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Form Meets Function: Discover the Science Behind a Versatile Self-Ligating Bracket System

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The orthodontic business and treatment models are changing. Patients are demanding esthetic treatment options, while doctors seek options designed for efficiency and reliability from start to finish. That's why we created 3M™ Clarity™ Ultra Self-Ligating Brackets. Now you have even more options to help deliver a range of flexible, customized esthetic treatment plans.

Take Advantage of the Clarity Ultra Bracket Difference

Collecting orthodontists' feedback on performance factors and features is an imperative for 3M. The Clarity Ultra bracket used survey data to meet professional specifications.

For instance, the results of a blind survey conducted for 3M among orthodontists in the United States and Germany showed that reliability and versatility—including door reliability, rotation control, ability to activate by ligation (when needed) and bonding and debonding reliability—were the most important attributes of any ceramic self-ligating appliance.

The top trend in the orthodontic industry today is esthetic treatment. So, a fully esthetic ceramic bracket that shows no metal parts and covers the archwire is still very important, but is not as critical as the reliability and versatility of the appliance.

Technology and Design

Clarity Ultra brackets are injection molded, using a proprietary, fine-grained, high-strength micropolycrystaline ceramic material. This allows the formation of smooth, molded surfaces, while providing high strength. The uniformity of the small ceramic grain size contributes to the translucency and stain resistance of the bracket.

Self-Ligating Efficiencies

The bracket door design of Clarity Ultra Self-Ligating brackets allows the bracket to retain the archwire and remain passive during treatment. No ligatures are needed, which means no opportunity for stained ligatures which can detract from the esthetics of the brackets.

No required ligatures also means a reduced inventory of ligatures for the practice, and easier archwire changes without having to remove or insert ligatures. When a ligated bracket is used, time is spent with the patient in the chair during every appointment, just to choose the colors of ligatures to be used that day. Removing this variable could reduce chairtime.

Reliable Bonding and Debonding

Clarity Ultra brackets are available precoated with the industry-recognized 3M™ APC™ Flash-Free Adhesive. Brackets coated with APC Flash-Free Adhesive have been shown to offer:

- Shorter chairtime during the bonding appointment
- Reduction of bonding steps
- Consistent and predictable debonding process
- Protection of enamel under the bracket due to acid erosion

A glass grit bonding base, as shown in Figure 2, with uniformly sized grains of aluminum oxide glass, similar to that of 3M™ Clarity™ Advanced Ceramic Brackets, was used on Clarity Ultra brackets. The glass grains cover the entire base from edge to edge. The glass grains are in the shape of polygons that create multi-faceted, mechanical bonding surfaces with multiple surfaces to which the adhesive can adhere.

Figure 1: Clarity Ultra brackets come available pre-coated with APC Flash-Free Adhesive on the base, ready for bonding right out of the package with no flash to clear away before light curing.

Rotation Control

In the survey referenced earlier, 'rotation control' was ranked the second most important attribute of a self-ligating bracket, contributing to the purchase decision for a bracket. Clarity Ultra brackets were designed with a wide door that covers the entire mesial/distal span of the bracket (Figure 3), and provides rotation control without the addition of accessories.

Figure 2: Clarity Ultra brackets have a glass grit layer on the base for increased bonding surface area, plus a stress concentrator designed to facilitate predictable debonding.

On-Demand Activation

All U/L 5×5 Clarity Ultra brackets are designed with tie-wings that can be ligated, if desired. The versatility of this bracket allows the practitioner to activate the bracket on demand, if and when it is indicated during the treatment. This also permits patients to request ligature colors to fit their style.

The proprietary, oval-shaped under tie-wing area is also a unique and important feature. This design allows easy ligation and even double-ligation, if and when needed. The bracket can be ligated using metal or elastomeric ligatures, and when control and space closure is needed, chains can be used, even with ligatures.

Hands-on panels were held to evaluate bracket performance. Participant responses indicated that Clarity Ultra brackets are easy to ligate. And when compared to Ormco's Damon® Clear Brackets, evaluators found the Clarity Ultra bracket tie-wings facilitate easier ligation (Figure 4).

Figure 3: The doors on Clarity Ultra brackets span the full width of the slot, offering rotational control.

Bracket Positioning

The Clarity Ultra Bracket design elements help in proper placement and positioning of the brackets. They are shipped with the door open to maximize efficiency by eliminating the extra step of opening the door to place the archwire. Similar to other door-type brackets, it is recommended to always grip the bracket mesial/distal in order to avoid closing the doors during placement.

Some practitioners may have used the occlusal edge of their current bracket as horizontal guidance during positioning. When positioning a Clarity Ultra bracket with the door open, the door may mask the occlusal edge of the bracket for visual positioning of the upper brackets. However, feedback from the current users shows that the lower edge of the open door in the maxilla can be used as a reference against the occlusal edge of the maxillary teeth for positioning.

The washable horizontal and vertical reference marks on the Clarity Ultra Bracket can also be used for effective visualization and positioning of the bracket versus the axis of the tooth. Other self-ligating brackets with doors may have small, plastic parts used as reference markers that need to be removed and disposed of after bonding the brackets.

Figure 4: Evaluating orthodontists found Clarity Ultra tie wings facilitate easier ligation compared to Damon Clear brackets.

Reliability: Door Function

Clarity Ultra brackets have two parts: the body and the door. The door mechanism includes a 0.007" Nitinol pin, hidden in the bracket body, and blocked on both sides. The pin provides door resilience and stability and is hidden from view, making the bracket esthetic with no metal showing through.

When designing the Clarity Ultra Self-Ligating brackets, it was imperative that the door function was reliable. In laboratory testing, the doors of Clarity Ultra brackets underwent many open-close cycles to validate their reliability. The results showed that the doors survived a minimum of 2X the open-close cycles of a typical treatment.

Another important factor in reliable door function is its stability—the ability to stay closed or open, as intended. Unplanned door opening or closing can either be a minor annoyance or cause a major unintentional delay in treatment. The Clarity Ultra bracket door mechanism is designed to resist unplanned opening or closing.

The doors of the Clarity Ultra brackets are designed to provide an audible and/or tactile “click” when opened or closed. The “click” is an indication of the door opening or closing.

Clarity Ultra brackets have a dedicated double-sided instrument for opening and closing the doors. Using a double-ended instrument reduces the number of hand instruments that are needed to be inventoried at the practice.

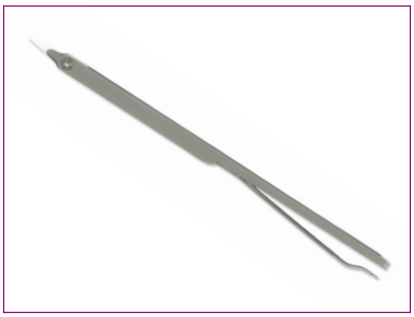

Figure 5: The open-close instrument offers a ceramic door-opening tip and a door-closing end together in one instrument.

Closing the Door

Closing the bracket doors using the 3M™ Unitek™ Open-Close Instrument for the Ultra SL System is easy. The closing end of the instrument has two notches that fit all wire sizes and shapes, and can be used to torque and seat the rectangular archwire into the slot before closing the door (Figure 6). In cases of severe crowding or severely rotated teeth, there may not be enough clearance for the notches to grip the wire. In those situations, doors can be closed with fingers.

1. Position the tool’s notches onto the archwire on both sides of the bracket with the pointer aligned below the bracket’s open door.
2. Ensure the wire is fully seated deep into the slot by lightly pressing and/or torqueing the wire with the tool.
3. Squeeze the tool, pushing the pointer against the open door. Continue squeezing until the door is closed.

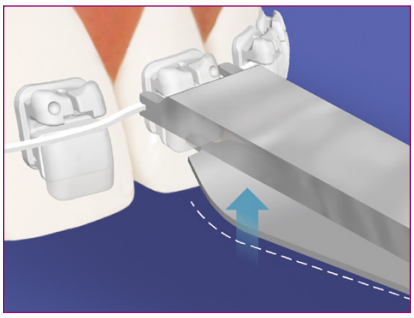

Figure 6: Seat the archwire on both sides of the bracket with the instrument and guide the door closed with the third arm.

Opening the Door

Opening the doors of Clarity Ultra brackets using the Unitek Open-Close Instrument is simple and easy. Insert the tip of the Unitek Open-Close Instrument into the horizontal groove just above the door (Figure 7), and twist the tool 90 degrees clockwise or counterclockwise (Figure 8).

The opening end of the open-close instrument has a proprietary ceramic tip that not only reduces wear but may also reduce marking the bracket, compared to a metal tip. This means less frequent replacement of the instruments, as they have been designed to withstand 3000 opening cycles. The rectangular design of the tip with the rounded corners allows the tip to easily be inserted into the tool slot.

After insertion, the rotation of the instrument requires only a light twisting motion to generate a reciprocal force to open the door. This is designed to minimize the net force to the tooth. If the door is pulled down using an explorer or other instrument, it may exert a force noticeable by the patient.

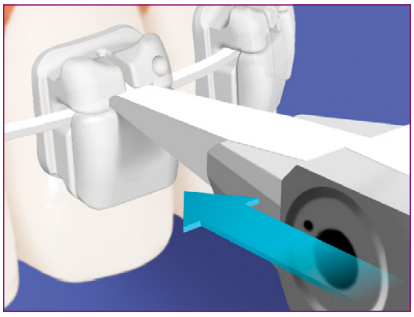

Figure 7: Insert the ceramic tip of the door-opening end into the groove above the door.

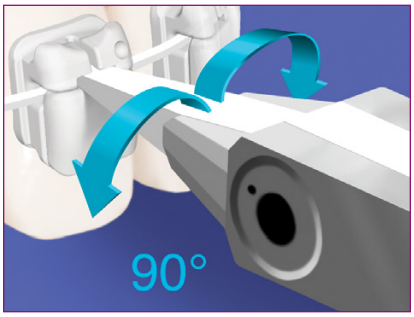

Figure 8: No pressure required. Turn the instrument 90 degrees, and the door will open.

Archwire Sequence Guideline

When treating with a passive self-ligating appliance, it is important to take full advantage of the system efficiencies. Following is an archwire sequence guideline for Clarity Ultra Brackets. Of course, each case may require a slight variation in the type and sequence of the archwires. But it is very important to keep in mind that leaving small, lower-force archwires in place to gently move teeth until all deflection in the archwire is resolved is a benefit of treatment with passive self-ligating brackets like Clarity Ultra Brackets.

Treatment Phase	Objectives	Wire Criteria	Recommended
Aligning	Initial vertical alignment De-rotation	Low forces Elasticity Avoid binding	Nitinol SE .014
Leveling	Initial space closure Refine vertical and rotation alignment Level Curve of Spee	Higher forces Elasticity Fill slot for refinement	Nitinol SE .018
Working	Arch form correction Torque correction Refine space closure	Long working range Stiffness to maintain leveling Size to achieve torque	Nitinol SE .014x.025
Finishing	Correct midlines Root alignment Class II or II correction Functional occlusion	Stiffness to maintain alignment Enough elasticity to make finishing bends without high forces Short working range Size to fill slot for final alignment	Beta III .017x.025 *then* Beta III .019x.025

Tandem Archwire Technique

Tandem archwires can be used with Clarity Ultra Brackets to help fill the archwire slot with low-force wires. Clarity Ultra Brackets can be used with the Tandem Archwire technique using a combination of two .014 round Nitinol archwires.

If the practitioner desires to level and align teeth early in treatment and correct rotations, when using a passive self-ligating bracket, the horizontal plane of the archwire slot can be engaged with small, low unloading-force wires. Using two flexible round archwires in tandem may fill both the horizontal and vertical planes of the bracket slot. This configuration is designed to correct and manage rotations early in treatment while simultaneously correcting vertical discrepancies. The tandem archwire can be inserted directly on top of the initial archwire used in treatment.

Bracket Esthetics for Patient Satisfaction

Clarity Ultra brackets are made of translucent, stain-resistant ceramic for brilliant esthetics. No metal parts show. The ceramic door covering the Clarity Ultra brackets has a smooth, contoured surface designed for patient comfort.

Clarity Ultra brackets are designed with a low profile, labial/lingually. This makes the bracket comfortable for the patient and reduces occlusal interference in some cases. Bite blocks, occlusal build-up or ligature guards can be used with Clarity Ultra brackets to reduce occlusal interference.

Lastly, Clarity Ultra ceramic brackets are available U/L, 5×5 for a complete esthetic treatment option. Individually colored ID dots help in easy bracket identification.

Compatibility with Existing Systems

Clarity Ultra brackets are compatible with 3M™ Victory Series™ Superior Fit Buccal Tubes,[1] as well as 3M™ Forsus™ Class II Correctors,[1] and can be combined for treatment efficiency. The in/out dimensions of Clarity Ultra brackets are equivalent to Clarity Advanced ceramic brackets and 3M™ Victory Series™ Low Profile Brackets.[1] 3M™ Unitek™ Esthetic Archwires will enhance the esthetic appearance, and 3M™ Unitek™ Lateral Development Archwires can be used to achieve a Platinum Proportion smile, if desired.

Bringing It All Together

You need treatment options designed for efficiency and reliability, from start to finish. Your patients want beautiful smiles—and expect to look good in the process. Clarity Ultra brackets provide a fully-esthetic solution for patients, while allowing you to deliver precise results.

[1] 3M date on file

For more information, visit 3M.com/ClarityUltra, or ask a 3M representative for a demonstration.

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