

## INTRODUCTION TO MPS MICROSYSTEMS

MPS Microsystems develops and manufactures high-precision, high-performance and very low-friction electro-mechanical microsystems. Managing the miniaturisation and integration of functions in small spaces, MPS Microsystems provides solutions that meet specific customer requirements. MPS Microsystems also offers a standard range of products, such as linear bearings and ball screws under the “microlinea” trademark.

Located in Bienne, Switzerland, in a modern and well equipped facility MPS Microsystems offers its 150 employees an exceptional working environment and provides customers with unique capabilities that are perfectly suited to the requirements of the medical and high-tech sectors.



MPS belongs to the Faulhaber Group, the German manufacturer of micromotors ([www.faulhaber.com](http://www.faulhaber.com)).

## APPLICATIONS FOR THE AUTOMATION INDUSTRY (selection)

### Pick & Place Heads for high throughput PCB assembly

The constant reduction in the size of electronic components linked to the increase in precision of electronic cards has continuously added to the requirements for gripper manufacturing.



Manufactured by MPS, these pick&place grippers are based on MPS specific linear bearing technology. In order to meet the sliding force, precision, straightness and surface finish requirements set by the customer, the components are ground, then polished and finally paired with an accuracy range of 0.4  $\mu\text{m}$  using balls classed by groups of 0.25  $\mu\text{m}$ .

## APPLICATIONS FOR THE OPTIC INDUSTRY (selection)

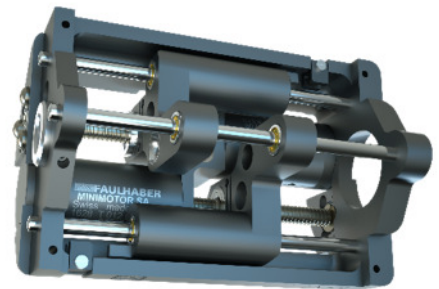
### **Ophthalmology**

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 6 mm micromotor, a pre-loaded screw-nut 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  $\mu\text{m}$  between each measurement.

### **Multi-platform guidance system**

Developed by MPS, the system very precisely moves a lens on a linear basis with a laser beam passing through it. This actuator consists of a ball screw and two linear bearings and must ensure that the lens is completely perpendicular with its axis during any movement. The linear positioning precision is 1  $\mu\text{m}$ .



### **Positioner of optical fibres**

Research in the field of dark matter is leading to the development of new equipment that enable the collection and analysis of light emitted by distant galaxies. In partnership with a research group, MPS has developed and is manufacturing a high precision, reliable system for positioning fibre optics directed towards these galaxies.

With a diameter of less than 10mm, the positioner must be able to accommodate two parallel axes that rotate independently, the optical fibre and two 4mm Faulhaber motors.



## APPLICATIONS FOR THE MEDICAL INDUSTRY (selection)

### **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.



### **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  $\mu\text{m}$ . 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.



## 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** workshop has 12 CNC turning machines used to machine bars from 2 to 42 mm. 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 oxyde) **balls** with diameters between 0.130 mm and 1.588 mm.

## **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 9001:2008, ISO 13485:2012, ISO 14001:2004

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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