

# Heraeus



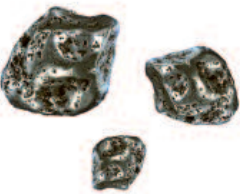
## Heraeus Medical Components

# The elements of success: Start to Finish

Since 1856 when Wilhelm Carl Heraeus began to successfully refine platinum on an industrial scale, Heraeus has been transforming metals and alloys into useful products. The Medical Components Division of W. C. Heraeus focuses our metallurgical knowledge and technical expertise on your medical component design.

By controlling manufacturing from the very start at metal refining and alloying, we maintain the highest standards at each step of the fabrication and assembly process. Heraeus' depth of experience with metals, in combination with polymer and ceramics, offers you unrivaled technical solutions to your medical device component development and manufacturing.

The full range of testing and in-house analytical capabilities like SEM, impedance spectroscopy and metallographic sectioning speed development and time to market. The result is a component that successfully fulfills its intended design requirements with the best choice of source materials, subcomponent manufacturing, and final assembly.



Whatever your device component need, Heraeus is ready to help you succeed. Our operations are broad-ranging and interlinked to provide the highest value at every stage. We provide:

**Materials** – Expert metallurgy and alloying to meet physical and electrical properties of your design.

**Wire, Strips, Tubes, Rods** – The building blocks of device component assembly are produced to specification.

**Coils, Stylets, Core Wires** – Secondary processes that create a sub-component for integration into a final assembly.

**Machined Components** – Using precision processes like Swiss machining for extremely small and complex parts like electrodes.

**Engineered Assemblies** – Combining materials and components in your design for accurate, confident bonding, welding, and assembly.

**Housings** – Fabrication and assembly of the implantable housings that put your technology to use in the body.

**Plastic Molding** – Mold design and specialty molding services complement our metal fabrication offerings.

**Coatings** – Surfaces that insulate, protect, and improve durability and performance.



# Heraeus Medical Components

## Materials

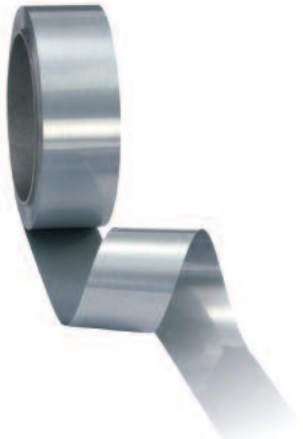
Metals are a Heraeus forte. Corrosion resistance, mechanical strength, high fatigue life, conductive properties, shape memory, purity and cleanliness are all factors addressed in our refining and alloying processes. Our materials are well established when biocompatibility plays an important role. When appropriate, we select source metals from other suppliers.

Metals and alloys include:

- |            |              |                 |
|------------|--------------|-----------------|
| ■ PRECIOUS | ■ REFRACTORY | ■ PERFORMANCE   |
| Platinum   | Tantalum     | Titanium        |
| Gold       | Niobium      | Stainless Steel |
| Silver     | Tungsten     | Nickel Chrome   |
| Rhodium    |              | Cobalt Chrome   |
| Ruthenium  |              | MP35N®          |
|            |              | Nitinol         |

## Wires, Strips, Tubes and Rods

Metals are worked to the first manufacturing stage through melting, drawing, cladding, rolling, profiling and special processing. Shaping and combining metals produces highly specific mechanical and electrical properties critical in device design.



Heraeus specialties include:

- Fine wire drawing to .0004" (0.01 mm) diameter
- Profiling to flattened, oval and tapered cross sections
- Cladding for electrical, shape memory and biocompatibility
- Tubes with diameters from .24" (6.1 mm) to tiny .004" (0.1 mm) configurations
- Strips and foils for conductive and filtering applications

## Coils, Stylets, Core Wires

Minimally invasive instrumentation relies on very precise physical properties of stiffness, flexibility, and torsion to enable the physician to access and provide treatment at the desired site in the patient. Heraeus applies a full range of coiling and wire forming techniques:

- Electrical conductor coils
- Coils for catheter reinforcement and support
- Multifilar double helix coils
- Wire fabrication from roll to final component assembly
- Precision wire straightening and grinding
- Wire forming



## Machined Components

Electrodes for cardiac rhythm management, neuromodulation, or sensing demand exacting dimensional precision. Complex endovascular and indwelling device designs also call for challenging machining and assembly processes. Heraeus' full range of medical component metalworking includes:

- Swiss machining
- Centerless grinding
- EDM
- Laser cutting
- Shape sintering
- CNC milling and turning
- Micro component manufacturing



### Engineered Assemblies

Supply chain management can be simplified by use of a supplier offering proven expertise in the full breadth of engineering and manufacturing services. Heraeus offers assembly services from simple joining to assembly of your device. Technologies and services provided include:

- Prototyping and precious metal handling
- Wire drawing, coiling, straightening, forming and grinding
- Precision machining, including Swiss, laser, EDM
- Plastic machining and injection molding
- Laser processing and welding
- Joining and clean environment assembly



### Implantable Housings

Therapies moving into the body present an opportunity to truly show the capabilities of material performance and component manufacturing. Heraeus Medical Components is a leader in biocompatible housing technology, including development of an innovative lip design for easy, reliable case closure. Our implantable housing components are utilized in:

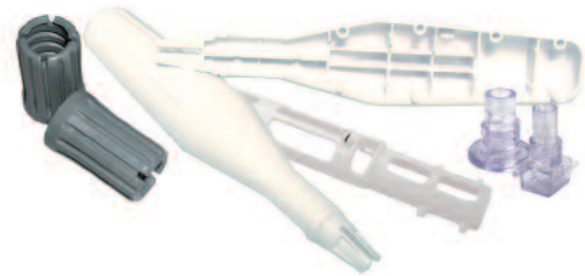
- Pacemakers and defibrillators
- Neuro-modulation devices
- Power sources as capacitors or batteries
- Drug pumps



## Plastic Components

Plastic components are used in almost all implantable devices – either for delivery or for permanent parts of indwelling devices. Using the right polymer, with precise molding, bonding, tipping and assembly, is a large part of Heraeus' complement of services.

- Mold design and material selection
- Insert and micro molding
- Machine to molding
- Bonding, tipping, surface coating
- Multi-material assembly
- Second sourcing of extrusion and specialty polymer processes



## Coatings

Metal or plastic coatings can provide a variety of characteristics, from electrical insulation to oxidation prevention or biocompatibility. Heraeus applies coatings to individual components, flat substrates, foils, wires and micro components.

Coating methods include:

- Evaporation
- Sputtering
- Electroplating
- Reactive PVD coatings
- Spray coating
- Vapor phase polymerization



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