure an ideal and predictable implant position for immediate or delayed restoration. Clinically, a comparison of the virtually planned and the achieved implant positions using the CAMLOG Guide system showed a high degree of accuracy (21, 22, 23) leading to predictable prosthetic results independent of the residual dentition and the surgical procedure (21). A success and survival rate of 100% was reported with template-guided inserted and immediately loaded implants (24).

## Modern treatment option – PROGRESSIVE-LINE

CAMLOG implants are available with two different outer macro-designs: SCREW-LINE and PROGRESSIVE-LINE. The PROGRESSIVE-LINE implants have a conically shaped apical area and buttress threads to develop high initial stability. In the coronal area, a crestal anchoring thread gives support for optimal hold with limited bone height, e.g. in sinus lift procedures.

The implants showed excellent stability based on insertion torque and ISQ measurements and thus enable modern treatment concepts such as immediate implantation or immediate loading even in soft bone (25).

## Conclusion

The solid documentation of the CAMLOG implant system is based on scientific evidence. This is an important contribution to Camlog's success story. The long-term data of the Promote surface, the use of either platform switching or platform matching, the positioning, and the stability of the implant-abutment connection are key factors contributing to the excellent performance and predictable success of CAMLOG implants in clinical practice. Continuous developments of the system satisfying modern treatment options are going hand in hand with clinical evidence.

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**Headquarters**
CAMLOG Biotechnologies GmbH | Margarethenstr. 38 | 4053 Basel | Switzerland
Phone +41 61 565 41 00 | Fax +41 61 565 41 01 | info@camlog.com | www.camlog.com

Manufacturer of CAMLOG® products: ALTATEC GmbH | Maybachstr. 5 | 71299 Wimsheim | Germany

biohorizons camlog