

medartis®

PRECISION IN FIXATION

INFORMATION ON THE PRODUCT RANGE

Hand



APTUS®

## Publications

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**The Role of Locking Technology in the Hand**  
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2. Geissler, W.B.  
**Operative fixation of metacarpal and phalangeal fractures in athletes**  
Hand Clin. 25, 409-21. 2009.
3. Diaconu, M., Facca, S., Gouzou, S., and Liverneaux, P.  
**Locking plates for fixation of extra-articular fractures of the first metacarpal base: a series of 15 cases.**  
Chir Main. 30(1), 26-30. 2011.
4. Yaffe, M.A., Saucedo, J.M., and Kalainov, D.M.  
**Non-locked and locked plating technology for hand fractures**  
J Hand Surg Am. 36(12), 2052-5. 2011.
5. Dodds, S.D., Patterson, J.T., Halim, A.  
**Volar plate fixation of recalcitrant scaphoid nonunions with volar carpal artery vascularized bone graft**  
Tech Hand Up Extrem Surg. 18(1), 2-7. 2014.
6. Leixnering M., Pezzeri C., et al.  
**First Experiences With a New Adjustable Plate for Osteosynthesis of Scaphoid Nonunions.**  
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7. Ghoneim A.  
**The Unstable Nonunited Scaphoid Waist Fracture: Results of Treatment by Open Reduction, Anterior Wedge Grafting, and Internal Fixation by Volar Buttress Plate.**  
Journal of Hand Surgery, 36A, 17-24, Jan. 2011
8. Hoffmann R.  
**Checkliste Handchirurgie,**  
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9. Spiegel, A., Pochlatko, N., Zeuner, H., and Lang, A.  
**Biomechanical Tests of Different Cannulated Compression Screws**  
White Paper, Medartis AG, Switzerland, 09.2012.
10. Arsalan-Werner A., Sauerbiert M., Mehling I. M.  
**Current concepts for the treatment of acute scaphoid fractures**  
European Journal of Trauma and Emergency Surgery, February 2016, Volume 42, Issue 1, pp 3-10
11. Mudgal C.S. et al.  
**Plate and screw design in fractures of the hand and wrist**  
Clin Orthop Relat Res. 2006;445:68-80
12. Ruchelsman D.E. et al.  
**The role of locking technology in the hand**  
Hand Clin. 2010;26(3):307-19
13. Perren S.M. et al.  
**Evolution of the internal fixation of long bone fractures. The scientific basis of biological internal fixation: choosing a new balance between stability and biology**  
J Bone Joint Surg Br. 2002;84(8):1093-110.
14. Gardner M.J. et al.  
**Has locked plating completely replaced conventional plating?**  
Am J Orthop (Belle Mead NJ). 2004;33(9):439-46
15. Kawamura K. et al.  
**Fixation choices for closed simple unstable oblique phalangeal and metacarpal fractures**  
Hand Clin. 2006;22(3):287-95.

# APTUS® Hand

## Introduction

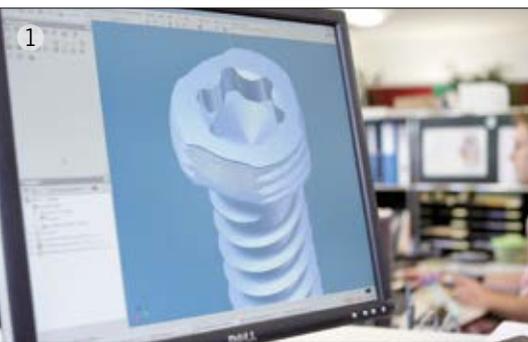
Injuries and skeletal diseases represent a challenge to modern hand surgery. The anatomically complex bone and joint structures, as well as soft tissue in confined spaces, require a high degree of skill and precision to reconstruct and restore function. In this regard, new biomechanically improved implants, in combination with appropriately matched instruments, facilitate daily work and contribute to reliable rehabilitation and preservation of function.

In collaboration with leading specialists, Medartis has developed the unique APTUS Hand fixation system for fracture treatment and reconstructive surgery. The different plate designs are adapted to the anatomy of the hand skeleton. A reduced profile height and an optimized implant surface offer protection to the soft tissues. With the TriLock locking technology, complex and intra-articular fractures are stabilized by means of the internal fixator principle. The improved biomechanical characteristics of the implants permit early mobilization and active therapy.

With the introduction of APTUS Hand, Medartis has been able to offer a considerable contribution toward expanding the therapeutic diversity for treatment of fractures of the phalanges and metacarpals as well as of arthrodesis.

With TriLock, Medartis was the first company to offer a fully modular, multidirectional and angular stable hand fixation system – an innovation that has become state-of-the-art in hand surgery.

# Precision in Fixation



- 1 3D image of a TriLock screw
- 2 Medartis headquarters in Basel
- 3 Screw production
- 4 TriLock demo model, scale 10:1
- 5 Quality inspection

## Medartis AG, headquartered in Basel, Switzerland, specializes in technical high-precision implants for surgical fixation of bone fractures and osteotomies.

Medartis develops, manufactures and sells titanium screws and plates, surgical instruments and system solutions for fracture fixation in the skull and the extremities. These implants allow for patient rehabilitation after surgical reconstruction of fractures, malunions and deformities or skeletal diseases and their adjacent soft tissues. Medartis is represented worldwide through its subsidiaries and a broad distributor network.

Our motto is «Precision in fixation». We place the highest priority on maintaining stringent quality standards, continuous further development and innovation as well as comprehensive service provision for surgeons, OR staff and patients. This enhances long-term customer relations based on partnerships and has formed the foundation for sustainable success since the company's founding in 1997. The goal of Medartis is to continually improve early functional rehabilitation through its high-quality products and exclusively developed technologies.

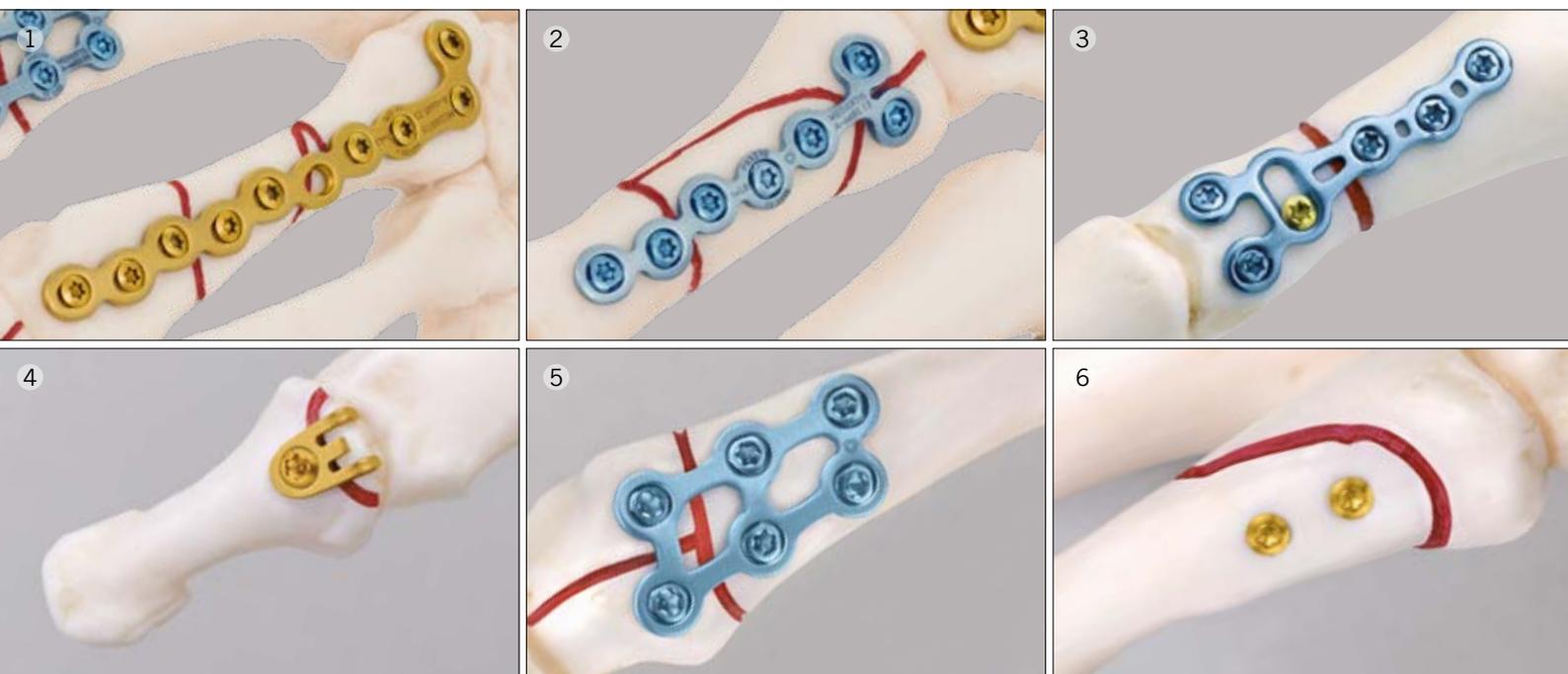
In order to fulfill the growing requirements of medical devices, our development teams engage in intensive knowledge exchange with our customers, partners and leading scientific institutes globally. Medartis' international locations allow us to determine the needs of surgeons and patients directly on site and to incorporate these needs into product development. This is the only way we can efficiently resolve current clinical problems and offer market-oriented products for use in the OR.

Service quality is considerably shaped by our international presence as well as local cooperation. Product quality is maintained by the fact that the entire process chain – from development to aftercare – is in the hands of our internal departments. Medartis can thus exclusively apply the newest technologies during product development for special areas such as small-bone surgery. At the same time, we have the greatest possible control over process quality and flexibility.

# 27 Bones – a Multitude of Options

## APTUS Hand

- Fractures of the distal, middle and proximal phalanges as well as of the metacarpals
- All transverse fractures, spiral fractures, fractures near joints with or without joint involvement, shaft fractures, comminuted fractures, dislocated fractures and ligament/bone avulsions
- DIP, PIP and carpal arthrodesis



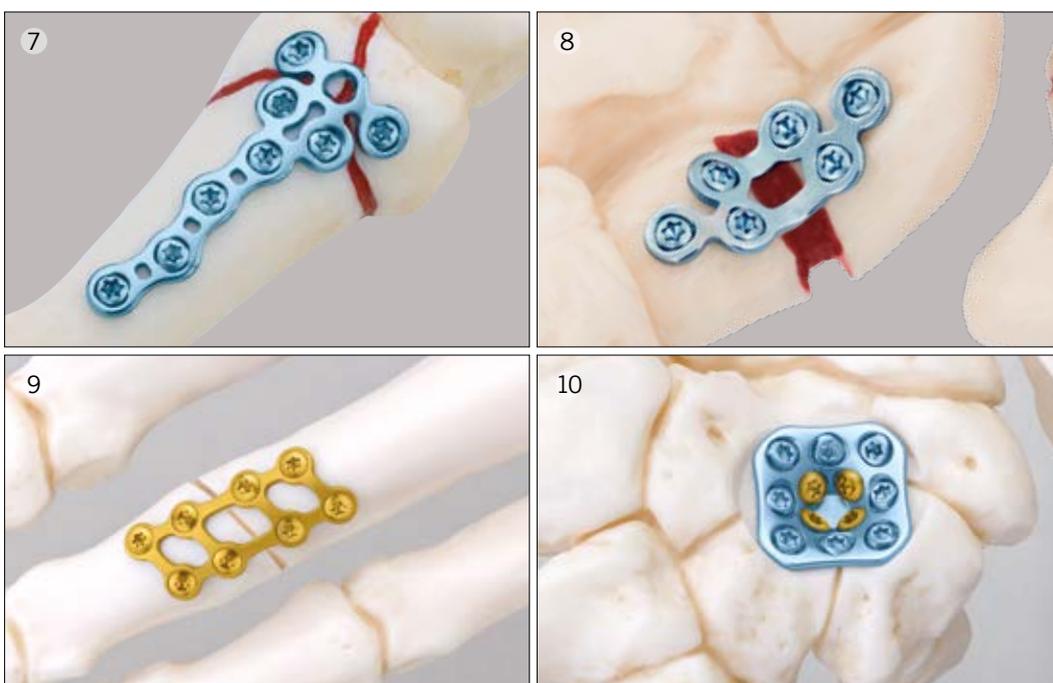
## APTUS Hand

### Trauma

Every fracture is different and must be treated accordingly. The primary objective is functional and pain free restoration of the anatomy and movement functionality of the hand. Medartis offers a large selection of plates and screws to find the best solution for all fracture types. Plate fixation and angular stable treatment solutions, according to the principle of internal fixation, permit early mobilization<sup>11, 13, 15</sup> and considerably reduce the regeneration time after a surgical intervention.

### Arthrodesis

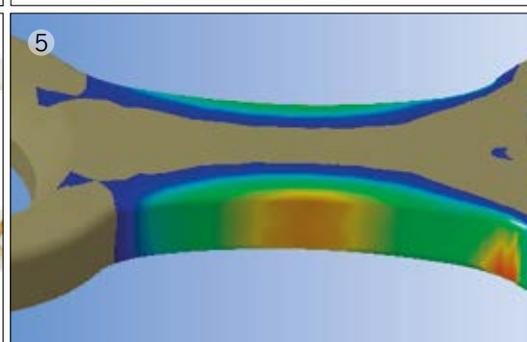
Arthrosis of the finger joints represent a frequent problem in medical practice. Pain free mobility of the finger joints is prerequisite for the functionality of the hand. If this can no longer be assured, arthrodesis is a potential method for treating painful finger joints.



- 1 Metacarpal oblique and transverse fracture
- 2 Joint and shaft fracture of proximal phalanx
- 3 Rotation correction
- 4 Ligament/bone avulsion
- 5 Intra-articular fracture of metacarpal
- 6 Oblique fracture
- 7 Intra-articular fracture of phalanx
- 8 Scaphoid fracture
- 9 PIP arthrodesis
- 10 Four corner arthrodesis

# Anatomical Plate Design

## APTUS Hand



- 1 Fixation plates in the container module
- 2 Detail of fixation plate
- 3 Four corner fusion plate with screws
- 4 Detail of hand bone model
- 5 Finite elements analysis of a Medartis plate

For further information on the plate range, see the APTUS Ordering Catalog at [www.medartis.com/meta/downloads/product-brochures](http://www.medartis.com/meta/downloads/product-brochures)

- The complete system for hand fracture management
- Multidirectional ( $\pm 15^\circ$ ) and angular stable fixation
- Fracture specific treatment and arthrodesis

## Plate Range

The plate range includes a broad portfolio of various plates for the following indications:

- Fractures of the distal, middle and proximal phalanges as well as of the metacarpals
- Transverse fractures, spiral fractures, fractures near joints with or without joint involvement, shaft fractures, comminuted fractures, dislocated fractures and ligament/ bone avulsions
- DIP, PIP and carpal arthrodesis

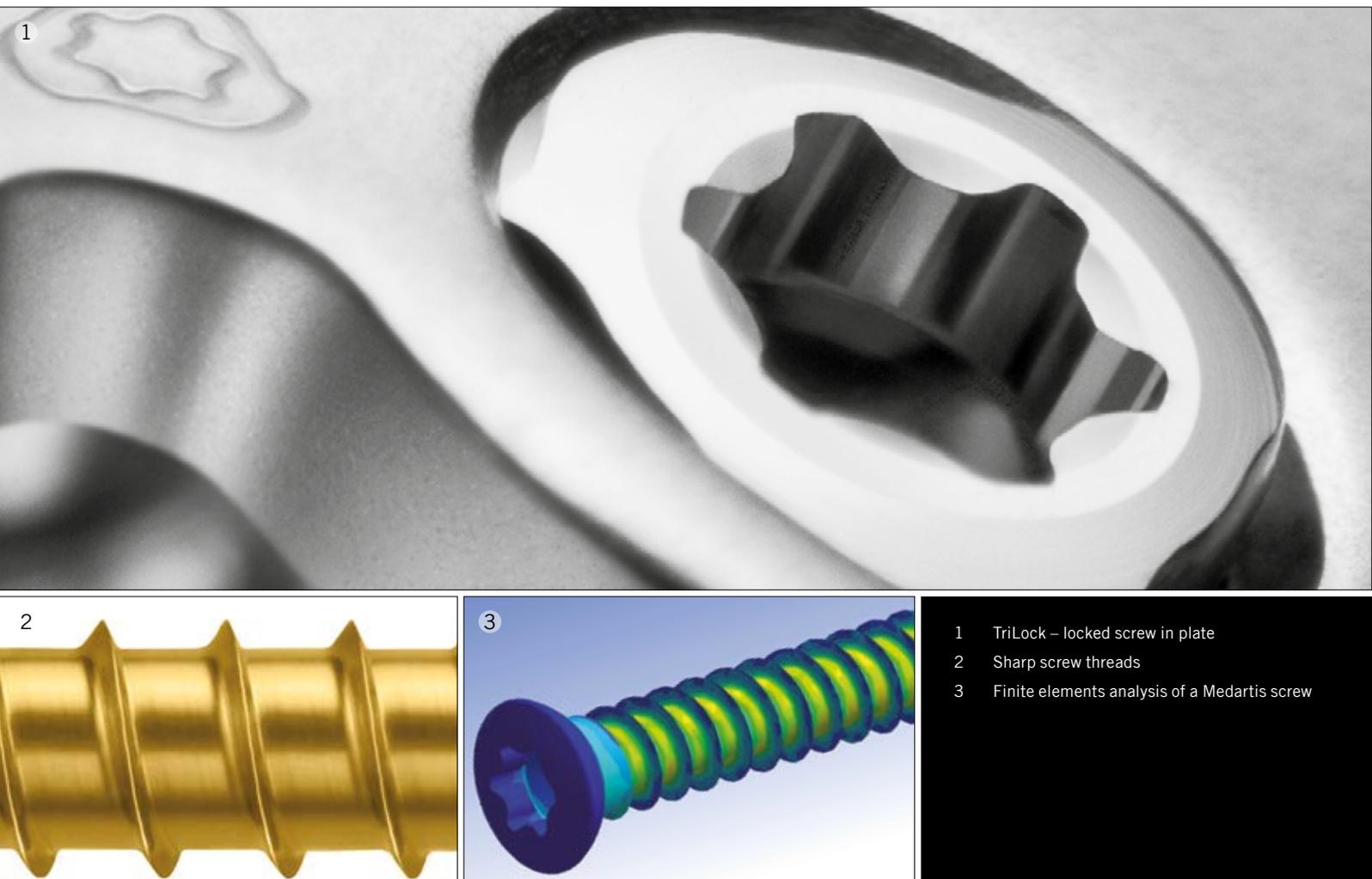
## Plate Features

- Anatomically pre-contoured plate geometries
- Rounded edges and a smooth surface offer protection of the soft tissues
- Color-coded implants for easy identification in the OR:
  - Gold = Fixation/compression plates and cortical screws (fixation)
  - Blue = TriLock plates and TriLock screws (locking)
- Offset screw holes in numerous plates avoid collisions between screws and prevent bone splitting during drilling and screw insertion<sup>1</sup>
- 2 screw sizes can be used for each plate thickness:
  - 1.2/1.5 screws for 1.2/1.5 plates with a plate thickness of 0.6 or 0.8 mm
  - 2.0/2.3 screws for 2.0/2.3 plates with a plate thickness of 1.0 or 1.3 mm



# Superior Screw Technology

## APTUS Hand



For further information on the screw range, see the APTUS Ordering Catalog at [www.medartis.com/meta/downloads/product-brochures](http://www.medartis.com/meta/downloads/product-brochures)

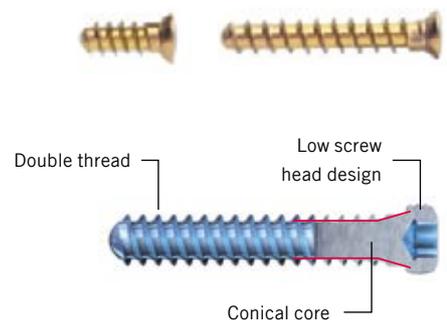
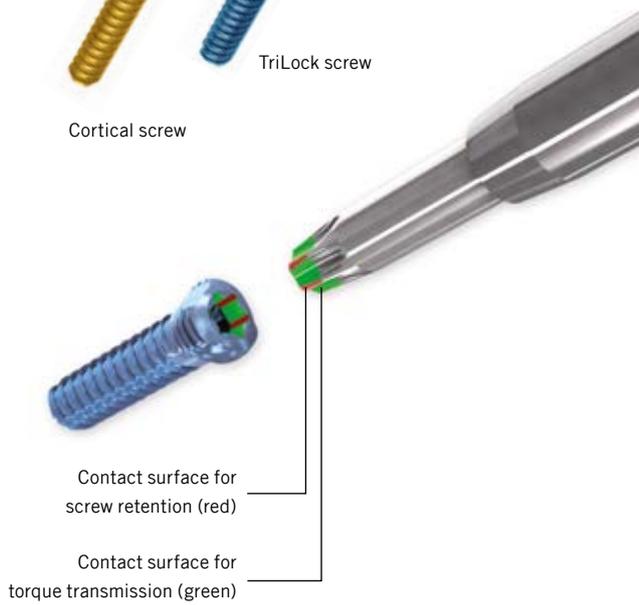
- HexaDrive interface with patented self-holding properties
- Effective thread characteristics
- Increased torsional, bending and shear stability

### Screw Options

- 1.5/2.0 TriLock screws (locking)
- 1.2/1.5/2.0/2.3 cortical screws (fixation)

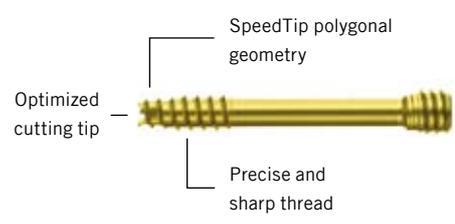
### Screw Features

- Patented HexaDrive screw head design
  - Secure connection between screw and screwdriver
  - Increased torque transmission
  - Simplified screw pick-up due to patented self-holding technology
- Soft tissue protection due to smooth screw head design
- Atraumatic screw tip offers soft tissue protection when inserting screws bicortically
- Increased torsional, bending and shear stability due to conical core
- Precision cut thread profile for sharpness and self-tapping properties
- Adapted pitches of the screw thread in cortical screws depending on screw length
- Double threaded TriLock screws reduce screw insertion time



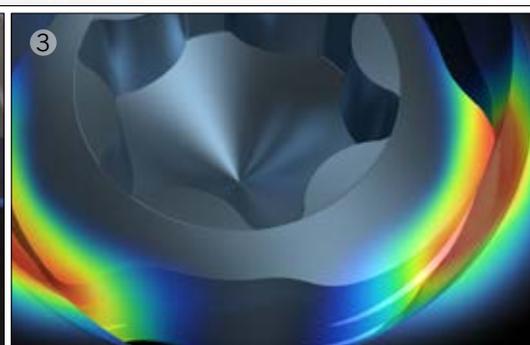
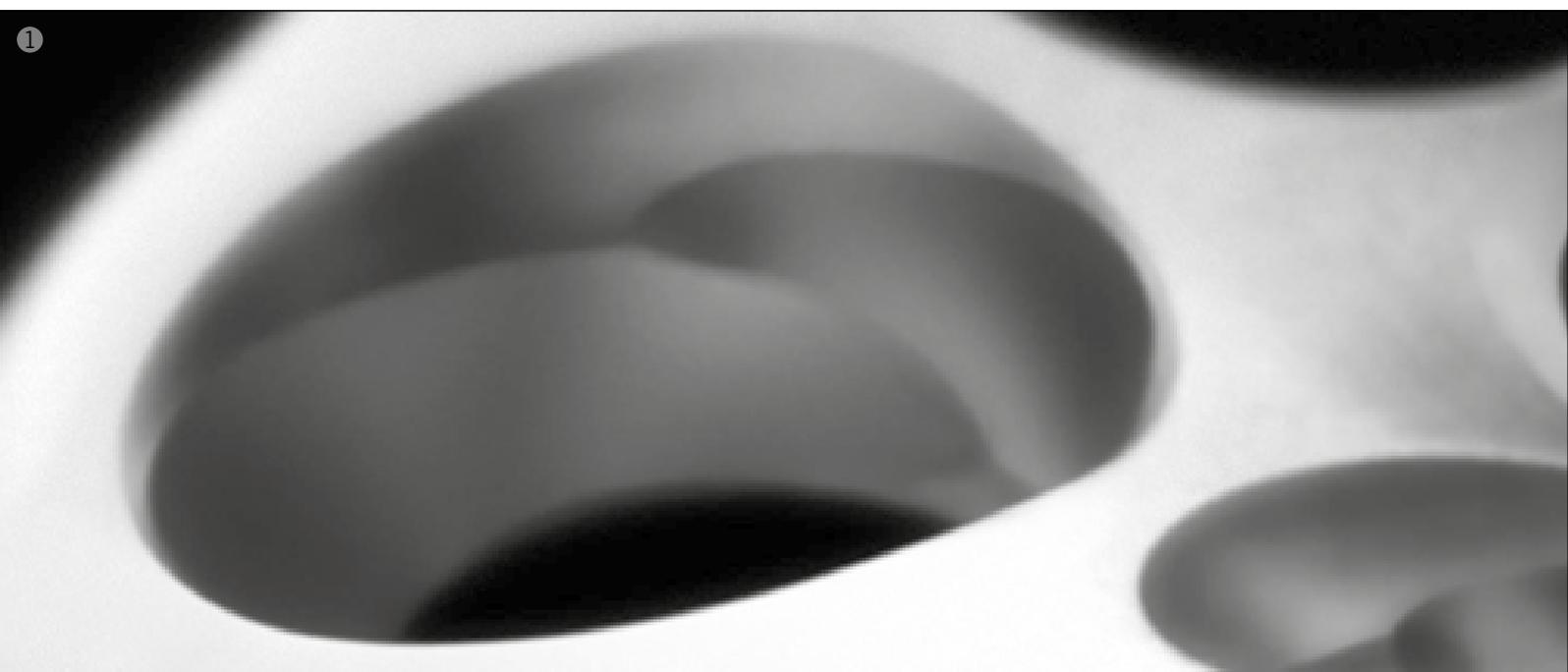
### SpeedTip CCS Cannulated Compression Screw

- Screws can be inserted directly without pre-drilling
- Reduced risk of bone fragment displacement thanks to excellent cutting behavior
- Effortless insertion – the polygonal tip pushes bone debris aside



# Technology, Biomechanics and Material

## APTUS Hand

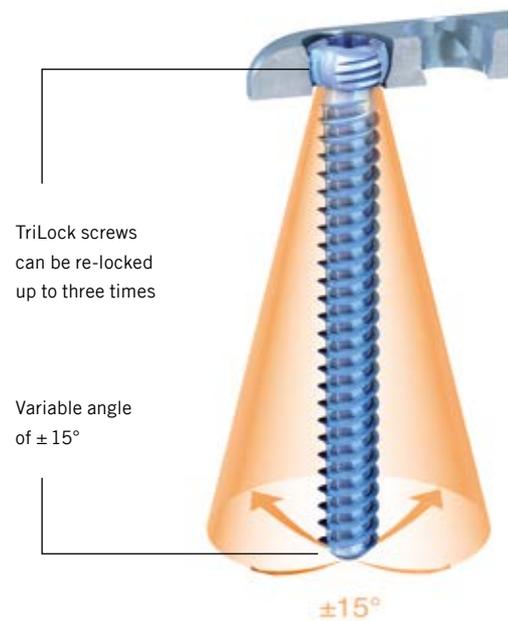


- 1 Plate hole with locking contour
- 2 Biomechanical test of an implant
- 3 Spherical three-point wedge-locking

- Patented TriLock locking technology
- High-grade materials
- High quality standard

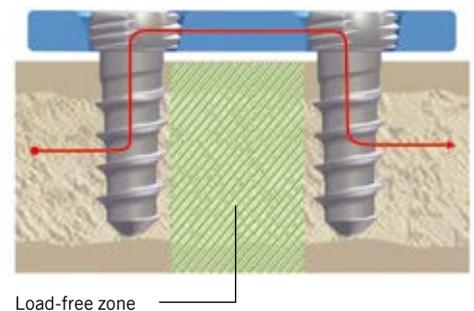
## Technology

- Patented TriLock locking technology – multidirectional locking of the screw in the plate
  - Spherical three-point wedge-locking
  - Friction locking through radial bracing of the screw head in the plate – without additional tensioning components
- Screws can pivot freely by  $\pm 15^\circ$  in all directions for optimal positioning
- Fine tuning capabilities of fracture fragments
- TriLock screws can be re-locked in the same screw hole at individual angles up to three times
- Minimal screw head protrusion thanks to internal locking contour
- No cold welding between plate and screws



## Biomechanics

- Internal fixator principle
  - Stable plate – screw construct allows the bridging of unstable zones
  - Improved vascularization of the periosteum due to low contact of the plate



## Material

All APTUS implants are made of pure titanium (ASTM F67, ISO 5832-2) or titanium alloy (ASTM F136, ISO 5832-3). All of the titanium materials used are biocompatible, corrosion-resistant and non-toxic in a biological environment. K-wires are made of stainless steel (ASTM F 138); instruments are made of stainless steel, PEEK, aluminum or titanium.

# Instruments

## APTUS Hand



- 1 Plate bending pliers in use
- 2 Plate cutting pliers
- 3 Self-holding mechanism screw/screwdriver
- 4 Color-coded instruments in the instrument tray
- 5 Measuring unit of the depth gauge

- Reduced instrument kit
- Intuitive application due to clear color coding
- Easy to use

### Simple Instrument Kit

The Medartis instruments are compact, ergonomically designed and easy to use.

- Depth gauge for single-handed use
- One screwdriver and one plate holding and positioning instrument each for the systems 1.2/1.5 and 2.0/2.3
- One drill guide each for the systems 1.2/1.5 and 2.0/2.3
- One plate bending pliers for all plate sizes
- One plate cutting pliers for all plate sizes



### Clear Color Coding Concept

Twist drills and instruments have a consistent and clear color code which allows for intuitive use within the different system sizes.

APTUS 1.2 = red

APTUS 1.5 = green

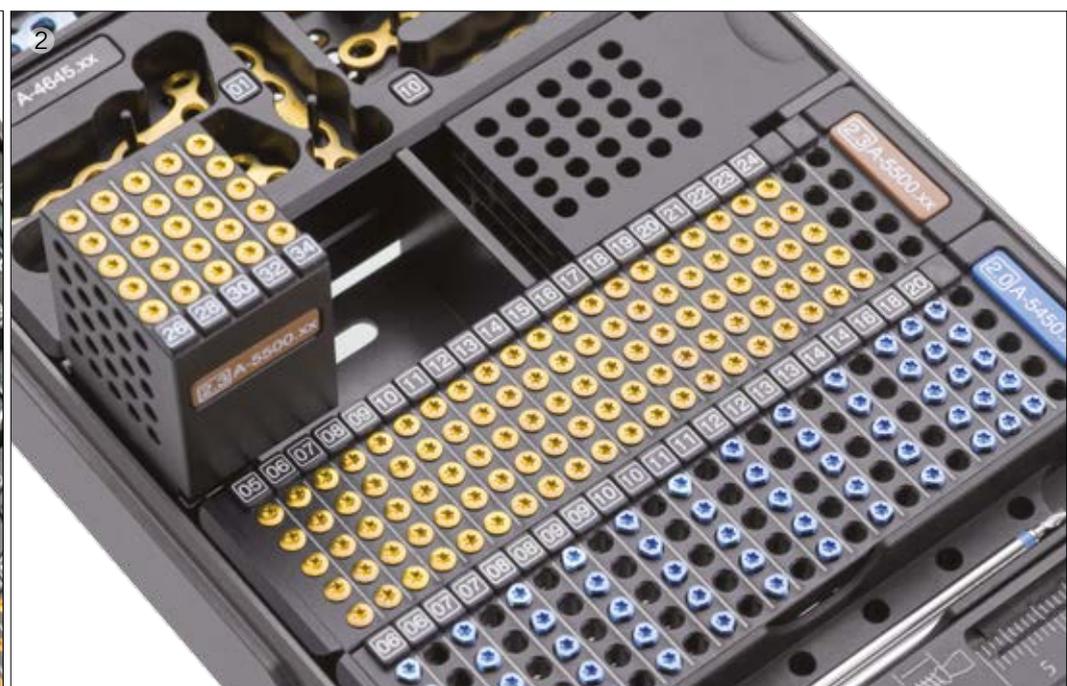
APTUS 2.0 = blue

APTUS 2.3 = brown



# Storage

## APTUS Hand



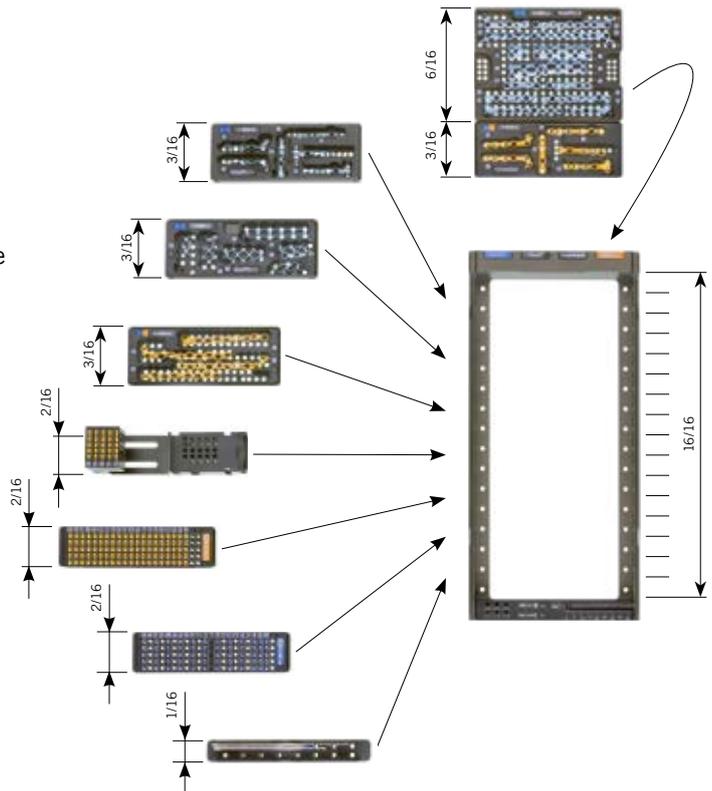
- 1 Modular configuration adaptable to customer needs
- 2 Small, low-weight, compact and economic modules
- 3 Simple identification of implants and instruments
- 4 Clear color coding on the implant container

- Modular, economic, compact
- 16/16 – can be configured to suit the customer's need
- Clear and consistent color coding

### Modular Container Concept

The base frame in the 16/16 grid can be freely combined with screw and plate modules of different sizes, allowing the customer to configure an individual APTUS Hand system.

- 16/16 Base frame
- 1/16 Twist drill module
- 1/16+2/16 Screw modules
- 3/16–6/16 Plate modules



### Individual Configuration

Plates and screws may be combined freely in the implant containers. From a small basic set up to the complete product range, everything can be adapted to the needs of the individual user.



### Flexible Color Coding and Labeling Concept

The use of colored stickers in the implant container permits consistent and clear color coding of the individual implants and system sizes, ensuring clear identification of the plates and screws.



# Clinical Examples

## APTUS Hand

### Case 1 – Osseous extensor tendon avulsion of the distal phalanx



Preoperative lateral X-ray



Intraoperative view of the avulsed fragment



Postoperative lateral X-ray  
Fixation with hook plate

### Case 2 – Fracture of the Proximal Phalanges III and IV



Preoperative X-rays  
72 year old woman, 4 weeks after fall from a ladder with temporary K-wire fixation



Osteosynthesis with two grid plates

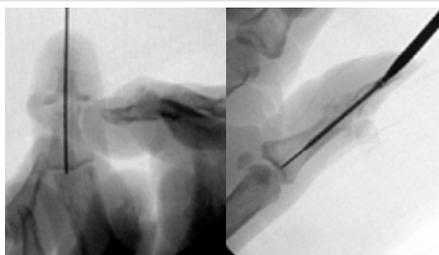


Postoperative X-rays

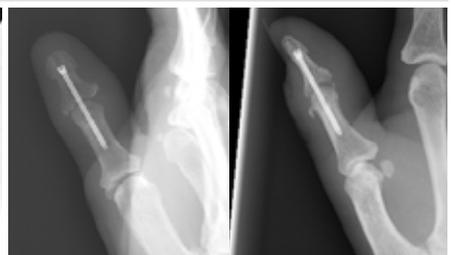
### Case 3 – DIP Arthrodesis Thumb



Preoperative X-ray  
Patient: male, 68 years old  
Several year history of IP joint thumb pain, unresponsive to NSAIDs and splinting



Intraoperative X-rays  
Left: Insertion of the K-wire  
Right: Placement of a 2.2 CCS



Postoperative X-rays

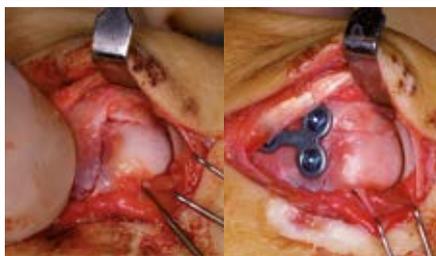
Clinical cases published with the kind permission of:

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### Case 4 – Metacarpals II/III – head fractures



Preoperative X-ray



Manual repositioning and stabilization with 2.0 angular stable plates.



Postoperative oblique X-ray

### Case 5 – Metacarpal shaft fracture



Preoperative X-rays



Plate fixation with 2.0 / 2.3 compression plates

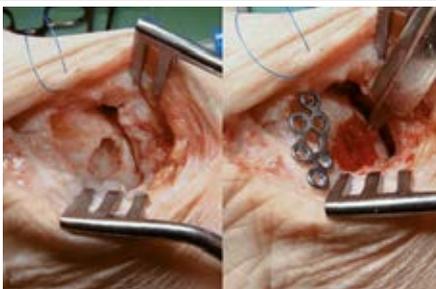


Postoperative X-rays

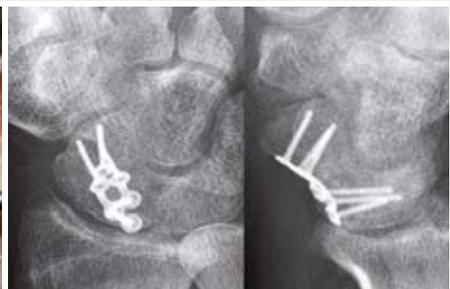
### Case 6 – Scaphoid Nonunion



Preoperative CT and X-ray  
Patient: male, 38 years old  
Nonunion of the scaphoid



Intraoperative image, volar  
Left: Resection of the pseudarthrosis tissue  
Right: Pre-fixation of the scaphoid plate with a suture



X-rays, 10 weeks postoperatively  
The union of the pseudarthrosis is well visible

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