



CHRISTIAN COACHMAN DDS CDT

Facially Generated and Cephalometric Guided Digital Wax-Up

Modern interdisciplinary restorative dentistry should start with a smile design project to facilitate restorative results that are in harmony with the face and lip dynamics of the patient. Treatment planning should be a brainstorming process aimed at finding the best procedures to facilitate the restoration. This means that, in facially driven dentistry, smile design should come before treatment planning.

Digital tools can be used to facilitate this process. Digital drawings can be made over facial photos of the patient to develop what we call the smile frame. This visual guide suggests the best 3-D position of the teeth and gingiva for the patient's lips and face. This 2-D smile frame can be calibrated to STL files and CBCTs.

This process allows for a facially driven diagnostic wax-up prior to planning the case. One of the new concepts we have been using is the cephalometric analysis to improve the digital wax-up. The cephalometric lines can be utilized to reveal the ideal position of the incisal edge and inclination of the central incisor as well as the occlusal plane.

On implant full mouth rehabilitation cases, this digital setup can be overlapped with CBCT to plan the implant position, grafting procedures and/or bone reduction. The digital setup can also be used to design and fabricate surgical guides, bone reduction guides and immediate load prostheses, maintaining a predictable relationship between the initial design and the definitive prosthetic outcome.

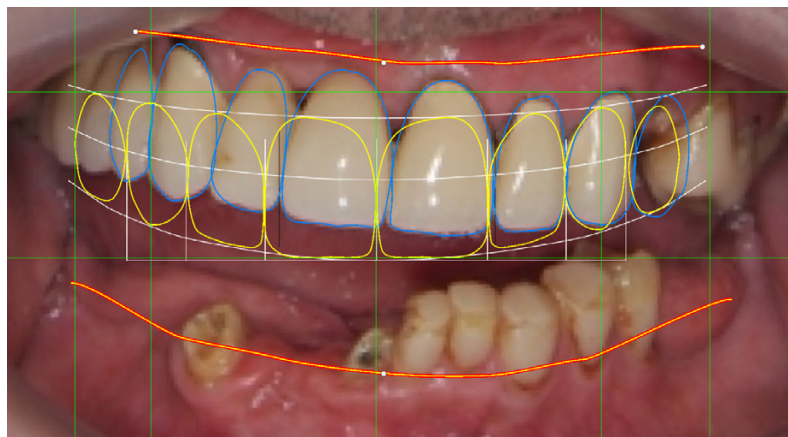


Fig 1. The facially driven 2-D smile frame from the anterior perspective

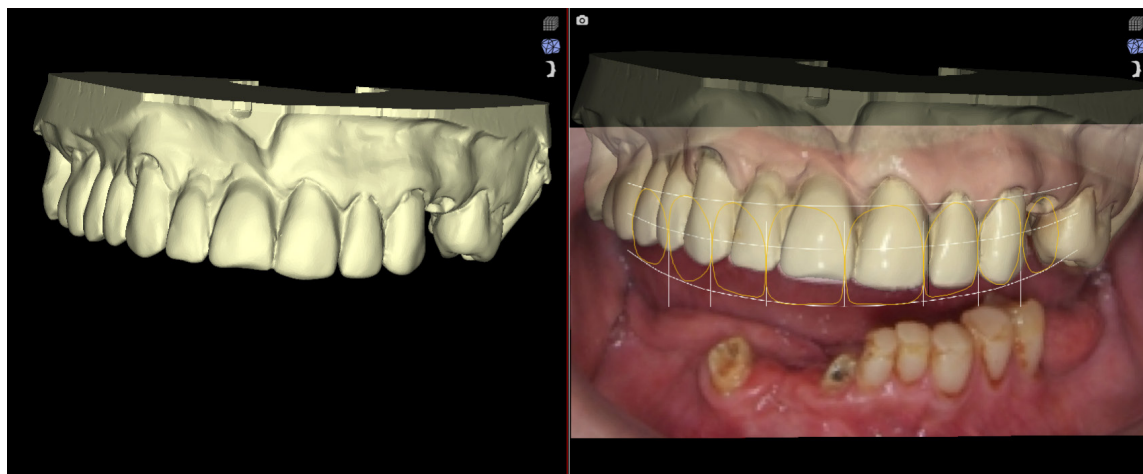


Fig 2. The 2-D smile frame is calibrated to the 3-D STL files of the arches and the bite registration is captured

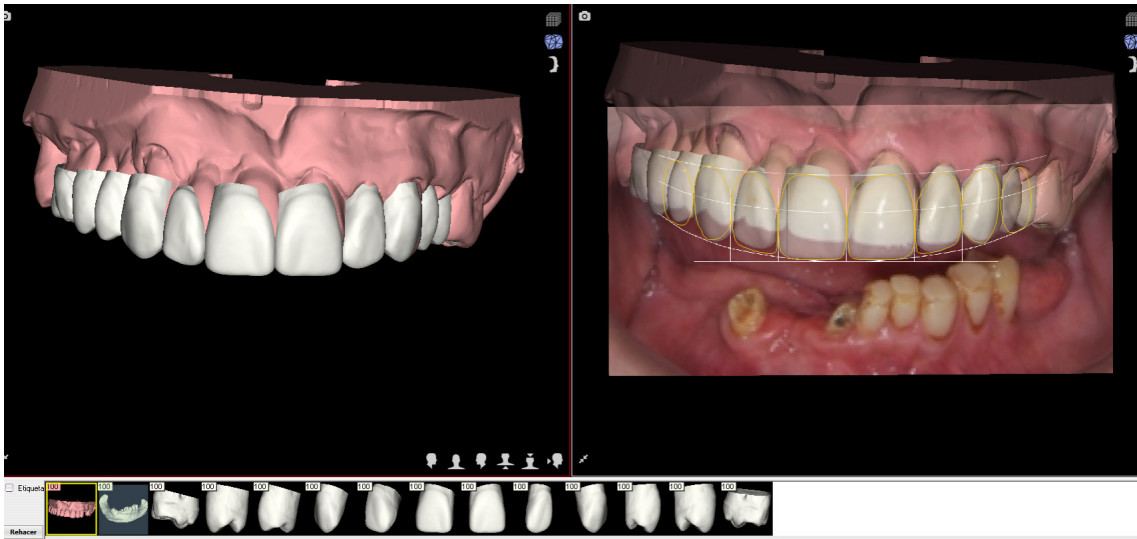


Fig 3. The 3-D digital wax-up is made based on the 2-D facially driven smile frame



Fig 4. The wax-up is checked with the face and smile frame following all the aesthetic parameters

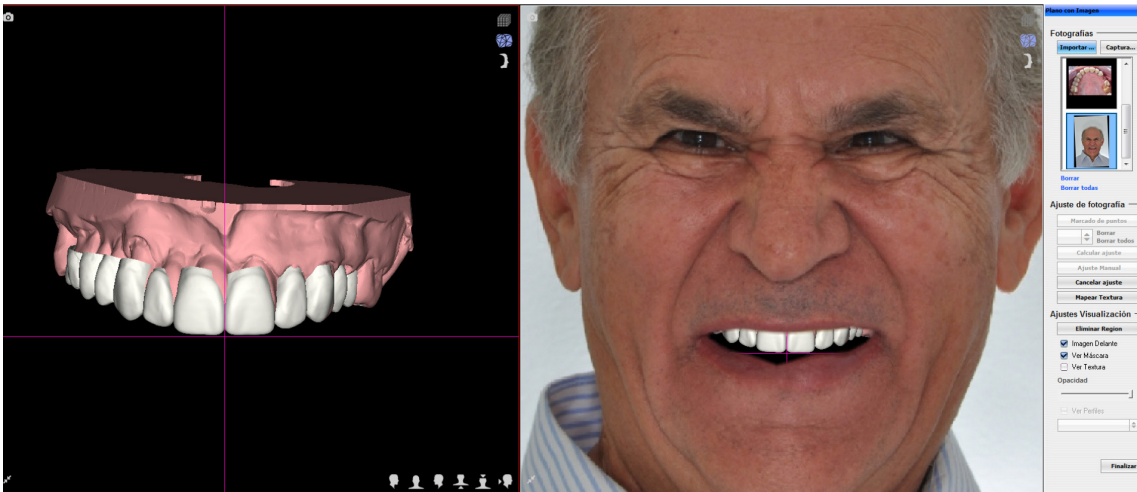


Fig 5. The 3-D design can be placed underneath the upper lip to give a better view of the dental-facial integration

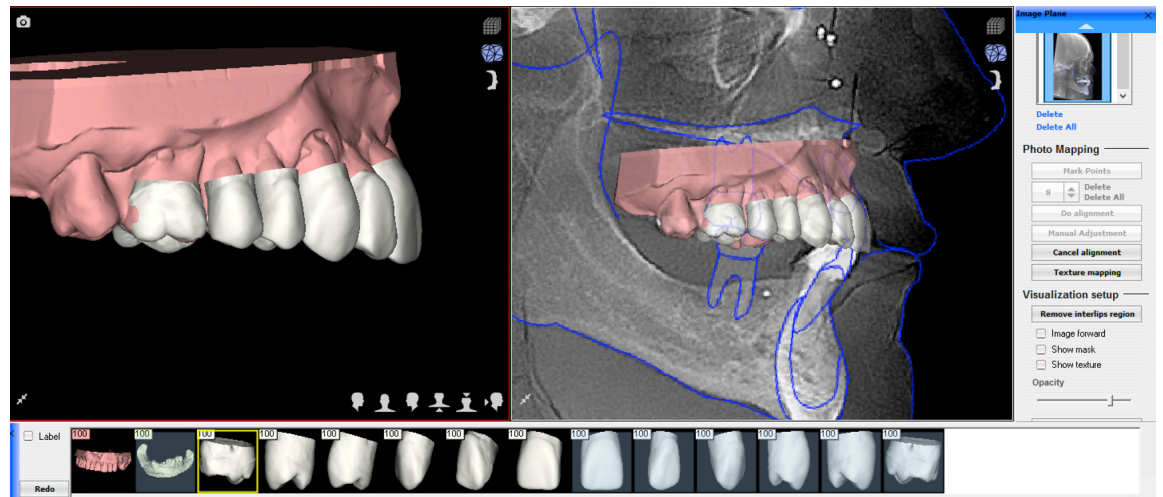


Fig 6. The new step on the Digital Smile Design process is to incorporate the very valuable cephalometric guidelines to fine tune the ideal position of the upper teeth according to the face

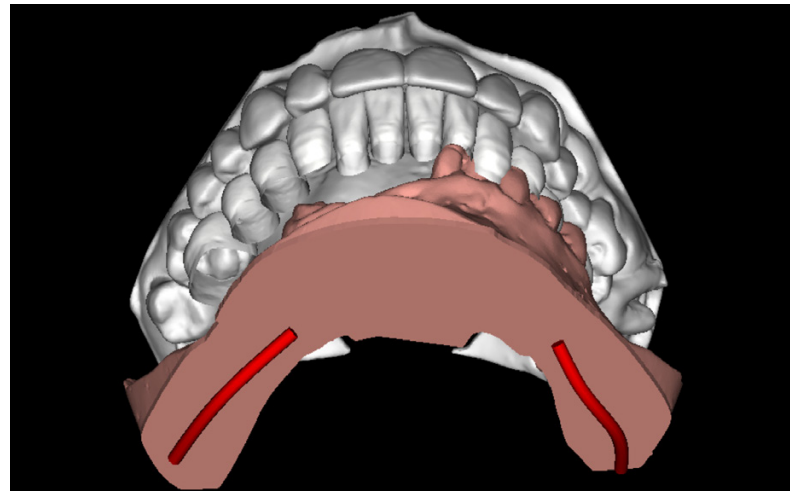


Fig 7. After defining the ideal position of the upper teeth with the face, the lower tooth setup is designed to create ideal intercuspation and functional design according to the ideal VDO

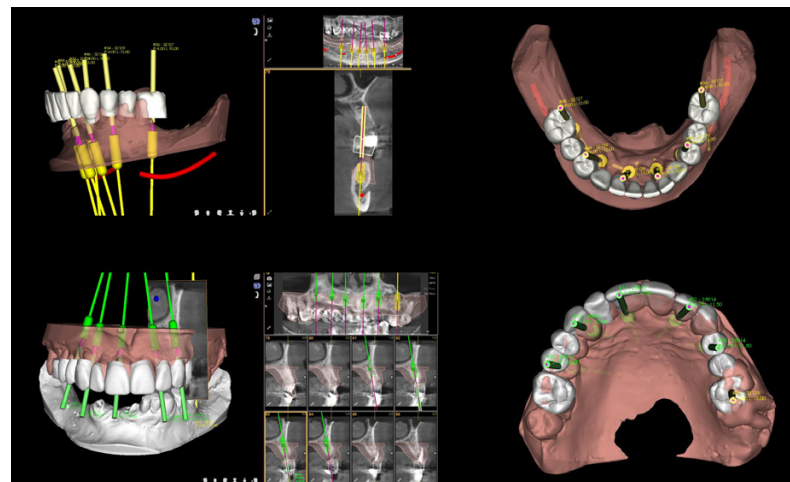


Fig 8. The ideal upper and lower tooth position is integrated to the CBCT file to plan the implant surgery and fabricate all devices as surgical guides, bone reduction guides and immediate prosthesis

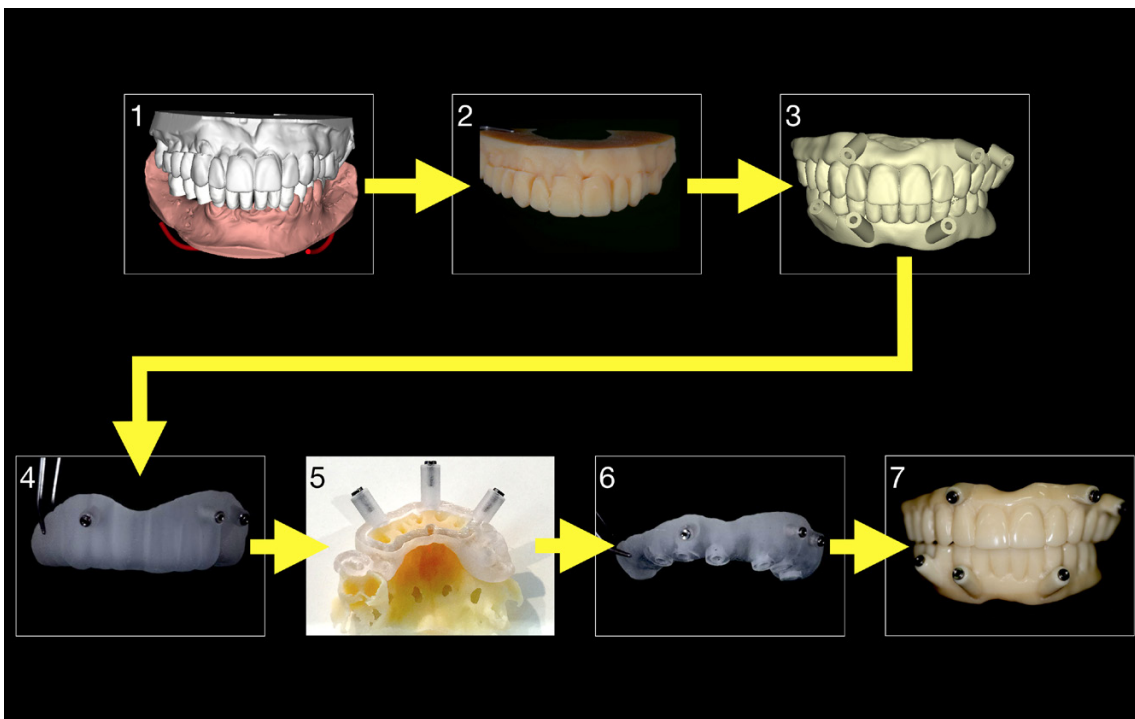


Fig 9. The complete CAD/CAM workflow for full arch implant rehabilitation

1. Ideal design
2. Printed model for the motivational mock up
3. Integration of the design to the ridge with the three positioning pins
4. Printed guide to drill the positioning pins
5. Printed bone reduction guide
6. Printed implant positioning guide
7. Milled immediate dentures

Notice that all devices are fabricated with the positioning pins to maintain the same facial integration, design, occlusion and VDO of the initial plan

Dr. Christian Coachman developed the Digital Smile Design Concept. It provides a calculated clinical approach to creating a natural, emotional and artistic smile more efficiently and precisely through innovative concepts and digital technology employed by clinicians and laboratories. For more information on this process visit digitalsmiledesign.com.