EXPERIENCE PIEZOSURGERY®
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 optimal precision and control – and minimal stress for you and your patients. Your perfect solution.

→ EXPERIENCE PRECISION

→ 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

→ MICROMETRIC CUTS

PIEZOSURGERY® provides micrometric cuts for minimally invasive surgeries with optimal 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, offering 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.
Bone bur

Bone saw

→ MACROVIBRATIONS
→ limited surgical control
→ lack of precision

→ MICROVIBRATIONS
→ high surgical control
→ precision and safety
→ clinical and histological advantages

Comparative studies have demonstrated both the clinical and histological advantages of the PIEZOSURGERY® device.

EXPERIENCE SAFETY

Clinical benefits of PIEZOSURGERY® technology

→ EXPERIENCE SAFETY

→ 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


→ IMPLANT SITE PREPARATION

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

REFERENCES

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 in wisdom tooth extraction
- reduced amount of facial swelling and trismus 24 hours after surgery
- immediate implant site preparation

→ BONE BLOCK GRAFTING
- optimal 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
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.

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 ideal 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.

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

→ FLEXIBLE HAND-PIECE POSITION
  → easy to adapt handpiece holder
  → 4 positions
  → sterilizable

→ FLEXIBLE PROTECTION FOILS
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.
EXPERIENCE PROFITABILITY
Get started in bone surgery with the PIEZOSURGERY® *white*

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 interruption on the keyboard

**FLEXIBILITY**
- 360° function of the foot control

**FLUSH FUNCTION**
- Started by a finger tip
- Flushing 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.
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 85 high quality insert designs are now available to surgeons worldwide – and new inserts are released every year.
mectron guarantees the highest quality standards for every insert

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.

PRECISION
A CNC controlled 5-dimensional sharpening machine cuts with an accuracy of up to 0.01 mm. The whole cutting process for a single insert lasts up to 12 min.

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

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

LABELING
Each insert is labeled gently by a laser.

QUALITY CHECK
Each insert is checked in detail before getting an OK for sales.
PIEZOSURGERY® has dedicated inserts for a wide variety of clinical applications.

PIEZOSURGERY® has over 85 inserts specifically designed in many applications in oral surgery and implantology, from sinus lift to ridge splitting, extractions and even orthognathic procedures.
- THIRD MOLAR EXTRACTION
  - STANDARD
    - EX11
    - EXP1-R
  - OPTIONAL
    - EX1
    - SLO-H

- EXPLANTATION
  - STANDARD
    - OT3-4
    - OPS
    - OT7A
  - OPTIONAL
    - OP3
    - QP3

- BONE BLOCK GRAFTING
  - STANDARD
    - OT6
    - OT7-4
    - QP5
    - OP5
  - OPTIONAL
    - OT8-8
    - OT125
    - OP2
    - QP2

- BONE CHIP GRAFTING/BONE MODELING
  - STANDARD
    - OT7-20
    - OP3
  - OPTIONAL
    - OT12
    - OP3A

- ENDODONTICS
  - STANDARD
    - OT1
    - OP1
    - OP3
  - OPTIONAL
    - OP2
    - OP3A

- OSTEOTOMY CLOSE TO NERVES
  - STANDARD
    - OT7S-3
    - OT7S-4
    - OT12S
    - OT7-20

- CORTICOTOMY TECHNIQUE
  - STANDARD
    - OT7S-4
    - OT7S-3
    - OT12S
    - OT7-20

- PERIODONTAL SURGERY
  - STANDARD
    - OP3
    - OP5
    - OP6
    - OP8
  - OPTIONAL
    - OP1
    - OP2
    - OP3

- CROWN PREPARATION
  - STANDARD
    - DB1
    - CROWN PREP TIP
  - OPTIONAL
    - DB2
    - CROWN PREP TIP
  - STANDARD
    - Ø 1,2 mm
      - TA12D90*
      - TF12D90*
    - Ø 1,4 mm
      - TA14D90*
      - TF14D90*
    - Ø 1,6 mm
      - TA16D90*
      - TF16D90*

* D120, D90, D60 = diamond coating
EXPERIENCE ULTRA-OSSEOEINTEGRATION

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

→ CLINICAL HANDLING

1 initial pilot osteotomy
OPTIONAL: check the preparation axis with alignment PIN IM1S

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 (59 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
→ SLC insert to perform the osteoplasty of the sinus vestibular wall with optimal safety and unparalleled intra-operative control
→ high-efficiency and safe SLO-H osteotomy insert
→ thin SLS membrane separator, more efficient than the old generation „elephant paw shaped“
→ elevators (SLE1, SLE2) with sharp terminal part to cut Sharpey’s fibers from the endosteum with the optimal safety. The endosteum will be protected thanks to the convexity of the tips
→ insert SLE1 to start the sinus membrane elevation from the sinus floor
→ 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 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

* inserts developed in collaboration with Prof. Tomaso Vercellotti and Dr. Philippe Russe
EXPERIENCE SAFETY

The PIEZO-LIFT technique facilitates sinus lift, by crestal approach

Clinical protocol according to Tomaso Vercellotti

The insert PL3 works like a piston inside a cylinder
Achieving the sinus floor
Cylindrical bone cavity preparation
Erosion of the floor and PIEZO-LIFT of membrane
PIEZO-LIFT using cavitation effect
Safe sinus lift
Removal of the safety bony ring
PIEZO-LIFT technique
Implant placement

SURGICAL SECURITY
Bony ring of the sinus floor for optimal surgical security

PIEZO-LIFT SET
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.
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.
EXPERIENCE
OPTIMIZED POWER

How mectron speeds up the extraction of wisdom tooth

Piezoelectric wisdom tooth extraction is less traumatic and the healing process is more favourable.\(^1\) mectron now introduces the first piezoelectric lever to facilitate the luxation manoeuvre and sometimes even third molar root extraction, especially when ankylosed.

This occurs when the manual force the operator exerts on the handpiece is added to the hammering action (typical of the mectron PIEZOSURGERY\(^\circledR\)) which propagates from the lever into the deep periodontium. Additionally, proper use of the piezoelectric lever can significantly reduce operating time.

→ BETTER VISIBILITY
→ MAXIMUM INTRAOPERATIVE CONTROL
→ FASTER THIRD MOLAR EXTRACTION

EXTRACTION TIME
IN MINUTES\(^2\)

<table>
<thead>
<tr>
<th></th>
<th>PIEZOSURGERY(^\circledR) Test Group</th>
<th>Conventional technique control group</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>total</td>
<td>4.6 ± 4.5</td>
<td>10.2 ± 13.1</td>
<td>.049</td>
</tr>
<tr>
<td>maxillary molar</td>
<td>2.7 ± 2.3</td>
<td>5.4 ± 9.4</td>
<td>.816</td>
</tr>
<tr>
<td>mandibular molar</td>
<td>6.5 ± 5.4</td>
<td>15.1 ± 14.8</td>
<td>.002</td>
</tr>
</tbody>
</table>

The efficiency of these levers was evaluated in a randomised, controlled study, comparing them to manual levers\(^3\), where they showed strongly reduced extraction times.

→ THIRD MOLAR EXTRACTION - CLINICAL PROCEDURE

1 Initial situation
2 Flap detachment
3 Syndesmotomy with EXL1 insert
4 Pericoronal osteotomy with SLO-H insert
5 Tooth luxation with EXL1 lever
6 Extraction manoeuvre

→ CLINICAL APPLICATIONS

→ Lever EXL1 is highly versatile, enabling luxation and simultaneous root extraction in a single manoeuvre.

→ Lever EXL2 (the shorter lever) has a smaller radius but makes it possible to apply greater force.

→ Lever EXL3 is mainly for alveolar debridement and/or removing radicular fragments from the extractive alveolus.


EXPERIENCE SCIENTIFIC EVIDENCE

As more than 250 studies prove the advantages of the original PIEZOSURGERY® method 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.

* You will find a selection of clinical and scientific studies about mectron PIEZOSURGERY® in the brochure „Scientific Abstracts – 18 years of clinical research“. A downloadable version is available at the mectron website www.mectron.com.
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.


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.


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


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%.


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


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


→ BONE HEALING
→ SENSITIVITY
→ SIMPLICITY
→ SECURITY
→ EFFECTIVITY
→ PATIENT COMFORT
EXPERIENCE HISTORY OF A SUCCESS
How mectron has been defining the future of bone surgery for more than 20 years

1997
- mectron and Prof. Tomaso Vercellotti developed the idea of piezoelectric bone surgery
- mectron produces the first prototype devices
- first extraction treatments

1998
- first lateral sinus lift treatments

1999
- Prof. Tomaso Vercellotti introduced the name PIEZOSURGERY® for the new method
- first bone splitting treatments in the maxilla

2000
- first bone splitting in the mandible
- first case studies about ridge expansion are published
- mectron starts serial production of the PIEZOSURGERY® device

2001
- 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

2002
- development of periodontal resection surgeries
- first bone block grafting treatments

2004
- more powerful and better ergonomics – mectron presents the 2nd generation of the PIEZOSURGERY® device
- first implant site preparation treatments using PIEZOSURGERY®

2005
- more than 30 scientific studies about PIEZOSURGERY® are published
- the first competitive units are launched
- first implant site preparation treatments using PIEZOSURGERY®

2007
- mectron presents the innovative inserts for implant site preparation, at the same time the first study about the inserts is published
2009

→ PIEZOSURGERY® 3 – the third generation is presented

2010

→ SINUS PHYSIOLIFT® kit for crestal sinus lift is presented

2011

→ PIEZOSURGERY® touch opens a new era in piezoelectric bone surgery

2013

→ exclusive inserts for explantation of cylindric and tapered implants presented

2015

→ PIEZOSURGERY® white - the new entry level unit presented

→ introduction of piezoelectric periosteum preparation

2016

→ PIEZO-LIFT revolutionary technique for crestal sinus lift is presented

2017

→ new LATERAL SINUS KIT – revisited technique for lateral sinus lift

2022

→ mectron introduces the first piezoelectric lever to facilitate the luxation manoeuvre and sometimes even third molar root extraction, especially when ankylosed.
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.

We are happy to share with you our online education platform. It will allow you to attend free of charge our live and on-demand educational webinars and view our clinical video library. A fantastic possibility to take a deeper view on clinical opportunities helpful for your daily practice. Visit our mectron education platform and register to receive notifications about upcoming webinars.

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Free of charge registration education.mectron.com
EXPERIENCE MECTRON

mectron has products for a wide range of other dental needs

We offer a broad spectrum of other dental products from air-polishing to curing lights and ultrasonic scalers. mectron is your strong and reliable partner for almost every dental challenge – experience mectron.
The following products are registered under MDR 2017/745. For graphic reasons the styling of the product names might be different. The registered product names correspond as following:

- PIEZOSURGERY touch ↔ PIEZOSURGERY® touch
- PIEZOSURGERY white ↔ PIEZOSURGERY® white