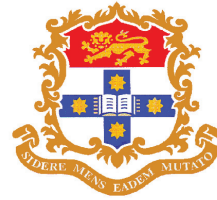


Australian Society  
of Orthodontists



University of Sydney



## Self Ligating Brackets

*Creating **Brighter** Futures*



# Self Ligating Brackets

## DEFINITION

Self-ligating brackets, rather than brackets that secure the archwire using an elastic o-ring or wire ligature tie, have a mechanical device built into the bracket to hold the arch wire in place. The current generation of self-ligating brackets have an opening and closing mechanism that, in effect, converts the bracket slot into a tube and can be classified as either passive or active.

Active self ligating brackets have a spring clip that stores energy to press against the archwire to assist engagement of the archwire and for rotation and torque control.

Examples of active self-ligating brackets include In-Ovation(GAC International), SPEED (Strite Industries), and Time (Adenta).

Passive self ligating brackets utilize a locking mechanism that does not encroach on the slot lumen which results in no active force on the archwire. The Damon(Ormco) and SmartClip (3M Unitek) brackets are examples of passive self-ligating brackets.

Since the appearance of the Russell attachment, there have been continued innovations and improvements. These advances include: Ormco Edgelock (1972), Forestadent Mobil-Lock (1980), Strite Speed (1980), "A" Company Activa (1986), Adenta Time (1994), Ormco Damon SL (1996), Ormco Twinlock (1998), Ormco Damon II (1999), GAC In-ovation (2000), Gestenco Oyster , GAC In-ovation R (2004), 3M SmartClip (2004), Ormco Damon III(2004), Ormco Damon Q (2009), TP Click-It (2012) and others.

## Examples of self-ligating brackets

**Damon Q** has a rigid slide that opens and closes vertically to contain the archwire within the bracket slot. It also has a vertical and auxiliary slot.



Figure 1:  
Damon Q bracket

## DEVELOPMENT

Self-ligating mechanisms have existed in orthodontics for decades. The first recorded being the Russell attachment described by Stolzenberg in 1935<sup>[1]</sup>.

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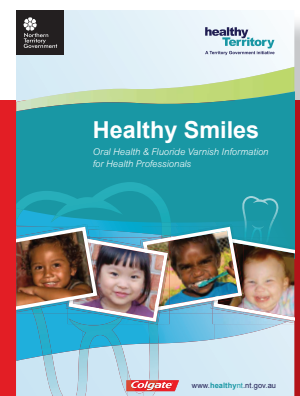
### Healthy Smiles – Oral Health & Fluoride Varnish Training Program for Primary Health Care Workers

To help improve oral health in remote communities Colgate provided educational funding and materials to the Northern Territory Government for the development of an Oral Health and Fluoride Varnish Training Program.

The Northern Territory is largely made up of small, remote communities without water fluoridation

- Children in the Northern Territory have poorer oral health than anywhere else in Australia. The Child Dental Health Survey 2003-4 showed that 5-6 year old Territorians have the highest average total number of teeth with dental decay.
- Menzies School of Health Research "Strong Teeth for Little Kids" was a randomized controlled trial conducted in the Northern Territory (NT) from 2006-08. The study showed a 24-36% reduction in tooth surfaces developing dental caries over 2 years, with 6 monthly applications of Duraphat.
- Healthy Smiles – Oral Health & Fluoride Varnish training program for Primary Health Care Workers has been developed by the Northern Territory Government with assistance from Colgate.
- Programme materials can be accessed at [http://www.health.nt.gov.au/Oral\\_Health/Oral\\_Health\\_Promotion/index.aspx](http://www.health.nt.gov.au/Oral_Health/Oral_Health_Promotion/index.aspx).

Armfield, J.M., Spencer, A.J., & Brennan, D.S. (2009). Dental health of Australia's teenagers and pre-teen children: The child dental health survey, Australia 2003-4, Dental Statistics and Research Series no.52. Cat. no. DEN199. Canberra: AIHW



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**Speed** has a flexible (active) nickel titanium (NiTi) clip which forms the buccal wall of the bracket slot and can interact with the wire. It also has an auxiliary slot(016x-016) and comes with a hook.



Figure 2:  
Speed Bracket

**Smartclip** has no mobile or sliding components. Archwire engagement involves elastic deformation of the clip positioned at the mesial and distal ends of the bracket slot. It is a passive mechanism that can become active when engaging a larger dimension archwire.



Fig 3:  
3M Unitek Smartclip bracket

**Innovation R** is a twin bracket with a flexible clip that forms the buccal wall of the bracket slot and can interact with the wire.



Fig 4.  
GAC Innovation R

The proposed advantages of self-ligating brackets include reduction in frictional forces<sup>[3-6]</sup>, producing more physiologically harmonious tooth movement<sup>[3]</sup>, full and secure wire ligation<sup>[2]</sup>, better sliding mechanics and possible anchorage conservation<sup>[7, 8]</sup>, decreased treatment time, longer treatment intervals with fewer appointments<sup>[7, 9, 10]</sup>, chair time savings, less chair-side assistance and improved ergonomics<sup>[10-14]</sup>, better infection control<sup>[12]</sup>, less patient discomfort<sup>[7, 8]</sup>, and improved oral hygiene<sup>[13, 15]</sup>. However, prospective clinical trials and systematic reviews have failed to demonstrate any advantage in terms of initial alignment, overall treatment time, or discomfort<sup>[16-20]</sup>.

The American Association of Orthodontists' Council on Scientific Affairs (COSA) has answered questions regarding claims of self-ligating bracket manufacturers and proponents. Nine of fourteen claims regarding self-ligating brackets have some peer-reviewed data. This data shows self-ligating brackets do not provide reduced friction between archwire and bracket, reduced clinical forces, reduced treatment time, faster alignment, faster space closure, different arch dimensions, better alignment and occlusal outcomes, less patient pain and better hygiene. In addition the claims that lateral expansion of the dental arch with self-ligating bracket systems grows buccal alveolar bone, that such lateral expansion of the dental arch is comparable with expansion using RME and conventional brackets, and that such lateral expansion of the dental arch is more stable in the long term, have no supporting peer-reviewed data at present<sup>[21]</sup>.

Self-ligating brackets have some disadvantages which include higher cost, possible breakage of the clip or the slide, higher profile because of the complicated mechanical design, potentially more occlusal interferences and lip discomfort, and difficulty in finishing due to incomplete expression of the archwires<sup>[16]</sup>.

Self-ligating brackets, like conventional twin edgewise brackets, do produce good orthodontic results and are being used very successfully by a significant number of orthodontists. One advantage of self ligating brackets that has been regularly and independently confirmed is that it usually takes less time to open and close the self ligation mechanism when changing or adjusting archwires than removal and replacement of traditional elastic o-rings or wire ligatures. An additional advantage that many orthodontists are finding is the enhanced aesthetics available with the very recent tooth coloured self-ligating brackets that do not require o rings which eventually discolour, detracting from the overall aesthetic appearance.

## THE ADVANTAGES AND DISADVANTAGES OF SELF-LIGATING BRACKETS

Harradine et al<sup>[2]</sup> mentioned that the problems with conventional ligation include failure to provide and maintain full arch wire engagement, higher friction, the decay or loss of force by elastic o-rings, potential impediment to oral hygiene, and that archwire ligation is time consuming.

## CLINICAL TIPS WHEN USING SELF-LIGATING BRACKETS<sup>[2]</sup>

To aid archwire engagement of passive self-ligating brackets it is important to fully engage the wire to allow clip closure. Sometimes this requires selecting an initial archwire of smaller diameter, eg .014" instead of .016" Nickel Titanium. If archwire engagement and clip or slide closure is difficult for a particular tooth, the wire can be held into the slot base using various instruments

# BRIGHTER FUTURES

**Brighter Futures** is published by the Australian Society of Orthodontists (NSW Branch) Inc. in conjunction with the Orthodontic Discipline at the University of Sydney.

The newsletter is intended to help keep the dental profession updated about contemporary orthodontics, and also to help foster co-operation within the dental team.

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such as an amalgam plugger, or ligature tucker. The Cool Tool (ORMCO) is specifically designed to engage the archwire against the base of the bracket slot. With thermally active archwires, it is easier to insert a wire into the bracket of malpositioned teeth if the Cool Tool is kept cold in the freezer. Patient comfort can be maintained by balancing labial pressure seating the archwire into the bracket slot with lingual finger or thumb pressure against the tooth so that net force on the tooth is greatly reduced. If a tooth is significantly rotated and one end of the slot is too close to the adjacent tooth for an instrument to be used, dental floss or a ligature wire looped over the archwire can be used to help seat the wire. Another technique to engage the wire on a rotated or displaced tooth is firstly close the clip or slide, then thread the wire through the closed bracket before engaging the other brackets. Although special tools are provided by most manufacturers to close slides and clips, In-Ovation brackets and Speed brackets can be closed with finger pressure. Damon brackets can be closed with light-wire or bird beak pliers.

**Opening clips and slides.** In-Ovation brackets are opened by pushing in an occlusal direction on the tail of the clip. Time and Speed brackets are opened with a probe or other sharp instrument engaging the hole in the clip. Speed brackets can also be opened in the same way as In-Ovation. Damon brackets have specific opening instruments.

**Modified treatment mechanics.** The use of self-ligating brackets usually does require technique modification, commencing with initial alignment using more flexible lower modulus archwires. Longer appointment intervals, such as eight to ten weeks between appointments, have been suggested due to the full and secure wire engagement of flexible, low modulus wires with self-ligating brackets.

## CONCLUSION

There have been claims that self-ligating brackets are superior to conventional brackets in many aspects. Often, this information comes from product marketing and non-scientific sources. The only advantage that has been regularly demonstrated by independent research is that the time taken to open and close the slides or clips, when changing an archwire, is shorter than time taken to remove and then replace elastic o-rings or metal ligature ties. Other advantages claimed by manufacturers and proponents could be valid, however, at this stage, most of these claims cannot be demonstrated by independent researchers to be statistically significant.

At present, the evidence does not support the claim that self-ligating bracket systems are more efficient or more effective than conventional brackets in treating malocclusions<sup>[16, 17, 19]</sup>.

## REFERENCES AVAILABLE UPON REQUEST



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