

Indispensable Clues for CAD CAM Technology

Wael M Zakaria*

Prosthetic Dental Sciences, College of Dentistry, Qassim University, Saudi Arabia

***Corresponding Author:** Wael M Zakaria, Prosthetic Dental Sciences, College of Dentistry, Qassim University, Saudi Arabia.

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CAD/CAM is the abbreviation of computer-aided design and computer-aided manufacturing. It is the technology involved with the utilization of digital computers to perform certain functions in design and production.

The CAD CAM systems fundamentals are composed of three major phases:

1. Acquisition of 3-D anatomic information using scanning techniques as:
 - Computerized Tomography (CT) Scanning.
 - Cone Beam Computed Tomography (CBCT) scanning.
 - Magnetic Resonance Imaging (MRI) Scanning.
 - 3-D Optical scanning that generates a point cloud or virtual model. Two main varieties of optical scanning were used
 - 3-D scanner based on self-calibrating fringe projection technology
 - 3-D laser scanning system
1. Create a 3-D computer model: Once correct and accurate geometric information is gathered using the scanning techniques, the information is imported into the scanning systems, specific computer -aided design (CAD) software package for manipulation and therefore production of a CAD model from which the prototype is manufactured.
2. Manufacture of physical prototype through two methods:
 - Subtractive CAM approach, also called Computer Numerically Controlled (CNC) milling machine. It relies on sculpting the restoration from a ready-made block with the employment of burs or disks. The material is subtracted from a block to leave the desired shaped the restoration.
 - Additive CAM approach, also called rapid prototyping or “solid free-form fabrication”. It operates on the concept of lay down material in layers or slices to build up a model instead of forming a model from a solid block, therefore offering a great opportunity of making all the internal geometry instead of just the outer surface contours as with a milling machine. Many technologies are used in dental CAD/CAM systems as:

- Three Dimensional Printing (3DP)
- Stereolithography (SLA)
- Laser sintering
- Fused Deposition Modelling (FDM)
- 3D Plotter

Some commercially available CAD/CAM systems use a dual approach of additive and subtractive CAM approaches [1,2].

Conclusion

The development of CAD/CAM systems has boosted dentistry by producing restoration of high quality. It facilitates the work of the dentist and offers the users of dental services the minimum time in the dental office.

This technology is useful in the Prosthodontics field either in the dental office or dental laboratories.

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