



THINK PARTS THINK TORNOS



## MEDICAL

Proven solutions in the medical sector  
for over thirty years.

# INTRODUCTION



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## **Precision, excellent surface finish and maximum productivity for the medical devices market**

The requirements and expectations of parts and components for the medical and dental devices market in terms of machining, technical support and service count among the most demanding compared to other industries and trades.

In order to keep pace with this innovative and continuously expanding market sector, potential limits have to be ignored or overcome and future-orientation thinking and acting are required to be able to swiftly react to changing or growing market requirements.

In this respect, Tornos is the perfect partner. Thanks to our comprehensive know-how, we are not only able to offer optimum production means for the machining of medical products of the highest quality but to also provide you with highly efficient innovative and customized machining processes and procedures for you to come up to the ever increasing demand for higher productivity.

Whether talking about bone screws, dental implants, surgical instruments or other medical devices - Tornos is your perfect partner. For more than 30 years, we have been closely analyzing the market and listening to our customers to be able to develop innovative machining solutions, to define new machine kinematics and adapt devices and other peripheral equipment to better respond to the requirements and demand of original equipment manufacturers (OEM) and supplying industries.

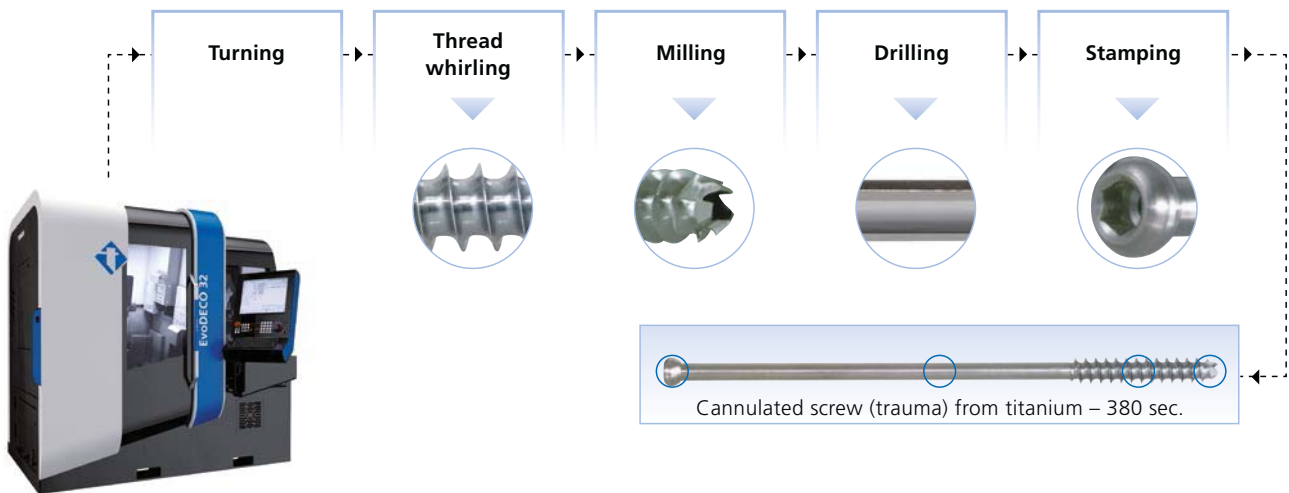
Therefore, it is not by chance that we count 400 companies from all around the world among our customers with a total of 2,000 automatic turning machines just for the medical and dental product market installed!

Not to forget another advantage: Due to our international sales network and our numerous specialists and experts in technical support, we are always in the immediate proximity of our customers in Europe, the USA and Asia; in this way, we are at the service of our customers should they require support in commissioning, trial runs, coaching and training and other after-sales services - be it in our Technical Centers or right at the site in our customer's plant.

Your challenges are our challenges.

*Philippe Charles*  
*Medical Segment Manager*

# ONLY HIGH-TECH TURNING SOLUTIONS PROVIDE THE PROCESSES REQUIRED FOR IMPLANT COMPONENT MANUFACTURE



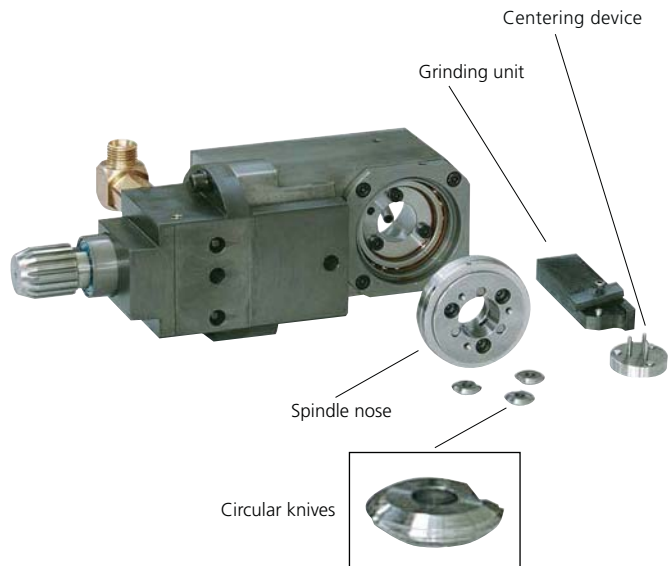
Tornos is a true pioneer in precisely this domain. Thanks to our developments and our practical know-how in the medical product segment, we are in the position to suggest machining modes for workpieces up to 32 mm in diameter on our single-spindle and multispindle lathes.

Our special know-how covers turning and milling including all the various operations involved including intelligent chip removal required for the efficient manufacture of components for the medical industry. The goal being to finish the parts in one single setup - no reclamping, no reworking. We will be glad to assist and advise you on grant the best possible choice of kinematics, machining performance, devices, facilities and tooling.

Thanks to our comprehensive knowledge and practical experience in special materials used in this segment (e.g. stainless-steel implants, titanium, PEEK, biodegradable materials, CoCr, ceramics, etc.), we suggest the optimum tools and machining conditions in order to optimize cycle times and increase productivity.

# MACHINING TECHNOLOGY

## Thread whirling (main spindle and back spindle)



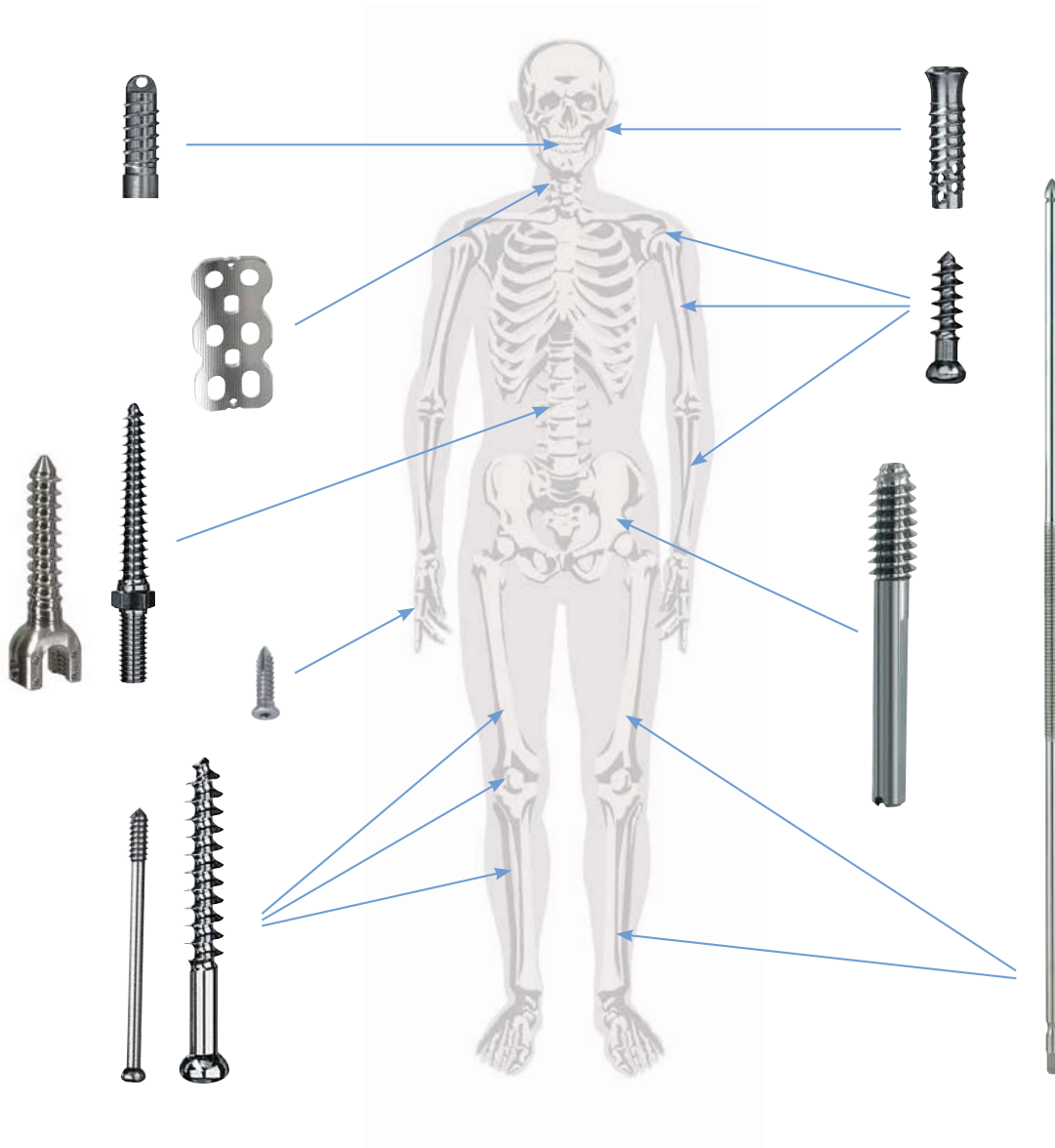
When machining threads meant for medical and dental implants, the finished parts must be of impeccable quality in terms of accuracy, shape of the thread and surface finish go hand in hand with a complete absence of burrs. As pioneer in this field, Tornos is the first company to have realized and mastered the implementation of the thread whirling process on a lathe with sliding headstock.

### Why thread whirling?

Difficult to machine materials, like titanium and stainless steel for implants, require optimized and perfectly adjusted cutting conditions. In general, the shape of threads meant for medical and dental implants is quite specific with no burrs allowed at all. The finished part must offer both excellent cutting capacity and high resistance to be able to smoothly implant the part in the bone without posing any risk to the patient. Thread whirling permits high cutting speeds in conventional thread cutting operations. The different cutting edges entering the material at very high rotation speed allow for perfectly controlling chip formation including their shape thus facilitating chip removal.



# THE PRACTICAL PROOF...

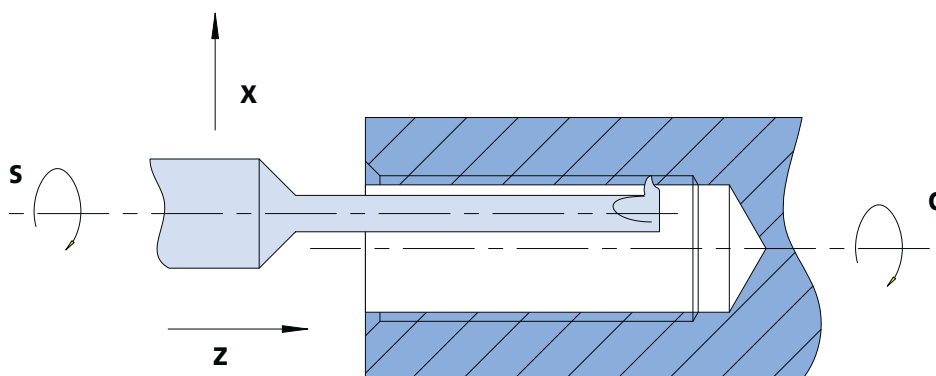
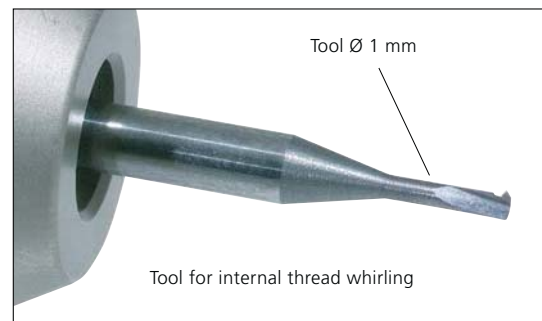


# MACHINING TECHNOLOGY

## Thread whirling (main spindle and back spindle)

### Advantages of the process

- Low cutting load.
- Excellent surface finish in general.
- Completion of a thread in one single setup.
- Perfect control of chip formation (fine particles) due to adapted cutting speed.
- Longer service life of tools - regrinding of tools possible.
- Machining technology with constant-profile cutting edges or inserts.
- Off-machine preadjustment of cutting tools.
- Length of threads in thread whirling up to 200 mm.
- Absolute absence of burrs.
- Process-parallel internal and external thread whirling from bar stock and in back spindle.

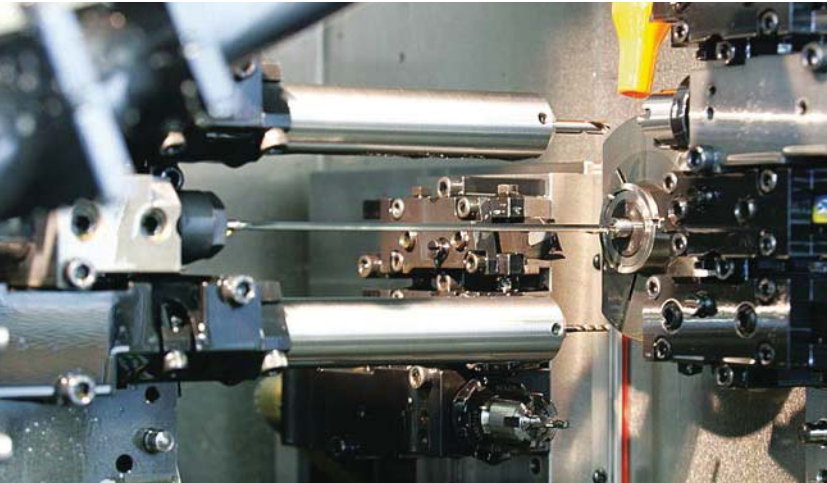


Schematic diagram of internal thread whirling



# MACHINING TECHNOLOGY

Deep hole drilling under high pressure up to 340 bars



The units for high-pressure deep-hole drilling (120 to 340 bars) may be implemented in most of our products equipped with standard interface; in the foreseeable future, they are intended to be available for all of our single-spindle and multi-spindle machines.



Length to diameter ratio up to 60 times the diameter

# MACHINING TECHNOLOGY

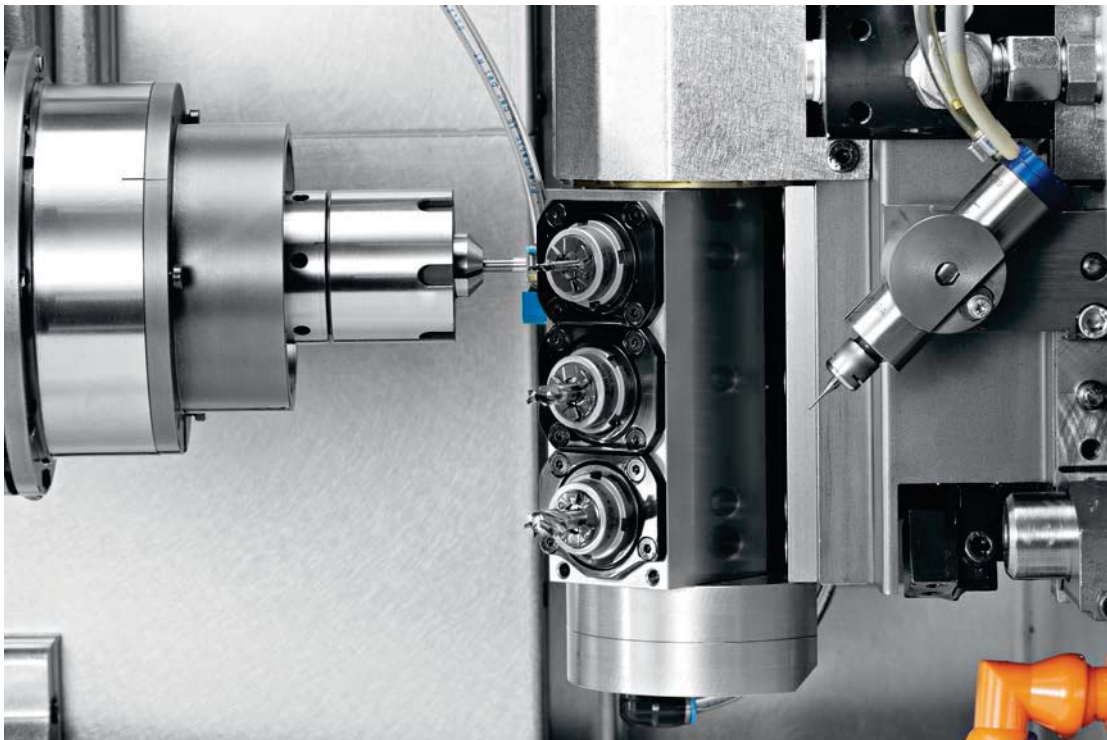
Machining of complex shapes by milling and multi-axis interpolation (B axis)

Certain components, especially implants for spine surgery, orthopedic bone screws and nails as well as dental implants, require highly specific facilities for the machining of complex shapes generally by milling.



## Advantages

- Machining of highly complex parts complete in one setup.
- Easier programming of shapes thanks to specific macros (automatic calculation of axis offsets and incrementation of program steps).
- Very short control times and start-up times.



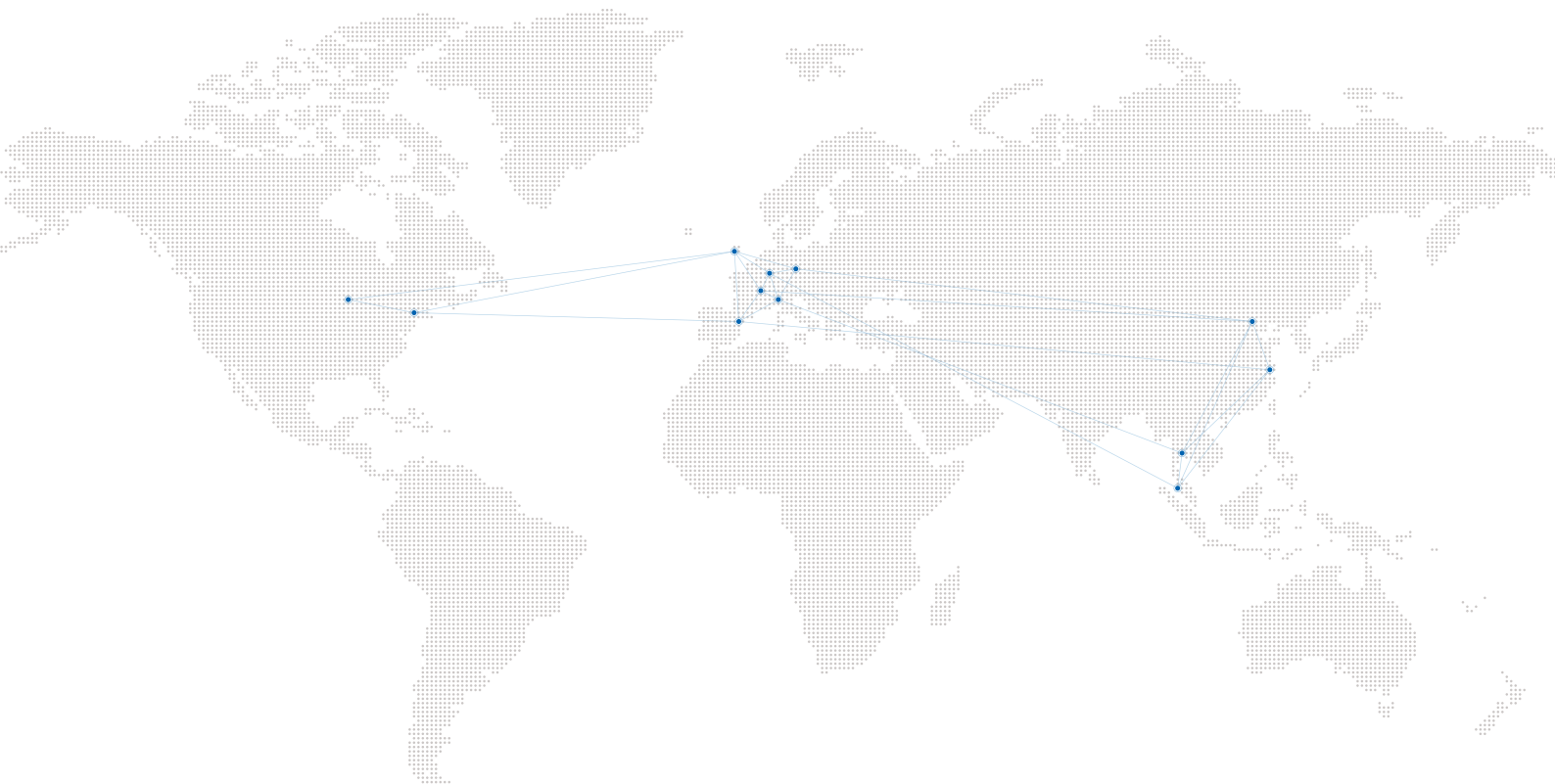


# OUR SUBSIDIARIES



## **Our subsidiaries**

Tornos has a worldwide sales and services network. This global presence is one of the keys to our leadership. Thanks local Tornos offices worldwide, which enable us to provide technical support in our customers' languages and in keeping with their customs, we help improve their quality, increase their productivity and reduce their operating costs. Our network enables us to follow your business activities across the globe.



# MEDICAL APPLICATIONS

Maxillofacial, orthopedics, trauma, hip screw



Titanium



Stainless steel 316



Stainless steel 316



Stainless steel 316



Titanium



Titanium



Stainless steel 316



Titanium



Titanium



Titanium



Stainless steel 316



Stainless steel 316



Titanium



Titanium



Titanium

# MEDICAL APPLICATIONS

Orthopedics, trauma, movement



Titanium



Titanium



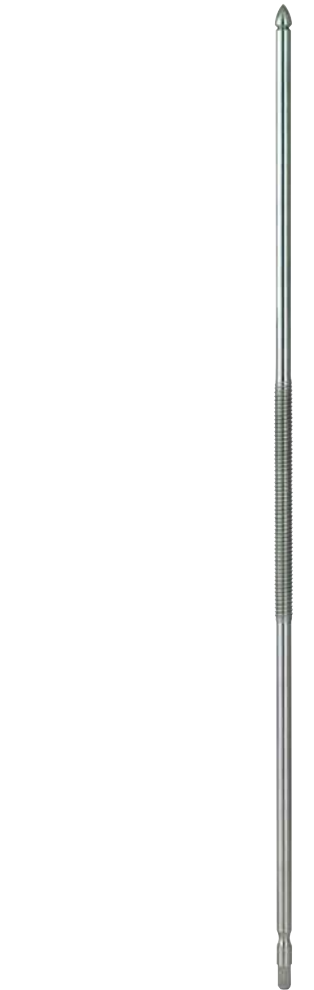
Hexalobular milling (Torx®)



Titanium



Stainless steel 316



Stainless steel 316



Titanium

# MEDICAL APPLICATIONS

## Spine



Titanium



Stainless steel 316



Titanium



Titanium



Titanium



Peek



Titanium



Peek



Titanium



Stainless steel/Titanium



Stainless steel 316



Titanium



Peek

# MEDICAL APPLICATIONS

Surgical tools, devices, instruments



Cobalt chrome



Stainless steel 316



Titanium

# MEDICAL APPLICATIONS

## Dental implants



Titanium



Stainless steel 316



Stainless steel 316



Titanium



Titanium



Stainless steel 316



Titanium



Stainless steel 316



Titanium



Stainless steel 316



Titanium



Titanium



# MEDICAL APPLICATIONS

## Dental implants



Stainless steel 316



Titanium



Titanium



Titanium



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**Conforms to the European CE/CEM Safety Standards**

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