

## Hip and spine simulator in the RMS

**There are continuous developments of new implant materials and new implant designs, which have to be submitted to realistic preclinical tests. The wear test with a simulator is an important one for artificial joints.**

The producers optimise the implant materials and try out new approaches in order to develop even more wear-resistant implants. The same applies to the design, which should permit easier handling, better anchoring in the bone or more application versions.

The prototypes of these new implants are submitted to realistic preclinical tests in simulators. The hip simulator, for example (figure 1), simulates the applied loads during gait according to ISO 14242-1. Due to the servohydraulic basis with four independent control cycles, the simulator in the RMS Foundation provides a free programming of the load and motion curves. Thus it permits to apply loads and carry out motions such as they occur in the hip (figure 2) or in the spine. Hence, our joint simulator can be used

for the wear tests of both artificial hips and intervertebral disc implants.

In the simulator, the implants in the six motion stations are arranged in the same manner as in human hips. In addition, there are two soaking specimens on the simulator, which are exposed to the same load but are not moved. The tests in the simulator are performed at 37°C in a protein-containing solution based on bovine serum, similar to the synovial fluid in the hip joint. Usually,



Figure 1: Servohydraulic 6-stations hip and spine simulator.

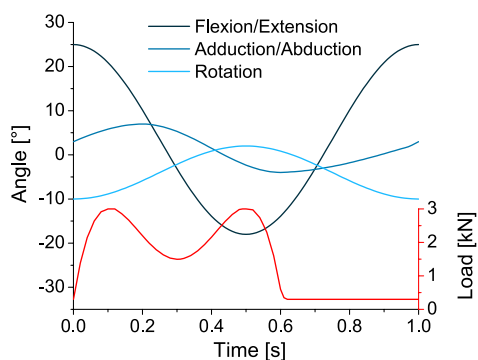


Figure 2: Load and motion curves for the hip according to ISO 14242-1.

a test takes 5 million cycles, which corresponds to a wear of 5-10 years in the patient. The weight of the components is constantly measured and thus the wear calculated, as shown in figure 3 for a standard polyethylene inlay of an artificial hip joint.

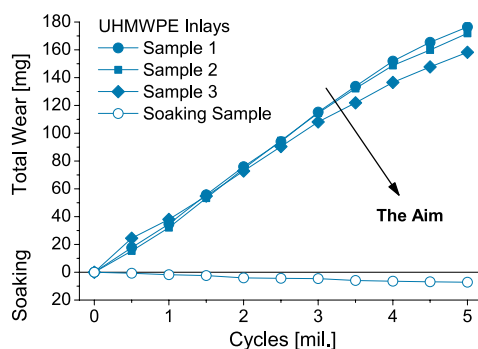


Figure 3: Wear and soaking of an inlay of a tested hip joint pairing with a CoCrMo head (Ø 32 mm). The inlay was made of ultra-high molecular weight polyethylene (UHMWPE).

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### Our equipments for wear testing:

- Hip and spine simulator by EndoLab, Thansau/Rosenheim Germany:

Servohydraulic 6-station simulator for the testing of hip implants according to ISO 14242-1 or intervertebral disc implants according to ISO/CD 18192.

- Two Pin-on-Disc testing devices OrthoPOD™ by AMTI, Watertown, USA:

Six-station testing devices with freely selectable load and motion cycles to test and determine the wear behaviour of two sliding partners by means of weight measurement.

- Function-related wear tests with the MTS 858 Mini Bionix with 4 degrees of freedom (hydraulic) or a joint test stand with 2 degrees of freedom (electric motor, self-made) for assemblies, as required.

**Please discuss your questions with us! We will be happy to advise you.**

**Or ask for our service catalogue. You will find this and other information on our website as well.**

The RMS has been certified according to ISO 9001:2008. Selected services have been accredited according to ISO/IEC 17025