



Foundation of Cardiac Surgery Development

FUNDACJA ROZWOJU KARDIOCHIRURGII

IM. PROF. ZBIGNIEWA RELIGI





FUNDACJA ROZWOJU KARDIOCHIRURGII

IM. PROF. ZBIGNIEWA RELIGI

NGO non - government organization

SME Medium entrepreneur < 100 employees

Educational center (conference, workshop 1000 participants per year)

Owner of the **research** and implementation center

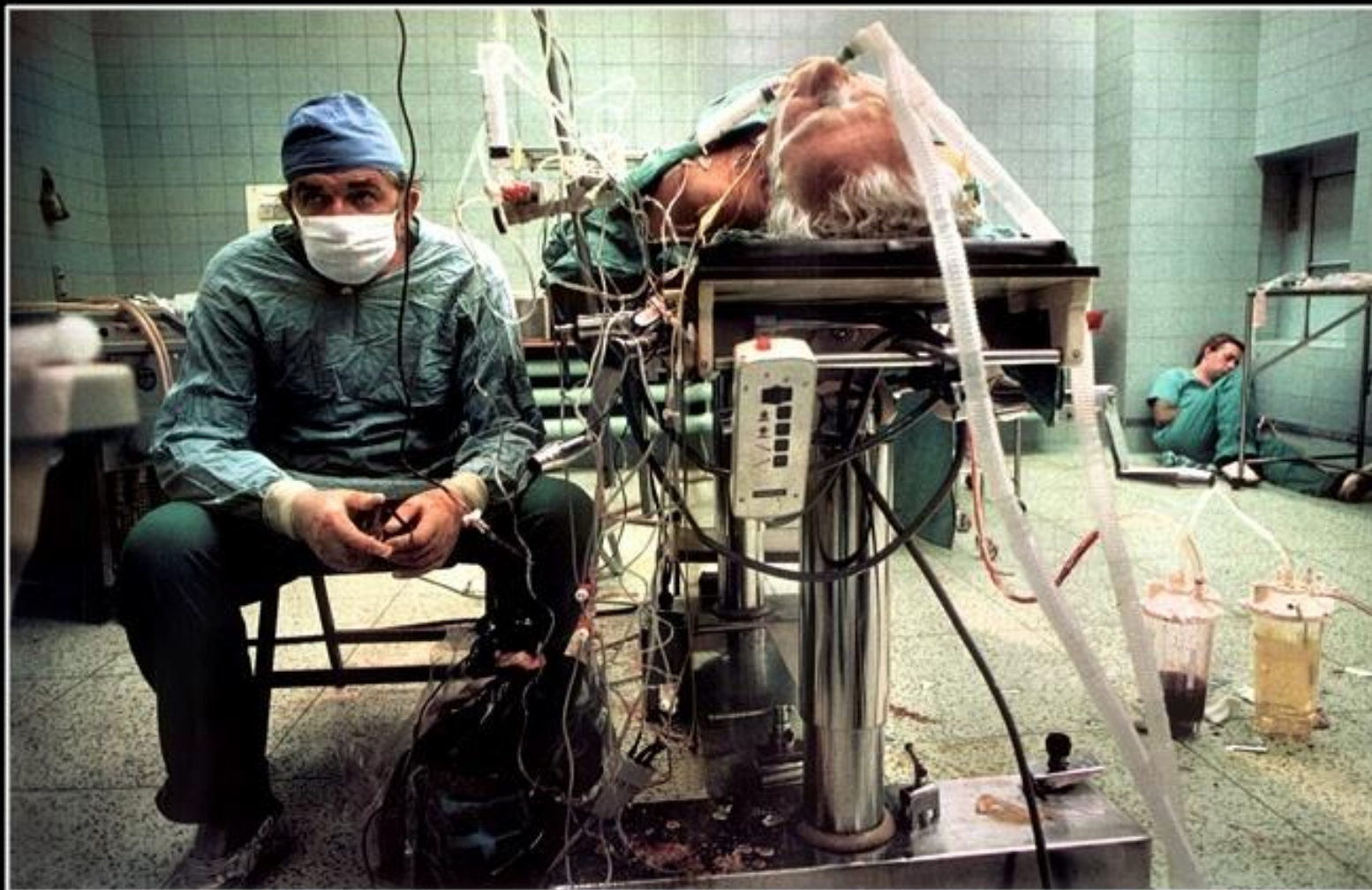
Owner of FRK IntraCordis (AH) & FRK Homograft (Tissue Bank) **company**



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Przedruk, National Geographic, January 1988



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Foundation of Cardiac Surgery Development (*Fundacja Rozwoju Kardiochirurgii, FRK*) was established in 1991 and its main goal has been to support the development of Polish cardiac surgery as well as to introduce into clinical usage modern technologies of heart treatment, including introduction of first Polish mechanical heart assist prosthesis. For this purpose, FRK, created in 1993 its own Heart Prosthesis Institute, which consistently conducts research and development work related to the Polish artificial heart, biological heart valves, cardiac surgery robots and, recently, development in biotechnologies for heart prosthesis.





The Polish Program Milestones

- **1985** – The first successful heart **transplantation** in Poland, performed in Zabrze by prof. Z. Religa
- **1986** – The first implantation of **mechanical heart assistance** in Poland - the **BRNO** LVAD, performed in Zabrze by prof. Z. Religa with J. Vasku team of **Univ. Brno (Czech)**
- **1987** – The first implantation of **artificial heart** in Poland – the **BRNO TAH VII**, performed in Zabrze by prof. Z. Religa with J. Vasku team of **Univ. Brno (Czech)**
- **1987** – The first implantation in Poland of Russian TAH **POISK** performed in Zabrze, by prof. Z. Religa with W. Szumakow team of Transplantology Inst. **Moscow**
- **1987** – The first xenotransplantation
- **1993** – The first implantation of **POLVAD**; Zabrze, Z. Religa team
- **1997** – The first implantation of **POLTAH**; Zabrze, Z. Religa team
- **2000** – start of **Robin Heart Project**





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Polish Ventricular Assist Device POLVAD 1993





"Tissue Engineering and Biological Heart Valves Prostheses" program - research on the construction and technology of manufacturing biological heart valve prostheses and other biomaterials produced by tissue engineering and cell culture.

Polish Artificial Heart program – research on the development of the construction, manufacturing technology and clinical use of heart prostheses and the development of cardiovascular support methods

The **"Robots and Innovative Tools of Surgery"** program - research on robotic and semi-automatic tools for minimally invasive cardiac surgery, research in the field of biocybernetics on systems supporting medical technologies, development of a tool system supporting surgery planning and surgeon training.



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The Bioengineering Laboratory
of Heart Prostheses Institute
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The Biological Valve Laboratory
of Heart Prostheses Institute
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The Biological Valve Laboratory
of Heart Prostheses Institute
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The Biological Valve Laboratory
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The Artificial Heart Laboratory
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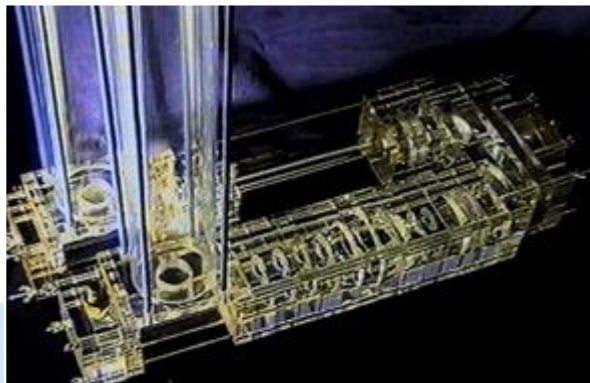
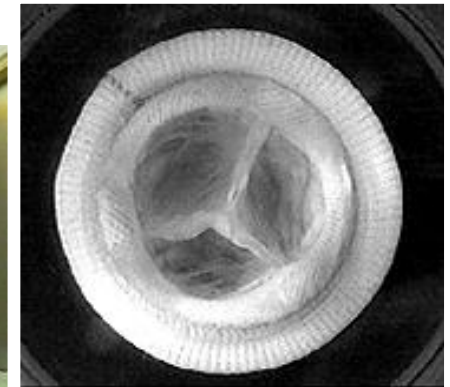
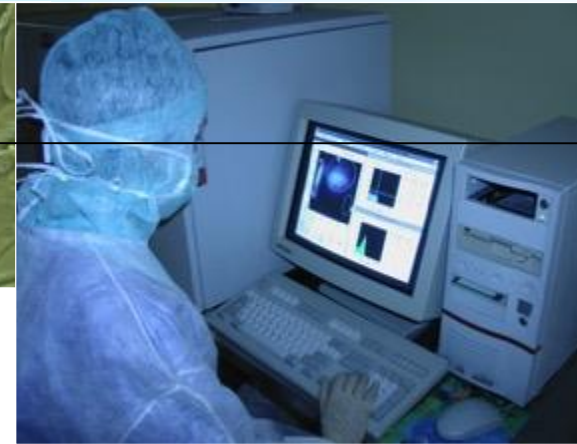
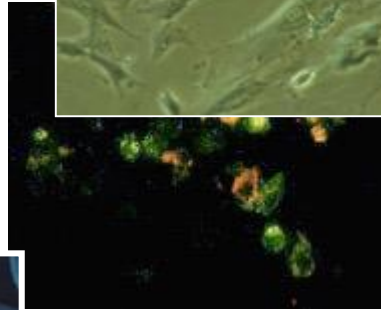
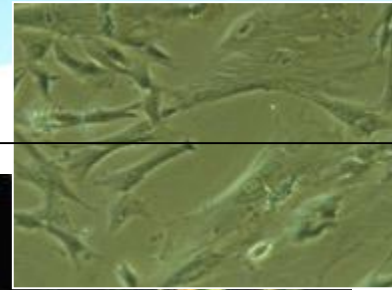
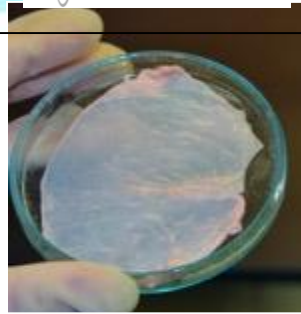
Challenges Achievement



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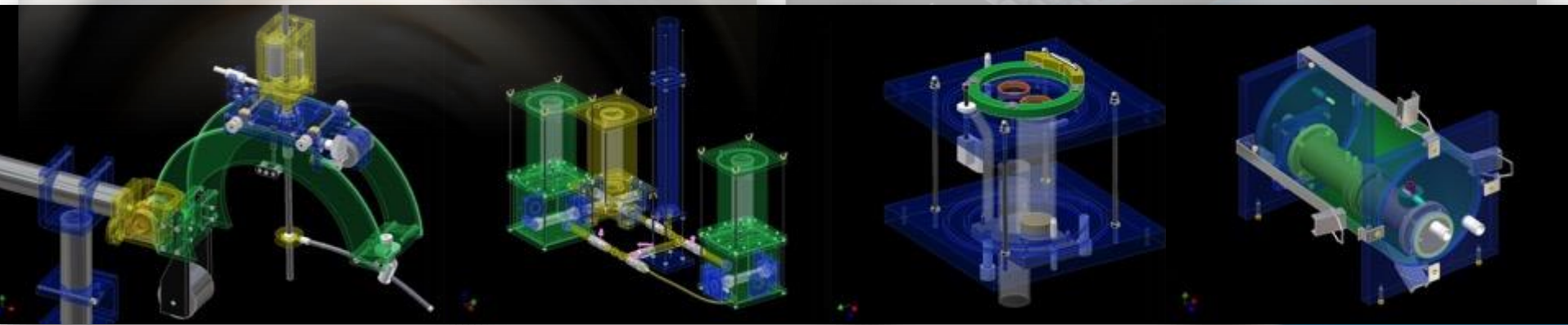
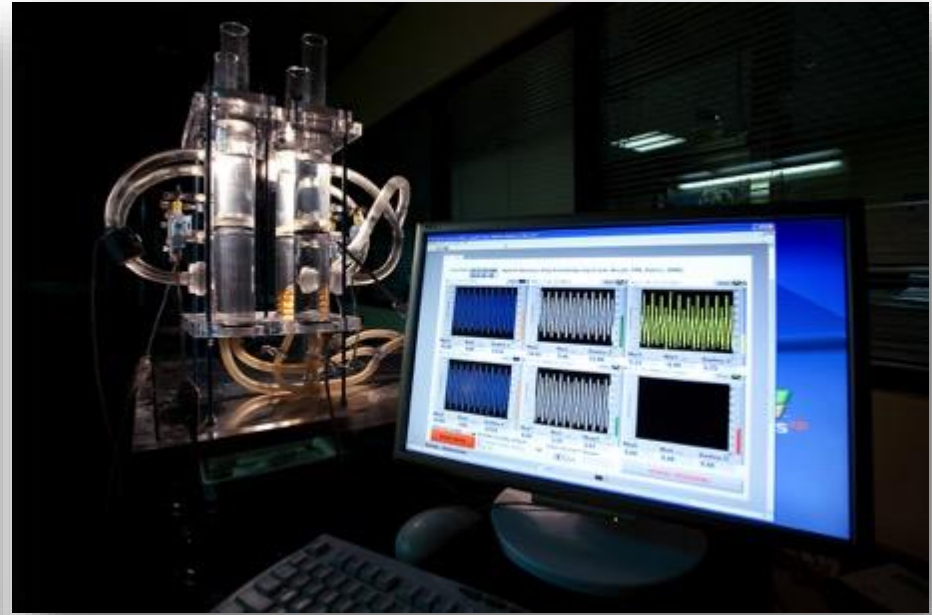
ProCordis





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Artificial organ testers





Polish Heart Assist Devices

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PRACE REALIZOWANE W RAMACH PROGRAMU „POLSKIE SZTUCZNE SERCE”

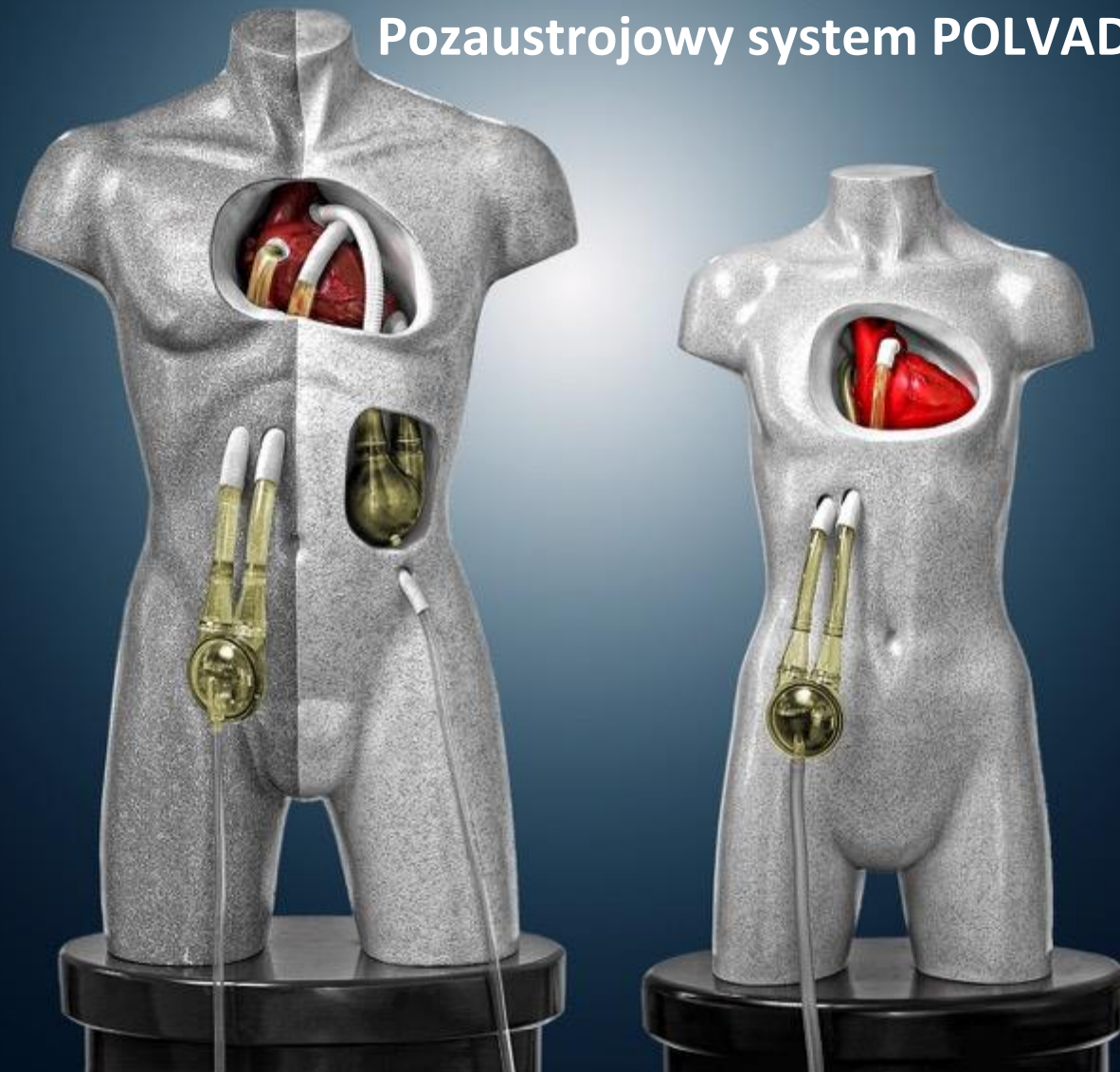




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Extracorporeal system **POLVAD**

Pozaustrojowy system POLVAD





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Extracorporeal system

Pozaustrojowy system RELIGA-EXT, RELIGA-PED





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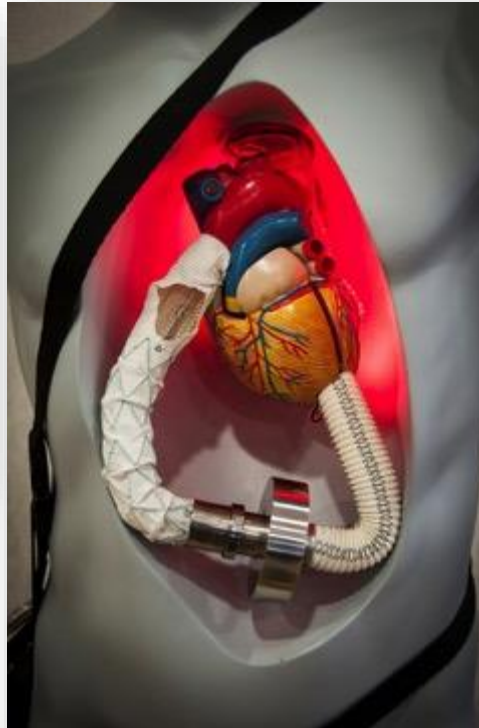
Polish implantable rotary blood pump

Polskie wszczepialne pompy wirowe



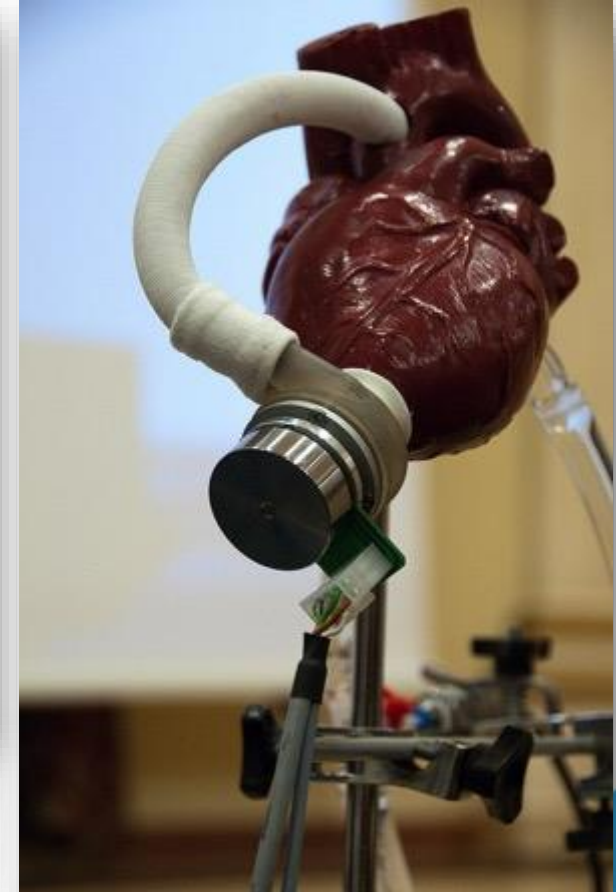
Pompa odśrodkowa

Konstrukcja: FRK; Zabrze
Centrifugal pump



Pompa osiowa

Konstrukcja: CTO Gdańsk
Axial blood pump





RobInHeart

SYSTEM MEDICAL ROBOTS

Robin Heart 2001-2010

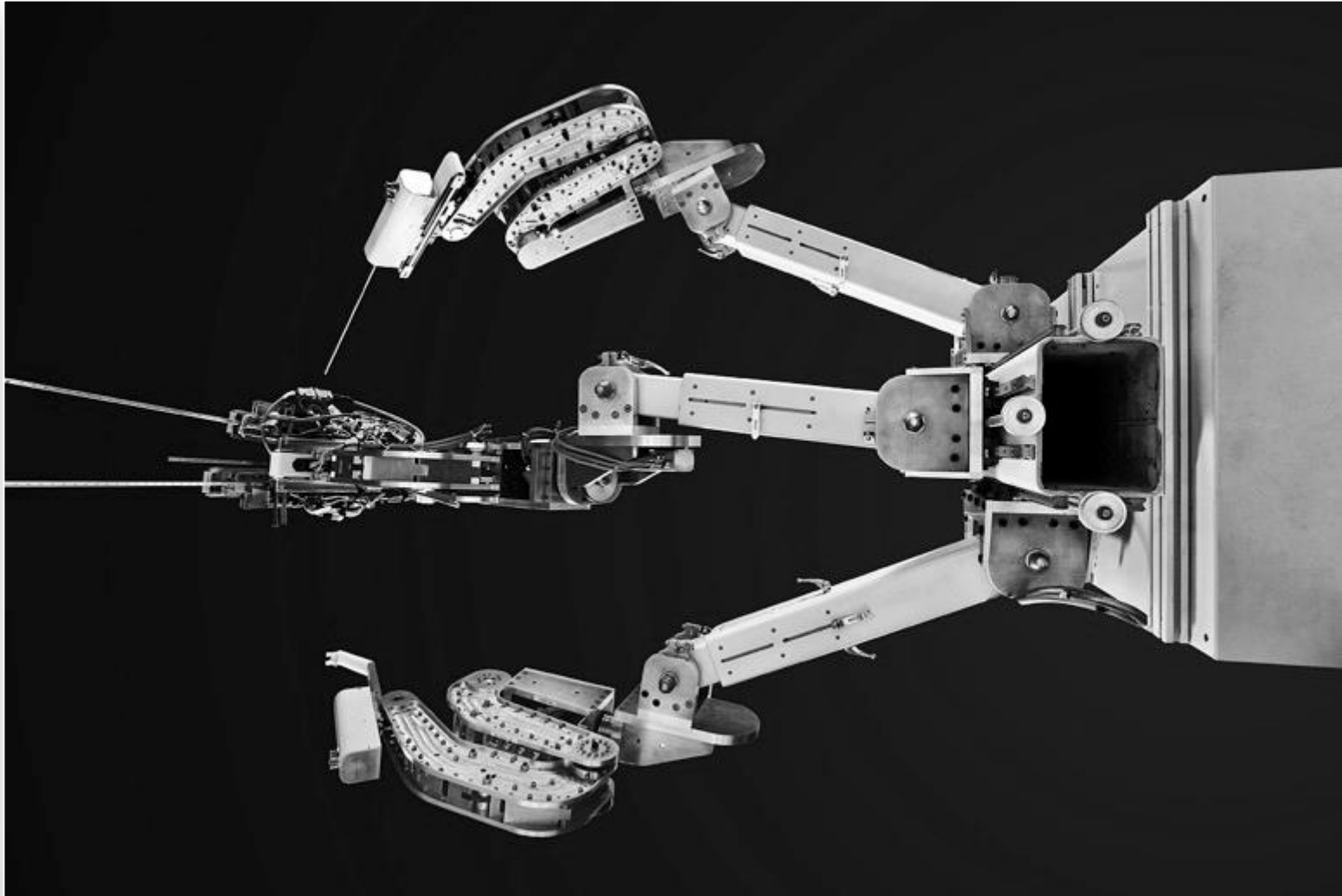




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RobInHeart
MC²



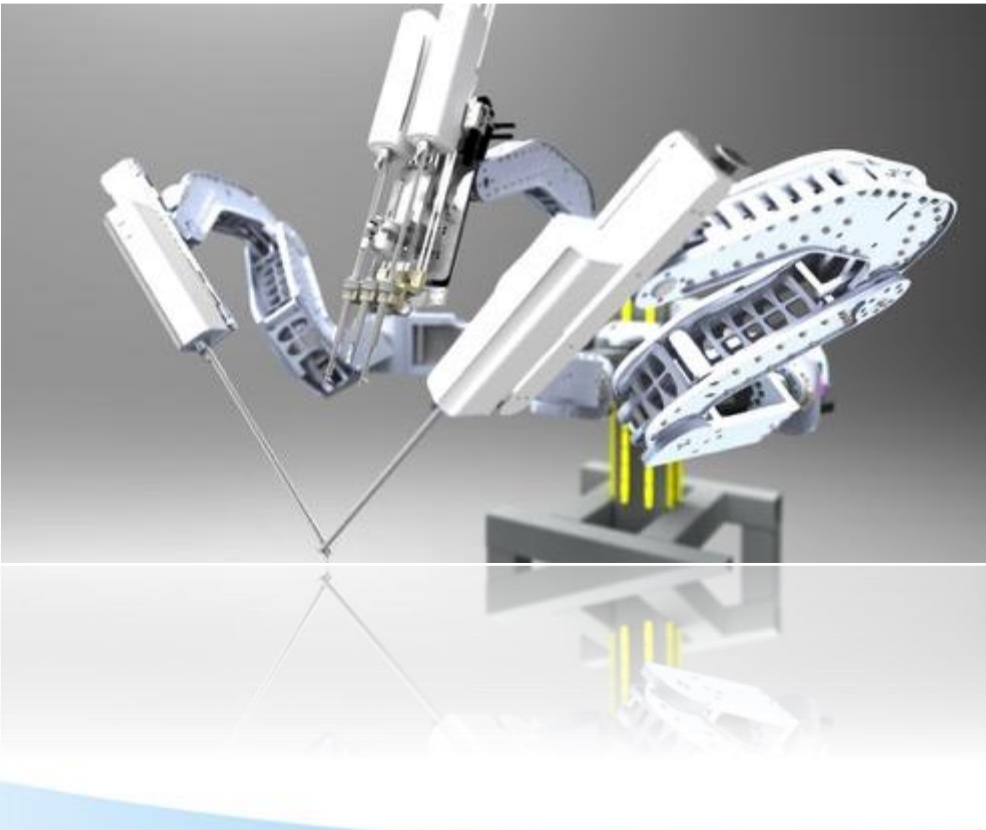


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RobInHeart
MC²





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RobInHeart

PVA

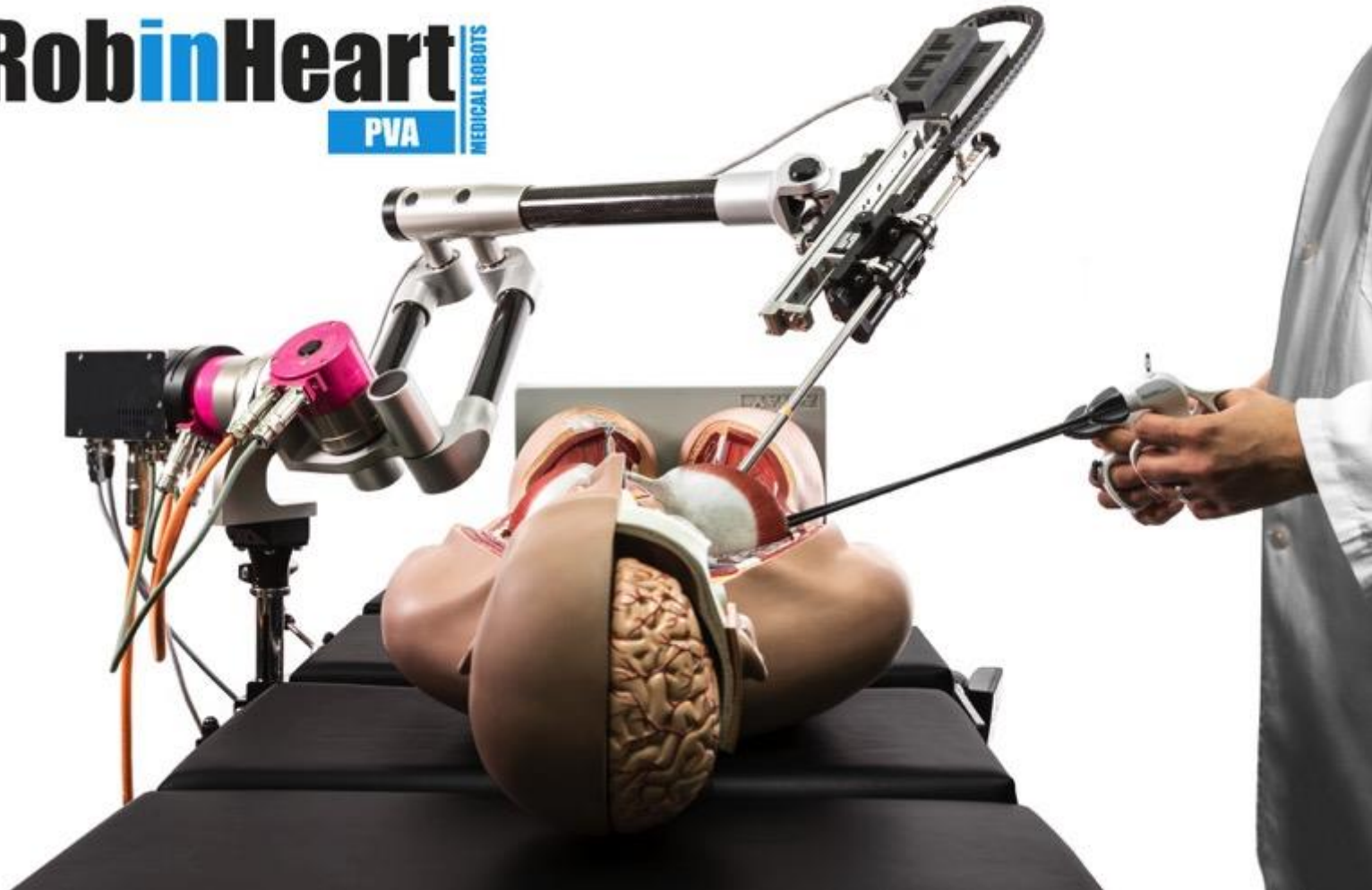




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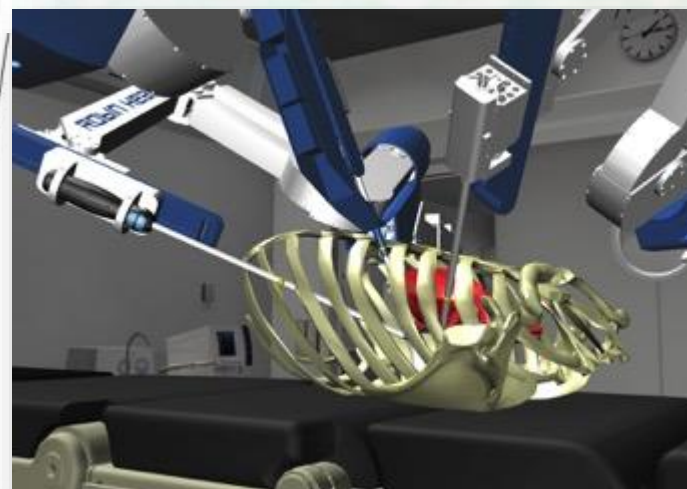
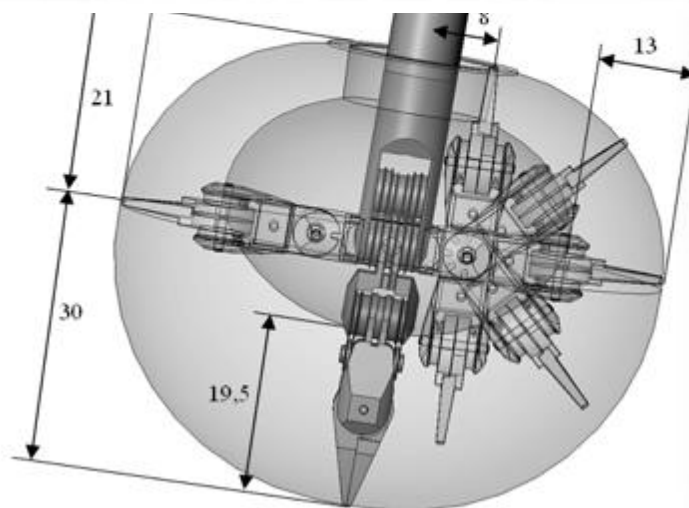
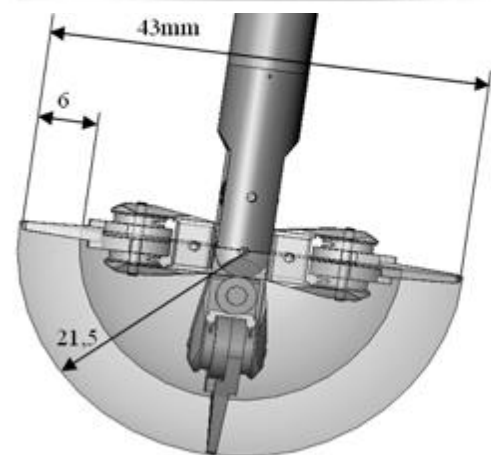
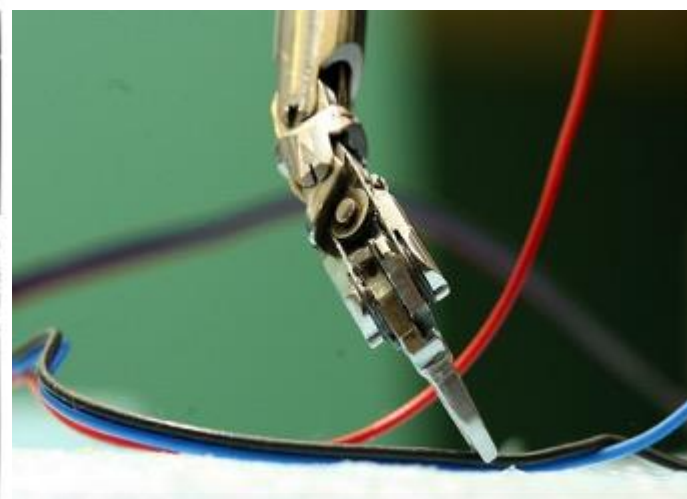
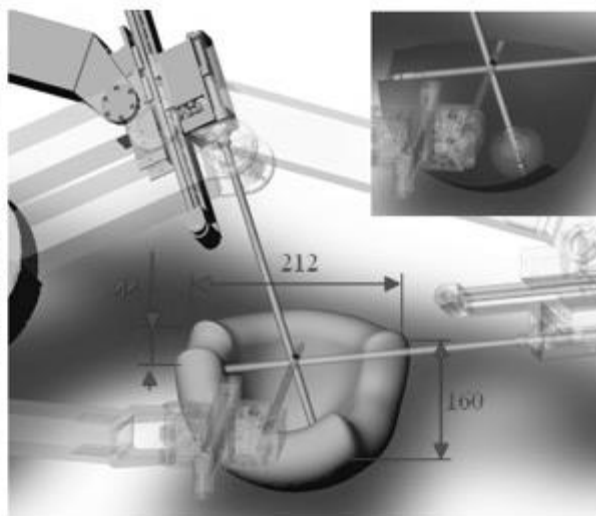
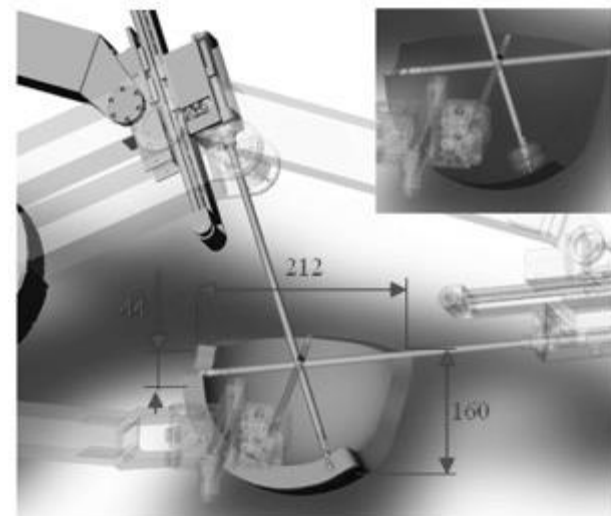
RobinHeart

PVA MEDICAL ROBOTS



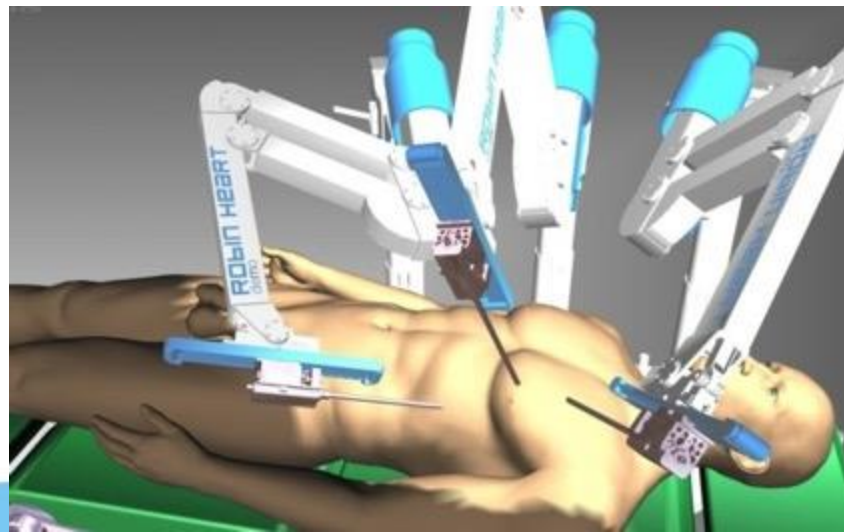
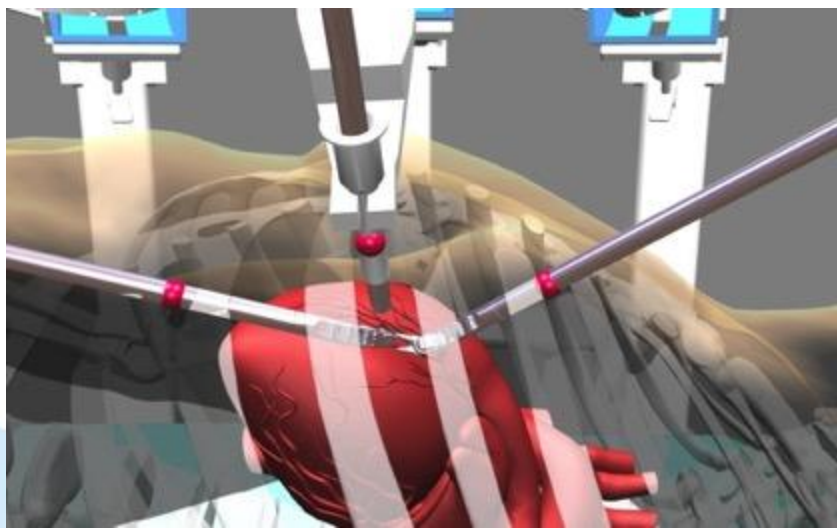


Surgery planning





Virtual Operating Room & in Vitro Test





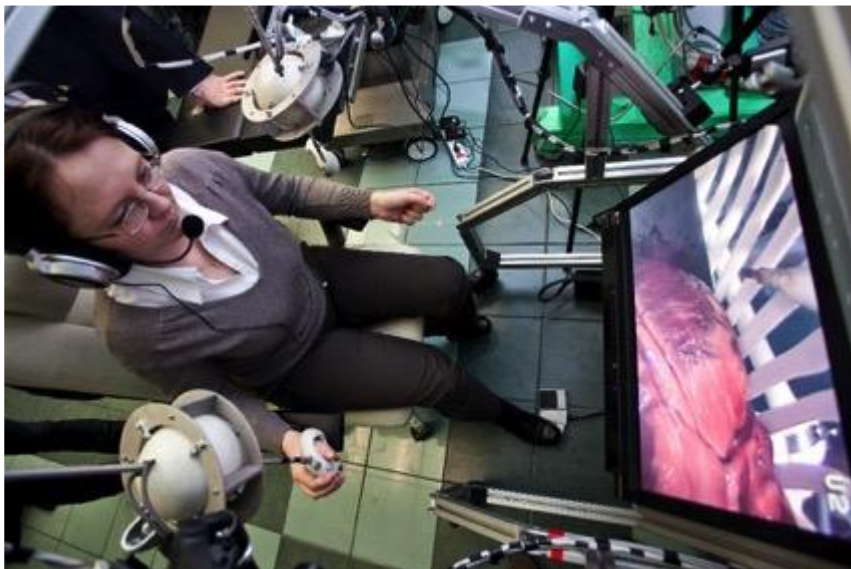
RobinHeart

UniTools MEDICAL ROBOTS





TELEOPERATION



ZABRZE - KATOWICE
2010



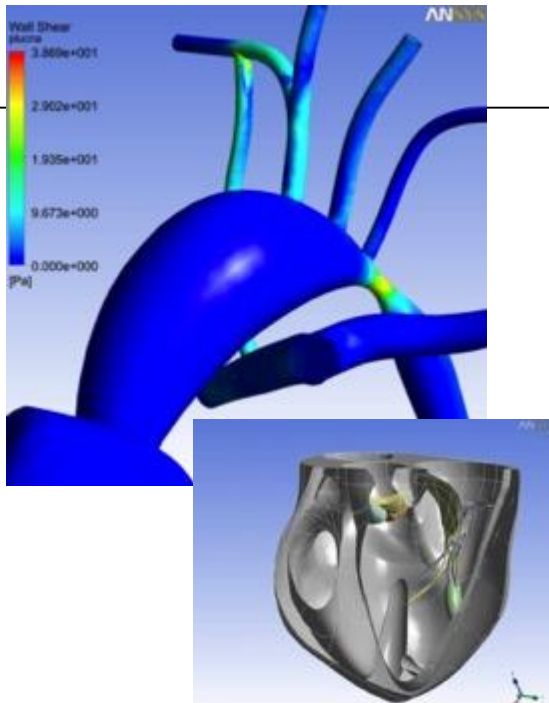
GUIDO KOPALNIA -320 m
2016



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Surgeon support systems

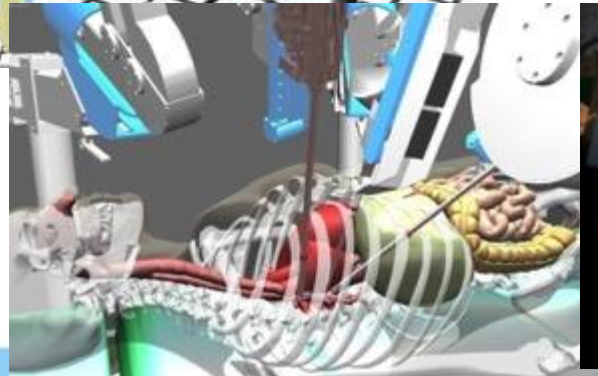
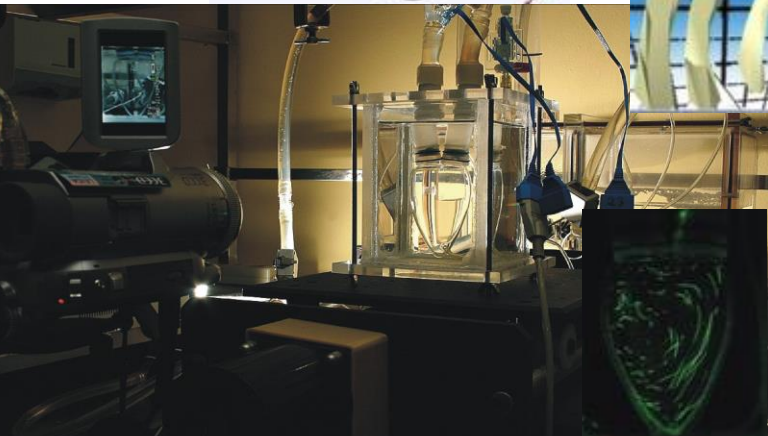
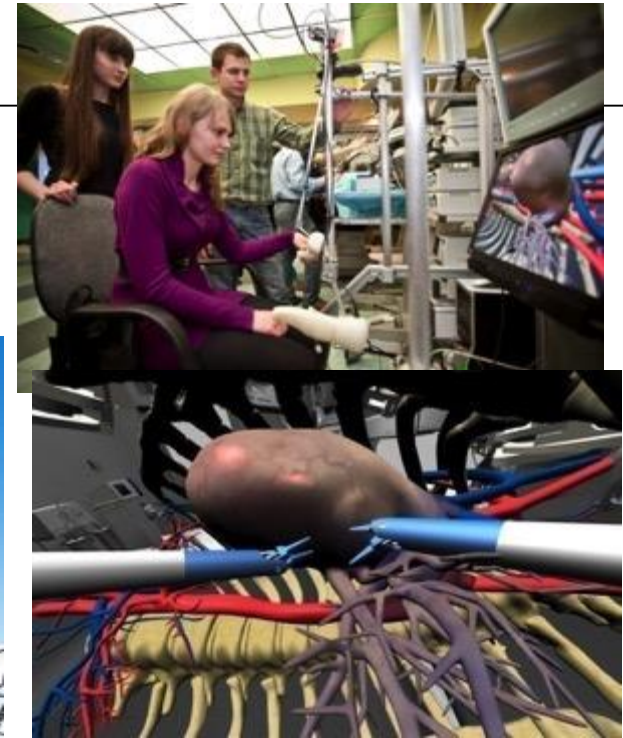
Surgery simulation



Surgery planning system



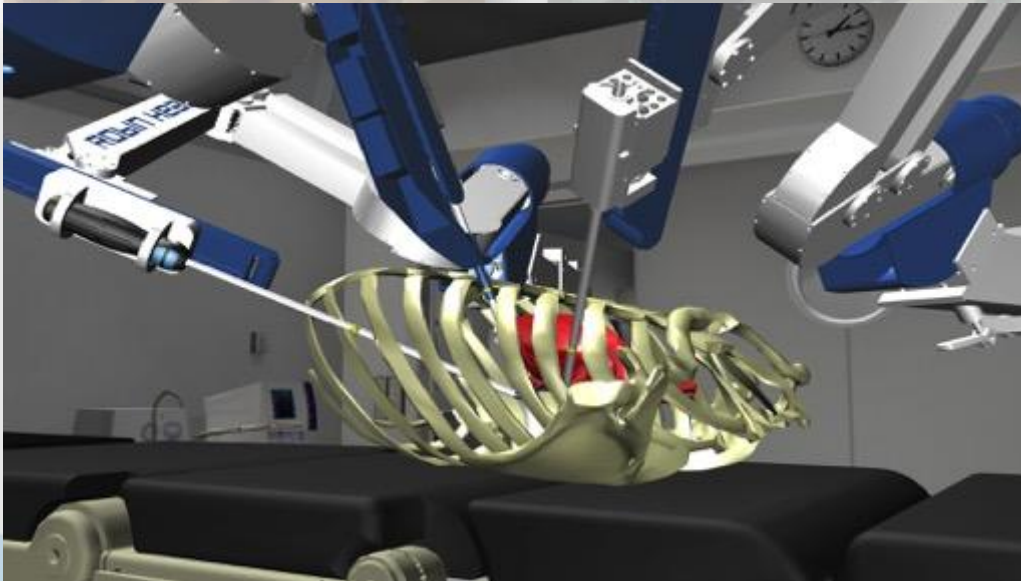
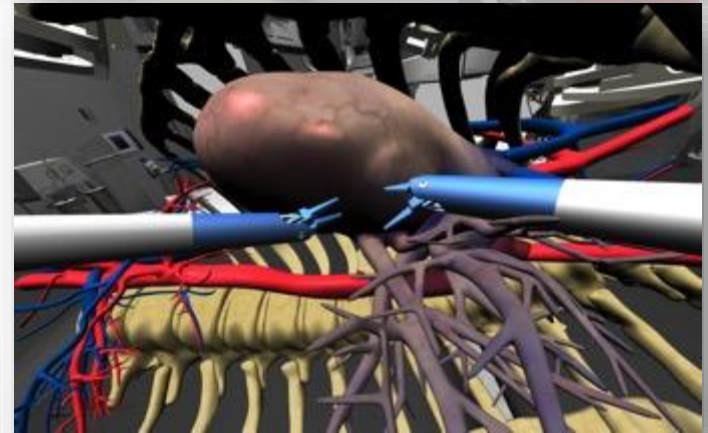
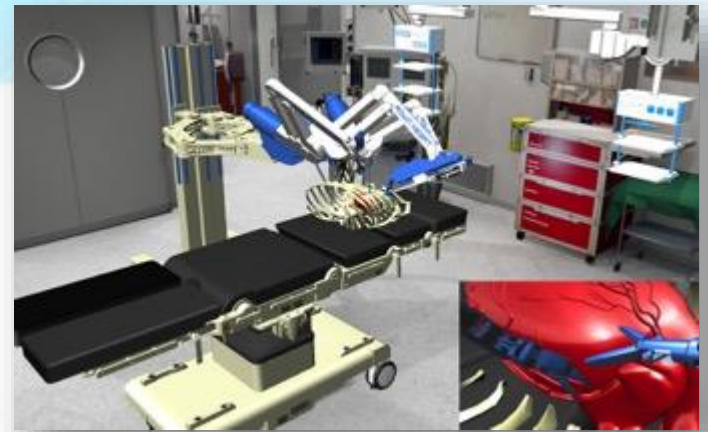
Surgery training process





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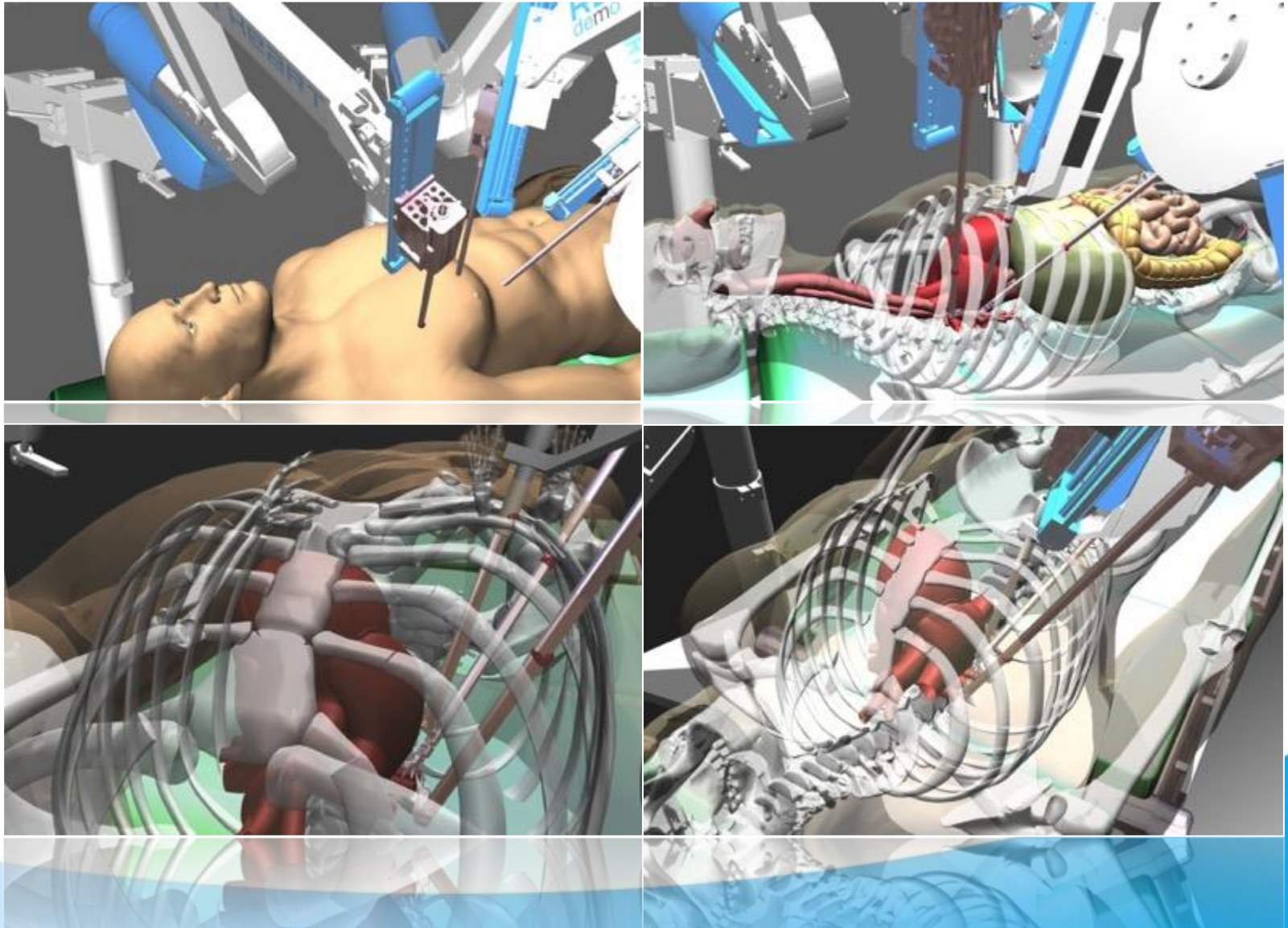
Physical and computer 3D modelling





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Mitral valve repair surgery planning





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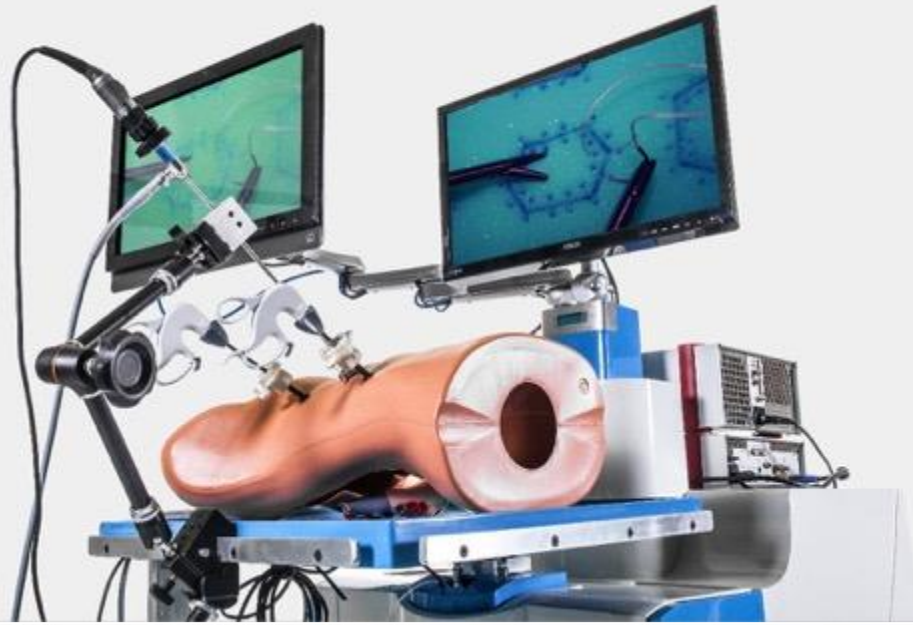
ENDOSCOPIC TRAINER





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LAPAROSCOPIC TRAINER





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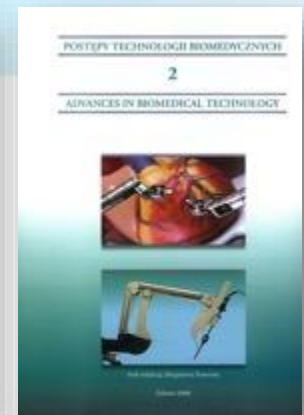
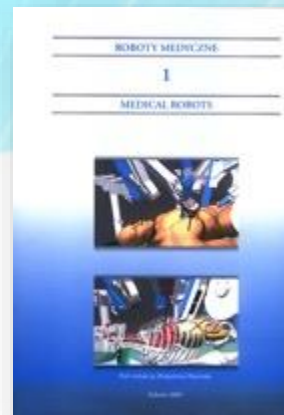
LAPAROSCOPIC TRAINER





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Edukacja





PROJECTS in 2018

Projekt pn.: **„Wprowadzenie do praktyki klinicznej oryginalnej polskiej wszczepialnej wirowej pompy wspomagania serca oraz systemu zdalnego monitorowania i nadzorowanej zdalnie rehabilitacji pacjentów na wspomaganiu serca”** finansowany przez Narodowe Centrum Badań i Rozwoju w ramach Strategicznego Programu Badań Naukowych i Prac Rozwojowych „Profilaktyka i Leczenie Chorób Cywilizacyjnych” – STRATEGMED, projekt konsorcyjny.

Projekt **„4 Dimensional Single Piece Miniaturized Blood Rotor (4Dblood ROT)** realizowany w ramach programu M-ERA.NET projekt konsorcyjny.

Projekt pn.: **„Nietrombogeniczne kompozyty metalowo-polimerowe z adoptowalną elastycznością w skali mikro i makro dla nowej generacji zastawek, dedykowanych dla systemu wspomagania serca – bioVALVE”** projekt realizowany w ramach programu M-ERA.NET projekt konsorcyjny.

Projekt badawczy pn.: **„Ocena hemodynamicznej istotności zwężeń tętnic wieńcowych metodą modelowania numerycznego w oparciu o wirtualny test wysiłkowy”** realizowany w ramach konkursu OPUS 8 Narodowego Centrum Nauki.

Projekt **„Zadajnik ruchu z realizacją siłowego sprzężenia zwrotnego”** realizowany w ramach konkursu LIDER 8 Narodowego Centrum Badań i Nauki

Projekt pn.: **„Opracowanie innowacyjnej, bioaktywnej protezy zastawki serca”** Program Badań Stosowanych NCBR, projekt konsorcyjny.

Projekt pn.: **„Mezenchymalne komórki zrębu oraz wzbogacony nimi skafold jako alternatywna forma terapii chorych z niewydolnością serca - PHOENIX”** finansowany przez Narodowe Centrum Badań i Rozwoju w ramach Strategicznego Programu Badań Naukowych i Prac Rozwojowych „Profilaktyka i Leczenie Chorób Cywilizacyjnych” – STRATEGMED, projekt konsorcyjny.

Projekt badawczy pn.: **„Interdyscyplinarne metody tworzenia i funkcjonalizacji materiałów biomimetycznych bazujące na odtkankowej macierzy zewnątrzkomórkowej”** realizowany w ramach konkursu OPUS 12 Narodowego Centrum Nauki.

Projekt pn.: **„Sieć Regionalnych Obserwatoriów Specjalistycznych w Procesie Przedsiębiorczego Odkrywania (SORIS w PPO)”** finansowany przez w ramach RPO WSL na lata 2014 – 2020, Działanie 1.3. Profesjonalizacja IOB projekt konsorcyjny.

Projekt pn.: **„ProVaHealth – Product Validation in Health”**, realizowany w ramach Programu Interreg Baltic Sea Region UE, projekt konsorcyjny.



Infrastructure

A three-storey building with a basement - an area of 2800 m²

Air conditioning (separate for tissue bank and TAH LAB)

Own gas heating

Power - vacuum pumps

Power supply - compressed air pumps

Electrical supply - 24 hours safe

Supply - in liquid nitrogen for a tissue bank

Computing cluster



IT INFRASTRUCTURE

At present, the Foundation has a server room equipped with modern computing servers and a professional disk array. The use of a strong server, equipped with a large amount of working memory and supported by GPU processors, allows for a significant increase in efficiency and quality of numerical analyzes.

The cluster uses the Ansys HPC calculation technology. This allows the use of a queuing system, and interactive applications such as Ansys (calculation of fluid flows).

The disk array is used, among others for storing data generated by programs working in the cluster, as well as a data warehouse (backup) of all employees of the FRK



FRK computing cluster - 144 computing cores on Xeon processors, a total of 1.4TB of RAM. Computing power ~ 33 TFLOPS including 8 TESLA cards by ~ 3 TFLOPS each.



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Niepubliczny Zakład Opieki Zdrowotnej
FRK HOMOGRAFT Sp. z o.o.



NZOZ FRK Homograft sp. z o.o. is a multi-specialized tissue bank established in 1998.
by the Foundation of Cardiac Surgery Development in Zabrze..

<https://homograft.frk.pl>



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F.R.K. "Intra-Cordis" Sp. z o.o.

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m. prof. Zbigniewa Religi



"Frk Intra Cordis" Sp. z o.o. carries out its activities in the medical equipment.

<http://www.frk.pl>



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We invite you to explore

We invite you to cooperation

www.frk.pl
office@frk.pl
nawrat@frk.pl



.... because really **great** things
we do out of curiosity
... things really **important**
from the need to help another man