Milling technique: Dentures without clasps

Part 6: Bars

By Frieder Galura

"Bars and channel-shoulder attachments... went out of fashion temporarily but as of late, bars have had a huge renaissance in the age of implantology..."

Bars and channel-shoulder attachments belong to the classical attachments group when associated with milling techniques. Historically, these types of techniques went out of fashion temporarily due to the adoption of the telescopic or conical attachment technique as these secondary blocked prosthesis were easier to clean for the patient. But as of late, bars have had a huge renaissance in the age of implantology.

In the prosthesis, the remaining support teeth of the prosthesis are primarily blocked by means of bars. In the posterior area, the teeth are aligned in the middle of the alveolar ridge. In the area of the anterior teeth the bar can be positioned slightly anterior to the alveolar ridge, especially in the case of an increasing atrophy for a better static condition of the denture.

We differentiate between bar joints and parallel bar attachments.

The working process for a fast bar prosthesis with a prefabricated titanium bar is shown with the following sequence of images. For the alignment of a bar joint you must consider special criteria.

Horizontal bar alignment (Figure 1): The bar should be positioned horizontally to the ideal occlusal plane to ensure that the masticatory forces are distributed correctly. Positioning it at any other angle results in incorrect loading of the implants and pressure on the soft tissue.

Vertical alignment (Figure 2): The bar acts as a rotational axis for conditionally tissue retained dentures (hybrid dentures). The bar should be positioned vertical to the median line to enable uniform loading of the alveolar ridge.

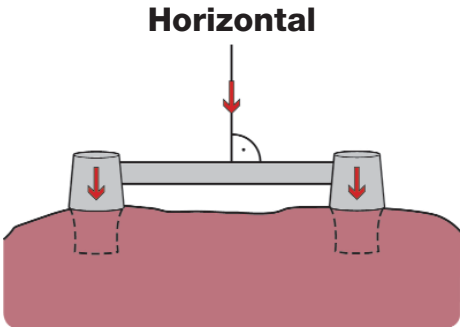


Figure 1. Horizontal bar alignment.

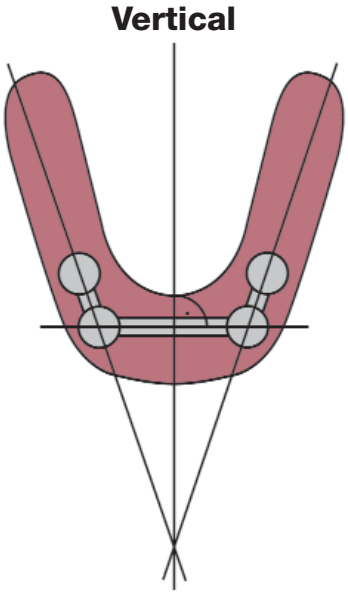


Figure 2. Vertical bar alignment.

Figure 3. Positioning the bar by means of a parallelometer (Paralas, Dentaurum).

Figure 4. Laser-welded bar construction.

Figure 5. The polished bar.

Figure 6. The bar retention is laser-welded...

Figure 7. ...and polymerised into the denture.

Figure 8. Edentulous case for a customized bar construction.

Figure 9. Set-up (labial view).

Figure 10. Set-up (lingual view).

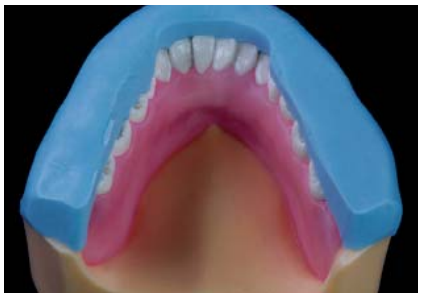


Figure 11. Fabricating a labial...

Figure 12. ...and a lingual putty key.

Figure 13. Foil copings on the abutments.

To begin with, the prefabricated titanium bar is shortened to the correct length and positioned to the correct horizontal axis with a parallelometer (in this case we use the Paralas device from Dentaurum) for laser welding (Figure 3).

The bar components are passively fitting before laser-welding together with the titanium abutments (Tiolox, Dentaurum Implants) (Figure 4). Only pure titanium wire should be used as filler material when laser welding. After laser welding, the bar is finished and polished (Figure 5). The titanium bar sleeve is laser welded to the retention (Figure 6) and polymerised into the denture (Figure 7). The prefabricated titanium abutment components enable a precise, cost-effective restoration to be fabricated using the same basic parent material, i.e. titanium.

Customized bars can be used for implant-retained dentures in the case of edentulous jaws. A prerequisite depending on bone quality and other factors are the insertion of 4-6 implants in the maxilla and/or the mandible. The advantage of these bars is the easy cleaning of the denture by the patient and the illusion of having fixed teeth. The disadvantage could be the effect of "unmasking" when the prosthesis is removed. Patients who already live with full dentures usually adapt quickly and won't experience hypersensitivity.

Figure 8 shows the starting point for a milled bar construction with four tiologic® bar attachments (Dentaurum Implants) for

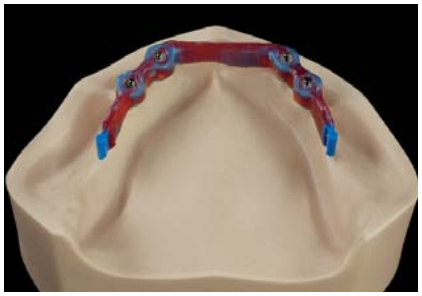
Figure 14. Connecting the abutments with an acrylic bar.

Figure 15. Checking the labial space conditions with the putty key.

Figure 16. Checking the lingual space conditions with the putty key.

Figure 17. Applying milling wax (lingual view) and...

Figure 18. ...positioning the Dent Attach V-males (labial view).



Figures 19 and 20. Wax-milling in a 2° angle - lingual and labial views.

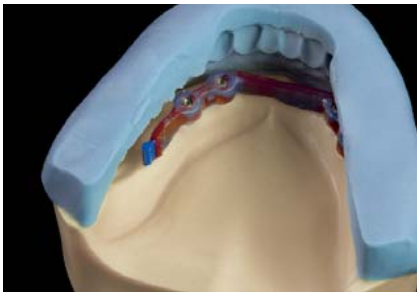


Figure 21. Wax-milling with putty key.

the bonding technique. By means of these abutments, we can get the fitting troubles under control which result from the contraction of the metal during the casting process (The contraction of titanium is 1.58%, precious alloy is 1.7% and CoCr alloy is 2.2%).

If the bars are bonded on the model or ideally, bonded in the patient's mouth, we shall achieve an absolutely passive fit on the implants. A trial set-up is compulsory for all implant work of this type (Figures 9 and 10) as the fabrication of a labial and lingual putty key is compulsory (Figures 11 and 12) for the check of the space conditions. We then produce plastic copings for the bar abutments by thermo-forming. The inner foil with a thickness of 0.1mm serves as a spacer for the metal bonder and "room to move" for the cast object. The cap of the outer foil is cut back with a scalpel for the opening of the screw head before the plastic coping is removed and the latter is shortened at the visible border line of the titanium abutment. The inner foils centre the copings (Figure 13) and are only taken out before investing.

In the next step, the foil copings are connected with a self-made acrylic bar (Figure 14) and the space conditions are checked (Figures 15 and 16). After applying Star Wax M, the distal positioning of Dent Attach V plastic attachments (Figures 17 and 18) follows the wax milling of the bar with a 2° wax milling bur (Figures 19 and 20). Again, a space check with the putty key should be made (Figure 21). Figures 22 and 23 show the cast and milled titanium bar. The investment rematitan Plus for crowns and bridges was used with a concentration of 70% (500 gram powder - 56ml liquid and 24ml H_2O).

It is planned to produce the bar housing as a one-piece cast (see Dentaurum working instructions for one-piece cast). The model with bar is prepared for the silicone duplication (Figures 24 and 25). After duplication, the area of the bar inside the silicone mould is poured out with rematitan Plus C&B with a concentration of 100% for a higher expansion of the bar. The rest of the model is filled with rematitan Plus for cast partials. When

Figure 22. Cast bar (lingual view) and...

Figure 23. ...and milled with a 2° bur (labial view).

Figure 24. Bar prepared for silicone duplication lingual view and...

Figure 25. ...labial view.

Figure 26. The refractory model.

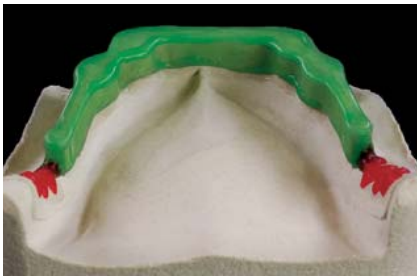


Figure 27. Waxing-up secondary construction.

Figure 28. Cast secondary construction.

Figure 29. Interior view of the secondary construction with inserted males.

Figure 30. Interior view of the secondary construction with fitted bar.

Figure 31. Bar construction with balance.

the refractory model is removed (Figure 26) we apply a wax sheet 0.6mm for modelling the bar housing (Figure 27).

Next, the wax housing is invested with rematitan Plus for cast partials and cast with titanium (Figure 28). Figures 29 and 30 show the interior view of the bar construction with inserted Dent Attach males and fitted bar. The completed work made of titanium has a weight of only 6.7 grams (Figure 31). The same construction made of CoCr would have a weight of 12.8 grams and made of precious alloy (Dentaurum Classic) a weight of 22.9 grams. Titanium is both strong and light!

About the author

Frieder Galura was trained as a dental technician at the University Dental Hospital in Heidelberg, Germany. He has worked in many dental practices and labs in Germany, concentrating on ceramics, milling and attachment techniques. He commenced working for Dentaurum as dental technician in 2002 and has lectured and run training programmes for them both in Germany and throughout the world. Since 1995, he has been widely published in Germany, France, Spain, Italy and Japan.