EXPERIENCE PIEZOSURGERY®
EXPERIENCE PRECISION

PIEZOSURGERY® technology is a cut above

PIEZOSURGERY® is superior to saws and burs, not only in terms of intra-operative precision, but also in regard to tissue healing. Burs and saws cut bone, but they do not differentiate: any soft tissue getting in their way will also be cut.

The special ultrasonic microvibrations of the original PIEZOSURGERY® technique cut bone – and nothing else. No soft tissue is damaged, which allows you to work with a precision that facilitates not only surgery itself, but reduces postoperative discomfort for your patients at the same time.

Choose PIEZOSURGERY® technology for maximum precision and control – and minimal stress for you and your patients. Your perfect solution.

MICROMETRIC CUTS
PIEZOSURGERY® provides micrometric cuts for minimally invasive surgeries with maximum surgical precision and intra-operative tactile sensation.

SELECTIVE CUTS
PIEZOSURGERY® protects any kind of soft tissue. Nerves, vessels and membranes will not be injured while cutting bone. Thus PIEZOSURGERY® offers maximum safety for surgeons and patients.

CAVITATION EFFECT
PIEZOSURGERY® offers maximum intra-operative visibility. The cavitation effect of the ultrasonic movements leads to a blood-free surgical site.

THE PATIENT’S BENEFIT
→ soft tissue will be protected, f.e. in lateral sinus lift surgery the risk of perforation is reduced over 80%
→ less swelling after surgery with PIEZOSURGERY®
→ faster and better osseointegration after implant site preparation with PIEZOSURGERY®
→ faster and less traumatic post-operative recovery

HISTOLOGICAL RESULTS
EXPERIENCE SAFETY

Clinical benefits of PIEZOSURGERY® technology

→ SINUS LIFT TECHNIQUE
- safer opening of the lateral window
- fewer membrane perforations
- safe detachment of the membrane
- fewer post-operative complications

→ IMPLANT SITE PREPARATION
- safe preparation respecting to the inferior alveolar nerve
- less post-operative inflammation
- faster healing and higher primary stability
- possibility of immediate post-extractive implant site prep
- possibility of differential implant site prep (correction of the axis)

REFERENCES


Piezosurgery®
Whether it is about sinus lift or implant site preparation, about extraction or bone block grafting – one of the most important features you should demand from your operating device is safety. Its major strength is minimizing the risk of cutting soft tissue. These structures are not sensitive to the frequencies used by the PIEZOSURGERY® technology.

→ EXTRACTION/EXPLANTATION

→ bone preservation in impacted or ankylosed root and third molar extractions
→ safe in proximity to the inferior alveolar nerve wisdom tooth extraction
→ reduced amount of facial swelling and trismus 24 hours after surgery
→ immediate implant site preparation

→ BONE BLOCK GRAFTING

→ maximum surgical control in bone grafting from mandibular ramus and chin
→ absence of necrosis on the surface of the cut
→ presence of nucleated osteocytes, indicative of the atraumatic effect

→ REFERENCES

EXPERIENCE  PERFORMANCE
mectron re-defines bone surgery once again with the new PIEZOSURGERY® devices

When mectron introduced PIEZOSURGERY® in 2001, the technology was revolutionary for bone surgery: a device providing precision, safety, perfect ergonomics and the highest quality to surgeons all around the world. The new technology immediately became state-of-the-art for bone surgery devices.

Having set this benchmark, we improved the technology in the following years - with a strong focus on ergonomics. The outcome: two devices offering a perfect balance between cutting performance and safety – PIEZOSURGERY® touch and PIEZOSURGERY® white.

EXPERIENCE
mectron has been designing and manufacturing PIEZOSURGERY® devices since 2001. This experience, plus the input of surgeons worldwide, has been incorporated into our PIEZOSURGERY® devices.

PERFORMANCE
Providing the optimal ratio between power and security is one of the key success factors of every surgery. Thanks to its intelligent electronic feedback-system the original mectron PIEZOSURGERY® technology provides the maximum of power and achieves perfect cutting efficacy in every situation – for surgeries which are time-efficient, secure and successful.
PIEZOSURGERY® LETS YOU FOCUS 100% ON SURGERY

STEP 1: tap on the surgery type. STEP 2: choose the irrigation type. STEP 3: start surgery. It is as simple as that. No further insert specific adjustments are required – the fine tuning and indication for each insert is automatically achieved by the PIEZOSURGERY® electronic feedback system.

This feedback system is the heart of our PIEZOSURGERY® technology. It automatically detects each insert in a few hundredths of a second, continuously monitors and adjusts optimal insert movement and power levels to consistently provide the best cutting efficiency in every situation – allowing the clinician to focus on surgery and deliver the best possible surgical outcomes.

The exclusive touch display of PIEZOSURGERY® touch and PIEZOSURGERY® white can be protected with a dedicated, individually packaged, sterile transparent foil. Thanks to these invisible shields, no dirt, scratches or fingerprints will affect your keyboard.

FLEXIBLE IRRIGATION SYSTEM
- the irrigation system works with cost-effective standard parts
- peristaltic pump tubing is reusable
- standard connections for tubing

STERILE PROTECTION FOILS

FLEXIBLE HANDPIECE POSITION
- easy to adapt handpiece holder
- 4 positions
- sterilizable
PIEZOSURGERY® white is your perfect introduction into bone surgery with PIEZOSURGERY®: The PIEZOSURGERY® white offers the ultimate in treatment safety, materials especially selected for ease in cleaning, disinfection and sterilization, and cost-effective standard parts for greatest economy.

If you have always wanted to use the revolutionary PIEZOSURGERY® technology, but were held back by budget constraints – here is your chance to take your bone surgery to the next level.

APC (AUTOMATIC PROTECTION CONTROL)
- Recognizes deviations from standard functioning automatically
- Stops power and liquid in less than 0,1 seconds
- Shows cause of the interuption on the keyboard

FLEXIBILITY
- 360° function of the foot control

FLUSH FUNCTION
- Started by a finger tip
- Cleaning cycle for the device’s main irrigation tubes

HANDPIECE
- Choice between handpiece with or without LED light
- Handpiece and handpiece cord (including the irrigation line) are fully sterilizable together
- Handpiece cord is extremely flexible
mectron raises the standard for bone surgery to a completely new level with the PIEZOSURGERY® touch

The actual benchmark in bone surgery comes with 100% perfection in every detail. With simple, intuitive settings at the touch of your fingers, PIEZOSURGERY® touch is an extension of your body and maximizes your surgical skills to help ensure precise, safe, flawless surgical outcomes.

The PIEZOSURGERY® touch device has several innovative features including a black glass touch surface, handpieces with swivel LED lights for optimum visibility, a more compact and versatile console, and a new and improved computerized feedback system. For ease of use, this device also features intuitive setting controls as well as four handpiece holder configurations.

All it takes is a touch. You will experience the most comfortable device in bone surgery.

→ EXPERIENCE PERFECTION

→ FOOT PEDAL
  → 360° function of the foot control
  → high weight for fix positioning
  → thanks to the U-bolt easy to move

→ AUTOMATIC CLEAN FUNCTION
  → controlled by the foot pedal
  → cleaning cycle for the device’s main irrigation tubes

→ HANDPIECE WITH LED
  → swivel-type LED-light can be directed to the insert tip
  → choice between automatic, and permanent light or switched off
  → mobile handpiece holder allows flexible positioning, sterilizable
mectron continually develops new inserts – with clinicians, for clinicians

Who would have better ideas and suggestions for new surgical inserts than surgeons themselves? All PIEZOSURGERY® inserts are developed in response to specific clinical needs and result from collaborations with universities and clinical practitioners. Our rigorous insert development process includes finite elements analyses, computer simulations, serial prototyping, and extensive laboratory and clinical research.

The perfect example of our expertise is the world’s thinnest osteotomy insert with only 0.25 mm thickness. The best proof of our expertise is over 80 high quality insert designs are now available to surgeons worldwide – and new inserts are released every year.

SHARP INSERTS
- gentle and effective bone cutting action
- fine and well-defined cutting line
- used for implant site preparation, osteotomy techniques and bone chip harvesting

SMOOTHING INSERTS
- diamond-coated surfaces for precise and controlled osteoplasty on bone structures
- preparation of difficult and delicate structures (ex: sinus augmentation, nerve lateralization)
- preparation of the final bone shape

BLUNT INSERTS
- soft tissue preparation (ex: Schneiderian membrane)
- root planing in periodontology

INSERT KITS
- set of inserts for clinical application
- stainless steel tray with depth markings
- ideal for sterilization and storage

EXPLORE INNOVATION
→ EXPERIENCE INNOVATION

→ INSERT DEVELOPMENT
- 1. close collaboration with universities for the development of inserts
- 2. computer simulation of shape and insert movement. The finite elements method allows precise prognoses of insert movements
- 3. extensive clinical testing – feedback from experienced practitioners
A CNC controlled 5-dimensional sharpening machine cuts with an accuracy of up to 0.1 μm. The whole cutting process for a single insert lasts up to 12 min.

Depending on the indication, the inserts are coated with specially selected diamonds. The granulometry of the diamond coating is adapted to the respective treatment.

A coating of titanium nitride, applied to inserts, increases the hardness of the surface, avoids corrosion and therefore increases working life.

Each insert is labeled gently by a laser.

Each insert is checked in detail before getting an OK for sales.

PIEZOSURGERY®’s unique cutting action results from the application of ultrasonic modulated vibrations to a surgical insert. To deliver the best surgical performance, the insert and handpiece must vibrate in unison up to 36,000 times per second. To withstand such enormous strain, all inserts are individually crafted from forged stainless steel and designed to couple with the handpiece perfectly for optimal tuning.

PIEZOSURGERY®’s proprietary, 12-step insert manufacturing process lasts several months and employs the finest materials and most advanced technological processes to guarantee that all inserts meet the highest quality and cutting efficiency standards.
PIEZOSURGERY® has dedicated inserts for a wide variety of clinical applications.

PIEZOSURGERY® has over 80 inserts specifically designed in many applications in oral surgery and implantology, from sinus lift to ridge splitting, extractions and even orthognathic procedures.
EXPERIENCE ULTRA-OSSEOINTEGRATION

PIEZOSURGERY® induces new bone formation, leading to faster osseointegration of dental implants

Implant site preparation with PIEZOSURGERY®, the revolutionary technique – safe and precise.

→ faster osseointegration: reduction of inflammatory cells and the more active neo-osteogenesis compared to drilled sites

→ high intraoperative control: the particular shape of the implant inserts allows a perfect control of the site preparation

→ preparation of 2, 2.8, 3, 3.4 and 4 mm: site preparation with PIEZOSURGERY® allows placement of all common implants

1 initial pilot osteotomy
OPTIONAL: check the preparation axis with alignment PIN IM15
2 pilot osteotomy in anterior or posterior region
OPTIONAL: check the preparation axis with alignment PIN 2-2.4
3 to optimize concentricity of implant site preparation between Ø 2 and Ø 3 mm, preparation of the cortical basal bone
4 to enlarge or to finalize the implant site preparation; insert with double irrigation for optimum cooling
Ultrasonic implant site preparation using PIEZOSURGERY®: a multicenter case series study analyzing 3,579 implants with a 1- to 3-year follow-up.


Abstract
This multicenter case series introduces an innovative ultrasonic implant site preparation (UISP) technique as an alternative to the use of traditional rotary instruments. A total of 3,579 implants were inserted in 1,885 subjects, and the sites were prepared using a specific ultrasonic device with a 1- to 3-year follow-up. No surgical complications related to the UISP protocol were reported for any of the implant sites. Seventy-eight implants (93 maxillary, 19 mandibular) failed within 5 months of insertion, for an overall osseointegration percentage of 97.82% (97.14% maxilla, 98.75% mandible). Three maxillary implants failed after 3 years of loading, with an overall implant survival rate of 97.74% (96.99% maxilla, 98.75% mandible).

Cytokines and Growth Factors Involved in the Osseointegration of Oral Titanium Implants Positioned using Piezoelectric Bone Surgery Versus a Drill Technique: A Pilot Study in Minipigs.


Conclusion
Piezoelectric bone surgery appears to be more efficient in the first phases of bone healing; it induced an earlier increase in BMPs, controlled the inflammatory process better, and stimulated bone remodeling as early as 56 days post-treatment.
reduce the risk of membrane perforation
new SLC insert to perform the osteoplasty of the sinus vestibular wall with maximum safety and unparalleled intra-operative control
new high-efficiency and safe SLO-H osteotomy insert
new thin SLS membrane separator, more efficient than the old generation “elephant paw shaped”
new elevators (SLE1, SLE2) with sharp terminal part to cut Sharpey’s fibers from the endosteum with the maximum safety. The endosteum will be protected thanks to the convexity of the tips
new insert SLE1 to start the sinus membrane elevation from the sinus floor
new insert SLE2 to finalize the sinus membrane elevation from the palatal wall

REFERENCES

Vercellotti T. Letter to the Editor Clinical Oral Implants Research, Volume 20, Issue 5, Date: May 2009, Pages: 531-532
Vercellotti T, Lang Niklaus P. “Piezosurgery in a Daily Practice” - Forum Implantologicum : Volume 8, Issue 1
EXPERIENCE EFFICIENCY
Sinus lift by lateral approach with PIEZOSURGERY® – after 15 years we re-define the protocol

EROSION TECHNIQUE: THE MAXIMUM, EVIDENCE-BASED SAFETY*

1 Insert SLC – osteoplasty of the sinus vestibular wall
2 Insert SLO-H – bone window osteotomy
3 Insert SLO-H – bone window detachment
4 Surgical forceps – bone window removal
5 Insert SLS – sinus membrane separation
6 Insert SLE1 – sinus membrane elevation from the sinus floor
7 Insert SLE2 – sinus membrane elevation from the palatal wall
8 Bone grafting procedure
9 Membrane placement

REVISITED SINUS LIFT BY LATERAL APPROACH

1 sinus vestibular wall consumption and sinus cavity identification (dark colour)
2 bony window osteotomy
3 bony window removal
4 sinus membrane separation from the bony window margins
5 beginning of the sinus membrane elevation from the sinus floor
6 finalization of the sinus membrane elevation from the palatal wall
7 bone grafting procedure
The new PIEZO-LIFT technique facilitates sinus lift, by crestal approach

New clinical protocol according to Tomaso Vercellotti

PIEZO-LIFT TECHNIQUE
The insert PL3 works like a piston inside a cylinder

Bony ring of the sinus floor for maximal surgical security

1. Achieving the sinus floor
2. Cylindrical bone cavity preparation
3. Erosion of the floor and PIEZO-LIFT of membrane
4. PIEZO-LIFT using cavitation effect
5. Safe sinus lift
6. Removal of the safety bony ring
7. PIEZO-LIFT technique
8. Implant placement
EXPERIENCE CONTROL

SINUS PHYSIOLIFT® II simplifies the crestal approach to sinus lift and give you perfect control during

The SINUS PHYSIOLIFT® II controls the pressure in the sinus cavity!

→ Elevation of the sinus membrane with micrometric precision by means of hydrodynamic pressure
→ Watertight sinus elevators CS1 or CS2 for hydrodynamic sinus lift
→ Atraumatic technique not requiring the use of hammer and osteotome
→ Implant site preparation using PIEZOSURGERY® – the insert P2-3 SP allows to remove the sinus basal cortex with minimal risk of penetrating into sinus cavity due to its conical shape
→ Multiple implant placement can be performed
→ A flapless procedure can be performed in some cases

CRESTAL SINUS ELEVATOR CS1 AND CS2

Hollow screw elevator will be placed with a micromotor or a ratchet.

CLINICAL OUTCOME

The radiographic controls showed that the graft material was distributed evenly around the implants, suggesting the integrity of the membrane.*

The criss-cross surface works like a perio file. It allows very efficient bone remodeling and a longer life span of the insert.

Spherical inserts (Ø 1.8 and 2.3 mm), facilitating the surgical procedure in preparing buccal and lingual cortical bone. Their diamond coating of D150 allows an effective but still controlled bone modeling.

Wedge-shaped perio files (respectively from 1.3 to 0.7 mm and from 2 to 1 mm thickness), with only 2 working surfaces, they allow interproximal osteoplasty without damaging adjacent root surfaces.

Lanceolate shaped insert with a D90 diamond coating. It can be used for root planning and debridement as well as in interproximal spaces where perio files cannot properly access.
EXPERIENCE ACCESSIBILITY
mectron optimizes access for osseous resective surgery

In collaboration with Professor Leonardo Trombelli and the University of Ferrara, Italy, mectron developed 5 inserts for osteotomy and osteoplasty procedures in periodontal resective surgery.

The combination of inserts with special shapes and dimensions makes it possible to perform controlled remodeling of the bony profile, avoiding the risk of damaging dental structures or other anatomically important structures. The precision and minimal invasiveness of PIEZOSURGERY® make these inserts a perfect tool for surgeons during the most delicate osteoplasty procedures in periodontal surgery.

→ INTERPROXIMAL BONY DEFECTS
→ VESTIBULAR AND LINGUAL OSTEoplasty

CLINICAL CASE
1 vestibular view
2 occlusal view
3 preparation of bone defect with OT14
4++5 interproximal bone osteoplasty with OP8 and OP9
6 tunneling procedure with insert OP5A
7 interdental brush passage
**PIEZOSURGERY® – HISTORY OF A SUCCESS**

**BONE HEALING**
- As bone healing is not disturbed by the PIEZOSURGERY®, but even seems to be improved, this method will have a major influence on new minimally invasive bone surgery techniques with special regard to biomechanics.

**SENSITIVITY**
- When using the PIEZOSURGERY® technique, on the other hand, the effort required to make a cut is very slight. This means that greater precision is achieved, guaranteed by the microvibrations of the insert.
  - Boioli LT, Vercellotti T, Tecucianu JF. La chirurgie piézoélectrique: Une alternative aux techniques classiques de chirurgie osseuse. Inf Dent. 2004;86(41):2887-2893

**SIMPPLICITY**
- The revolutionary properties of piezoelectric surgery have simplified many common osseous surgical procedures, including sinus bone grafting.

**SECURITY**
- The membrane perforation rate in this series of 100 consecutive cases using the piezoelectric technique has been reduced from the average reported rate of 30% with rotary instrumentation to 7%.

**EFFECTIVITY**
- The morphometrical analysis revealed a statistically significant more voluminous size of the particles collected with PIEZOSURGERY® than rotating drills.

**PATIENT COMFORT**
- Microvibration and reduced noise minimize a patient’s psychologic stress and fear during osteotomy under local anesthesia.

- mectron and Prof. Tomaso Vercellotti developed the idea of piezoelectric bone surgery → mectron produces the first prototype devices → first lateral sinus lift treatments
- Prof. Tomaso Vercellotti introduced the name PIEZOSURGERY® for the new method → first bone splitting treatments in the mandible → first bone splitting in the maxilla → first case studies about ridge expansion are published → mectron starts serial production of the PIEZOSURGERY® device → first crestal sinus lift → Piezosurgery® I, the world-wide first unit of piezoelectric bone surgery, is presented by mectron at IDS → over 20 inserts are available → first study about sinus lift with PIEZOSURGERY® presented → development of periodontal resection surgeries → first bone block grafting treatments
- more powerful and better ergonomics – mectron presents the 2nd generation of the PIEZOSURGERY® device → first orthodontic microsurgery treatments
- more than 30 scientific studies about PIEZOSURGERY® are published → the first competitive units are launched → first implant site preparation treatments using PIEZOSURGERY®

**2006** → **2007** → **2008** → **2009** → **2010** → **2011** → **2012** → **2013** → **2014** → **2015**
- development of new applications → first implant site preparation treatments using PIEZOSURGERY® → more than 30 scientific studies about PIEZOSURGERY® are published → the first competitive units are launched → first extraction treatments → first bone splitting treatments in the maxilla → first lateral sinus lift treatments → first study about sinus lift with PIEZOSURGERY® presented → development of periodontal resection surgeries → first bone block grafting treatments → more powerful and better ergonomics – mectron presents the 2nd generation of the PIEZOSURGERY® device → first orthodontic microsurgery treatments
mectron has been defining the future of bone surgery for the past 20 years, and it’s evidence-based

For over 20 years we have had ongoing collaborations with clinical practitioners and research institutions worldwide. PIEZOSURGERY® technology is supported by more than 250 clinical and scientific studies; you will not find this substantiation with devices other than PIEZOSURGERY®.

We invite you to educate yourself on the benefits of our technology by reviewing the extensive peer-reviewed literature. Selected examples of the breadth of benefits associated with PIEZOSURGERY® are collected in our Scientific Abstracts, available for download at www.mectron.com.
mectron is committed to ensuring you get the best knowledge of PIEZOSURGERY® method

PIEZOSURGERY® has caused a paradigm shift in osseous surgery and has become the new standard of care in oral and periodontal surgery. In addition to its revolutionary technology, its unique level of quality and its optimal ergonomic features, there is yet one more important factor to success with PIEZOSURGERY® technology: you.

On www.mectron.com we offer you even more seminars: In the section courses and workshops you will find different seminars on PIEZOSURGERY® in English. Please contact your mectron partner for the courses in your local language – you will find the contact address in the dealer list on our website.

Visit our website at piezosurgery.mectron.com and discover the latest surgical videos and clinical animations allowing an easy orientation about the possibilities PIEZOSURGERY® is offering.

PIEZOSURGERY® Network is an international community of mectron PIEZOSURGERY® users interested to share their experiences and knowledge. The website presents clinical cases and informs about the latest clinical and technical developments.

Visit our website at piezosurgery.mectron.com and discover the latest surgical videos and clinical animations allowing an easy orientation about the possibilities PIEZOSURGERY® is offering.
mectron has products for a wide range of other dental needs

We offer a broad spectrum of other dental products from air-polishing to LED-polymerization lights and ultrasonic scalers. mectron is your strong and reliable partner for almost every dental challenge – experience mectron.