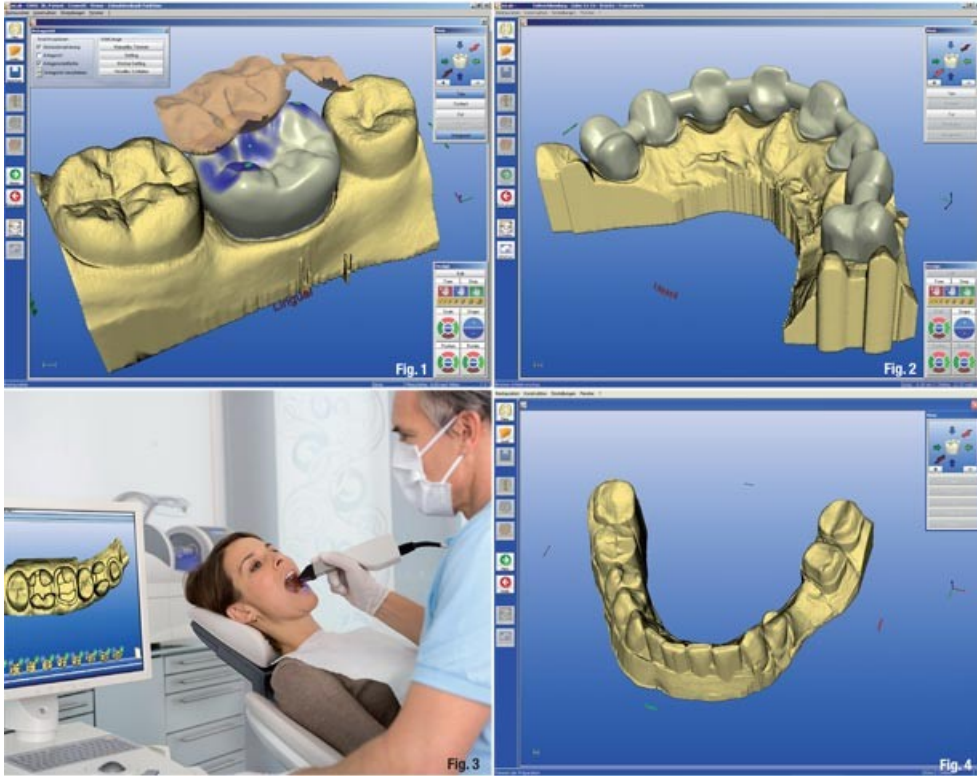




Cad Cam Dentistry.

The term 'CAD/CAM' in dental technology is currently used as a synonym for prostheses produced by 'milling technology'. This is not entirely correct. CAD is the abbreviation for 'computer-aided design' and CAM stands for 'computer-aided manufacturing'. The term 'CAD/CAM' does not provide any information on the method of fabrication. All CAD/CAM systems consist of three components:

- A digitalisation tool/scanner that transforms geometry into digital data that can be processed by the computer Software that processes data and, depending on the application, produces a data set for the product to be fabricated
- A production technology that transforms the data set into the desired product.



Laboratory production

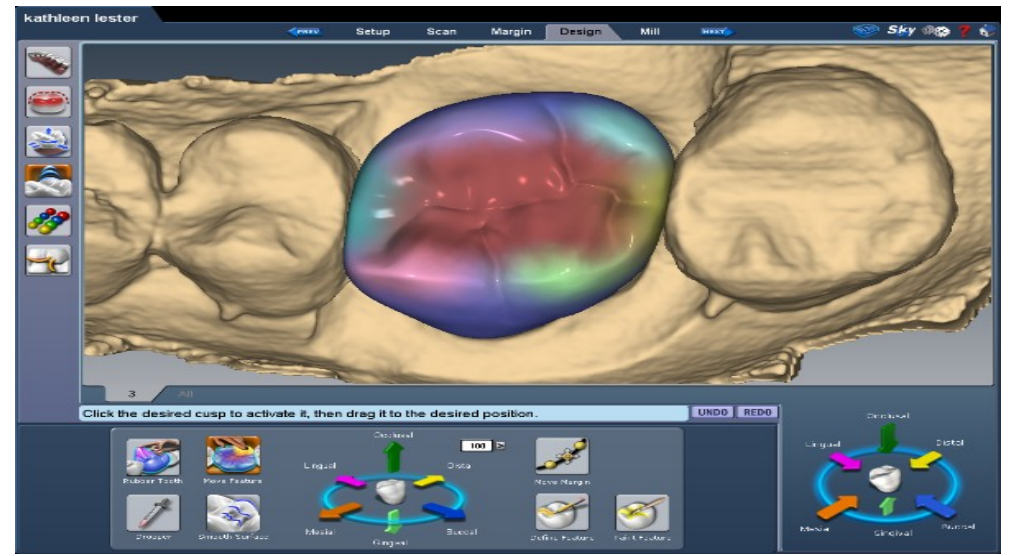
The production is the equivalent to the traditional working sequence between the dentist and the laboratory. The dentist sends the impression to the laboratory where a master cast is fabricated first. The remaining CAD/CAM production steps are carried out completely in the laboratory. With the assistance of a scanner, three-dimensional data are produced on the basis of the master die. These data are processed by means of dental design software. After the CAD-process the data will be sent to a special milling device that produces the real geometry in the dental laboratory. Finally the exact fit of the framework can be evaluated and, if necessary, corrected on the basis of the master cast. The ceramist carries out the veneering of the frameworks in a powder layering or overpressing technique.

Optical scanners

The basis of this type of scanner is the collection of three-dimensional structures in a so-called 'triangulation procedure'. Here, the source of light (eg laser) and the receptor unit are in a definite angle in their relationship to one another. Through this angle the computer can calculate a three-dimensional data set from the image on the receptor unit. Either white light projections or a laser beam can serve as a source of illumination

Design software

Special software is provided by the manufacturers for the design of various kinds of dental restorations. With such software, crown and fixed partial dentures (FPD) frameworks can be constructed on the one hand ; on the other hand, some systems also offer the opportunity to design full anatomical crowns, partial crowns, inlays, inlay retained FPDs, as well as adhesive FPDs and telescopic primary crowns. The software of CAD/CAM systems presently available on the market is being continuously improved. The latest construction possibilities are continuously available to the user by means of updates. The data of the construction can be stored in various data formats. The basis therefore is often standard transformation language (STL) data. Many manufacturers, however, use their own data formats, specific to that particular manufacturer, with the result that data of the construction programs are not compatible with each other.



Processing devices

The construction data produced with the CAD software are converted into milling strips for the CAM-processing and finally loaded into the milling device. Processing devices are distinguished by milling axes:

- 3-axis devices
- 4-axis devices
- 5-axis devices

The quality of the restoration does not necessarily increase with the number of processing axes. The quality results much more from the result of the digitalisation, data processing and production process.



Materials used go from : Grindable silica based ceramic blocks are offered by several CAD/CAM systems for the production of inlays, onlays, veneers, partial crowns and full crowns (fully anatomical) Vita In-Ceram Alumina (Al₂O₃): suitable for crown copings in the anterior and posterior region, three-unit FPD frameworks in the anterior region Vita In-Ceram Zirconia (70% Al₂O₃, 30% ZrO₂): suitable for crown copings in the anterior and posterior region, three-unit FPD frameworks in the anterior and posterior region. Thanks to its superior masking ability this ceramic is suitable for discoloured abutment teeth. VITA In-Ceram Spinell (MgAl₂O₄): has the highest translucency of all oxide ceramics and is thus recommended for the production of highly aesthetic anterior crown copings, in particular on vital abutment teeth and in the case of young patients.Zirconium dioxide is a high-performance oxide ceramic with excellent mechanical characteristics. Its high flexural strength and fracture toughness compared with other dental ceramics offer the possibility of using this material as framework material for crowns and FPDs, and, in appropriate indications, for individual implant abutments.

