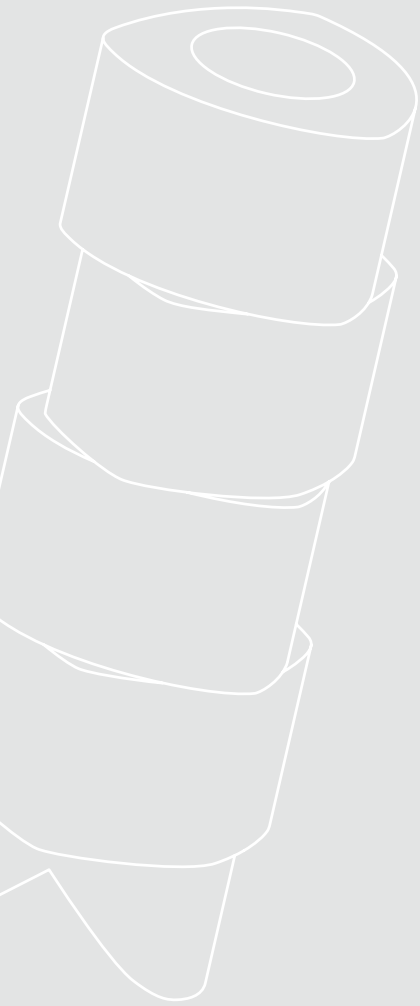


SonicWeld *Rx*[®]

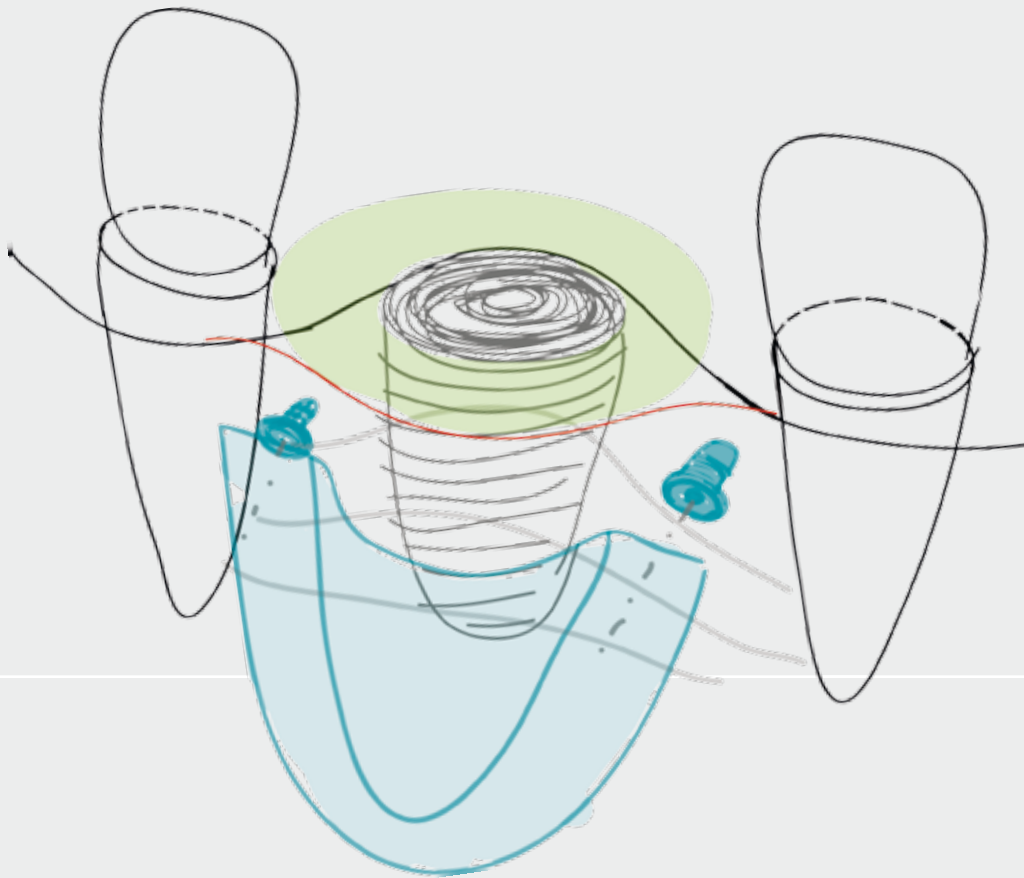
Restoring Nature





The loss of a tooth is typically followed by fast atrophy of bone in the alveolar ridge. To create a solid base for dental implants, the bone must be augmented horizontally and at times, vertically as well. SonicWeld Rx® Dental opens up new ways to shorten operating time and avoid removal interventions, which can go a long way to reducing patient stress.

Join our community of experts: SonicWeld Rx® Dental has been used with great success all over the world. As a result, this innovative method has found many friends: experts who have integrated the technology and continue to find great applications. These specialists invite you to share their knowledge in lectures, workshops, and online. Don't miss out! Learn more about the versatility and advantages of SonicWeld Rx® Dental. A detailed calendar of events is available at:
www.sonicweldrx-dental.com/courses



Just two millimeters for success

Widely published and taught by experts, this dimension is the minimum bone volume needed around a dental implant to anchor it firmly in the jaw for years to come. This is the goal for the best functional and aesthetic solution – and SonicWeld Rx® Dental from KLS Martin helps you achieve it with a method that is simple, practical, and patient-friendly.

SonicWeld Rx® Dental is based on an idea that was originally intended for furniture manufacturing. KLS Martin adapted this ultrasonic fixation method to applications in maxillofacial trauma and pediatric cranial bone surgery.

The material used, Resorb x®, is an innovative high-performance polymer consisting of Poly-D-L-lactic acid. Since the first clinical tests in 2001, Resorb x® has been used in many thousands of cranial and maxillofacial procedures. In 2005, ultrasonic application of Resorb x® improved ease-of-use and effectiveness. By 2007, the applications grew to include oral and dental bone augmentation.

A solution that dissolves
for a smile that stays

Simply put, SonicWeld Rx® Dental gives you control of bone particulate. Use of foils, membranes, alveolar protectors, and SonicPins Rx® as called for by the situation will help you shape the alveolar ridge to meet your three dimensional needs. Following regeneration of the bone, barriers and SonicPins Rx® gradually weaken and resorb through hydrolysis and metabolic pathways. This eliminates follow-up intervention as conventionally required for removing non-resorbable meshes, screws or tacks. What's finally left is a solid base for dental implants.



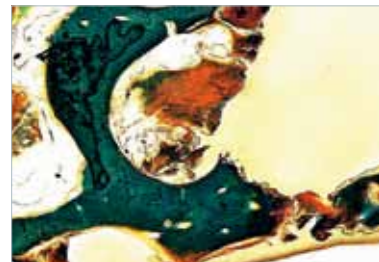
Longitudinal section through SonicPin Rx® and supporting tissue twelve days after the intervention.

Due to the biomechanical properties of the initial PDLA material, excellent biocompatibility and a safe degradation process are obtained. Biocompatibility and degradation behavior have been proven with numerous animal and clinical studies (Reference list 1-12).



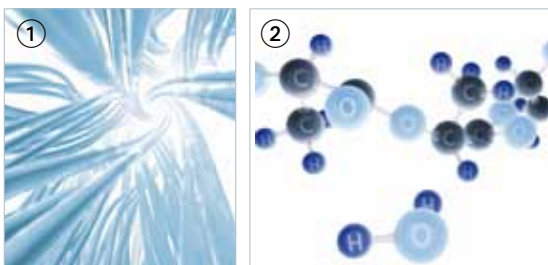
Two weeks after the surgery.

The unique SonicWeld Rx® creates a distinctly higher mechanical strength than conventional resorbable fixing systems. What's particularly striking is the increased primary stability of the SonicPins Rx® due to direct anchorage of the polymer in the trabecular meshwork of the bone.



Three months after the surgery and later.

In clinical studies, no signs of thermal damage or necrosis to the bone has been observed. Uneventful cell reactions around the implants have been observed, as well as complete resorption and bony healing (Reference list 2).



The complex polymer chains ① of the Poly-D-L-lactic acid (PDLLA) absorb the H₂O content of the surrounding body fluid ② (hydrolysis). The embedded water splits the polymer chains in ever-shorter molecular chains. Human metabolism then transforms the D- and L-lactides into carbon dioxide and water for final discharge through the metabolic channels.

References

Mechanical basic research

1. Pilling E., et al., An experimental study of the biomechanical stability of ultrasound-activated pinned (SonicWeld Rx® + Resorb x®) and screwed fixed (Resorb x®) resorbable materials for osteosynthesis in the treatment of simulated craniostyosis in sheep, *Br J Oral Maxillofac Surg* (2007), doi:10.1016/j.bjoms.2006.12.008.

Clinical testing and histological examination

2. Pilling E., et al., An experimental in vivo analysis of the resorption to ultrasound activated pins (SonicWeld®) and standard biodegradable screws (Resorb x®) in sheep, *Br J Oral Maxillofac Surg* (2007), doi:10.1016/j.bjoms.2006.12.002.

3. Mechanical basic research: Technical University of Dresden, Faculty of Medicine, Polyclinic for Prosthetic Dentistry Professor Dr. Bernd Reitemeier (M.D.) Dr. Gert Richter (engineer) Heike Meißner (certified engineer)

4. Clinical testing and histological examination: Technical University of Dresden, Faculty of Medicine, Hospital and Polyclinic for Oral and Maxillofacial Surgery Professor Dr. Dr. Uwe Eckelt (M.D.) Dr. Eckart Pilling (M.D.) Dr. Ronald Mai (M.D.)

Full literature list at:
www.sonicweldrx-dental.com

The safe route to bone augmentation



Membrane fixation with SonicWeld Rx® Dental is very simple: Drill the hole with a special drill ① and push the tip of the SonicPin Rx® into the hole ②. Establish pressure forward and maintain it while activating the SonicWeld Rx® unit. The sonotrode's ultrasonic vibrations cause the SonicPin Rx® to melt on the surface and glide into the bone cavities ②. When the SonicPin Rx® is at the desired depth, stop activation but do not immediately disengage from the SonicPin Rx®. After a few seconds, the polymer will harden ③. Subsequently, the membrane is attached to the previously inserted SonicPins Rx® and ultrasound is then used to weld it in place ④.

The core component of this procedure is the SonicWeld Rx® unit, an ultrasound generator producing ultrasonic waves of a precisely defined frequency that are then focused with a sonotrode. The SonicPin Rx® is picked up with the sonotrode tip and placed onto a pilot hole. When activating the ultrasound generator, the SonicPin Rx® is set vibrating by the sonotrode. The friction between the vibrating SonicPin Rx® and the bone surface generates heat, thus liquefying the surface of the pin and enabling it to glide into the hole.

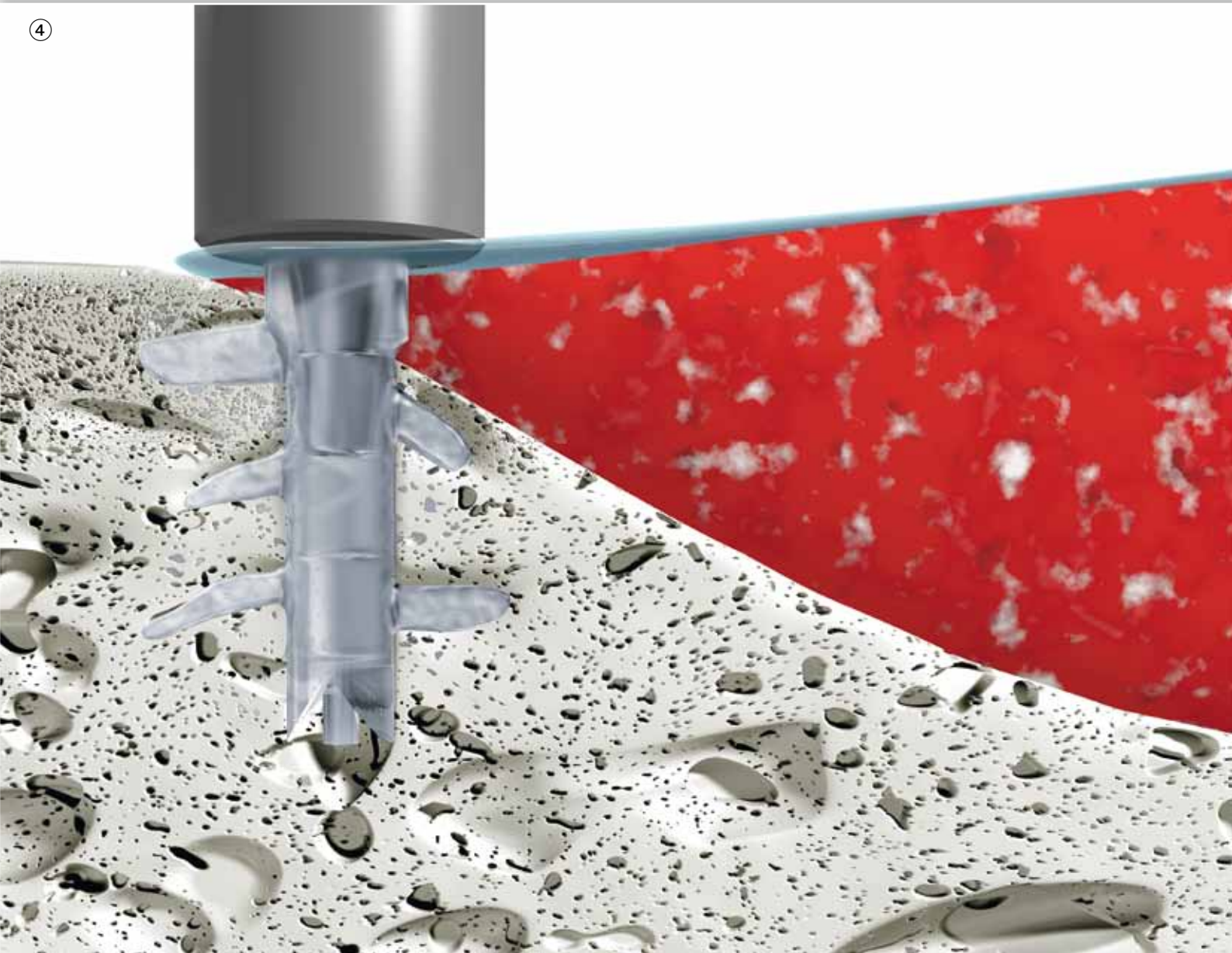
Thanks to the change in its state of aggregation, the SonicPin Rx® can penetrate even into bone cavities that could never be reached using the conventional procedure. In addition, the head of the SonicPin Rx® bonds with the Resorb x® foil, alveolar protector or membrane to create a three-dimensional structure of unmatched initial stability. Combined with the special shell technique by Iglhaut, these properties open up new dimensions in horizontal and vertical augmentation.

Shell technique: Achieving goals with decreased risk

An ideal vehicle is one that comfortably handles the easy path, but also the perils of rough terrain – this idea is not unlike solutions in augmentation. While hard barriers are excellent for structure, they may not be ideal under the delicate crestal gingiva – an area that must not be compromised in early healing. Patient compliance, soft tissue tension or movement, and other risk factors are not rare in preprosthetic surgery.

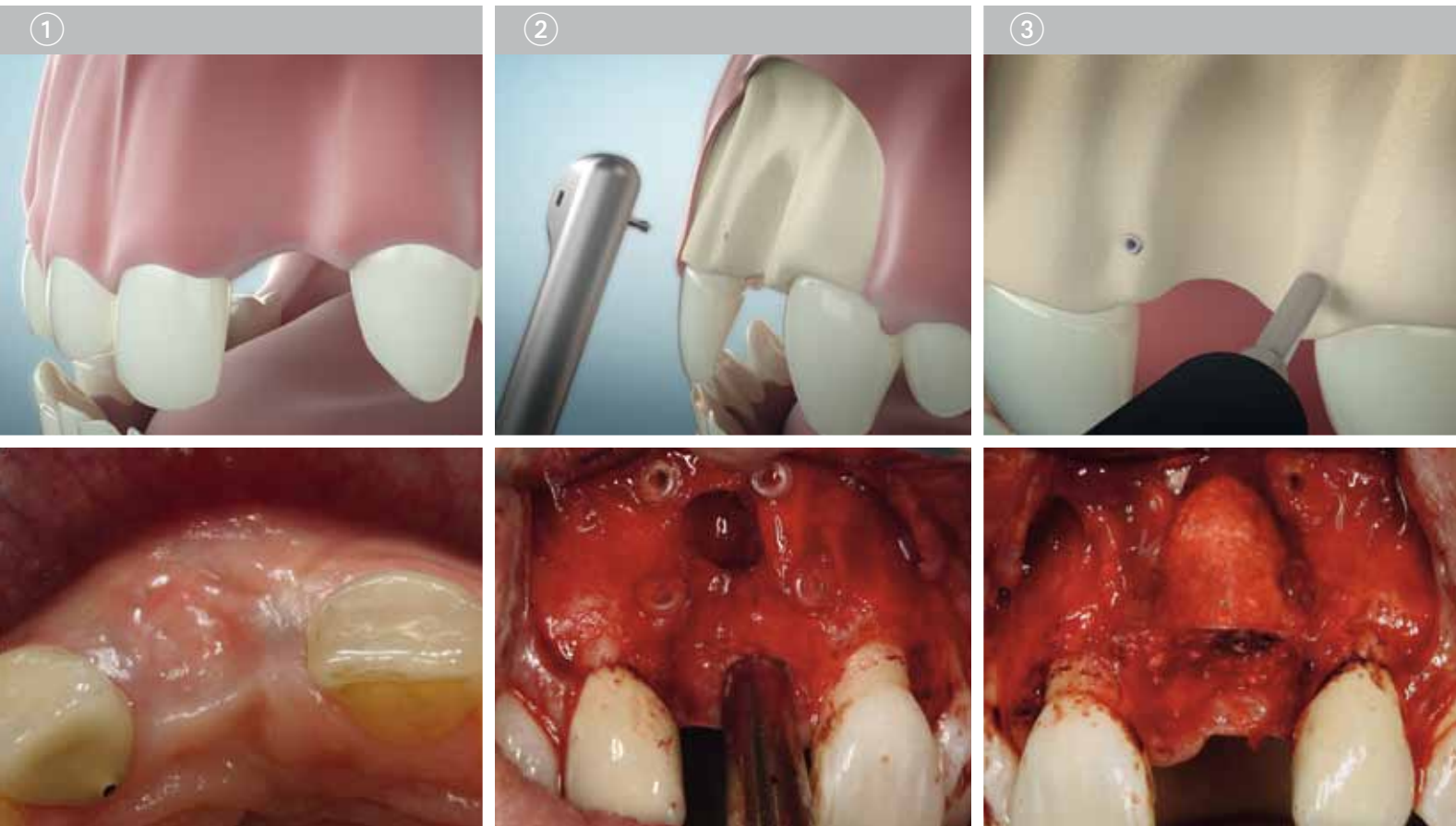
For this reason, the Resorb x® foil or Resorb x® membrane is constructed into one or two walls to create a 4-wall defect. A collagen membrane is used to cover the hard tissue augmentation zone. Such collagen membranes offer the best soft tissue tolerance. This ‘shell technique’ pioneered by Dr. Gerhard Iglhaut has been used successfully in many applications since 2007. It is similar to the proven autogenous bone shell technique described by Dr. Fouad Khoury, which has been in use for horizontal and vertical augmentation for many years.

④



Perfect for single-tooth defects –
the alveolar protector

An ideal solution for correcting minor single-tooth defects is preprosthetic augmentation with KLS Martin's alveolar protector. With its convex finger nail design, it recreates the alveolar process perfectly, thus allowing excellent regeneration of the natural structure. The patient benefits couldn't be more obvious, aesthetically as well as functionally.



Clinical images courtesy of Dr. Gerhard Iglhaut, Memmingen, Germany

① Soft tissue may require augmentation pre-operatively if tissue type is poor. Consider a crestal incision pattern, with vertical incisions only in the anterior region to avoid interrupted blood supply to the wound.

② Pre-drill each hole immediately adjacent to the defect.

③ Place two to four SonicPins Rx® around the defect. The 3-dimensional shape may allow for just two micro or standard SonicPins Rx® to be used.

④ Place the Resorb x® alveolar protector over the SonicPins Rx® and weld them together.

Use the flat sonotrode surfaces for welding and smoothing rough edges.

⑤ After smoothing rough edges, overfill the defect with bone until it is dome-shaped. Next drape a collagen barrier over the crest.

⑥ Flap edges must come together without tension from the sutures. Consider two levels of suturing – a deep mattress suture to eliminate movement in a wide area of the augmentation zone, and then suturing of the flap edge. Primary healing is critical and assisted by the diffusion-open collagen membrane that covers the augmentation and provides an additional barrier under the incision.

④



⑤

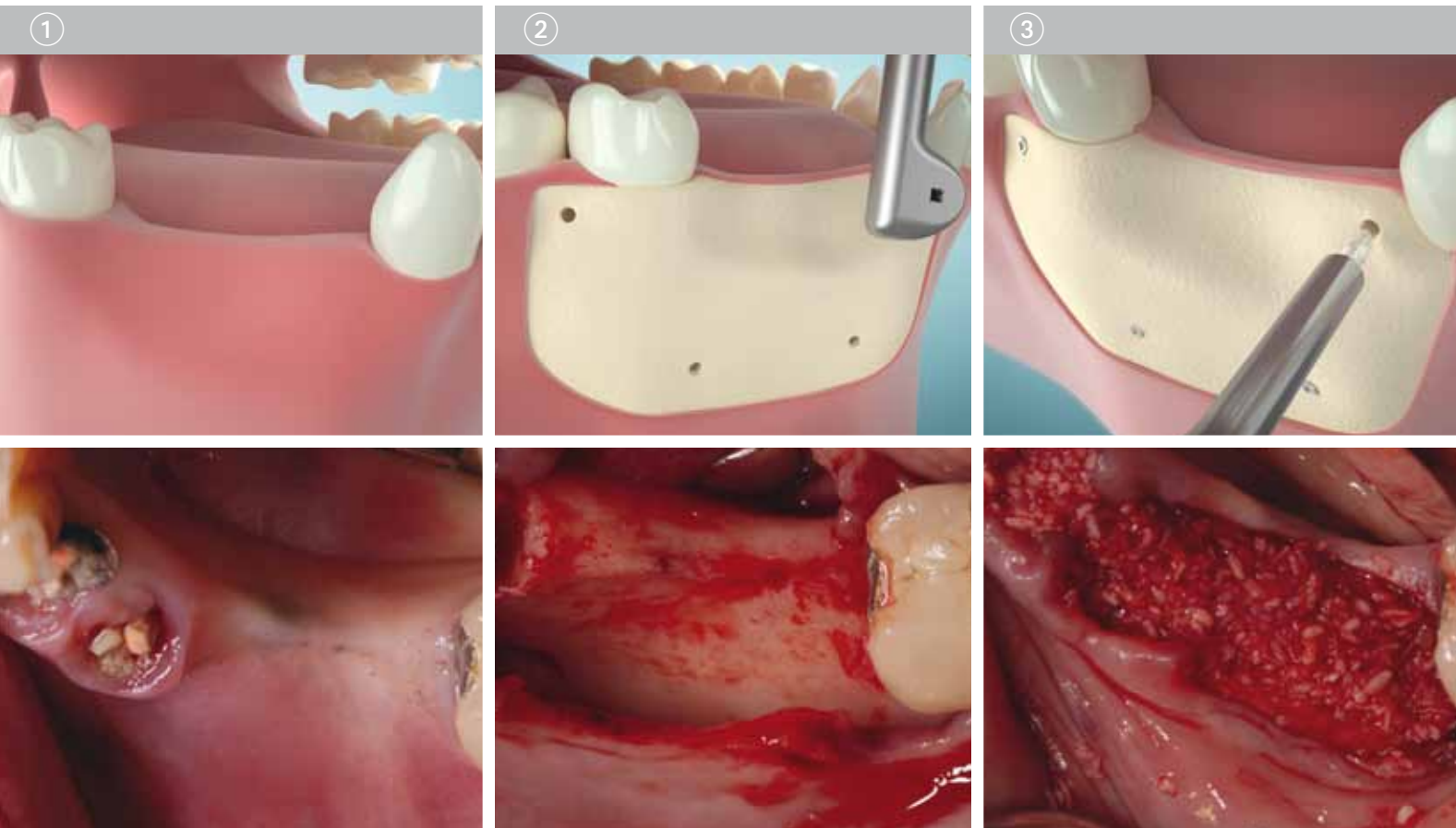


⑥



Let your patients
smile again

Where horizontal defects exist, it is best to use the proven shell technique with a single Resorb x® foil or Resorb x® membrane.



Clinical photos courtesy of Dr. Lewis Cummings, Houston, Texas

1 Expert clinicians recommend soft tissue augmentation prior to large bone augmentations if the tissue is not a thick healthy biotype. Select the appropriate Resorb x® foil or Resorb x® membrane. In large cases like this one, the 50 x 20 mm size is ideal.

2 3 Predrill the holes and place the SonicPins Rx®. Four to five SonicPins Rx® are usually enough, with one on each crestal side, and at least two apically on either side of the defect.

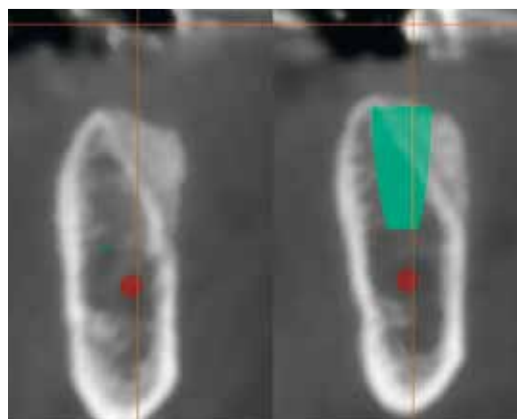
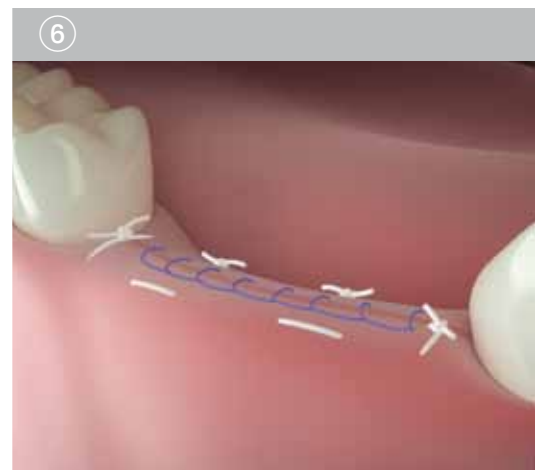
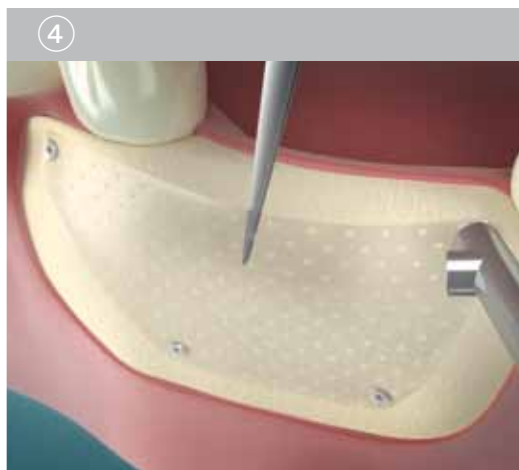
4 Place the Resorb x® foil or Resorb x® membrane over the SonicPins Rx® and weld them together. Use the flat sonotrode surfaces for welding and smoothing rough edges. The most volume can be gained by

welding one side, then placement of an instrument to hold a curve while welding the apical SonicPin Rx® on the other side.

5 After smoothing rough edges, overfill the defect with bone until it is dome-shaped. Next drape a collagen barrier over the crest. In this case, Alloderm®* was used to gain simultaneous soft tissue thickness.

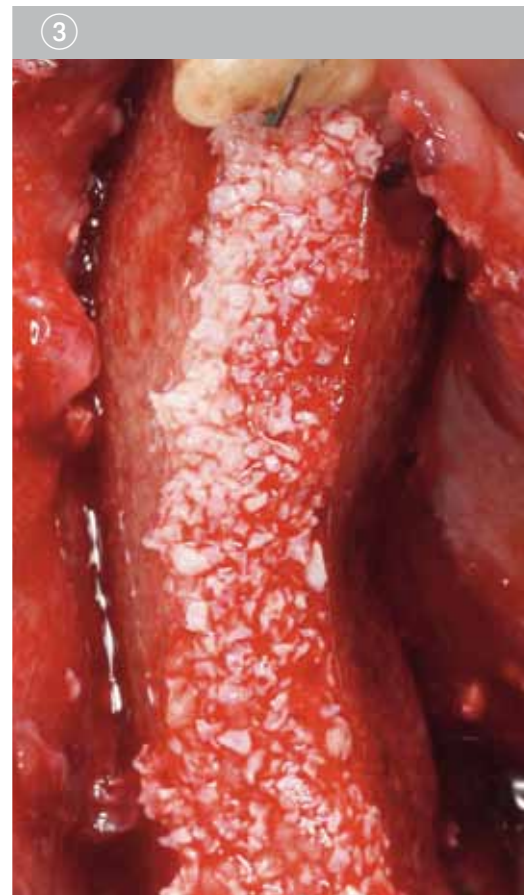
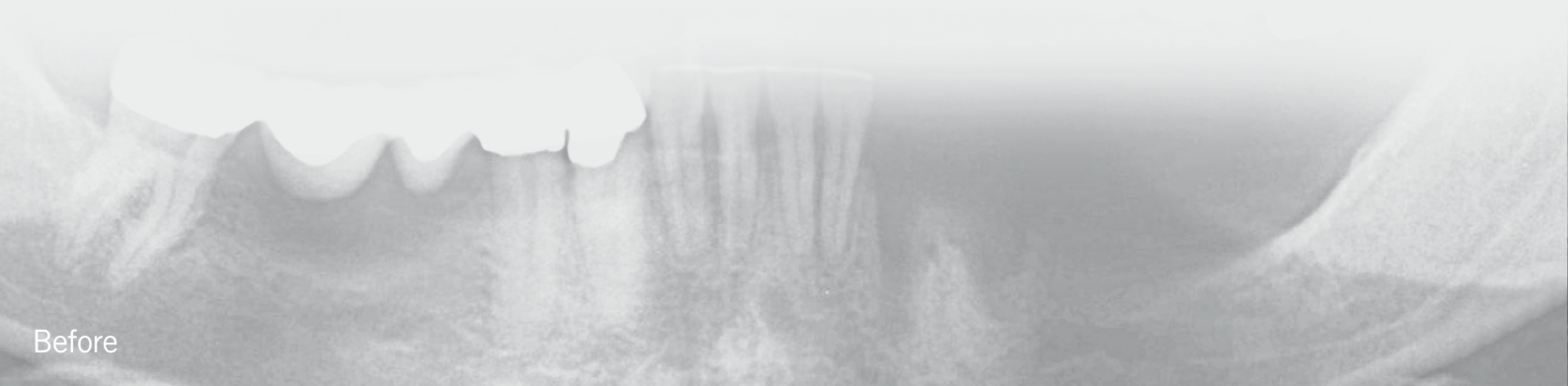
6 Flap edges must be come together without tension from the sutures. After extensive dissection is performed to release the tissue, consider two levels of suturing – a deep mattress suture to eliminate movement in a wide area of the augmentation zone, and then suturing of the flap edge.

*Alloderm® is a registered trademark of LifeCell Corporation.



A proven strategy for larger gaps

Major defects with horizontal and vertical bone loss are a challenge to augment. With two Resorb x® foils or Resorb x® membranes, the user can control the augmentation by creating a four-walled defect. The creation of walls allows for both convenience of particulate placement control, diffusion of blood to the wound, as well as safety in case of crestal wound complications. The protocol was developed with Dr. Gerhard Iglhaut and has been proven in the hands of many clinicians since 2009.



Clinical images courtesy of Dr. Gerhard Iglhaut, Memmingen, Germany

① If the tissue is of poor thickness, soft tissue augmentation may be necessary prior to surgery. Incision lines should be along the crest, and only vertical in the anterior.

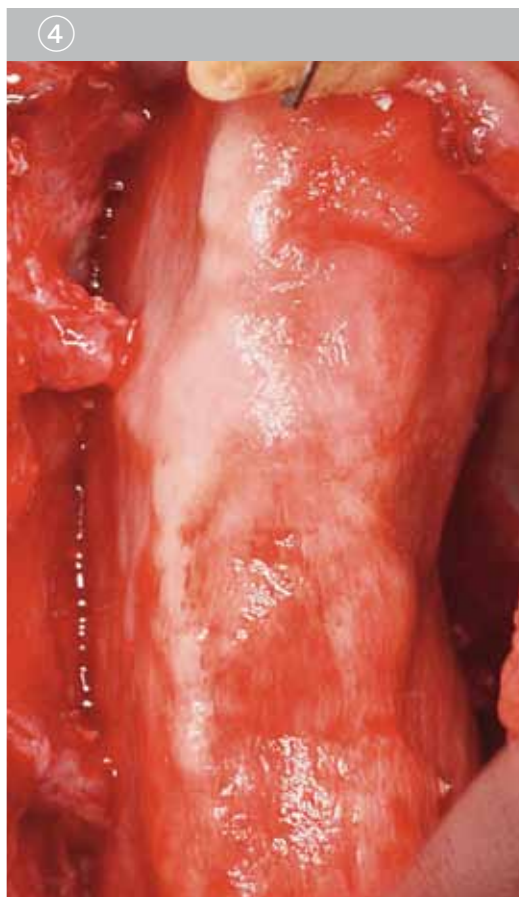
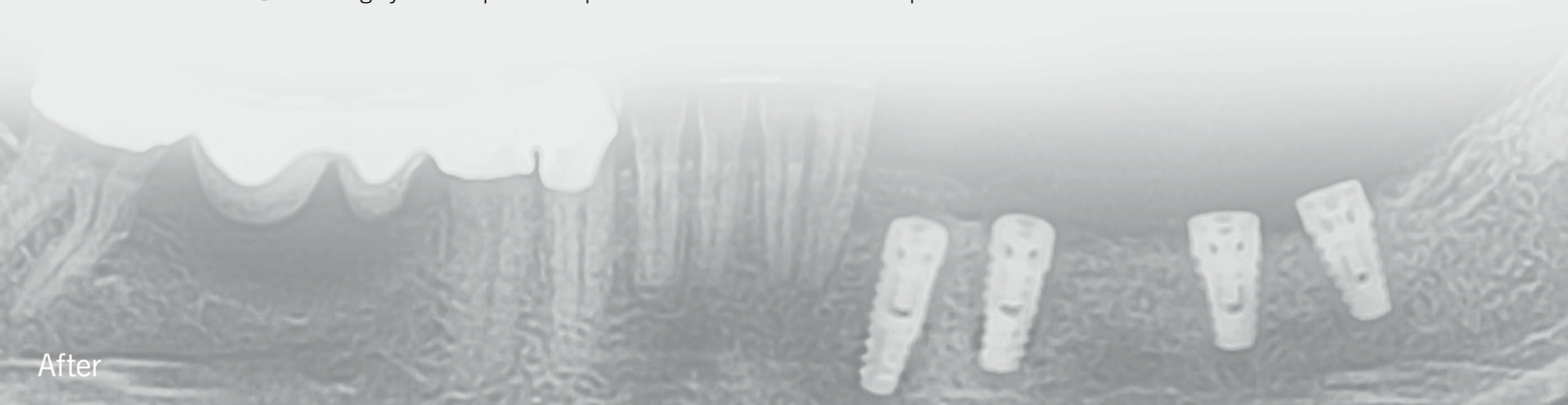
② Place four SonicPins Rx® around the buccal side of the defect and weld the buccal Resorb x® foil or Resorb x® membrane. Next, secure another to two crestal SonicPins Rx®.

③ Thoroughly fill the space with particulate bone.

④ Cover the augmentation with a collagen barrier to cushion the construct and aid as a predictable barrier under the wound.

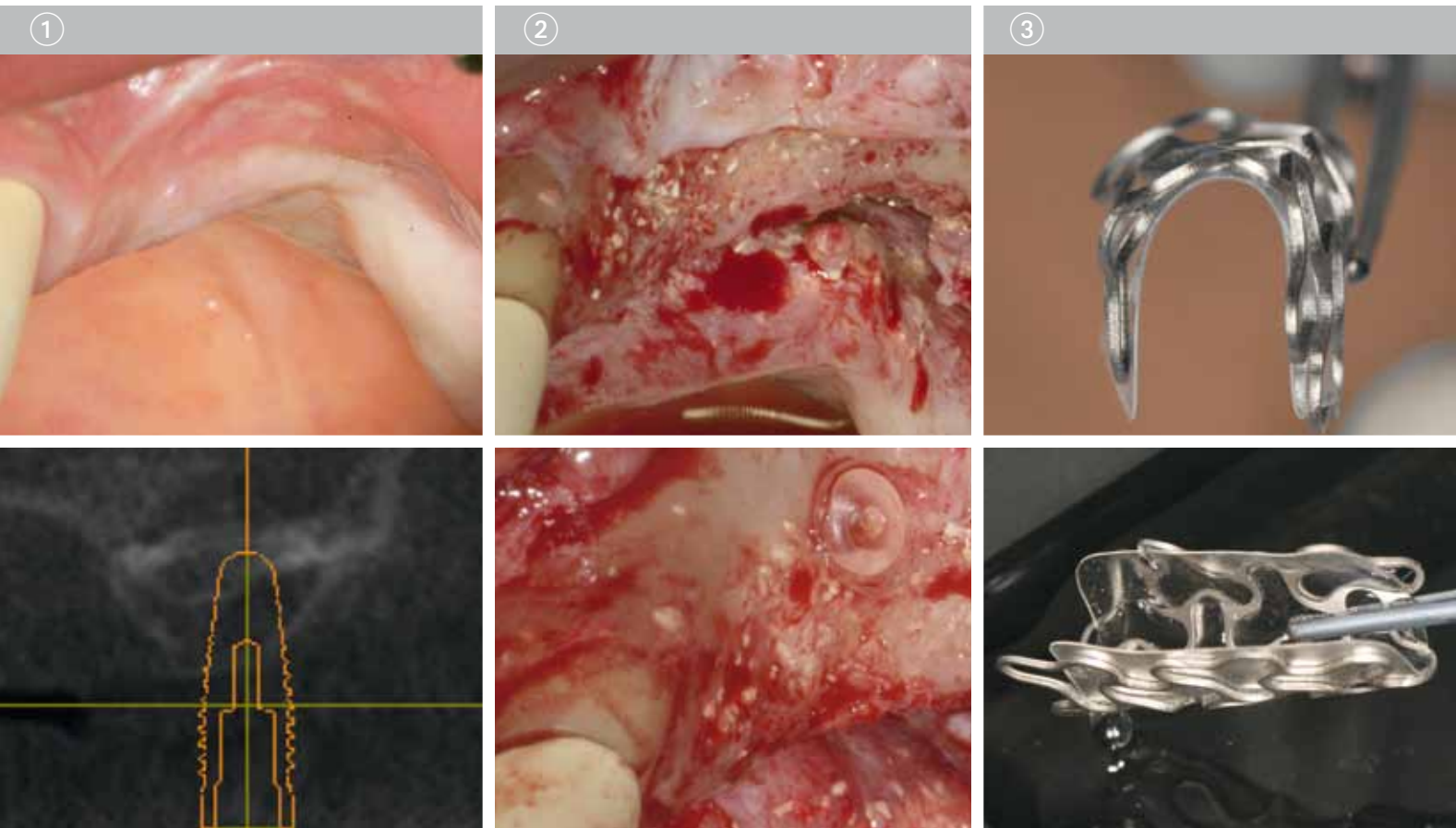
⑤ Obtain absolute tension-free closure using deep mattress suture to first create a zone of immobilized tissue. Primary healing is critical to success.

⑥ Significant results are possible with the shell technique.



New horizons in 3D spaces

The frame technique takes advantage of the thermoplastic properties of the Resorb x® polymer to create individual solutions using a metal template. This technique is very effective in vertical augmentation in cases where the soft tissue conditions and closure are ideal, and the risk of primary healing is not a concern.



Clinical case courtesy of Dr. Kevin Murphy, Baltimore, Maryland, USA

The frame technique is best suited for vertically deficient cases with optimal thick tissue biotype. The clinician must be sure that absolute tension free closure and primary wound healing can be achieved.

① SonicPins Rx® are placed on both the buccal and lingual borders of the defect within the size of the Resorb x® foil or Resorb x® membrane.

② Next, a three dimensional frame is created by bending a template over the defect in the desired shape. The Resorb x® foil or membrane is placed over or inside the frame and dipped into the sterile hot water for just a few seconds. It will adapt to the frame when lifted out of the water and will cool and harden quickly.

③ The smoothing sonotrode is then used to weld the Resorb x® foil or membrane on one side.

④ The Resorb x® foil or membrane is gently lifted and the space is thoroughly filled with particulate bone. Final welds are made to secure the Resorb x® foil or membrane to the remaining SonicPins Rx®.

⑤ Collagen is draped over the crest. Before crestal suturing, a deep mattress suture is placed, often to the lingual periosteum in a split flap technique.

⑥ Predictable soft tissue healing in large augmentation is dependent on soft tissue grafting, tension-free wound closure, and post-operative care. Final result shows vertical augmentation.

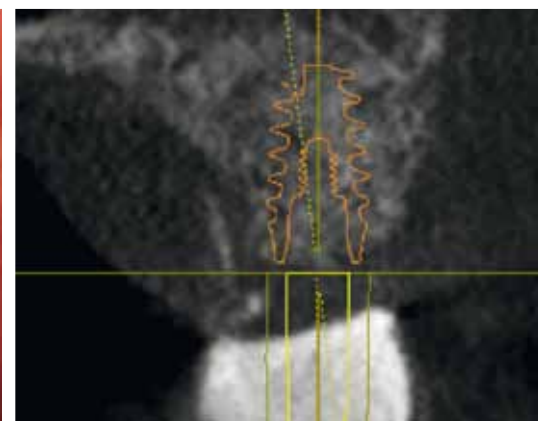
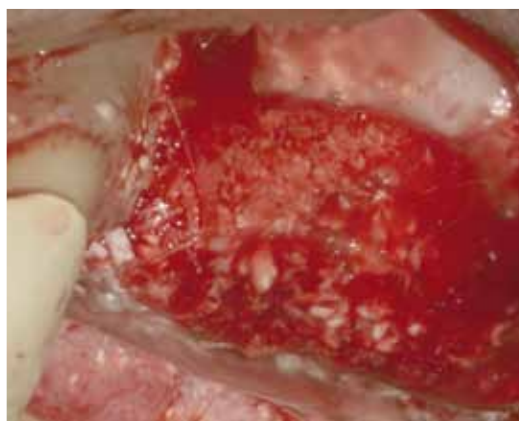
④



⑤



⑥



Everything you need
to succeed



52-500-03-04 Handpiece*

- ① 52-500-00-04 SonicWeld Rx® Unit complete*
not pictured:
52-500-02-04 Foot switch, round*
52-500-04-04 Foot switch, square (add-on option)

52-501-01-04 Sonotrode, straight*

① **SonicWeld Rx® unit**

The microvibrations generated by the ultrasonic unit cause the SonicPins Rx® to liquefy on the surface. Applying just a little pressure makes them glide into the predrilled hole and anchor themselves solidly into the bone structure. The SonicWeld Rx® unit is maintenance-free. Only the handpiece and the cable need to be cleaned and then sterilized at 134°C (273°F), 2 bar.

② **Sonotrode**

To insert the SonicPins Rx®, straight and angled sonotrodes with tapering working ends are available. Moreover, smoothing sonotrodes are available for perfect adaptation of the Resorb x® foils/membranes and the alveolar protector to the anatomical conditions.

③ **Resorb x® foil/Resorb x® membrane and alveolar protector**

All Resorb x® materials consist of 100 % intrinsically amorphous PDLLA. Once heated up in the Xcelsior water bath, they can be easily shaped. Being completely transparent, they offer a perfect overview of the surgical site at any time – during as well as after the operation. Once welded in place and cooled down, they form a dimensionally stable, pressure-resistant (rigid) 3D structure that protects and maintains the augmentation.

④ **SonicPin Rx®**

Available in 2-item or 5-item clip magazines, with pin diameters of 1.6 mm and 2.1 mm, for single-handed insertion with perfect ease and solid self-anchoring in cortical and cancellous bone.

⑤ **Micro SonicPin Rx®**

Available in 2-item or 4-item clip magazines, with pin diameter of 1.6 mm.

⑥ **Titanium bending templates**

For adaptation to anatomical structures (frame technique).

⑦ **Xcelsior water bath**

Used for shaping/modeling the Resorb x® foils and membranes.

⑧ **Storage and sterilization unit**

For sterile processing of handpiece, sonotrodes and tools.



7 52-400-10-04 Xcelcior complete

8 55-015-30-01 Miniset Tray
55-969-44-04 Component tray
55-963-51-04 Lid



Dental attachment
52-509-05-07

BOS Drill
52-610-04-07

52-512-05-07
Dental attachment
surgical length (not shown)

J-Notch
52-510-04-07

Wrench for Sontrodes*
52-502-01-04

52-501-01-04

52-501-02-04

52-501-03-04

52-501-04-04

2



55-962-45-04

52-313-25-04



6 52-313-50-04



4 52-516-24-04 1,6 x 4 mm 2 pcs
52-516-54-04 1,6 x 4 mm 5 pcs



5 52-519-25-04 1,6 x 5 mm 2 pcs
52-519-45-04 1,6 x 5 mm 4 pcs

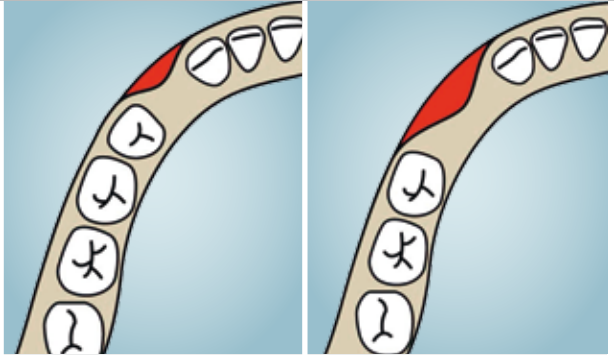


52-301-07-04 t=0.1 mm

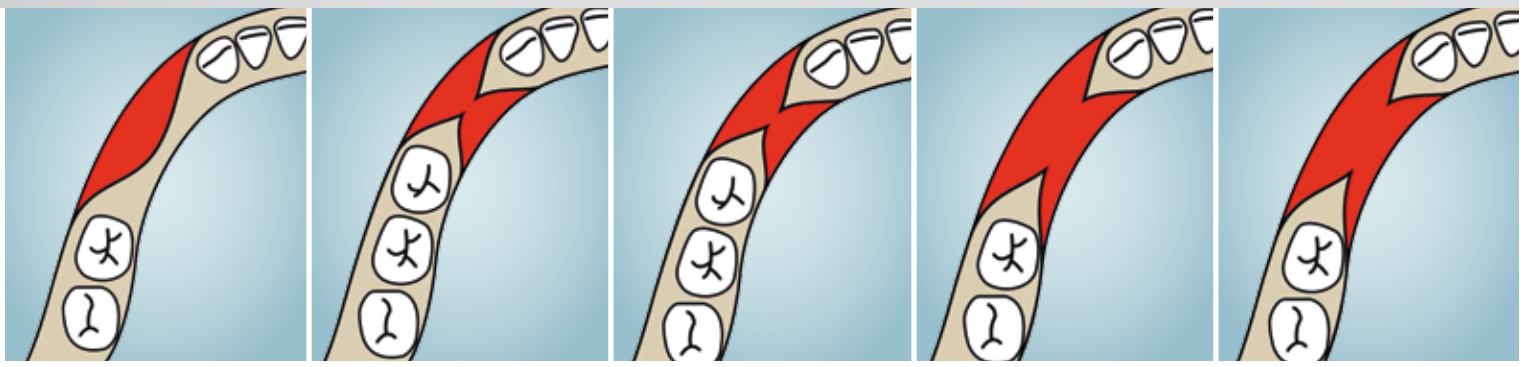


3 52-302-30-04 t=0.2 mm
52-301-38-04 t=0.1 mm
52-301-20-04 t=0.1 mm
52-301-28-04 t=0.1 mm

The easy way
to order Resorb x®



		Shell Technique Horizontal Small	Shell Technique Horizontal Medium
Resorb x® Alveolar Protector t = 0.1 mm (52-301-07-04)		1 protector	
Resorb x® Alveolar Protector Plus ** (1 x Resorb x® Alveolar Protector t = 0.1 mm and 2 x Micro SonicPin Rx® 1.6 x 5 mm) (52-301-00-04)		1 set	
Resorb x® foil 25 x 25 mm t = 0.1 mm (52-301-28-04)			1 barrier
Resorb x® membrane 25 x 25 mm t = 0.1 mm (52-301-38-04)			
Resorb x® foil 50 x 20 mm t = 0.1 mm (52-301-20-04)			
Resorb x® membrane 50 x 20 mm t = 0.2 mm (52-302-30-04)			
Micro SonicPin Rx® 1.6 x 5 mm, 2-pack ** (52-519-25-04)		2 – 4 pins	
SonicPin Rx® 1.6 x 4 mm, 2-pack ** (52-516-24-04)			
Micro SonicPin Rx® 1.6 x 5 mm, 4-pack ** (52-519-45-04)			4 – 5 pins
SonicPin Rx® 1.6 x 4 mm, 5-pack ** (52-516-54-04)			



Shell Technique Horizontal Large	Shell Technique Vertical Medium	Frame Technique Vertical Medium	Shell Technique Vertical Large	Frame Technique Vertical Large
	2 barriers	1 barrier*		
1 barrier			2 barriers	2 barriers
	2 – 3 pins lingual		2 – 4 pins lingual	2 – 4 pins lingual
4 – 5 pins	4 – 5 pins buccal	2 – 3 pins buccal, 2 pins lingual	4 – 5 pins buccal	4 – 5 pins buccal

* Requires 52-313-25-04 or 52-313-50-04 template and 52-400-10-04 Xcelsior waterbath for themoplastic shaping of the barrier.
 ** To insert the pins, predrilling is necessary with the twist drills 52-509-05-07 (dental attachment), 52-510-04-07 (J-notch) or 52-610-04-07 (BOS-Drill).

KLS Martin Group

Karl Leibinger GmbH & Co. KG
78570 Mühlheim · Germany
Tel. +49 7463 838-0
info@klsmartin.com

KLS Martin GmbH + Co. KG
79224 Umkirch · Germany
Tel. +49 7665 9802-0
info@klsmartin.com

Stuckenbrock Medizintechnik GmbH
78532 Tuttlingen · Germany
Tel. +49 7461 16 58 80
verwaltung@stuckenbrock.de

Rudolf Buck GmbH
78570 Mühlheim · Germany
Tel. +49 7463 99 516-30
info@klsmartin.com

KLS Martin France SARL
68200 Mulhouse · France
Tel. +33 3 89513150
france@klsmartin.com

Martin Italia S.r.l.
20871 Vimercate (MB) · Italy
Tel. +39 039 605 6731
italia@klsmartin.com

Martin Nederland/Marned B.V.
1270 AG Huizen · The Netherlands
Tel. +31 35 523 45 38
nederland@klsmartin.com

KLS Martin UK Ltd.
Reading RG1 3EU · United Kingdom
Tel. +44 1189 000 570
uk@klsmartin.com

Nippon Martin K.K.
Osaka 541-0046 · Japan
Tel. +81 662 28 90 75
nippon@klsmartin.com

KLS Martin L.P.
Jacksonville, FL 32246 · USA
Tel. +1 904 641 77 46
contact@klsmartin.com

Gebrüder Martin GmbH & Co. KG
Representative Office
121471 Moscow · Russia
Tel. +7 499 792-76-19
russia@klsmartin.com

Gebrüder Martin GmbH & Co. KG
Representative Office
201203 Shanghai · China
Tel. +86 21 2898 6611
china@klsmartin.com

Gebrüder Martin GmbH & Co. KG
Representative Office
Dubai · United Arab Emirates
Tel. +971 4 454 16 55
middleeast@klsmartin.com



www.sonicweldrx-dental.com

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Gebrüder Martin GmbH & Co. KG
A company of the KLS Martin Group
KLS Martin Platz 1 · 78532 Tuttlingen · Germany
Postfach 60 · 78501 Tuttlingen · Germany
Tel. +49 7461 706-0 · Fax 706-193
info@klsmartin.com · www.klsmartin.com



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The KLS Martin SonicWeld Rx® solution is based on the BoneWelding®-technologie¹⁾ protected by the industrial property rights of WoodWelding AG, Switzerland, and has been licensed by this company.

¹⁾ "BoneWelding" is a registered Swiss trademark.