RESEARCH STUDY

The Palodent® 360 matrix system

Comparing strength and contact dimensions across competing circumferential matrix systems

For extensive restorations that can't be accommodated by a sectional matrix system, the Tofflemire matrix band has traditionally been the circumferential matrix of choice. However, the Tofflemire matrix band is obsolete technology that is awkward to use, creates poor interproximal contacts, and can lead to clinical failure when used with modern composite resins.[1]

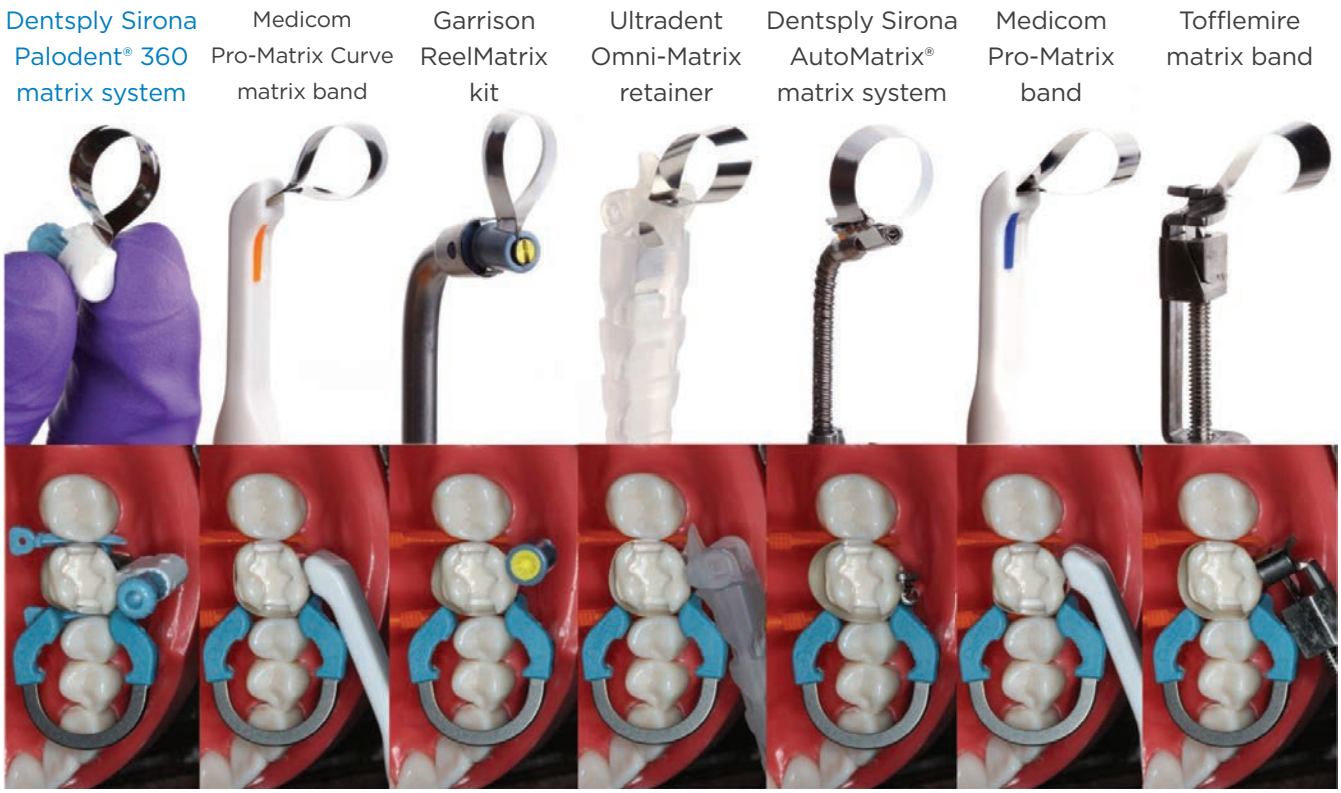
Several newer circumferential systems have been developed to address these shortcomings, including Dentsply Sirona's Palodent® 360 circumferential matrix system. A December 2019 study led by Nathaniel C. Lawson, DMD, PhD, evaluated the results achieved by these circumferential matrix systems. Here, we present the Lawson study's methods and results.

At a glance	
Palodent® 360 matrix system advantages	• Easily provides broadest contacts in middle 1/3 of tooth • 23% larger interproximal contact than Tofflemire matrix band • Creates reliable contacts that help improve periodontal health • Strengthens marginal ridge in Class II restorations, reducing susceptibility to fracture
Tofflemire matrix band	• Creates unacceptable contacts 75% of the time • Creates contacts 23% smaller and 32% higher on average versus Palodent® 360 circumferential matrix system
Pro-Matrix band	• Creates unacceptable contacts 75% of the time
Pro-Matrix Curve matrix band	• More likely to create unacceptable contacts versus Palodent® 360 circumferential matrix system • Three times more likely to create flash than the Palodent® 360 circumferential matrix system
Omni-Matrix retainer	• Creates unacceptable contacts 87% of the time • Four times more likely to create flash than the Palodent® 360 circumferential matrix system
Garrison ReelMatrix kit	• Creates contacts 16% smaller and 18% higher on average versus Palodent® 360 circumferential matrix system

Purpose of the study

To measure the intensity, shape and location of a contact provided by several different interproximal matrix systems.

System	Manufacturer	Type
Palodent® 360 matrix system	Dentsply Sirona	Circumferential
Pro-Matrix Curve matrix band	Medicom	Circumferential
Garrison ReelMatrix kit	Garrison	Circumferential
Omni-Matrix retainer	Ultradent	Circumferential
AutoMatrix® matrix system	Dentsply Sirona	Circumferential
Pro-Matrix band	Medicom	Circumferential
Tofflemire matrix band (.002")	Water Pik	Circumferential



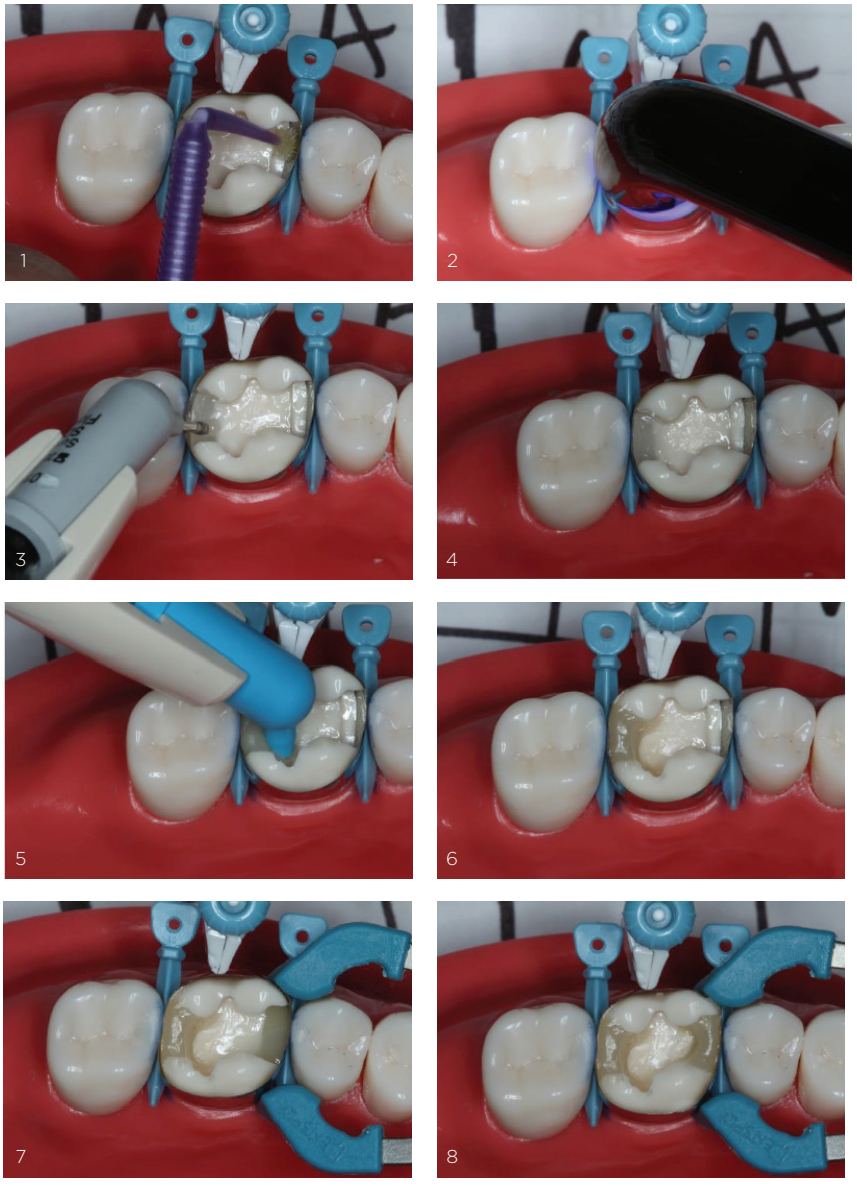
The circumferential matrix systems evaluated in this study.

Methods

Specimen preparation

Typodont teeth were obtained with standardized MOD Class II preparations on a maxillary first molar. Eight teeth per matrix system were evaluated. All teeth were completely tightened within the dentoform. One operator prepared all specimens.

The matrix systems (matrix and wedges) were prepared and placed using hand pressure. A layer of adhesive was placed, air evaporated and light-cured. SDR® flow+ bulk fill flowable was placed in an initial increment in the distal marginal ridge and light-cured according to the instructions for use. A second increment of TPH Spectra® ST universal composite material was placed, condensed, shaped and light-cured. A Palodent® Plus Universal Ring was placed in mesial contact, and the mesial marginal ridge was formed identically to the distal marginal ridge.



Filling the prepared typodont tooth with the Palodent® 360 matrix in place.

Methods (continued)

Indicating contact

The matrix system was disassembled, but in order to properly evaluate the contacts as shaped by the matrix systems no further finishing or polishing was performed. An interproximal marking floss was forced through the contact with a single pass.

The single operator evaluated each contact as being open (no pressure on the floss and no sound produced when flossing), weak (pressure could be sensed when passing the floss through the contact, but little force was required and no sound produced), or adequate (pressure could be sensed and a slight force was required, producing a popping sound). The tooth was then removed from the typodont and the contact area was evaluated.

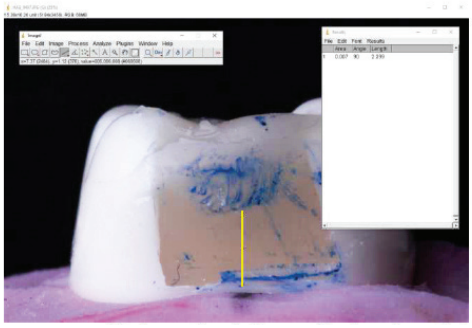
Using marking floss to indicate the contact through the operator's tactile observations as well as ink impregnated in the floss.

Evaluating contact

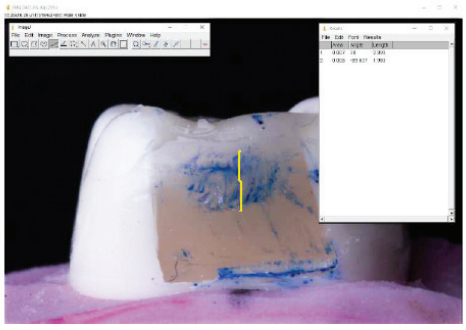
The typodont teeth were mounted in a silicone matrix at a fixed distance from a DSLR camera mounted on a tripod. The mesial and distal contact of each tooth was photographed without changing camera settings. All images were analyzed with Image J software.

The measurement scale was calibrated with an image of a ruler taken at the same magnification and with the same camera settings as the typodont teeth. Measurements were taken from the bottom of the Class II box to the bottom of each contact (the most cervical marking) and from the bottom to the top of each contact (the most occlusal marking). These measurements were made at the buccal-palatal center of the tooth as denoted by a line on the silicone matrix.

Each typodont tooth was observed by the single operator to determine whether there appeared to be excessive flash, or composite material beyond the preparation margins.

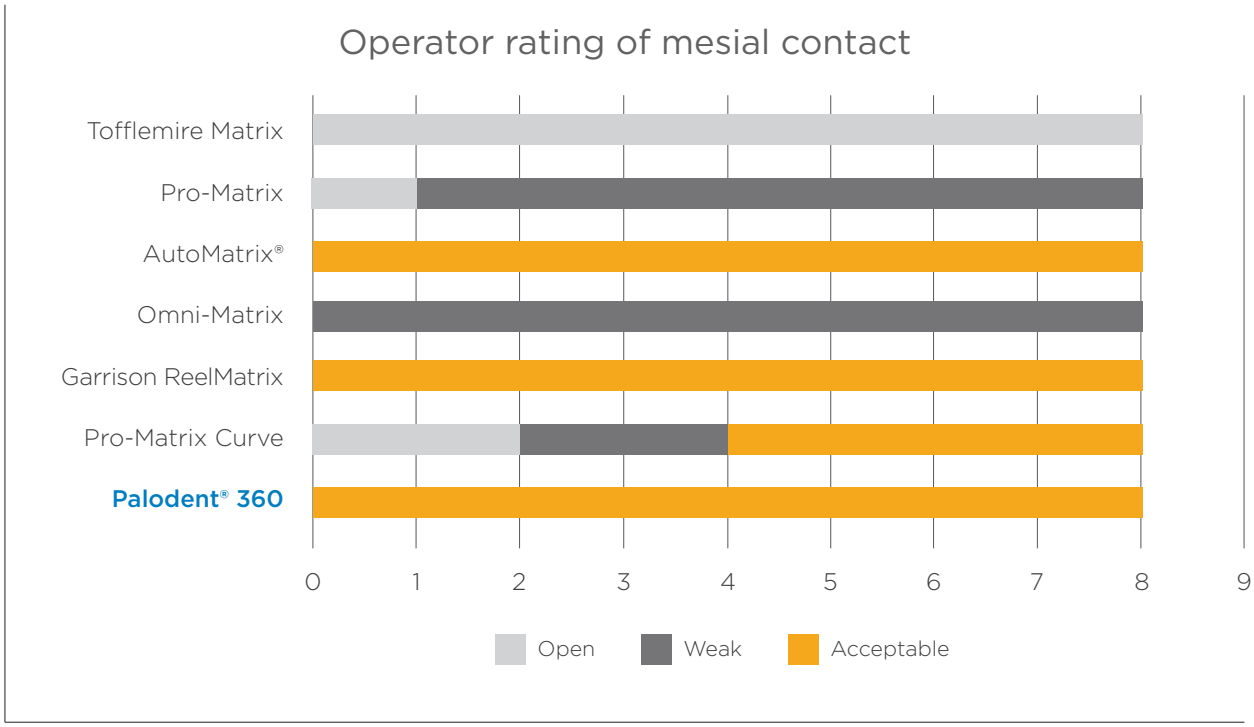


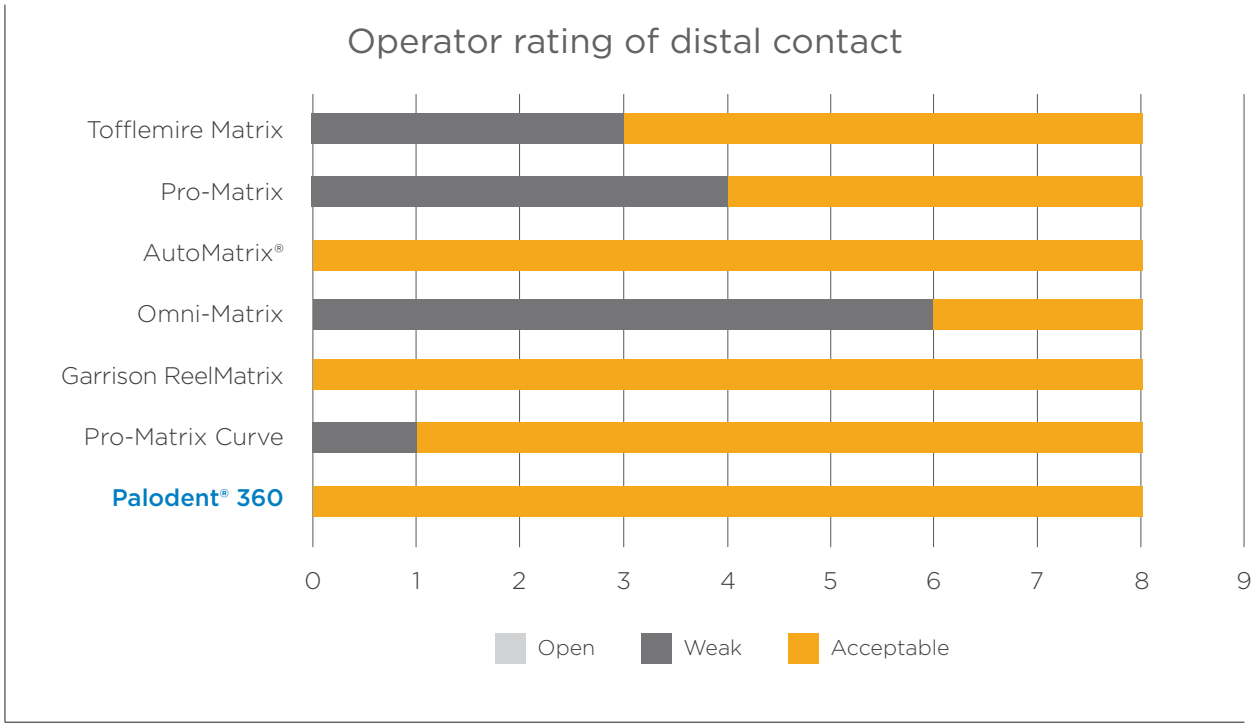
Measuring from the bottom of the Class II box to the bottom of the contact (the most cervical marking).

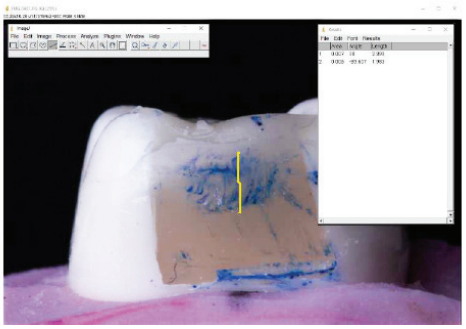


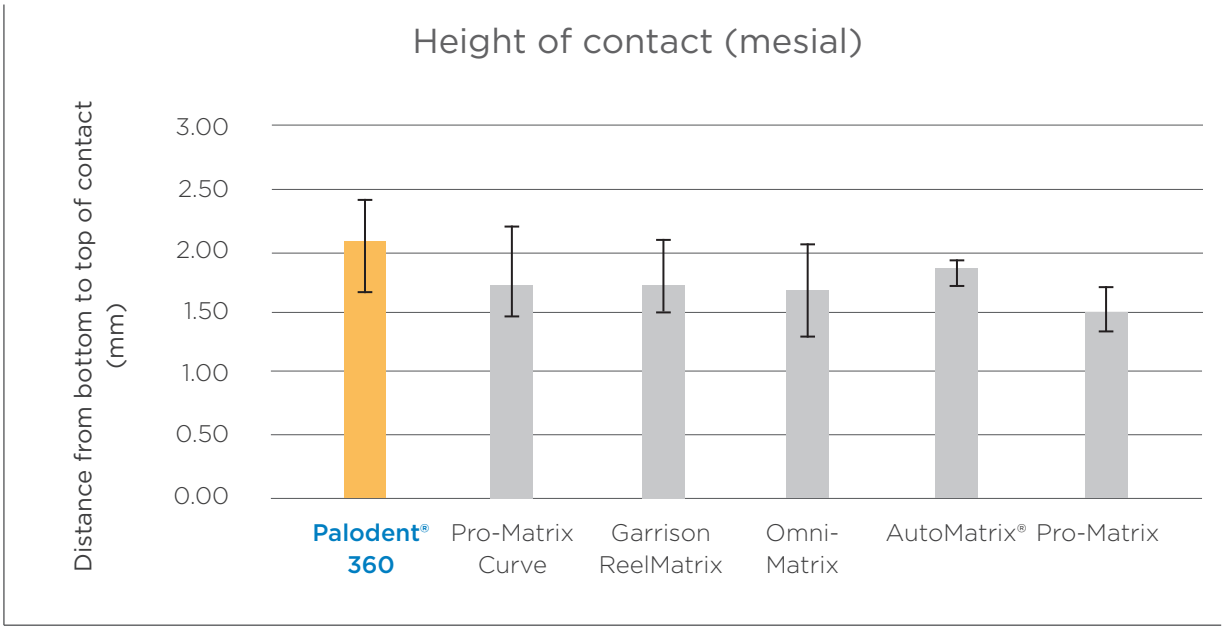
Measuring from the bottom (most cervical marking) to the top (most occlusal marking) of the contact.

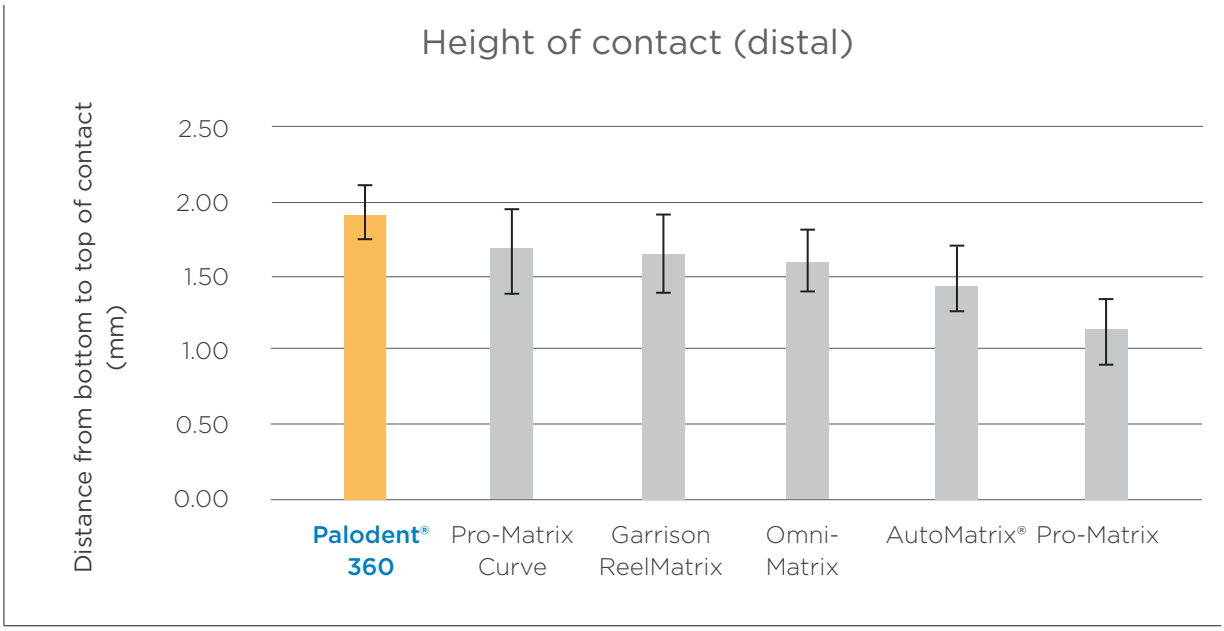
Results

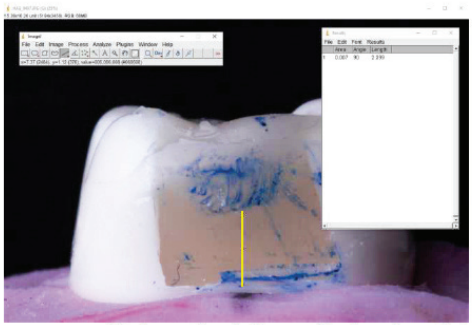

Operator rating of mesial contact
Tofflemire Matrix
Pro-Matrix
AutoMatrix®
Omni-Matrix
Garrison ReelMatrix
Pro-Matrix Curve
Palodent® 360
0
1
2
3
4
5
6
7
8
9
Open
Weak
Acceptable

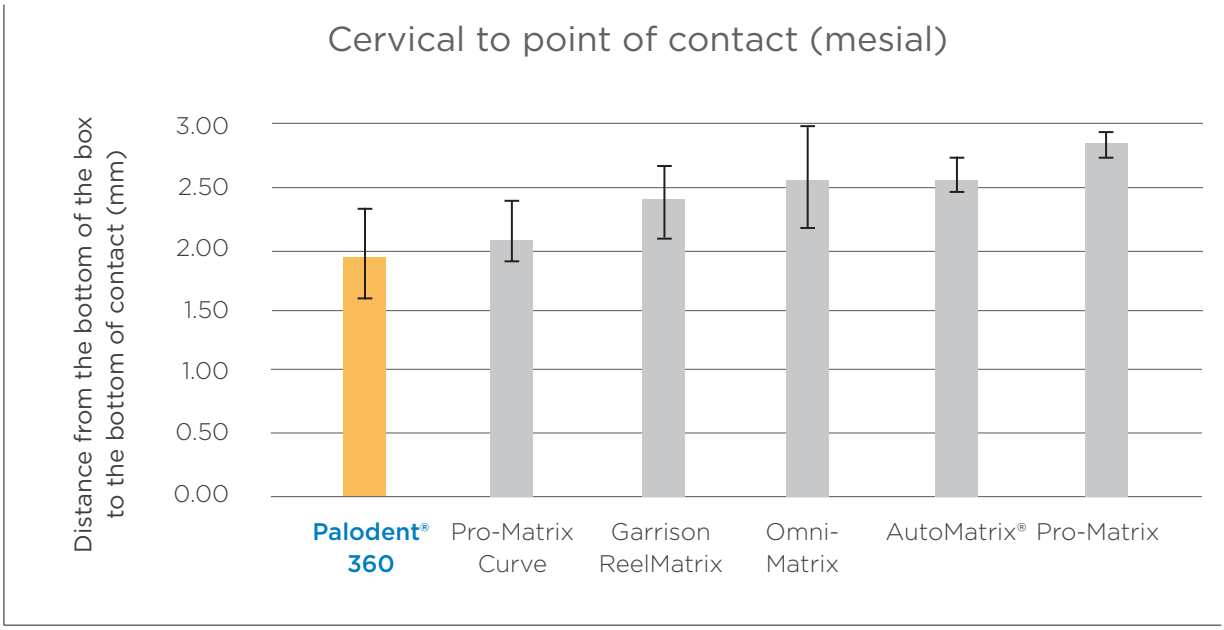

Operator rating of distal contact
Tofflemire Matrix
Pro-Matrix
AutoMatrix®
Omni-Matrix
Garrison ReelMatrix
Pro-Matrix Curve
Palodent® 360
0
1
2
3
4
5
6
7
8
9
Open
Weak
Acceptable

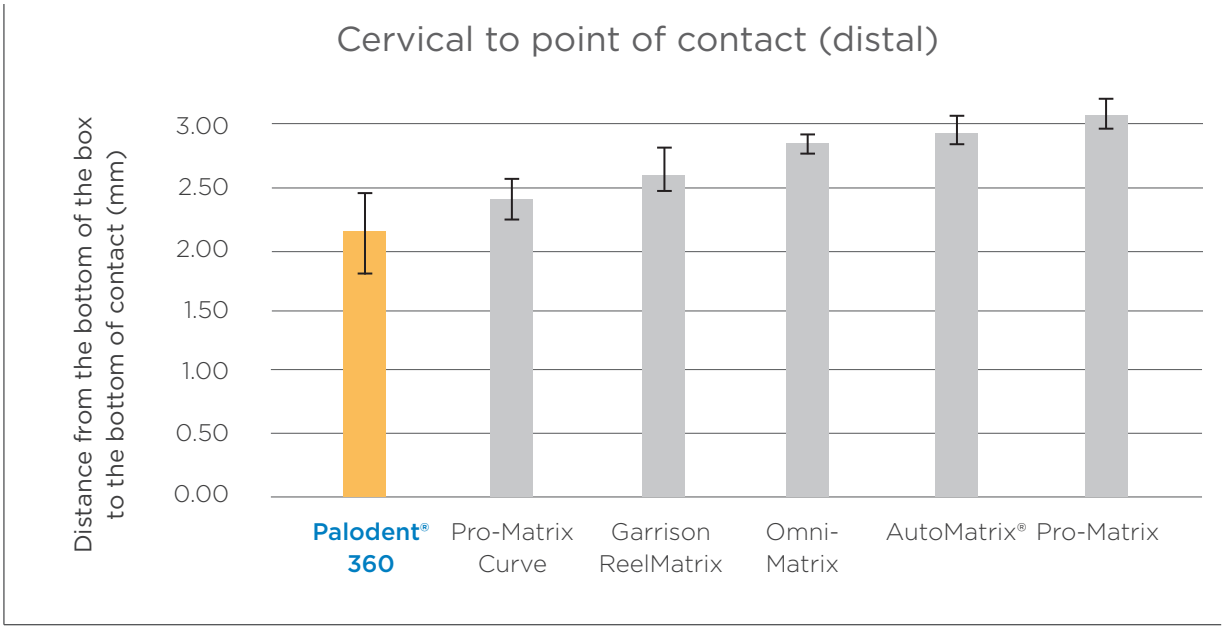



Height of contact (mesial)
Distance from bottom to top of contact (mm)
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Palodent® 360
Pro-Matrix Curve
Garrison ReelMatrix
Omni-Matrix
AutoMatrix®
Pro-Matrix

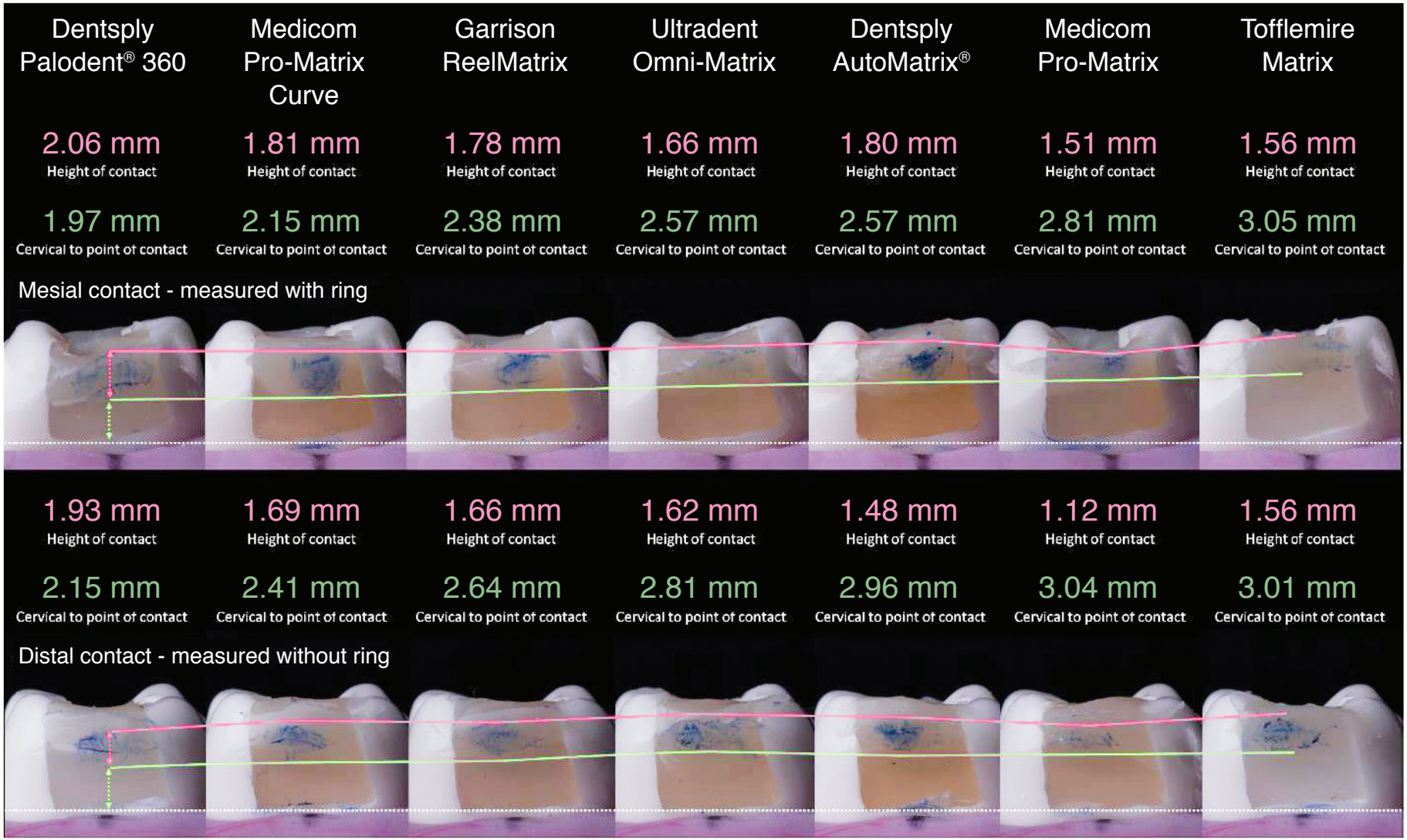

Height of contact (distal)
Distance from bottom to top of contact (mm)
2.50
2.00
1.50
1.00
0.50
0.00
Palodent® 360
Pro-Matrix Curve
Garrison ReelMatrix
Omni-Matrix
AutoMatrix®
Pro-Matrix




Cervical to point of contact (mesial)
Distance from the bottom of the box to the bottom of contact (mm)
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Palodent® 360
Pro-Matrix Curve
Garrison ReelMatrix
Omni-Matrix
AutoMatrix®
Pro-Matrix


Cervical to point of contact (distal)
Distance from the bottom of the box to the bottom of contact (mm)
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Palodent® 360
Pro-Matrix Curve
Garrison ReelMatrix
Omni-Matrix
AutoMatrix®
Pro-Matrix

Contact measurements illustrated



Operator evaluation of flash

Teeth with flash on mesial surface with ring							
Typodont	Palodent® 360 matrix system	Pro-Matrix Curve matrix band	Garrison ReelMatrix kit	Omni-Matrix retainer	AutoMatrix® matrix system	Pro-Matrix band	Tofflemire matrix band
1				X			X
2		X					X
3		X		X	X		
4							
5		X					X
6							X
7					X		
8				X			

Teeth with flash on distal surface without ring							
Typodont	Palodent® 360 matrix system	Pro-Matrix Curve matrix band	Garrison ReelMatrix kit	Omni-Matrix retainer	AutoMatrix® matrix system	Pro-Matrix band	Tofflemire matrix band
1				X			
2		X	X	X			
3							
4							
5	X						
6							
7							
8							X

Summary of findings

The Palodent® 360 matrix system provided contacts that were judged to have acceptable tightness.

Additionally, contacts produced with and **without a ring** were measured as being **longer** and **located more cervically** compared to competitive circumferential matrix systems.

Finally, only one contact out of 16 created by the Palodent® 360 matrix system was determined to exhibit excessive flash.

Learn more

The products you choose make a measurable difference to the efficiency of your procedures and the quality of results you achieve. The study led by Dr. Lawson examines the most important factor in a choice of circumferential matrix system: the results that it reliably achieves. But there are many other factors to consider as well: ease of use, adaptability to different clinical cases, product support and more.

We believe the Palodent® 360 matrix system excels in every aspect, and invite you to explore all its benefits and try it for yourself.

For more information, visit www.dentsplysirona.com/palodent360 or contact your Dentsply Sirona representative.

1. Owens BM, Phebus JG, An evidence-based review of dental matrix systems, "General Dentistry," September/October 2016

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