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CPD Article

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Proud of our History, Looking Forward to the Future

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Non-precious certainly doesn't mean unaesthetic.

Wirobond 280 for accuracy of fit without precious metals.

An alloy with countless advantages

While there has been a boom in demand for highly aesthetic restorations, at the same time more and more patients are demanding lower-cost alternatives to expensive alloys. But many dental technicians seem to distrust the economical non-precious alloys. "Too imprecise" and "too difficult to finish" are typical examples of the widely held preconceptions with which non-precious alloys are frequently dismissed. Wrongly, in the opinion of master dental technician Jurgen Stentenbach, who shows in this contribution that restorations can be made using non-precious alloy frames without having to compromise on accuracy of fit or aesthetics.

(Fig. 1) The pre-operative situation does not look at all promising! The patient, who had not received dental treatment for years, required a substantial bite elevation.

Partial tooth loss, if untreated, leads to changes in the patient's oral situation with every year that passes. This often includes considerable abrasions to the remaining dentition with a loss in height of bite, non-physiological loads on the remaining teeth, frequently coupled with joint and muscle problems (CMD) and/or periodontal problems.

The female patient who presented for treatment at the practice had not received dental treatment for years. Problems with the vertical dimension, malocclusion and concomitant abrasions compelled her to seek extensive corrective dental treatment. The pre-operative situation did not look at all promising (Fig. 1). An absence of supporting areas and reduced vertical relation made it necessary firstly to re-establish a physiological vertical dimension. Gap formation severe abrasions and lack of support meant that bite elevation was required. A normal arrangement of the posterior teeth would not be a straightforward matter.

(Fig. 2)
The Pindex saw-cut models show eight ground teeth in the mandible....

(Fig. 3)
..... and as many as ten prepared teeth in the maxilla.

The standard Pindex saw-cut models show eight ground teeth in the mandible and as many as ten prepared teeth in the maxilla (Fig. 2 and Fig. 3). All the teeth in each jaw were waxed up as copings and then splinted to form small bridges (Fig. 4). Even at the wax-up stage, great care was taken to ensure that the shape of the copings matched the later veneering, because it is a general rule that the more ceramic has to be built up, the more susceptible a veneer is to flaking or chipping. Tooth 26 (upper left first molar) was formed as a retainer and then reduced in size (Fig. 5).

(Fig. 4)
All the teeth in each jaw were waxed up as copings and were then splinted to form small bridges.

(Fig. 5)
Tooth 26 (upper left first molar) was appended to the upper bridge as a terminal pontic.

(Fig. 6)
Preciline rod attachments made of burnout plastic were waxed distally onto the terminal premolars of the mandible.

Preciline rod attachments made of burnout plastic were waxed distally onto the terminal premolars in the mandible (Fig. 6). The wax-up was then individually fitted with

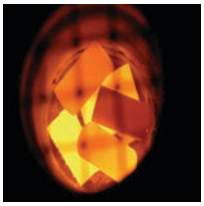
3-millimetre sprues and mounted on a mould former (Fig. 7). Of cause, opinions differ about spruing without sprue bars. But in our laboratory we have obtained good results with this method on smaller restorations using 3-millimetre sprues. If, in the case of this particular patient, all the copings were connected to form a single long-span bridge, I would of course use a sprue bar.

(Fig. 7)
The wax-up was then individually fitted with 3-millimetre sprues and mounted on a mould former.

Right Temperature - right fit

We used Wirobond 280 as the casting alloy. Manufactured by BEGO, it is made up of about 60% cobalt, 25% chromium and 6.2% tungsten. It also contains 4.8% molybdenum, 2.9% gallium and less than 1% of silicon and manganese respectively.

It is coefficient of thermal expansion is in the range from 14 [10-6 K-1] (25°C to 500°C) to 14.2 (25°C to 600°C), and its melting range lies between 1360°C and 1400°C. The alloy is easy to melt and cast (Fig. 8), for which we use the Fornax high-frequency induction casting machine.



(Fig. 8)
Wirobond 280 is easy to melt and cast, for which we use the fornax highfrequency induction casting machine.

The main reason for using this method is the economic advantages it offers. Our casting machine is now over 25 years old and it still gives us perfect casting results. So after divesting, we can sandblast with 120µm special corundum and Perlablast and fit the copings immediately. (Fig.9) shows an unfinished crown directly after divesting. Even the thin margins have been satisfactorily filled.

(Fig. 9)
Immediately after divesting. Even the thin margins have been satisfactorily filled.

The full economic advantage that Wirobond 280 offers compared to a precious metal alloy becomes clear when you consider its weight: the same construction in precious metal would certainly weigh more than 40 grams! The 21 units here weigh a mere 12 grams (Fig. 10) enabling patients to afford additional veneering.

Better – and made by BEGO

While Wirobond 280 is noticeably harder than precious-metal alloys, its Vickers hardness of HV280 is lower than other commonly used non-precious alloys. Wirobond 280 is consequently less tough, yet still retains sufficient hardness and is relatively easy to finish with cross-cut burs and stones. We prefere cross-cut burs which we used to reduce the margin in the region of 12 to 22 (upper left to upper right lateral) with the upper frame seated (Fig. 11). The lower frames with its distal rod attachments is also seated (Fig. 12).

Oxide firing is necessary. An oxide layer with an even, velvety coloration is a sure sign that the alloy has filled the structure optimally (Fig. 13).

Before veneering, the copings are again sandblasted with 250 µm aluminium oxide to clean them.

After steam cleaning, the opaque can be applied and fired (Fig. 14). Fig. 15 shows the mandible after initial firing. The sharply inclined 32 (lower left lateral incisor) was somewhat difficult to form.

(Fig. 10)
Great cost saving – Wirobond 280 means patients can afford additional veneerings.

The same procedure was followed for the maxilla: whereas one quadrant has already been fired once, only the first dentine firing is being applied in the second

quadrant. The anterior is still at the opaque firing stage (Fig. 16). Time is saved because no prolonged cooling is required.

Accent on hygiene

(Fig. 11)
Wirobond 280 has low toughness but still retains sufficient hardness. It is easy to finish with cross-cut burs. In the upper anterior region, the margin was reduced for ceramic shoulders.

(Fig. 12)
The lower frame with the rod attachments also fits well.

(Fig.13)
An even controlling firing confirms that the alloy has filled the mould optimally

The trial fitting on the patient with new bite registration, overimpression and model making, was followed by milling for the stress distribution arms. The model was then prepared for the wax-up of the sublingual

(Fig.14)
After sandblasting and steam cleaning, opaque can be applied and fired.

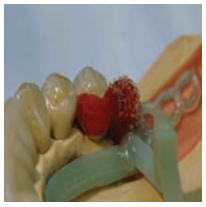
(Fig.15)
The sharply inclined die 32 can be seen in the mandible after initial firing.

(Fig. 16)
The bridges of the maxilla were layered and fired successively. Times is saved because no prolonged cooling is required.

bar (Fig. 17). For this we use light-curing wax manufactured by Primotec, which eliminates the usual duplication of the model required with conventional methods. Retention pearls were sprinkled over the secondary components of the wax-up ready for investing (Fig. 18), before casting in Wironium Plus. The stress distribution arms were modelled from pattern resin for reasons of stability (Fig. 19). Once the prefabricated teeth had been set up, the lower prosthesis was ready for a trial fitting (Fig. 21). The lower prosthesis in plastic was fashioned after the successful trial fitting, with periodontal hygiene in mind (Fig. 23).

(Fig. 17)
After the trial fitting, the model was prepared for the wax-up of the sublingual bar.

(Fig. 18)
Light-curing wax saves duplicating the model.



(Fig. 19)
The stress distribution arms were modelled from pattern resin.

(Fig. 21)
After the prefabricated teeth had been set up, the lower prosthesis was ready for a trial fitting.

(Fig. 23)
After the successful trial fitting, the prosthesis was completed having regard to periodontal hygiene considerations. The stress distribution arm fits precisely.

(Fig. 24)
Gently retaining white attachment matrices were used for the first few days.

In the foreground, it can be seen how precisely the stress distribution arm fitted. Gently retaining white attachments were used for the first few days (Fig. 24). Once the patient had got used to the method of handling after about a week, the white attachments were replaced by more strongly retaining yellow attachments. The milled bed, the rod attachment and the corresponding secondary component were also designed with periodontal hygiene in mind – all surfaces can be cleaned with an interdental brush (Fig. 25 and Fig. 26).

(Fig. 25)
Rod attachment, milled bed and secondary component were also designed with periodontal hygiene in mind...

(Fig. 26)
... all surfaces can be cleaned with an interdental brush.

Conclusion

Immediately after cementation it was clear that this problematic situation had been satisfactorily resolved. It was only in the region of 32 and 33 (lower left lateral incisor

(Fig. 27)
Problem satisfactorily resolved – it was only in the region of 32 and 33 (lower left lateral incisor and canine) that it was not possible to conceal the actual tooth position.

(Fig. 28)
Precision work – the stress distribution arms fit precisely. Accuracy of fit with Wirobond 280 is fully comparable with the result obtainable with a gold alloy.

(Fig. 29)
Good impression – the gingiva has adapted to the crown margin and there is no sign whatsoever that the papillae have been squashed.

and canine) that it was not possible to conceal the actual tooth position (Fig. 27). The partial denture and stress distribution arms, however, fit precisely so that the accuracy of fit is fully comparable with the result obtainable with a gold alloy.

The upper anterior region is visally pleasing too, thanks to the ceramic shoulders in the region of 12 to 22 (lateral to lateral) (Fig. 28). So, despite the preconceptions frequently expressed by many dental technicians, it is perfectly possible to achieve aesthetically good results with non-precious alloy such as Wirobond 280. Immediately after insertion of the restoration, the gingival has adapted neatly to the crown margin and the papillae show no signs of irritation whatsoever (Fig. 29).Even the patient's insistence on crossbite occlusion in the posterior area to make more room for her tongue does not detract from the pleasing overall result (Fig. 30).

(Fig. 30)
The only slight disappointment – the patient insisted on crossbite occlusion to make more room for her tongue.

CPD Questions Ref No. TS09-04

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Q1. What diameter sprues were used?

A)2mm
b)3mm
c)4mm
d)5mm

Q2. What is the Chromium content of Wirobond 280?

a)15%
b)30%
c)35%
d)25%

Q3. After divesting the framework was blasted with....

a)80µm special corundum
b)110µm special corundum
c)120µm special corundum
d)250µm special corundum

Q4. The construction in precious metal would weigh more than 40 grams. The 21 units in Wirobond 280 would weigh.....

a)12 grams
b)22 grams
c)32 grams
d)42 grams

Q5. What is the Vickers Hardness of Wirobond 280?

a)HV 480
b)HV 380
c)HV 280
d)HV 180

Q6. Why was light curing wax used?

a)Attractive colour
b)Eliminates the usual duplication of the model required with conventional methods
c)Stabilises the lingual bar
d)Quicker processing

Q7. What veneer retention method was used?

a)Wax pattern retentions
b)Post casting bonding agent
c)Retention pins
d)Retention pearls

Name:

GDC Number

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Postcode:

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