

# Fixed Removable & Digital Technology



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## Introduction:

As many of you are aware, the introduction of new digital technologies have increased available options to our patient's treatment plans. With the advent of digital dentures, CAD/CAM - RPD frameworks, crown and bridges it is likely you will be part of the new dental technology landscape eventually. Not to say that all this technology has been perfect but in most respects but, it is superior and more efficient with minor updates to come. The technology is ever growing at a rapid rate with constant changes and upgrades to propel forward the quality and efficiency of dental products. In my opinion, that this technology is here to stay and will slowly creep into practice life intentionally or by necessity.

The content of this article is focused on one of the many types of digital technologies for implant over dentures. It is the fixed removable prosthesis. A fixed removable prosthesis is usually not a patient's common request or the primary treatment plan option offered by practitioners. Why is this so? I do not really have the answer. I guess the phrase "you don't know what you don't know" may very well be the reason. However, what I would like to share with everyone is my experience with the fixed removable and how it has benefitted my patient who was looking for this exact appliance but unable to communicate his prosthetic wishes to me.

My journey of the fixed removable started as most of our new dental endeavors do, at trade shows and/or continued education lectures. The fixed removable Rebourke bar caught my eye at a trade show table and made sense to me on a mechanical level. How to integrate this into my practice clinically was the challenge and like most of us, the learning curve to complete the case in full confidence is intimidating.





Fig. 1 — Initial existing bar



Fig. 2 — Existing initial CUD



Fig. 3 — Bio-film existing bar



Fig. 4 — Implant level impression



Fig. 5 — Preliminary wax try-in

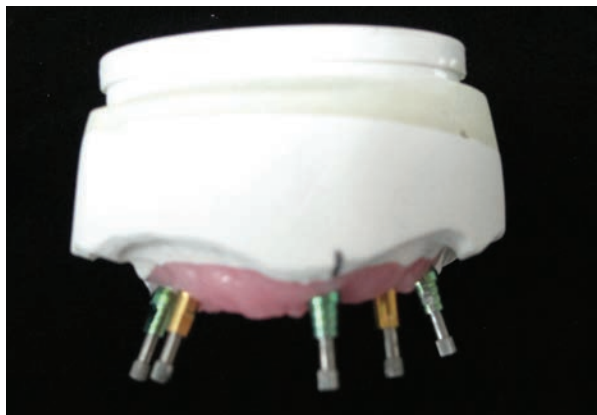


Fig. 6 — Bite cylinders for verification jig

### A Little bit about the Rebourke Bar:

The Rebourke bar is fully implant supported with no resiliency. It requires a minimum of four implants. It is a combination of a fixed bridge and an over denture. It does not rely on the soft tissues for support during occlusal function like a standard complete denture, thereby slowing down the rate of bone resorption typically associated with tissue borne prosthesis. In the upper arch, no palate coverage, allows the

patient to retain natural palatal textures and thermo perception when eating. It has a 25-degree anterior angulation, securing the anterior with a purposeful path of insertion with posterior locking mechanisms “MK1 attachments” to keep it locked in place. It also allows for an anterior flange providing support for labial contours (soft tissue) for those patients who have “lost their dental bulge” not just lip support alone. If a cantilever is required, it should be kept to a one-tooth extension to ensure strength and durability of the appliance and implants.

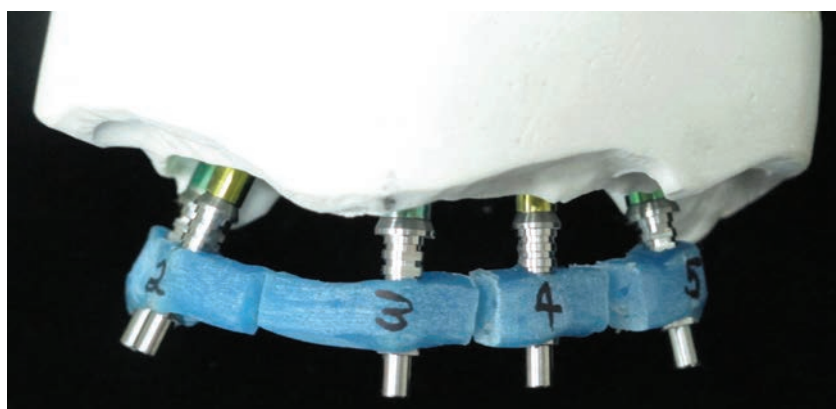


Fig. 7 — Verification jig on model

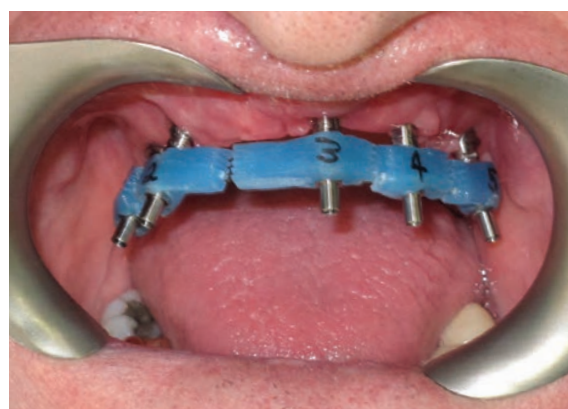


Fig. 8 — Verification jig intra-oral

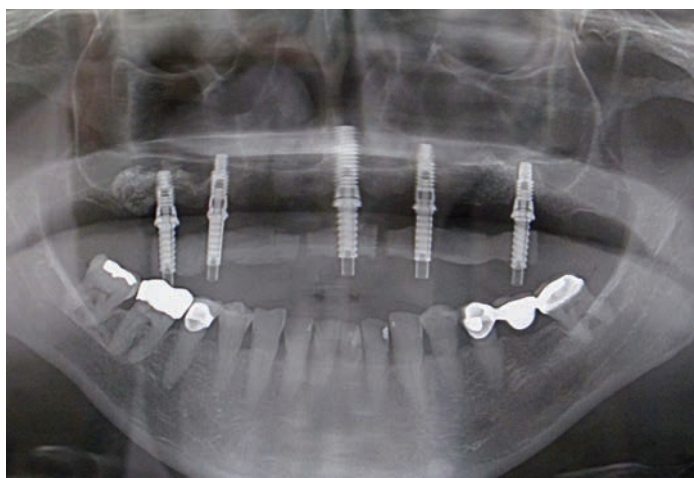


Fig. 9 — OPG of verification jig



Fig. 10 — PA of center implant

complete upper removable over denture (Fig.1-2).

The option of two zygomatic implants placed in the posterior maxilla was discussed at the time of grafting but the patient was not interested. The existing bar appeared to be off the ridge due to bone resorption. Therefore, we were contemplating making a new bar adapted to the



Fig. 11 — Final impression with ginga fast



Fig. 12 — Master cast

## Case Study:

Our patient presented as a 65-year-old healthy male, fully dentate lower arch mixed natural, crown, and bridgework. The upper arch is fully edentulous with five bio-horizon implants and a CAD/CAM bar with 4 locator attachments and a

new ridge contour and decided to look into a new concept at the same time - the Rebourke bar.

The patient had a well functioning denture but for psychological reasons wanted, something fixed or attached. He desired getting away from the denture concept for reasons like age perception, self-image and acceptance by others.



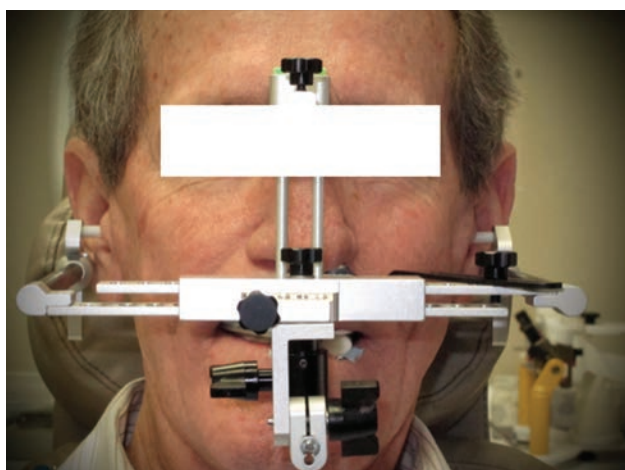


Fig. 13 — Facebow transfer.



Fig. 14a — Final wax set-up

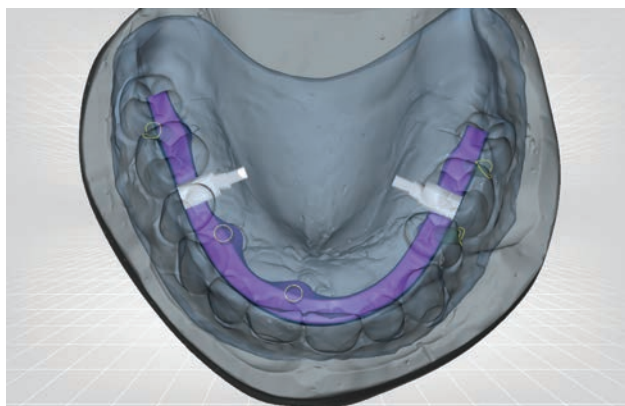


Fig. 14b — Scanned design superior view

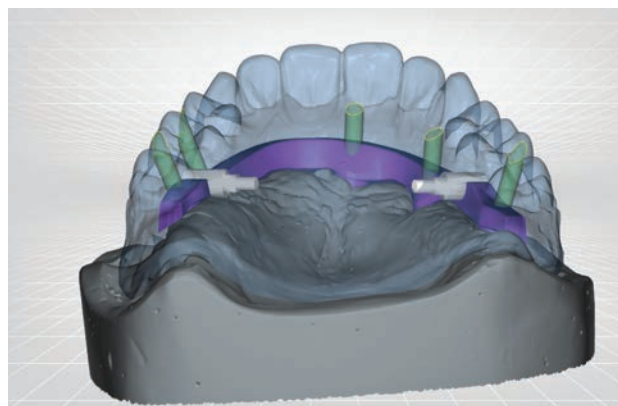


Fig. 14c — Scanned design palatal view

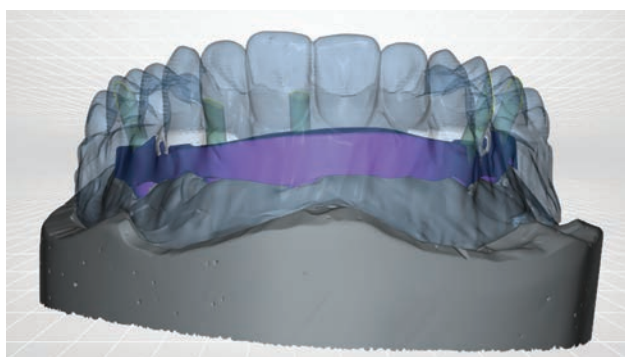


Fig. 14d — Scanned design frontal view



Fig. 15 — Returned case kit from lab

The option of a fixed bridge was discussed but the lack of a labial flange for tissue support held back this option. The resilient over denture did the job but the patient felt as if the denture was always wore gradually or not as tight as when they left with new liners. The patient felt like the denture was loosing its retention week by week. I know what some of you are thinking that a secondary bar could be made over the primary bar, which would eliminate some of the wear and tear on the locator liners as to assist in limiting the occlusal forces on the locator attachments and sharing the forces on the top

part of the primary bar. This was discussed with the patient but he knew he wanted something more fixed

Before starting such a case, major considerations must be given when treatment planning. In addition to the patients defect (just lip support via denture teeth and or teeth and tissue/bone facial support), VDO, VDR (freeway space), aesthetics, phonetics, acrylic volume, ridge contour, occlusal



Fig. 16 — Primary bar on model



Fig. 17 — Primary bar sagittal view.



Fig. 18 — Primary bar intra-oral



Fig. 19 — Articulated double structure left side



Fig. 20 — Articulated double structure right side

scheme, implant emergence profile and the patient's willingness to adapt to the new prosthesis (psychological reasoning) must be evaluated.

There are a few other specific requirements of the Rebourke bar that one must consider;

- The minimum space the primary and secondary bars require from tissue level is 6mm and does not including the denture set up. (That is just the space required for the bars).
- The other minimum requirement is a space of 7mm between the 2 most distal implants for placement of the MK1 attachments.
- A fee must be worked in advance out in order to complete the diagnostics and if the result of the diagnostics is unfavorable, the patient must be aware that there is a fee attached to the diagnostic services.
- Diagnostics are time-consuming they involve a preliminary impression, a final implant level

impression, a wax set up and try in for a aesthetics and vertical dimension confirmation as well as an evaluation of the opposing occlusal scheme.

Therefore, this is where the Rebourke bar journey begins.

- We were at an advantage in the sense we knew the existing height of the initial bar, which was 7mm.
- The existing bar was removed for an implant level impression (Fig.4) and as noticed in (Fig.3) there was a build up of biofilm under the bar, which was cleaned and replaced.
- From this impression, a master cast was poured with gingifast (Fig.12) to produce our verification jig (Fig.7).
- Bite verification cylinders were used to fabricate the jig (Fig.7).
- Once the jig was fabricated on the model, it was cut into sections between the implants to be replaced intra orally (Fig.8).
- After looting the jig together intra-orally, a panorex was





Fig. 21 — Matrix of set-up



Fig. 22a — Wax up for final try-in  
cameo surface



Fig. 22b — MK1 attachment placed for  
try-in



Fig. 23 — Intaglio surface of wax try-in



Fig. 24 — Processing pins in place for  
investment

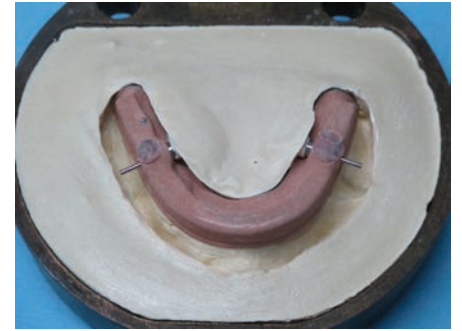


Fig. 25 — Invest case for processing

taken to verify seating, in some cases, metal-to-metal contact is visible and a Sheffield test would verify its passivity.

- Another interesting note in the verification panorex is the translucency around some of the implants and bite verification housing unions (Fig.9).
- Periapicals were taken as a safeguard to ensure full and proper seating (Fig.10).
- Satisfied with our verification jig we move forward to our preliminary wax try in (Fig.5), which was approved by the patient.
- At this point we now have our co-ordinates or boundaries for scanning the model and the wax try in to verify we have sufficient space for the primary bar, secondary bar and the over denture.
- A digital report sent through e-mail by Panthera is viewed on 3-D viewer software to be authorized by practitioner and patient (Fig.14b, 14c, 14d). This important step gives the patient the realization that you are on the edge of technology with their treatment.
- For the final set-up, a face bow transfer was taken (Fig.13) (to transfer the arc of closure, which is imperative for the new rigid structure) and a new set-

up produced with Ivoclars' Phonares II denture teeth (Fig. 14a).

- In our particular case, we had to drop a molar in quadrant one because of insufficient space, which the patient saw on the 3-D viewer, and approved it because it was out of the aesthetic window at the final try-in appointment.
- The design was approved and the milled structures were fabricated (Fig. 15).
- The primary bar as depicted here on the model (Fig.16) is a highly polished titanium structure allowing engagement of the supra structure on a 25 degree angulation in the anterior with bi-lateral locking hoops for the MK1 attachments in the posterior (Fig. 16, 17, 18). The articulated double structure indicates the amount of set-up space, the right posterior being at less than minimum (Fig.19, 20).
- The outer surface of the secondary bar was sandblasted and coated pink as not to show through the acrylic after processing. Both structures were inserted intra orally first, to verify fit and a new panorex was taken to confirm seating.
- Forwarding to the final set-up we use the matrix that was made before the bars were milled and readapted



Fig. 26 — Processed case



Fig. 27 — Processing screw removed



Fig. 28 — Self cure applied around MK1 for finish



Fig. 29 — Finished intaglio surface for insert

the denture teeth to the supra structure with the processing pins in place (Fig.21- 22b).

- The wax up for try-in was completed with processing pins in place as to not get wax in the actual MK1 attachments (Fig. 22). A view of the intaglio and cameo surfaces for the final wax try-in appointment (Fig. 23 - 22).
- Once the final try-in has been approved for aesthetics, phonetics, bite verification, the denture will be ready for its final wax up and processing.
- The final wax denture is invested in the usual manner with the processing pins in place and the intaglio surface blocked out with lab putty (Fig. 24 - 25).
- Once cured and cooled the case is retrieved from investment, trimmed and the processing pins removed (Fig. 26 - 27). The case is then put back on the master cast with the MK1 attachments locked into the primary bar and self-curing resin is applied around the lingual aspect of the MK1 to secure it into place (Fig. 28).

- Excess acrylic and slide pins are trimmed and polished with appropriate burs and rubber points to finalize the prosthesis for insertion (Fig. 29 - 30).
- A final check to ensure the MK1 attachment is in proper working order, a test with the removal tool on the master cast is exercised before insertion (Fig. 31).
- Once satisfied with all the completed work the case is ready for insertion and final minor mill in of any occlusal discrepancies (Fig. 32 - 33).
- On a minor note, a concave shape with a bur is made around both buccal pin exits.
- From a hygiene point of view, the primary bar should be removed at minimum once a year for a cleaning under the bar and around the implants.
- Follow up radiographs to be taken at the discretion of the dentist at the hygiene intervals to monitor implant status.
- As for the removable prosthesis, it should be removed and cleaned daily as any other implant removable denture both manually “brushing” and chemically “soaking in a cleanser”.





Fig. 30 — Finished cameo surface for insert



Fig. 31 — Removal key for MK1 on model



Fig. 32 — Intra-oral insert palatal pic



Fig. 33 — Intra-oral CO insert pic

## Discussions and Conclusion

Digital technology has proven to be beneficial in many aspects of treatment planning, fabrication and the success of this implant profile. I believe we are in the infancy of this technology and have a whole lot more in store for us with its full impact on dentistry yet to be seen.

In conclusion, the patient was very satisfied in all respects with his new prosthesis. Having the rigid structure of a fixed removable with a palate free design was desired by patients and seems to be the perfect fit for this one. It was interesting to note that after a month or so, the patient was still impressed with the appliance and his new routine of denture removal and insertion. The feeling of wearing a denture is not there anymore he claims it feels like it is part of me. Alternatively, we had a discussion before proceeding with treatment about the future and if there should come a time that dexterity becomes an issue, what would he do (possible solution, my new project lock and release bar). To which he replied, I'd worry about that when I get there, for now I am happy. Comforting words!

I would like to take this opportunity to thank Dr. John McCullough DDS and his mentorship for which I'm forever thankful and the beneficiary of his of experience. Also the staff at Panthera Dental in Quebec for their guidance and support through all aspects of fabrication. ■

### About the author

**Panfilo Joseph Della Marina DD,LD** is a graduate of the George Brown Denturist program 1996 and an Ivoclar BPS certified denturist 2004. Joseph is a member of the Denturist Association of Canada, Denturist Association of Ontario, Maine Licensed Denturist Association and the National Denturist Association of America. Joseph is also a council member for the College of Denturists of Ontario and former member of the CAC (Curriculum Advisory Committee) charged with the accreditation of Canadian Schools of Denturism to ensure that the highest quality curriculum. The majority of his practice consists of implant prosthetics and working with those who place dental implants. Joseph is a member of the advisory board for Spectrum Denturism Magazine and is internationally published author in Denturism.