

MPS PRODUCTS FOR APPLICATIONS FOR THE MEDICAL INDUSTRY (selection)



INTRODUCTION TO MPS MICROSYSTEMS

MPS Microsystems develops and manufactures high precision, high-performance and very efficient electro-mechanical microsystems. Managing the miniaturization and integration of functions in small spaces, MPS Microsystems provides solutions perfectly suited to specific customer requirements. MPS Microsystems also offers a standard and scalable range of products, such as linear bearings and ball screws.



MPS' strengths particularly appreciated by its customers are:

- Innovative and reliable solutions
- Performance and miniaturization
- High quality service
- Trusted relationship

Located in Bienne, Switzerland, in a modern and well-equipped facility MPS Microsystems offers its 220 employees an exceptional working environment and

offers its customers a sustainable competitive advantage in their market.

MPS belongs to the Faulhaber Group, the German manufacturer of micromotors (www.faulhaber.com).

Implantable drug pump

MPS Micro Precision Systems produces an implantable peristaltic pump (AIMD Class 3) that consumes very little energy, is biocompatible and corrosion-resistant.

Used for the programmable administration of morphine, ziconotide and Lioresal, it enables the treatment of severe chronic pain and spastic paralysis.

Partnerships fostered through direct and trusted contacts, control of the design and manufacture of titanium bearings with ceramic balls, the capacity and know-how for accurate assembly under optimal conditions for controlling particle concentration, have all enabled MPS Micro Precision Systems to establish an industrial tool and a qualified supplier network.



Biocompatible Implantable Actuators

MPS develops miniature implantable biocompatible actuators which aim at supporting organ functions of the human body. Produced by MPS, these systems combine cutting-edge technology and technical innovations.

To date, the technology developed by MPS is used for urinary incontinence and long bone lengthening. These systems are considered as AIMD (active implantable medical devices) and have been patented. MPS has developed an intelligent system for the bidirectional transmission of data and wireless power transfer from a control box to the implant.

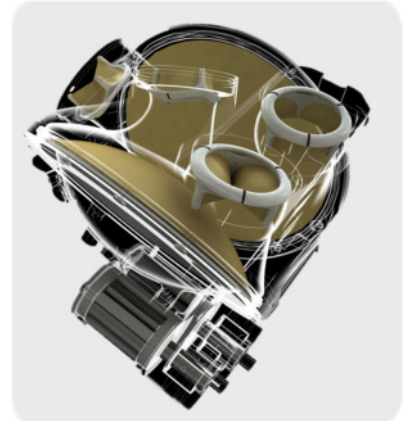
The motorised part of the implant is encapsulated and the mobile systems are totally biocompatible. Mechanical and electrical, they have been designed so as to reduce friction and other sources of energy loss to a minimum, therefore ensuring very little energy consumption.



Heart pump

MPS Microsystems is working in partnership with a customer to produce hydraulic components intended to actuate the pump of an artificial heart. By selecting appropriate materials, using perfect surface finishes and complex micron-corrected geometry, this motor pump is able to reproduce the natural heart beat; the pulsatile flow created makes it possible to achieve 230 million cycles over 5 years.

Part of the assembly of components is carried out by matching and shrinking for perfect control of dimensional constraints. Glued joints (PEEK/aluminium and PEEK/steel) for this heart pump are made on plasma-prepared surfaces, guaranteeing repeatability.



Miniature hexapode for spine surgery

In close collaboration with our customer, MPS produces a miniature and extremely accurate hexapod robot, which is used to assist surgeons during spine operations. Movements are enabled by 6 linear actuators, each operated by 5 mm brushless motors manufactured by the Faulhaber group.

Each actuator ensures precise movement of 1 μm . It is controlled in a closed circuit by an inductive sensor.

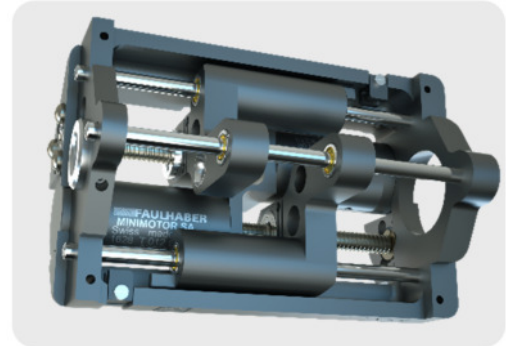
Miniaturised, tested and calibrated at MPS, the hexapod has a diameter of 50 mm, a height of 80 mm and weighs 330 grams. The manufacturing processes are validated and the suppliers qualified according to regulatory requirements for class 2 medical devices.



Ophthalmology

Eye tomography and cataract operations require the focus of the laser beam to be very precise. MPS has developed high-precision miniature lens actuators for manufacturers of ophthalmic devices.

These actuators consist of a 10 mm micromotor, a ball screw system and a linear guideway. The system is designed in such a way that it is able to compensate for the imperfection of axes alignment. The most stringent requirement is to find the 0-position with a precision of 1 μm between each measurement.



MPS COMPETENCES

Research & Development

The high level of training and experience of its **micro-mechanics engineers** allows MPS to quickly develop innovative solutions that meet the needs of its customers. Our developments and documentation meet the international standards of the medical market.

Fully equipped, the **prototyping workshop** guarantees the production and modification of rapid prototypes, free from the logistical constraints of mass production. The equipment includes lathes, milling machines, wire erosion machines and grinding machines.

The **test laboratory** equipment is used to carry out service life tests for systems developed by MPS, noise measurements, traction tests, torque measurements and simple measurement systems.

Manufacturing (precision as a key value of MPS)



The **turning & milling** workshop has a series of CNC and EDM machines. Each work bench is equipped with measuring instruments for controlling, at any time, the quality of the products manufactured.

Acquired over many decades, MPS's **heat treatment** knowledge is essential to achieve the material properties needed for the performance of the systems manufactured. MPS also has expertise in deburring and washing components.

MPS sets itself apart thanks to its **grinding and polishing** expertise. In these workshops, components achieve dimensional precision of less than one micron, through centerless grinding, external / internal diameter grinding, and mirror surface finishes ($R_a < 0.1 \mu\text{m}$). All MPS ball screws have threads that are grinded on latest-generation equipment.

MPS manufactures high quality (ISO grade 3) miniature stainless steel and ceramic (zirconium oxide) **balls** with diameters between 0.130 mm and 1.588 mm.

Micro Assembly



MPS specialises in the micro-assembly of complex systems which require specialist knowledge and specific expertise.

The size of parts and the required precision necessitate a controlled atmosphere in the entire assembly workshop, with continual air change and filtration. A clean room ISO 7 is available for implantable medical applications.

Our main skills include the assembly of micro-components, laser welding, laser marking, gluing, precision lubrication, washing and pairing, enabling adjustments of less than 0.2 μm .

The workshop is organised according to "lean manufacturing" principles. Dedicated cells are set up when necessary.

Quality

The MPS Quality department ensures the continuation of certification : ISO 9001 - ISO 1348 - ISO 14001.

In order to guarantee the delivery of products that observe legal requirements, MPS prepares the files that are essential for certifications (European Directives 93/42/EC, 90/385/EEC, 21CFRpart820, etc.) and for medical devices to be placed on the market.

Project management

In our project development process, customers are in close contact with a dedicated project manager who ensures close communication and coordination with the internal project team and external partners. The MPS management system integrates the project management process.

WHERE TO FIND US

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