

## INFLUENCE OF HIP ENDOPROSTHESES IMPLANTATION ERROR ON IMPLANTS WEAR

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### Abstract

*Scientific goal of the Project is determination of femoral head and acetabular cup symmetry axes determination for patients after hip endoprosthesis implantation, investigation and adjudication of physicochemical and mechanical processes in hip joint implants exploitation taking account into tribological processes and wear intensity evaluation with different correlated femoral head and acetabular cup setting. Investigations also contains examination of amount of metal ions in patients bodies after hip replacement operations.*

*Planned effect of the Project is determination of parameters assigning operation technique quality and indication of optimal friction couple setting. In the frame of the Project friction moment run and friction work values for single cycle in dependence on correlated setting of endoprosthesis components and as a consequence influence of implant setting on amount of metal ions releasing to human body will be determined using simulator.*

*The extent of work contains:*

1. Computer tomography digital images of patients after hip replacement database preparation
2. Study the impact of prosthesis setting on amount of released metal ions: chromium and cobalt to the human organism.
3. The development of digital image processing method for endoprosthesis setting modeling using FEM.
4. Investigate the friction-wear investigations performance with different endoprosthesis settings.
5. Characterization of the wear products after tribological tests.
6. Optimal endoprosthesis settings database elaboration.
7. Verification and optimization of mounting through numerical analysis of implant-bone system in endoprosthesis.

*The final result of the Project is to improve the surgical navigation system by identifying in femoral head and acetabular cup setting that will provide the least resistance to motion, increased stability and the least amount of metal ions released during exploitation. Initiators intend to create a database containing the assignment of setting parameters for exploitation properties. In the future it is planned to use the developed database for surgical navigation software, enabling surgeons to avoid negative endoprosthesis mutual settings during operation.*

[Engineering of Biomaterials, 109-111, (2011), 46]

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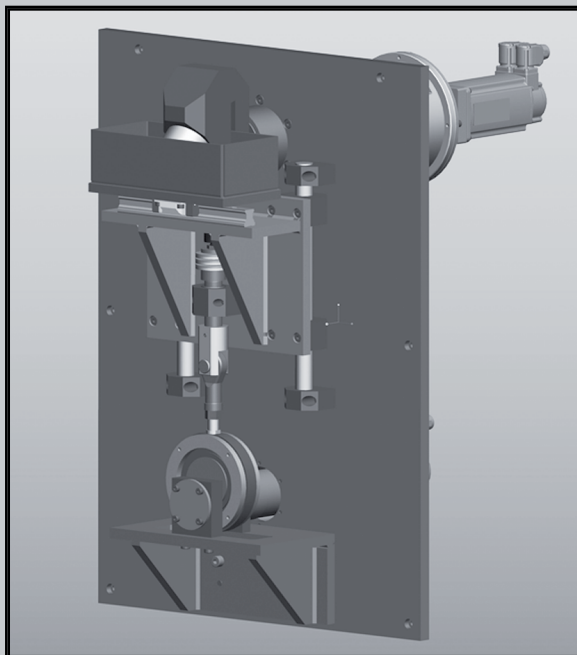


FIG. 1. Simulator for of hip endoprosthesis testing designed and manufactured in Metal Forming Institute in Poznan.