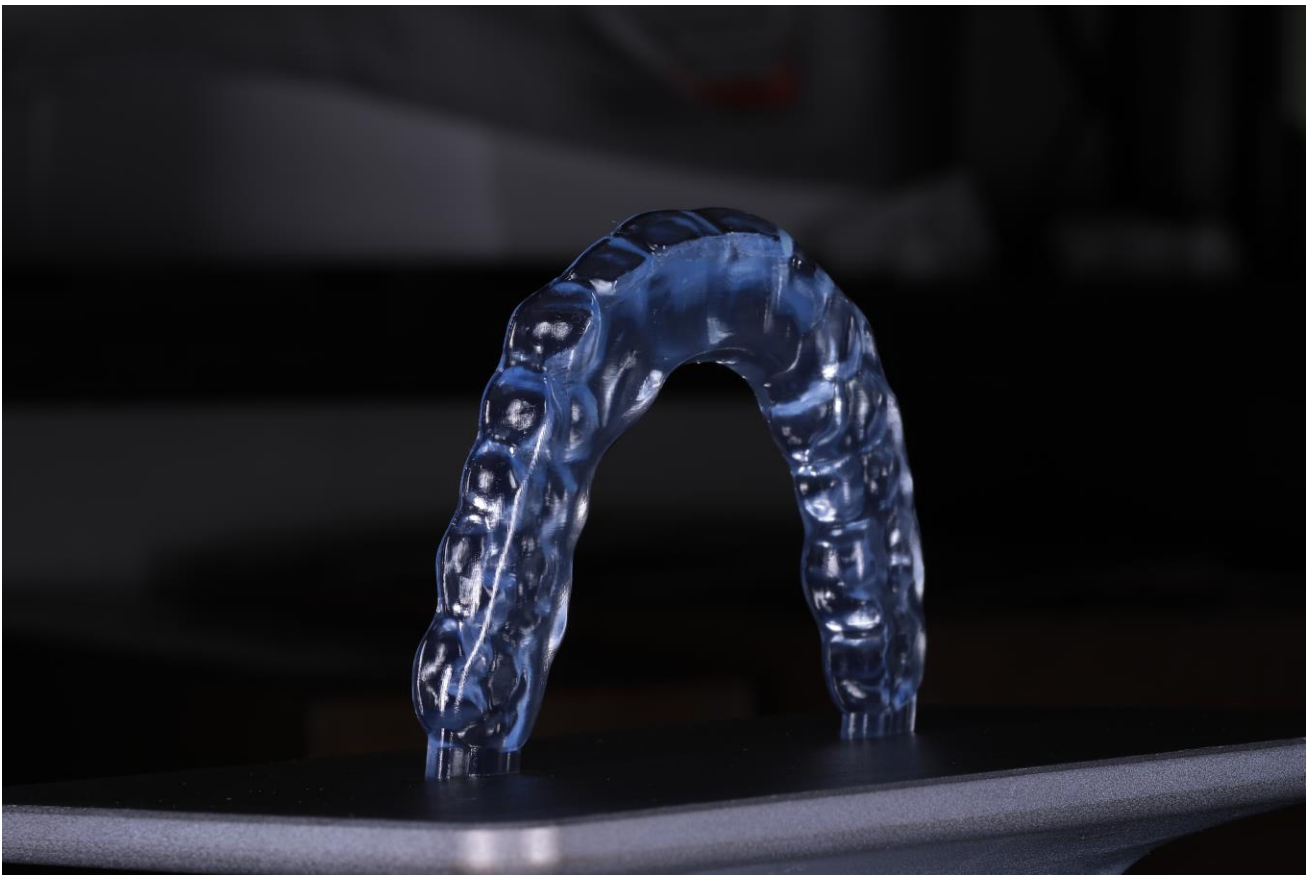


A game changer for chairside splint production.

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Introduction

From their inception, porcelain laminate veneers have become a staple in modern cosmetic practice. Their indications include the corrections of tooth shape and position, closing of diastemas and masking tooth discoloration. In terms of aesthetics and tooth conservation, these restorations have been proven to be incredibly successful^{1,2}.

When enhancing or rejuvenating a smile, the key is to achieve minimal tooth reduction. The conservative nature of veneer preparation allows for ultra-thin veneers that can be relatively fragile. With advances in material sciences, we now have numerous porcelains with improved aesthetics, bond strength and fracture toughness³. These materials allow the dentist to conservatively design smiles and favorably direct functional forces. However, when nonfunctional forces are applied, as in the case in bruxism, long-term success can be affected.

Bruxism can complicate porcelain veneer prognosis, hence in some clinical situations, porcelain veneers may be contraindicated^{4,5}. According to the American Academy of Orofacial Pain, bruxism is a diurnal or nocturnal parafunctional activity which includes clenching, bracing, gnashing and grinding of the teeth⁶. It is defined as a forcible clenching or grinding of the teeth, or a combination of both in non-functional movement of the jaw.

Magne *et al.* reported that failure rates increased in the presence of uncontrolled bruxism. Managing bruxism in the form of a nocturnal and/or diurnal splint is recommended as a preventative measure to reduce the risk of failure^{7,8}. Occlusal splints allow the mandible to continue the nonfunctional excursive movements whilst balancing the force distribution across the arch, thus protecting the veneers.

Case Study

A 34-year-old female presented with aesthetic concerns. She found her smile to be unflattering and wanted to improve her overall aesthetics and self-esteem. She wanted slightly sharper “feline” upper canines and a whiter smile.

Treatment Plan:

After thorough co-diagnostic digital smile design and planning, the patient decided on 10 porcelain veneers and 2 resin veneers. The increased length of her upper canines presented a potential risk for increased lateral forces in excursive movements. In addition, the patient reported a history of bruxism.

Occlusal Splint Design & Material:

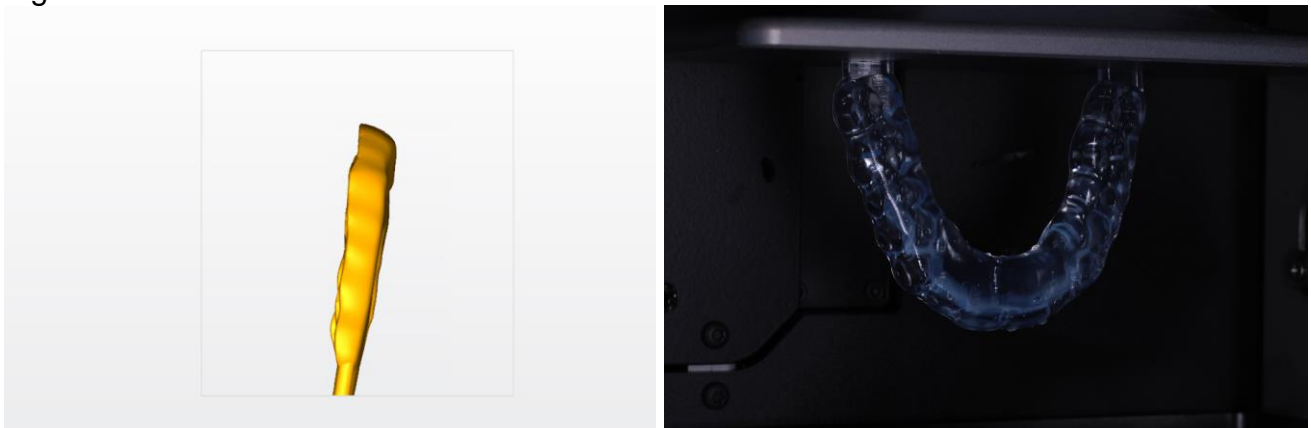
Flat plane occlusal splint was decided as ideal and the scans were sent for Ai Design via 3Shape Design Services. This is a 15-minute design service enabling same day productions.

Material: Keyprint KeySplint Soft

3D Printer:

Asiga Max UV with UltraGLOSS™ material tray and Composer software.

Figure 1.



Occlusal Splint Fit:

The printed occlusal splint had an incredibly accurate fit with little discomfort or noticeable pressure on the anterior teeth. Due to the digital design process and digital bite registration, only minor occlusal adjustment was required.

Figure 2.



Benefits of the Asiga UltraGLOSS™ material tray:

The post processing time had been all but eliminated. Apart from the standard washing and post curing requirements, trimming off the sprues at the distal saddle of the splint was the only manual labor required. This allowed us the flexibility of manufacturing and delivering a perfect occlusal splint within a day.

KeySplint soft has always had a high patient compliance due to the fit and nature of the material. Now with the release of the UltraGLOSS™ material tray, chairside fabrication has become effortless and time efficient without compromise.

Conclusions

Longevity of restorations (in the absence of debonding or fracture) is quintessential in successful clinical practice. Patients with bruxism exhibit a three times higher probability of debonding and eight times higher probability of porcelain fractures compared to their non-bruxing counterparts. As such, the use of occlusal splints reduces the failure rate of porcelain laminate veneers in patients with bruxism. Having the ability to provide a same day design and production service with nominal manual labour has now become my gold standard treatment. In addition, the KeySplint material and the accuracy of 3Shape Design service consistently produces exceptionally comfortable occlusal splints which increase patient compliance and in turn increase the longevity of dental restorations.

Figure 3.



Tips and Tricks for Printing:

1. Thoroughly mix your KeySplint resin prior to pouring into the UltraGLOSS™ material tray
2. If you already have KeySplint resin in the UltraGLOSS™ material tray, it may be good practice to always clean your build tray according to the Asiga Protocol by exposing the tray to 30 seconds of UV light. Then peel off the cured resin for the base prior to mixing the resin in the tray.
3. When designing your splint, add an extra 3mm of solid form to the distal portion on the splint. This will establish a stable anchor for the splint when mounting it on the build platform. For consistent results, place the splint at a 9-degree angle as shown in Figure 1.
4. Double check that you are using the UltraGLOSS™ material tray profile in Asiga Composer and print at the recommended layer thickness of 50-microns.
5. After printing, use 2 baths with fresh 99% IPA solution. The first bath is to remove the bulk of uncured resin and the second bath is for a thorough wash for 5 mins.
6. After washing and air drying, place the splint in an oxygen free environment and cure for the recommended curing times (times are specific to curing chamber manufacturer).
7. Once cured, remove the distal extension portion with an acrylic bur and lightly buff the area. You are now ready to issue the high gloss splint.

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About Dr Kasen Somana BSc Hons (Melb) BDS Hons (Syd) MSc (Lond) MFGDP (UK)

Dr Kasen Somana has been in private practice in Melbourne, Australia for almost 20 years and is the principal dentist of Signature Dentistry in Toorak. His practice has a special interest in conservative digital aesthetic fixed prosthodontics and occlusal rehabilitation. Determined to provide the highest level of care to his patients, he often participates and lectures at digital dental conferences locally and internationally. He is a key opinion leader for 3Shape and Asiga.

About Asiga

Asiga, a 3D printer manufacturer located in Sydney, Australia manufacture 3D printers for direct additive manufacturing in industries including dentistry, hearing, medical modelling, jewellery and more. Having the ability to output predictable and accurate 3D printed parts is essential for these industries, ensuring production continuity. Asiga 3D printers offer an open material architecture providing compatibility with more than 500 materials from many industry leading 3D printing polymer manufacturers. www.asiga.com

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