HKU Faculty of Dentistry develops fast 3D dental restoration system

Researchers at the HKU Faculty of Dentistry have developed a 3D dental prosthesis-manufacturing system that makes customised dental restorations such as crowns in a fraction of the usual time.

The new system, based on computer-aided design (CAD) and computer-aided manufacturing (CAM) technology, can make a single crown in 1.5 hours, compared with the usual method’s 41 hours. As a result, a restoration can be made and fitted in the same day, instead of requiring multiple visits.

The new CAD-CAM method directly scans an impression model of the patient’s bite, and dental ceramic is then shaped according to the desired design. Because this system uses only a few steps, the restorations are very precise. By contrast, the conventional method can lead to reduced accuracy and fit because it relies on multiple sequential steps (involving plaster pouring, die preparation, wax modelling, metal casting, and porcelain application).

Another major advantage of the new system is 3D digital fine-tuning of the surface before the restoration is actually made, thereby improving fit and aesthetics. To help optimise the restoration, data from adjacent scanned teeth impressions are also taken into account during the digital design step.

In fact, the researchers have gathered digital data from teeth of 500 Chinese people, along with other data such as physical features of jaws and faces, to construct the world’s first Chinese dental database that can help in digital remodelling.

“We call this our ‘Knowledge-based System’,” says Professor Lim K Cheung, Chair Professor of Oral and Maxillofacial Surgery and principal investigator of the project. “Use of this dental database in the virtual sculpting step can speed up the restoration process and improve fit even further, especially in Chinese patients with missing or ruined teeth.”

The 2-year project was a collaboration between the Faculty and the Hong Kong Productivity Council, through a grant of HK$2.7 million from the Innovation and Technology Fund. Three scientific papers derived from the project are being prepared for publication in international refereed scientific journals.

The project was featured in the Ming Pao Daily newspaper on 28 September 2009 (in Chinese, available from this link): http://facdent.hku.hk/docs/MingPao_28Sept09.pdf

For more information about the HKU Faculty of Dentistry, please visit www.facadenthk.org

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