CLINICAL ORAL SCIENCE AND DENTISTRY

REVIEW ARTICLE ISSN 2688-7428 Open Access

The Damon Bracket System: Timeline and Evolution from Past to Present

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Received date: June 14, 2024, **Accepted date:** June 29, 2024, **Published date:** July 07, 2024.

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Abstract

Self-ligating brackets (SLB) by definition do not require a ligature tie to secure the archwire but have an inbuilt mechanism that can be opened and closed for the same. These type of brackets have existed for a long time in orthodontics from the 1930s. Since that time, many bracket designs have been patented, although only a few of those became available commercially. It was Dr. Dwight Damon in 1998 who spoke about Low Friction & Low Force system. He promoted SLB not just the bracket but as a “System” with the purpose of utilizing the benefits of light continuous force generated by Copper NiTi wires. The Damon bracket system has gained increasing popularity over the years amongst orthodontists. This article summarises the evolution in the Damon bracket system till date.

Keywords: Damon,Self-Ligation,Brackets, Orthodontics.

Introduction

The Damon Bracket System was invented by Dr. Dwight Damon. The Damon System (Ormco Corp., 1332 South Lone Hill Ave., Glendora, CA 91740-0000) is a passive self-ligation system that was introduced in the year 1996. It is a point to ponder as to why term it as a "System" when speaking of this new approach to clinical orthodontics? "System” is the blending of passive self-ligating brackets and high-technology arch wires carefully curated to keep the applied force in the "Optimal Force Zone" throughout orthodontic treatment. The Damon System is ought to be an amalgamation of passive self-ligating brackets, high-tech archwires and minimally invasive treatment protocols designed as a gentle, light force system with greater benefits that are

more than just straight teeth. With the Damon System, they claim that doctors are able to employ face-driven streamlined treatment mechanics to provide a satisfying treatment experience to patients– beautiful faces and broad smiles, with fewer appointments to the clinic and greater comfort. Available in metal and aesthetic bracket options, the Damon System allows treating a wide variety of cases as the need demands.

Timeline of Damon Bracket Evolution:

1996- 1st Generation Damon SL (Self-ligating) bracket released

2001- 2nd Generation Bracket – Damon 2 released. Initial Damon treatment protocols established

2002- Clinical Studies released regarding efficiency of Damon Bracket system and archwires

2004- Damon 3 Hybrid Bracket released

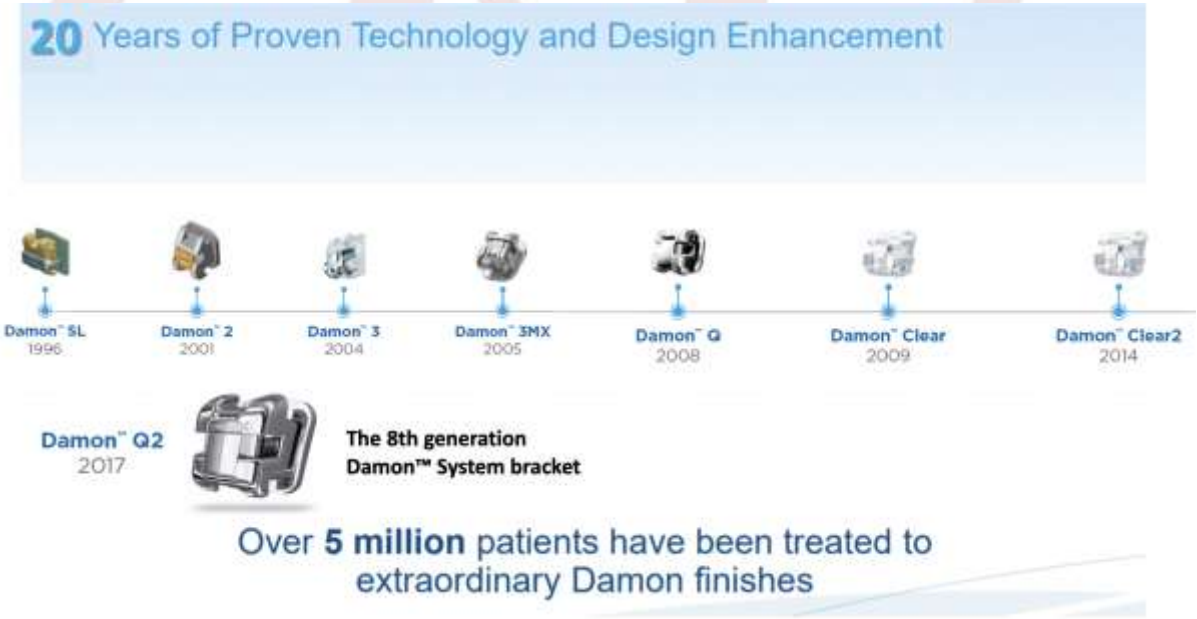
2005- Damon 3MX Bracket released

2008 - Damon Q Bracket released

2009 - Damon Clear Bracket released

2014 - Damon Clear2 Bracket released

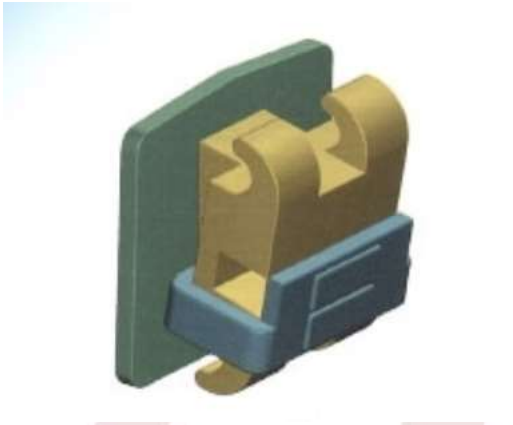
2017 - Damon Q2 Bracket released



The 1st generation of the Damon system was released in 1996 with a relatively small user base and limited distribution. The first Damon Forum for Damon users was held shortly thereafter with a handful of users who shared opinions and their experiences with this low force, passive ligating system. By 2000, the second generation bracket- the Damon 2, was released with significant design modifications to suit better needs. The formulation of suggested treatment methods for the Damon system was just as crucial as the changes in bracket design. These therapeutic approaches served as a valuable resource for clinicians employing the Damon system, addressing the improvements in chair-side mechanics that must be implemented in order to maximise the system's benefits. In 2004 and 2005 respectively, the Damon 3 hybrid and Damon MX brackets was released. In 2009 and 2014, to offer an alternative for patients desiring esthetic appearance, ceramic brackets were launched.

The Generations of Damon Brackets

DAMON SL BRACKETS ("A"company) became available in the mid1990s and had a slide that wrapped round the labial face of the bracket.



These brackets were a definite step forward but had two significant problems the slides sometimes opened inadvertently due to the play of the slide round the exterior of the bracket, and they were prone to breakage due to work hardening on the angles of the slide during manufacture. One study6 quantified these problems. In 25 consecutive cases in treatment for more than one year, 31 slides broke and 11 inadvertently opened between visits. This compared with 15 broken and lost elastomeric ligatures in 25 consecutively treated cases with conventional brackets, so the difference in ligation fragility was not enormous, but when a clinician has paid extra for a novel bracket design and the main design feature is not highly robust and is susceptible to inexpert handling from inexperienced operators, it has a significant negative effect on widespread adoption of that bracket. Nevertheless, these brackets generated a substantial increase in the appreciation of the potential of self-ligation.

DAMON 2 BRACKETS (Ormco Corporation) were introduced to address the imperfections of DamonSL. They retained the same vertical slide action and U-shaped spring to control opening and closing, but placed the slide within the shelter of the tie-wings. Combined with the introduction of metal injection molding manufacture, which permits closer tolerances, these developments almost completely eliminated inadvertent slide opening or slide breakage and led to a further acceleration in the use of self-ligation.

Damon 2 bracket released in 2000

However, the brackets were not immediately and consistently easy to open and this aspect of functionality is very important to the new user. Also, it was possible for the slide to be in a half open position, hindering arch wire removal or placement.

DAMON 3 BRACKETS (Ormco Corporation) had a different location and action of the retaining spring, and this produced a very easy and secure mechanism for opening and closing.

In addition, Damon 3 brackets are semi aesthetic. However, early Damon 3 production brackets had three very significant problems: a high rate of bond failure, separation of the metal from the reinforced resin components, and fractured resin tie wings. These three problems all received fairly rapid investigation and improvement but illustrate that it continues to be a significant challenge for manufacturers to extrapolate from the experience with prototype brackets in the hands of skilled enthusiasts to subsequent full scale production

and the use by relative novices.

DAMON 3

- A combination of clear material and stainless steel for aesthetics and strength
- Passive self-ligation technology with four solid walls for efficient, low-friction tooth movement
- Ultra-smooth contours and rounded edges

Damon 3 semi aesthetic bracket showing the improved slide mechanism and the junction of metal and resin components, which was initially prone to separation.

The more recently launched all metal Damon D3 MX bracket and subsequent Damon Q bracket have clearly benefited from previous manufacturing difficulties and from further clinical experience and expertise. As with other brackets such as Speed and In Ovation (GAC International Inc., 355 Knickerbocker Avenue, Bohemia, NY 11716), these later Damon brackets also feature a slot for drop in hooks, which was mentioned earlier in the list of ideal requirements. Damon MX brackets showing the vertical slot, which permits placement and removal of drop in hooks in this bracket and in the Damon Q.

DAMON 3MX

EXTRAORDINARY STRENGTH

- Stainless steel 17-4 metal-injection molded (MIM) construction
- Passive self-ligation technology with four solid walls for efficient, low-friction tooth movement
- Easy-to-use slide mechanism with deep funnel and backstop for quick wire changes
- Smooth slot corners for reduced binding even in severe deflections
- Vertical slot for removable drop-in hooks and other auxiliaries Contoured base design for optimal bond retention.

Damon 3 MX- All metal design, the slide is rhomboidal, has an additional vertical auxiliary slot for attaching click-in type of hook; has Bracket numbering ID in slot base.

Damon™ 3MX Brackets :

Maxillary		Torq.	Ang.	Rot.
Central	High	+17°	+5°	0°
Central	Std	+12°	+5°	0°
Central	Low	+7°	+5°	0°
Lateral	High	+10°	+9°	0°
Lateral	Std	+8°	+9°	0°
Lateral	Low	+3°	+9°	0°
Cuspid	High	+7°	+6°	0°
Cuspid	Std	0°	+6°	0°
Bicuspid		−7°	+2°	0°
Bicuspid – G/O		−7°	+2°	0°
Mandibular		**Torq.**	**Ang.**	**Rot.**
Anteriors	Std	−1°	+2°	0°
Anteriors	Low	−6°	+2°	0°
Cuspid	High	+7°	+5°	0°
Cuspid	Std	0°	+5°	0°
1st Bicuspid		−12°	+2°	0°
1st Bicuspid – G/O		−12°	+2°	0°
2nd Bicuspid		−17°	+2°	0°
2nd Bicuspid – G/O		−17°	+2°	0°

DAMON Q

Damon Q is an essential part of the DamonTM System, a proven combination of passive self-ligating brackets, high-tech archwires and minimally invasive treatment protocols with benefits that are more than just straight teeth. Whether you are new to self-ligation or an experienced user, Damon Q is designed to provide

efficient, controlled tooth movement with remarkable clinical results.

RELIABILITY AND DURABILITY

- Four walls with optimized slot depths for improved rotation control and efficient tooth movement
- Stainless steel 17-4 metal-injection molded construction for strength and durability

EFFICIENCY

- Horizontal and vertical auxiliary slots for greater versatility
- Rhomboid-shaped bracket and pad, and vertical scribe line guide precision bracket placement

BRACKET IDENTIFICATION

- Colored ID dots are located on tie wings of each bracket. A Permanent ID marking (International System) is also molded in the base of the slot.

EASE OF USE

-Innovative SpinTekTM slide with chamfered lingual leading edge facilitates easy slide closure and wire engagement throughout all phases of treatment.

COMFORT AND ASTHETICS

- Small bracket profile and size with smooth, rounded corners help prevent occlusal interference while offering greater comfort and aesthetics

TORQUE VALUE IDENTIFICATION

- Green: Low Torque Blue: Standard Torque Red: High Torque
- All Damon brackets – Slot base marking, plus (+) = high torque, minus (-) = low torque.

Damon q bracket showing the additional horizontal slot for auxiliary arch wires

Damon Q Brackets :

Maxillary		Torq.	Ang.	Rot.
Central	Low	+2°	+5°	0°
Central	Std	+15°	+5°	0°
Central	Super	+22°	+5°	0°
Lateral	Low	-5°	+9°	0°
Lateral	Std	+6°	+9°	0°
Lateral	Super	+13°	+9°	0°
Cuspid	Low	-9°	+5°	0°
Cuspid with Hook	Low	-9°	+5°	0°
Cuspid	Std	+7°	+5°	0°
Cuspid with Hook	Std	+7°	+5°	0°
Cuspid	Super	+11°	+5°	0°
Cuspid with Hook	Super	+11°	+5°	0°
Bicuspid		-11°	+2°	0°
Bicuspid – G/O		-11°	+2°	0°
Bicuspid – Weldable		-11°	+2°	0°
1st & 2nd Bicuspid with Hook		-11°	+2°	0°
1st & 2nd Bicuspid with Hook – G/O		-11°	+2°	0°

Mandibular		Torq.	Ang.	Rot.
Central	Low	-11°	+2°	0°
Central	Std	-3°	+2°	0°
Lateral	Low	-11°	+4°	0°
Lateral	Std	-3°	+4°	0°
Cuspid	Low	0°	+5°	0°
Cuspid with Hook	Low	0°	+5°	0°
Cuspid	Std	+7°	+5°	0°
Cuspid with Hook	Std	+7°	+5°	0°
Cuspid	Super	+13°	+5°	0°
Cuspid with Hook	Super	+13	+5°	0°
1st Bicuspid	Std	-12°	+4°	0°
1st Bicuspid with Hook	Std	-12°	+4°	0°
1st Bicuspid	Super	-5°	+4°	0°
1st Bicuspid with Hook	Super	-5°	+4°	0°
1st Bicuspid – G/O	Std	-12°	+4°	0°
1st Bicuspid with Hook – G/O	Std	-12°	+4°	0°
1st Bicuspid – G/O	Super	-5°	+4°	0°
1st Bicuspid with Hook – G/O	Super	-5°	+4°	0°
1st Bicuspid – Weldable	Std	-12°	+4°	0°
1st Bicuspid – Weldable	Super	-5°	+4°	0°
2nd Bicuspid		-17°	+4°	0°
2nd Bicuspid with Hook		-17°	+4°	0°
2nd Bicuspid – G/O		-17°	+4°	0°
2nd Bicuspid with Hook – G/O		-17°	+4°	0°
2nd Bicuspid – Weldable		-17°	+4°	0°

DAMON CLEAR

- The only 100% clear self-ligating bracket.

- Four solid walls enable full rotation control for meticulous finishing.

- Sturdy polycrystalline (PCA) construction is impervious to staining and discoloration.

- Damon Clear2 with an ultra precision slot provides 2x the rotational control.

- Innovative SpinTek slide employs reciprocal forces during opening for fast, comfortable wire changes and adjustments.

- A simple twist using the SpinTek Opening Instrument disperses forces in opposite directions for a net force of 0 kg even with calculus build up.

- Patented laser-etched pad provides optimal bond strength for greater reliability.

- Smooth, rounded contours for improved patient comfort.

POSITIONING GAUGES

- Removable positioning gauge, rhomboid shape and pad with vertical scribe line aid in precision bracket placement for smile arc enhancement.
- Each gauge is colour-coded to aid in bracket selection and torque value identification:

Green - low torque,
Blue - standard torque,
Red - high torque.

BRACKET IDENTIFICATION

- International ID on the side of each gauge and within the slot of each bracket.
- Colour-coded dots on upper distal tie wing, same as Damon 3MX.

DAMON CLEAR 2

PERFORMANCE

- 100% clear passive self-ligating bracket body and slide for the supreme aesthetics patients demand

- Polycrystalline alumina (PCA) material is resistant to staining from coffee, mustard, red wine and other agents

- Passive self-ligation technology eliminates the need for elastomerics, which are known to stain and collect bacteria during treatment

GREATER CONTROL AND RELIABILITY

- Improved precision slot on Damon Clear2 brackets (upper 3-3 variable torques) provides 2x the rotational control* for meticulous finishing and efficient treatment

- Sturdy construction with fortified slide, window channel and tie wings for exceptional strength and durability

- Customized base design with patented laser-etched base provides optimal bond strength for greater reliability

DAMON CLEAR2

EASE OF USE AND COMFORT

- Innovative SpinTek slide facilitates easy slide closure and wire engagement throughout all phases of treatment for fast and comfortable wire changes and adjustments

- Fast, comfortable debonding experience for patients when using the Damon Clear Debonding Instrument; Less susceptible to bracket fractures during removal for improved safety, no flash removal using a bur or scaler required for improved efficiency.

PRECISION BRACKET PLACEMENT

- Removable positioning gauge with scaler notch and rhomboid-shaped brackets and base guide bracket placement

- Color-coded positioning gauges on brackets (3-3) denote torque values.

BRACKET IDENTIFICATION

Colored ID dots are located on tie wings of each bracket. A Permanent ID marking (International System) is also molded in the base of the slot.

Damon™ Clear and Damon™ Clear 2

Maxillary		Torq.	Ang.	Rot.
Central	Low	+2°	+5°	0°
★ Central	Std	+15°	+5°	0°
Central	High	+22°	+5°	0°
Lateral	Low	-5°	+9°	0°
★ Lateral	Std	+6°	+9°	0°
Lateral	High	+13°	+9°	0°
★ Cuspid	Std	+7°	+5°	0°
★ Cuspid with Hook	Std	+7°	+5°	0°
Cuspid with Hook	High	+11°	+5°	0°
Bicuspid	Std	-11°	+2°	0°
Bicuspid with Hook	Std	-11°	+2°	0°
Mandibular		**Torq.**	**Ang.**	**Rot.**
Central	Std	-3°	+2°	0°
Lateral	Std	-3°	+4°	0°
Cuspid	Std	+7°	+5°	0°

DAMON Q2

Damon Q2 is the 8th generation bracket in the world-renowned Damon System, a proven combination of passive self-ligating brackets, light force archwire sequencing, and recommended treatment protocols used to successfully finish millions of cases. Combining reliable Damon bracket features with the convenience of ample under tie-wing area and greater rotational control, Damon Q2 offers the versatility to efficiently treat all cases with simplified mechanics.

- SpinTek instrument employs reciprocal forces during opening for reliable wire changes and adjustments throughout treatment.
- Rhomboid-shaped pad and new vertical scribe line help guide bracket placement.
- Ample under tie-wing area
- accommodates all powerchain, elastics, steel ligatures, and other auxiliaries for treatment versatility.
- Small bracket profile and size with smooth, rounded corners designed for patient comfort and aesthetics.
- Convenient use of drop-in hooks and optional permanent hooks designed for durability with Ormco's elastics and auxiliaries.
- Four solid walls with refined precision slot for +2x the rotational control designed for predictable finishing and efficient treatment.
- Modified prescription for upper central and lateral standard torque brackets designed for a predictable finish.
- Bracket base with 80 gauge mesh designed for reliable bond strength throughout treatment and a predictable debonding experience.
- Injection molded 17-4 stainless steel appliance provides exceptional strength and durability during treatment.

Damon™ Q2 Brackets & Buccal Tubes

MAXILLARY	type	torq.	ang.	rot.
Central	Low	+2°	+5°	0°
Central	Std.	+12°	+5°	0°
Central	High	+22°	+5°	0°
Lateral	Low	-5°	+9°	0°
Lateral	Std.	+8°	+9°	0°
Lateral	High	+13°	+9°	0°
Cuspid	Low	-9°	+5°	0°
Cuspid w/ Hook	Low	-9°	+5°	0°
Cuspid	Std.	+7°	+5°	0°
Cuspid w/ Hook	Std.	+7°	+5°	0°
Cuspid	High	+11°	+5°	0°
Cuspid w/ Hook	High	+11°	+5°	0°
Bicuspid		-11°	+2°	0°
Bicuspid - G/O		-11°	+2°	0°
Bicuspid w/ Hook		-11°	+2°	0°
Bicuspid w/ Hook - G/O		-11°	+2°	0°
Bicuspid - Weldable		-11°	+2°	0°

MANDIBULAR	type	torq.	ang.	rot.
Central	Low	-11°	+2°	0°
Central	Std/Low	-6°	+2°	0°
Central	Std.	-3°	+2°	0°
Lateral	Low	-11°	+4°	0°
Lateral	Std/Low	-6°	+4°	0°
Lateral	Std.	-3°	+4°	0°
Cuspid	Low	0°	+5°	0°
Cuspid w/ Hook	Low	0°	+5°	0°
Cuspid	Std.	+7°	+5°	0°
Cuspid w/ Hook	Std.	+7°	+5°	0°
Cuspid	High	+13°	+5°	0°
Cuspid w/ Hook	High	+13°	+5°	0°
1st Bicuspid	Std.	-12°	+4°	0°
1st Bicuspid - G/O	Std.	-12°	+4°	0°
1st Bicuspid w/ Hook	Std.	-12°	+4°	0°
1st Bicuspid w/ Hook - G/O	Std.	-12°	+4°	0°
1st Bicuspid - Weldable	Std.	-12°	+4°	0°
1st Bicuspid	High	-5°	+4°	0°
1st Bicuspid - G/O	High	-5°	+4°	0°
1st Bicuspid w/ Hook	High	-5°	+4°	0°
1st Bicuspid w/ Hook - G/O	High	-5°	+4°	0°
1st Bicuspid - Weldable	High	-5°	+4°	0°
2nd Bicuspid		-17°	+4°	0°
2nd Bicuspid - G/O		-17°	+4°	0°
2nd Bicuspid w/ Hook		-17°	+4°	0°
2nd Bicuspid w/ Hook - G/O		-17°	+4°	0°
2nd Bicuspid - Weldable		-17°	+4°	0°

Conclusion

The Damon bracket system has been evolving ever since its inception to suit the needs of the orthodontist and patient demands. As such there is no known universal bracket system to treat all types of malocclusions, yet there are varieties of system available from which the clinician should judge and make judicious use of it. Providing the "right treatment for the right patient using a right appliance at a right time" is the key word for success.

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