Unilateral removable partial dentures (RPDs) are often prescribed by clinicians with reluctance due to their relative instability in comparison with fixed and bilateral appliances. This article discusses a technique that eliminates much of the instability of a unilateral design and engages undercuts that would usually present challenges to the dental technician.

The double hinged sectional design originated in the 1980s with a patient who had refused fixed restorations, bilateral and traditional unilateral RPDs. The patient presented with a small bounded edentulous saddle with sound abutment dentition and gingivae and pronounced undercuts in the proximal aspects of the teeth and the surrounding soft tissue. An appliance was required that would obviate the need for cemented or implanted retention without clasping, while remaining resistant to displacement during use.

With multiple paths of insertion available, a sectional denture was the most obvious solution as significant freedom of movement was required for each section, but in this application entirely separate sections were undesirable.

This resulted in the design of a unilateral plate, connected to a moving saddle area by a hinged bar, the assembly to be locked in place during use by a Pullen-Warner bolt mechanism operating through the buccal flange. The moving parts would be concealed within the replacement teeth and saddle area to present a minimally invasive profile. This design can be applied to almost any posterior bounded saddle situation, and variations of it can even be used on occasion to replace single teeth.

After casting of the secondary models, the first stage of manufacture is a wax try-in, the artificial teeth having been prepared with cut-out areas to accept the moving parts of the appliance. These are used as a guide when patterning the metal components so that they fit snugly into the space intended for them.

This initial wax-up determines the space available for the moving parts, so it is vital that this is approved before work begins on the framework. Once returned to the laboratory, a silicone index is taken of this try-in and the teeth are removed from it.

The moving parts are designed around the smaller blue swing-lock hinge patterns, which are now only available direct from Swing Lock, Inc. in Texas.

The hinged bar is constructed by joining two hinge components together with wax, the distance between them being chosen to achieve the maximum clearance when open without fouling on the abutment teeth during operation.

This assembly is cast separately from the main body of the framework in a variation of the standard swing-lock technique.
Once the refractory model has been made, the index and teeth are transferred to it (Fig. 1). This is essential, as the prepared tooth surfaces determine the position of the hinged bar and ensure a perfect fit between the acrylic and chrome parts of the finished device. The index is also used later in the process to create the buccal flange.

Although Pullen-Warner bolt assemblies were once commercially available, it is uncertain whether this is still the case and it is a relatively straightforward procedure to create one from stainless steel tubing and 1.2 mm cobalt chromium wire (Fig. 2).

The wire is scored to create a locking groove, which is engaged by a tag soldered to the tubing. This assembly is soldered to the casting before the addition of the acrylic flange for which it acts as retention.

The internal metal component of the device is formed by a conventional chrome cobalt plate that incorporates a tube of the required diameter to receive the locking assembly.

This is created by inserting into the pattern the same stainless steel tubing and cobalt chromium wire used to make the locking bolt, this being left in place during casting.

The tube is angled so as to disguise the bolt as much as possible and create a locking effect: the bolt assembly locks at its buccal end, so a tube set at 90° to the plate would have a greatly reduced effect. At the buccal end of the swing arm, retention is added for the bolt assembly, all of the components being waxed together in their closed positions (Fig. 3). Waxing this section around the tube and wire ensures that all of the locking components are in perfect alignment on the finished casting.

Owing to the danger of unintentionally welding the moving parts during casting,
the temperature of the mould should be reduced to 850°C before removal from the furnace. This low casting temperature has the advantage of producing a very clean fit surface although it carries a greater risk of miscasting. In all other respects, a conventional partial denture casting procedure is followed, but additional care should be taken when devesting due to the fragility of the appliance. Fig. 4 shows the raw casting and sprue system.

After chrome finishing (Fig. 5), a new wax-up is made around the metal using the original silicone index as a guide. A new index is then made and inlet and vent holes drilled into it for the pouring of acrylic. An interlocking index is also made for the palatal aspect of the model with the appliance in place to reduce as much as possible the escape of acrylic and to prevent displacement of the appliance during processing. The framework’s moving parts are given a thin coating of wax and it is fitted down to a sealed duplicate model cast in Class III stone. The silicone indices and teeth are added and the void area filled with a high quality pourable acrylic. This is cured and finished conventionally, resulting in a sectional denture similar to that illustrated in Figs 6, 7 and 8.

Although time-consuming and labour-intensive, this technique gives the patient a true removable bridge.

The finished appliance engages all of the available undercuts in both the hard and soft tissue, giving complete stability without clasping. It is entirely non-invasive and suffers aesthetically only by the positioning of its locking bolt, which can be hidden beyond the smile line.

A similar appliance was documented by Barker and Cooper (2006), in which the locking element took the form of a magnet, eliminating all protruding metal. It may be possible to modify this approach using a precision attachment in place of
the magnet so as to increase stability while retaining this aesthetic advantage. These techniques remain untested by this laboratory, but suggest possible refinements to the procedure. From the patient’s point of view, the main disadvantages of this system are that it requires a far higher degree of manual dexterity and a stricter oral hygiene regimen than a conventional RPD.

It is therefore vital for the technician to ensure that these factors have been fully considered in the clinician’s evaluation. However, our experience has been that patients appropriately prescribed such appliances express a high degree of satisfaction with the result.

References