NATIONAL INSTITUTE FOR RESEARCH & DEVELOPMENT IN ELECTRICAL ENGINEERING (INCDIE ICPE-CA)

EoI of ICPE-CA for HESR electromagnets and power supplies, RESR injection PM

DARMSTADT - HESR CM25 , 9. December 2008

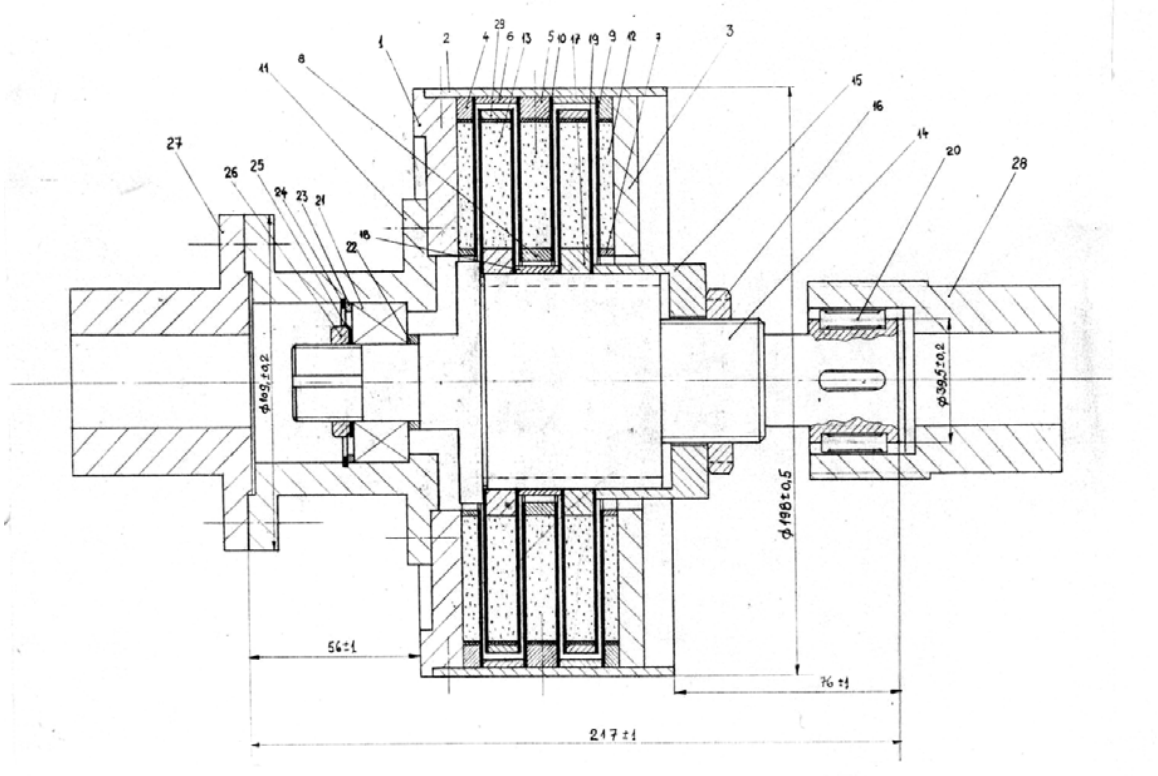
NATIONAL INSTITUTE FOR RESEARCH & DEVELOPMENT IN ELECTRICAL ENGINEERING (INCDIE ICPE-CA)

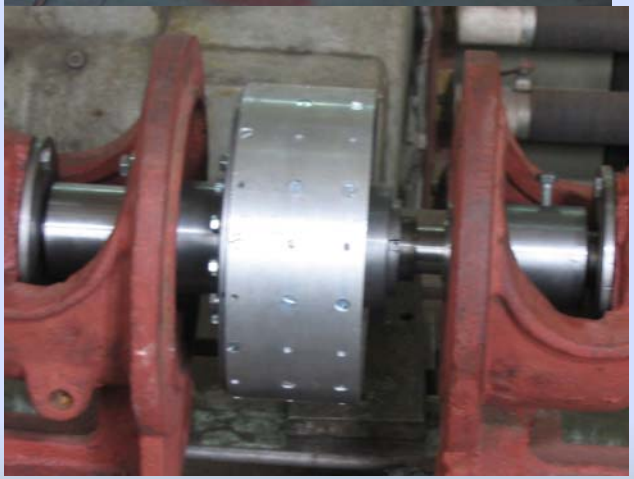
Research Area

- Advanced carbonic materials
- Multifunctional metallic materials
- Micro and Nanostructured materials
- Hydrogasodynamic
- Ceramic materials
- Polymeric materials
- New energy sources
- Electromechanical engineering
- Electro- technologies
- Characterization of electrotechnical materials
- Bio-electromagnetic Compatibility
- Thermal behavior of the solid products and materials by thermal analysis methods
- Biology

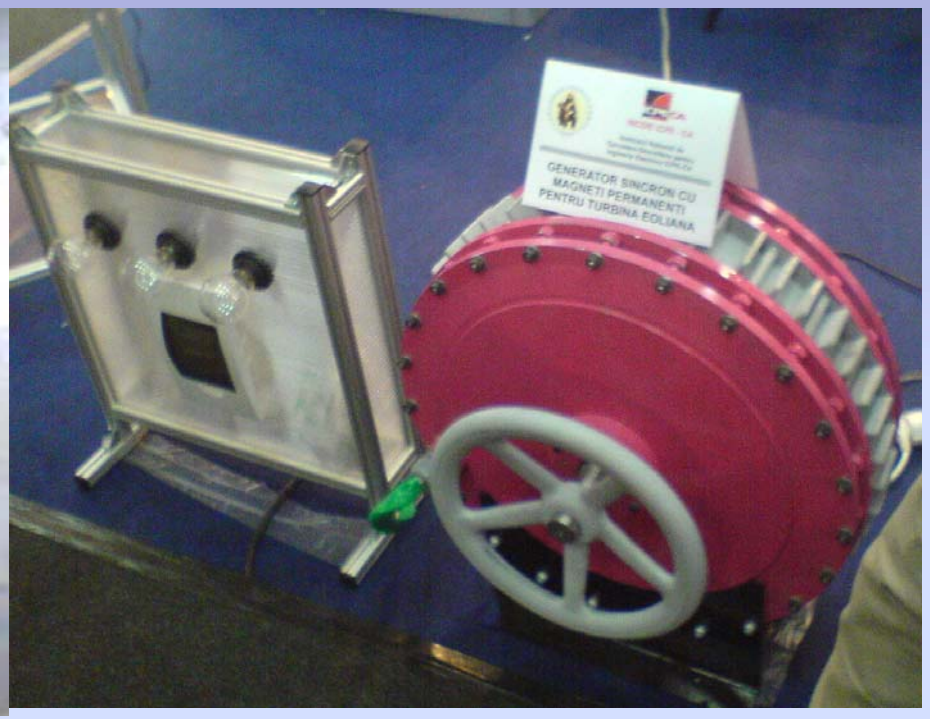
- **Axial magnetic couplings**

- Static Torque: 480 Nm;
- Dynamic torque 450 Nm at 1500 rot/min.





Sincron generator for wind turbine 5 kW



- cardanic balancing machine for railway equipment

- rotors balancing machine

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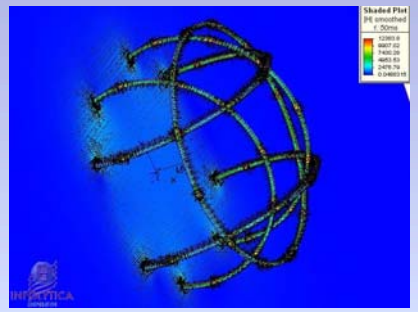
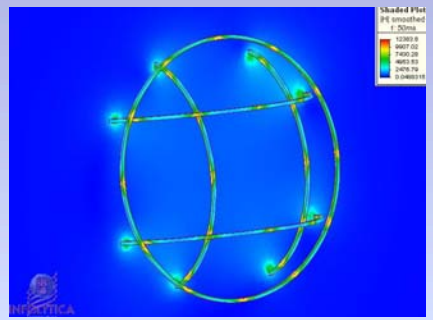
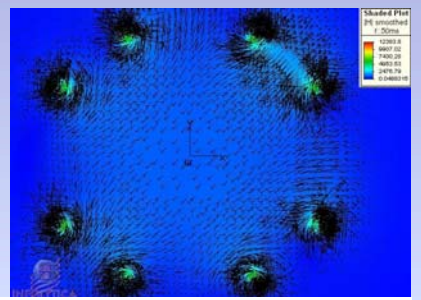
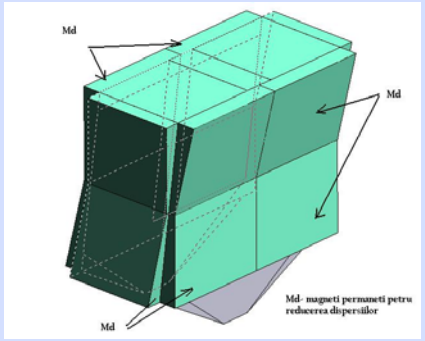
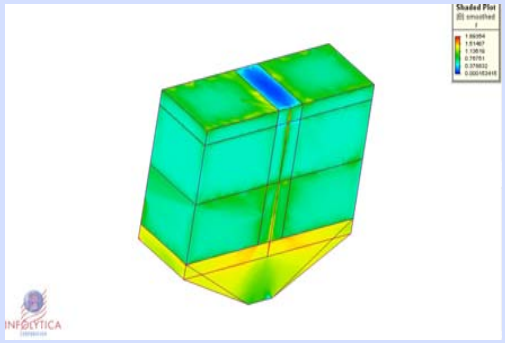
- 3d Helmholtz coils

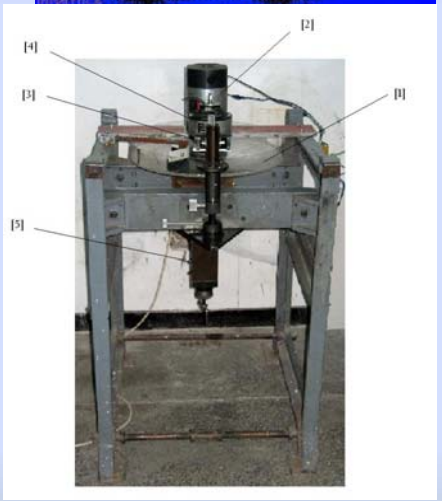




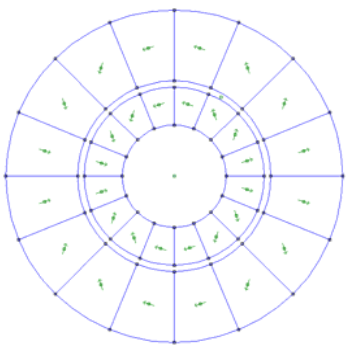


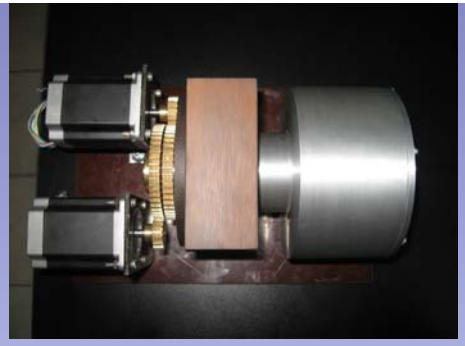


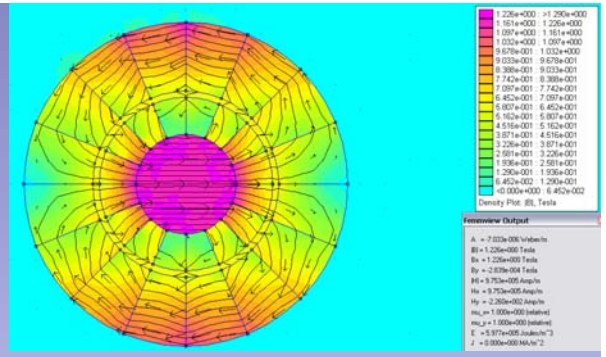




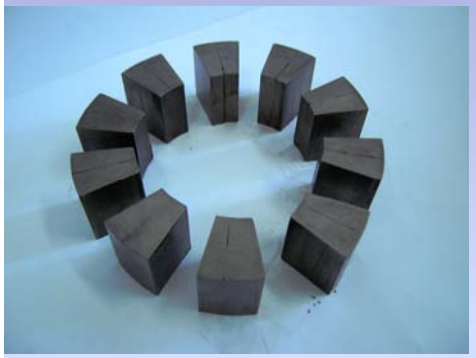
- Magnetic circuit for magnetorheological polishing

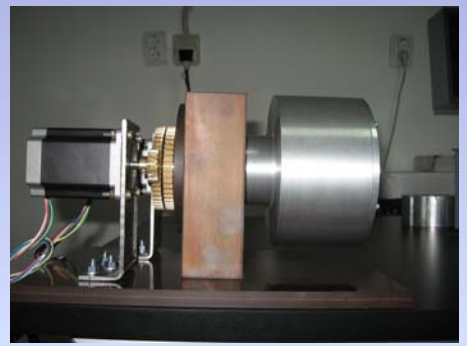


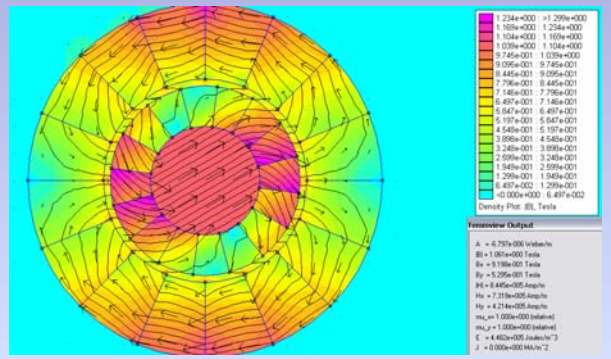


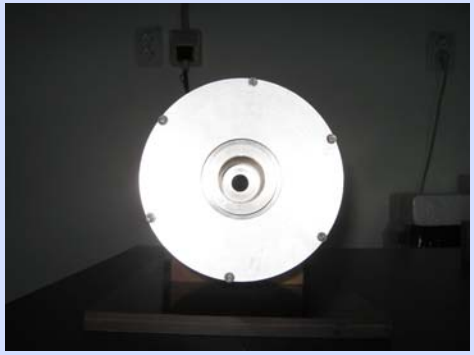


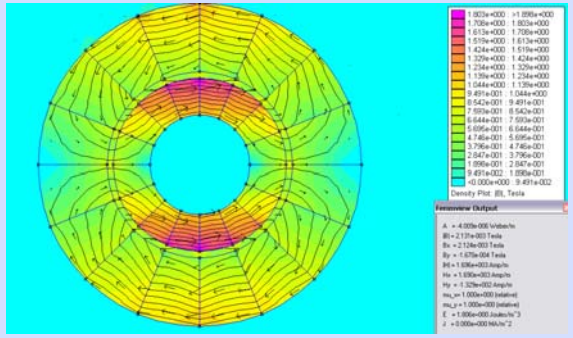
HALLBACH CYLLINDER

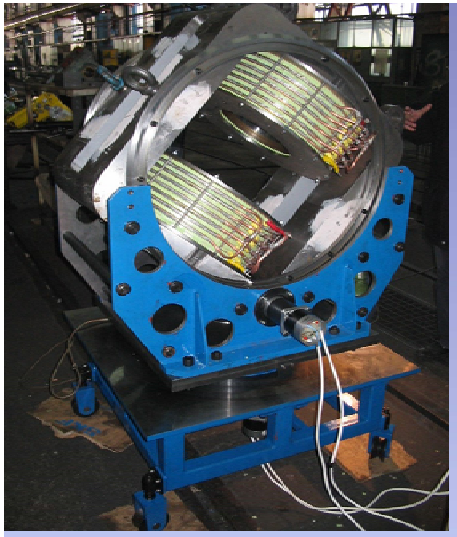


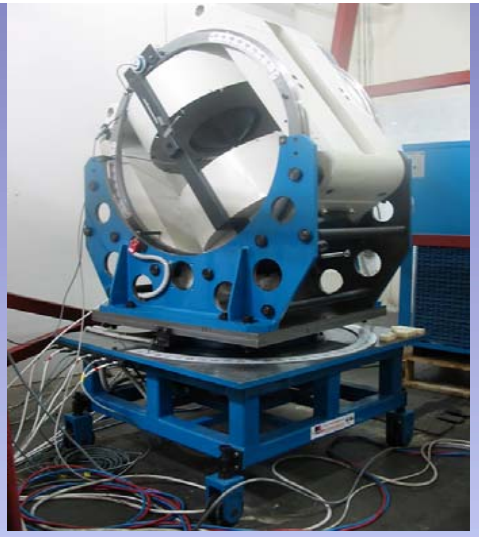












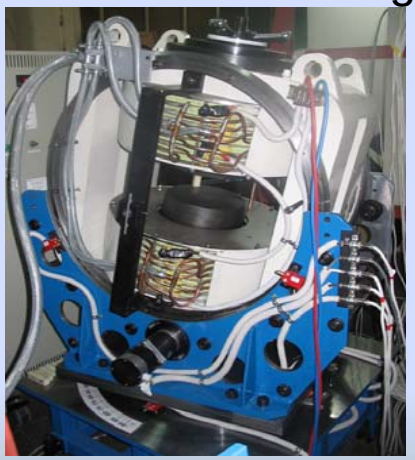

2,8 T Electromagnet for JINR DUBNA

Characteristics:

-250 mm poles diameters; Air gap variable up to 100 mm

-2,8 T for 20 mm air gap; turnable after two normal axes;

-total mass 1 800 Kg.

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Bucharest, 2008

OFFICIAL LETTER

To: Prof. Dr. Hans H.Gutbrod, FAIR Joint Core Team leader
c/o Dr. Dieter Krämer
GSI
Planckstr. 1
D – 64291 Darmstadt
Germany

Referring: Collaboration work

Dear Prof. Hans H.Gutbrod

Our institute is interested to collaborate with You regarding the realization of HESR facility and we send appending our *"Expression of Interest"*.

Looking forward to receiving your formal acceptance and working with You.

Your sincerely, Date:04.04.2008

Prof. Dr. Wilhelm Kappel
General Manager

Expression of Interest
in providing in-kind contributions
for the construction of the
Facility for Antiproton and Ion Research

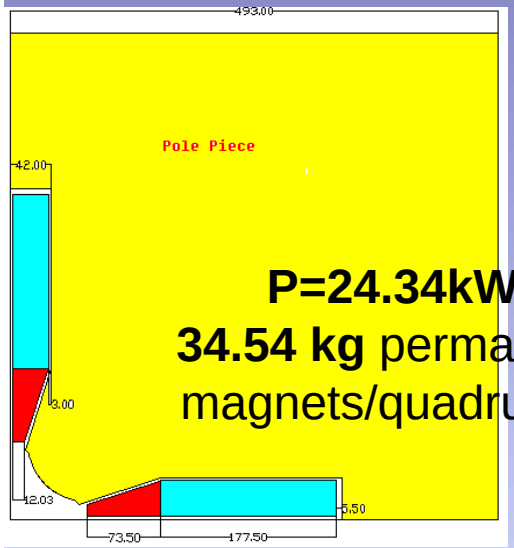
- Affiliation: National Institute for Research and Development in Electrical Engineering, INCDIE ICPE-Advanced Research;
- Address: no. 313, Splaiul Unirii, sector 3, 030138-Bucharest , www.icpe-ca.ro;
- Country: Romania;
- Name/Function: Prof. Dr. Wilhelm Kappel
- General Director.
- **Short description of work package/contribution/PSP no. proposed to take over:**
- We will take over for the realization of the HESR facility from the workpackage 2.11,
- **quadrupoles** and **sextupoles** and **power supplies (**here including power supplies for the steerer magnets).
- Also from WP 2.10 for the RESR we can build the **injection permanent magnet** for the 5o deflection.
- We will also contribute to the design of the given equipements, together with and inside the HESR-consortium,
- leaded by IKP Jülich. Value of in-kind contribution: **2MEuro**
- - Is it planned to produce the components in your own workshops? NO
- - Is it planned to procure items together with external industry? YES
- - Planned industrial partners DARMSTADT - HESR CM25 , 9. December 2008 : **UCM Resita** (quadrupoles and sextupoles), **ICPE-Actel S.A. Bucharest** (power supplies);
- - Funding agency (name) ANCS (National Authority for Scientific Research) is informed
- on this EoI YES;
- - Funding agency has approved procurement of items of EoI YES;
- - Funding agency has approved appropriate funding YES.
- signature
- 31.03.2008

		WBS 2.3 HEBT	2.4 Super FRS	2.5 CR	2.6 NESR	2.7 p-linac	2.8 SIS100	2.9 pbar-target	2.10 RESR	2.11 HESR	2.12 SIS300	2.13 ER	2.14 Com. Sys.	3.0 Civ. Constr.
TS-2	Magnets	Bending	Bending	Bending	Bending	Bending	Bending	Bending	Bending	Bending	Bending	Bending		
		Quad	Quad	Quad	Quad	Quad	Quad	Quad	Quad	Quad	Quad	Quad		
			Sextupoles	Sextupoles	Sextupoles		Sextupoles			Sextupoles	Sextupoles	Sextupoles		
		Other	Other	Other	Other		Other		Other	Other	Other	Other		
TS-3	Power Converter	Power Conv.	Power Conv.	Power Conv.	Power Conv.	Power Conv.	Power Conv.	Power Conv.	Power Conv.	Power Conv.	Power Conv.	Power Conv.		
TS-4	RF-System			RF	RF	RF	RF		RF	RF	RF	RF		
TS-5	Inj/Extraction			Inj/Extr.	Inj/Extr.		Inj/Extr.		Inj/Extr.	Inj/Extr.	Inj/Extr.	Inj/Extr.		
TS-6	Diagnostics	Diagnostics	Diagnostics	Diagnostics	Diagnostics	Diagnostics	Diagnostics	Diagnostics	Diagnostics	Diagnostics	Diagnostics	Diagnostics		
TS-7	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum	Vacuum		
TS-8	Part. Sources					EZR						Linac		
TS-9	ECOOL				ECOOL					ECOOL				
TS-10	St. Cooling			St. Cool					St. Cool	St. Cool				
TS-11	Special inst.	Special	Special			Special	Special	Special						
TS-12	Local Cryo	Local Cryo	Local Cryo	Local Cryo			Local Cryo				Local Cryo		Refrigerator	
TS-14	Common System												Controls / Interfaces	
													Quench Detection	
													Magnet QC	
													Alignment	
													El. Power	

Color Code:

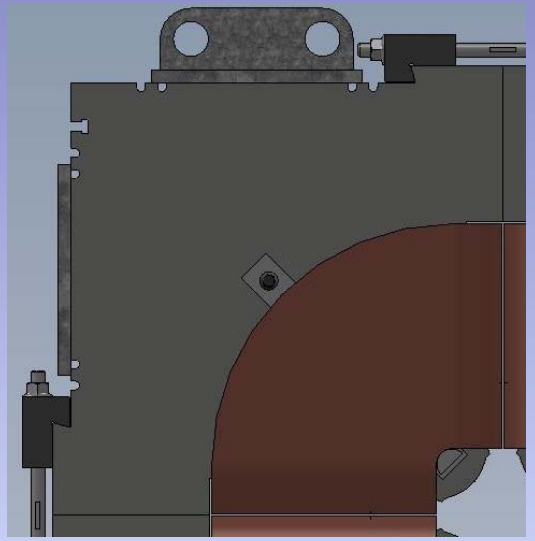
- This EoI covers this Work Package
- This EoI covers > 50 % of this Work Package
- This EoI covers < 50 %, > 10 % of this Work P.
- This EoI covers < 10 % of this Work Package
- This EoI is related to this Work Package

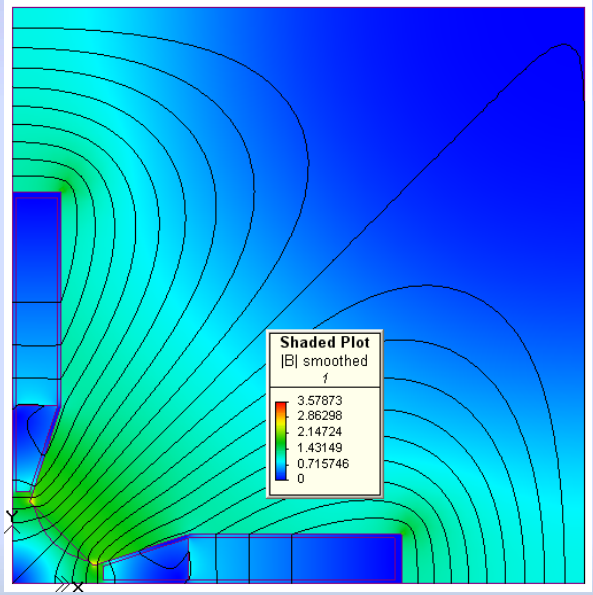
Quadrupole

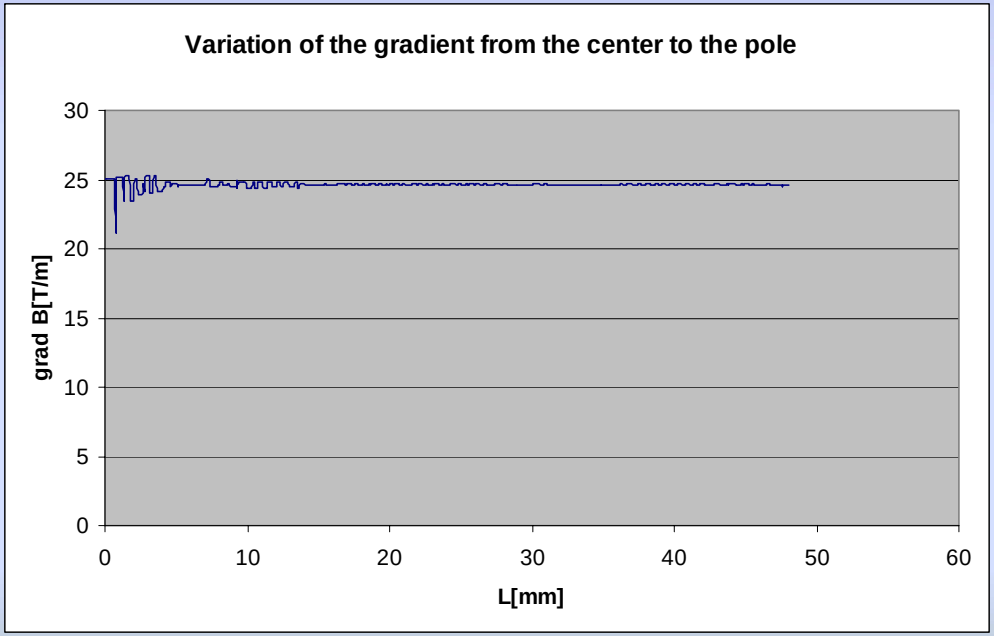


P=24.34kW
34.54 kg permanent magnets/quadrupole

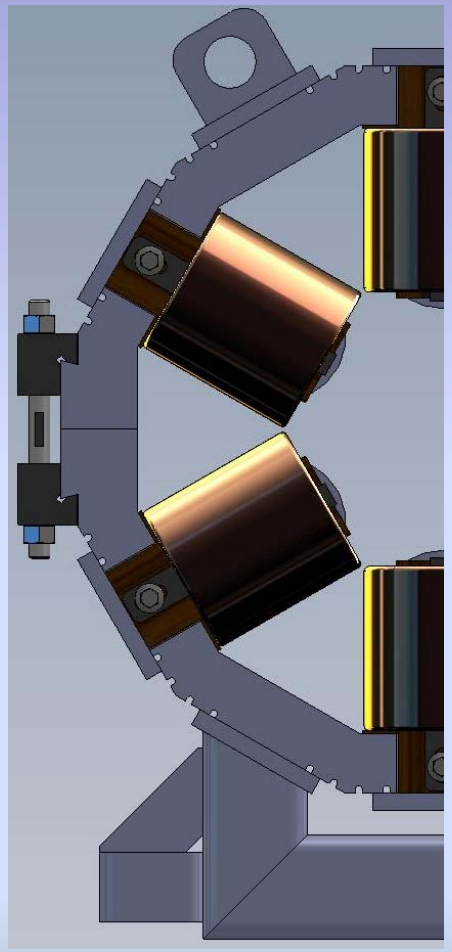
Aperture D=100mm
Max gradient = 25 T/m
Effective length = 0.6 m
Good field region r>40mm (aim)
Iron size: 0.9m x 0.9m
Iron mass 3 t
Copper mass 0.6 t
84 magnets

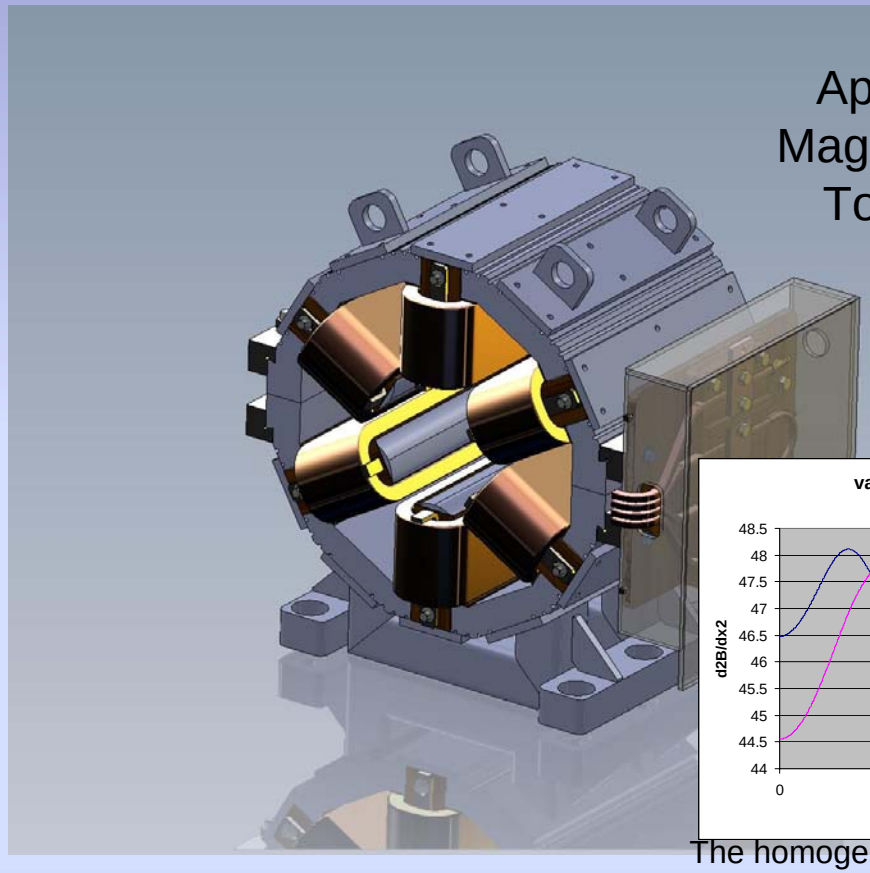




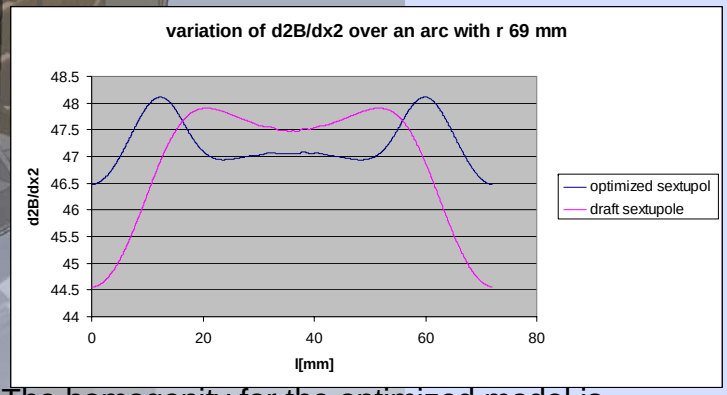


Sextupole





DC current: 290 A
Power: 1,8 kW
Aperture: R = 70 mm
Magnetic length: 290 mm
Total mass: ~270 kg

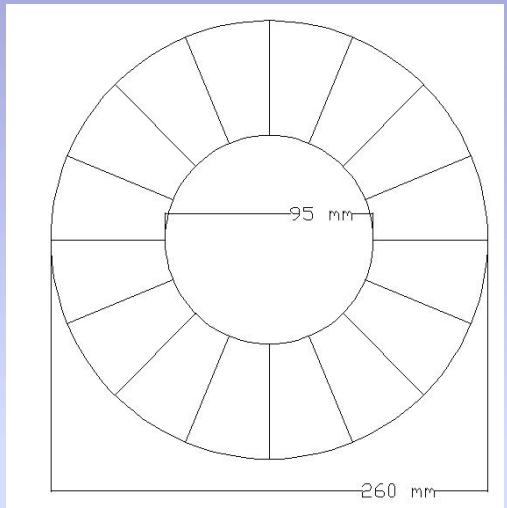


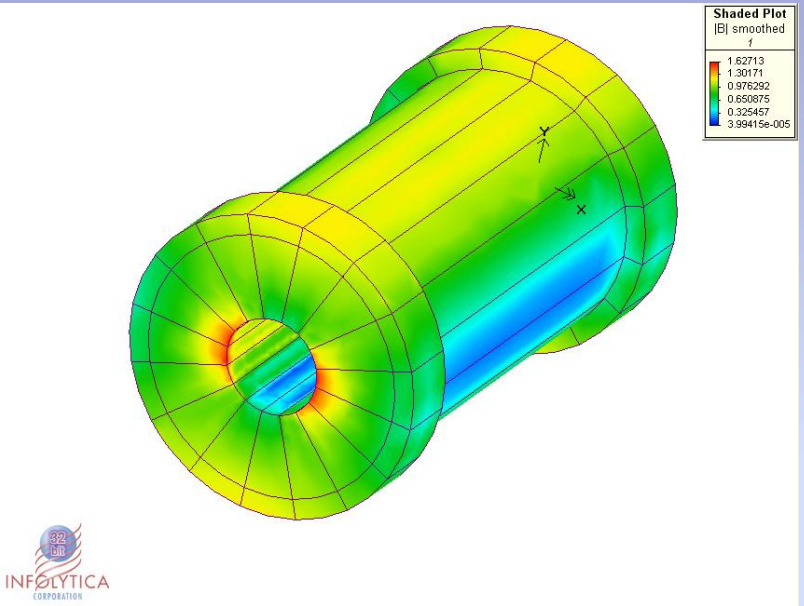
The homogenity for the optimized model is 2.45E-04 for over an arc whit 39 mm and for the draft model the homogenity is 2.08E-03

Permanent injection magnet for HESR

Number	2	RESR and SIS18 injection
Aperture	100 mm	
Field integral	1.11338 Tm	Antiprotons of 3 GeV injection energy
Deflection angle	5°	Together with magnetic septum 15°
effective length	0.9 m	estimate
Effective field	1.24 T	estimate

Permanent injection magnet for HESR





d_{out} (mm)	B (T)	Length (m)	V (mm^3)	Mass (kg)	No of magnets
280	1.24	0.92	5E7	375.01	2
260	1.15	0.99	4.53E7	339.92	2

Cooperation and Connections with industry

The factory is the result of a long time experience in the field of machine building, as concerns the power equipment, metallurgy Diesel engines as well as the electrical machines. It is the largest company in the West side of Romania

Number of employees- Presently, there are 3,492 employees

236 years

UCM Resita
FONDATĂ 1771
membră a inet grup

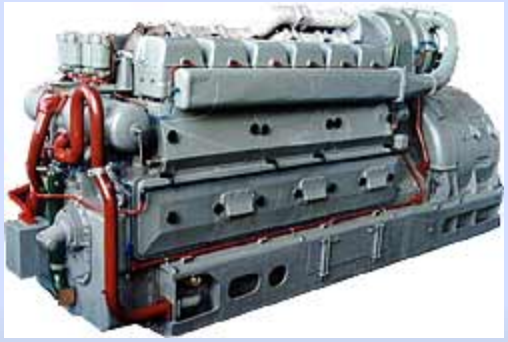
Products

Hydro power equipment

- Hydraulic turbines of low, medium and high output,
- Electric generators and excitation systems,
- Hydropower unit of low output and micro-hydro power units.

Diesel engines

- High, medium and low speed diesel engines
- Types of diesel engine from 1500 Hp up to 29270 HP



Production Capacity

•Supply of research and design services, testing and technical assistance, putting into operation and maintenance.

Welding

236 years

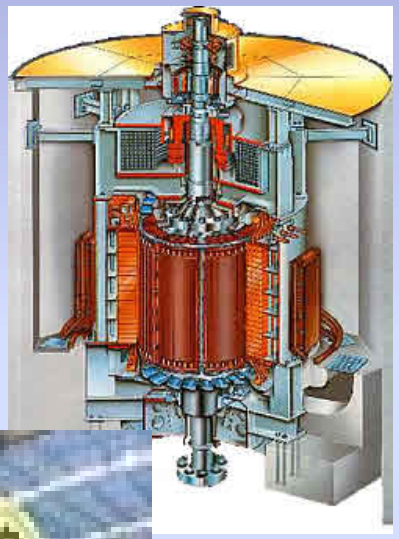
UCM Resita
FONDATĂ 1771
membră a inet grup

Manufacture of hydropower units, electric and heat machines, cast and welded assemblies, spare parts and components

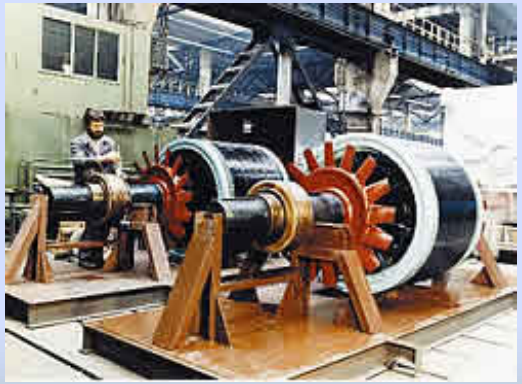
no 1 236 years

UCM Resita
FONDATĂ 1771
membră a inet grup

- Design for electric machines and automation systems



- Electric machine production



no 1 236 years

UCM Resita
FONDATĂ 1771
membră a inet grup

Presently, U.C.M. Resita designs and manufactures:
Horizontal and vertical induction motors with short-circuited/wound rotor, in the range of: 500-10000 kW; speed 300-3000 rpm.
Horizontal and vertical synchronous motors and generators, in the range of: 500-12500 kW; speed 100-1500 rpm.
DC motors and generators, in the range of: 500-6000 kW; speed 40-1000 rpm.

S.C. ICPE ACTEL S.A.

RESEARCH INSTITUTE
FOR ELECTRICAL ENGINEERING

Electric Drives
Power Electronics

Bucharest

History

- ***1950*** **- ICPE ACTEL S.A. represents an Electric Drives Department in ICET – Research Institute for Electrical Engineering**
- ***1955*** **- ICPE ACTEL S.A. represents the Electric Drives & High Power Automation Laboratory of ICPE (former ICET)**
- ***1992*** **- ICPE ACTEL S.A. comes off the Institute ICPE and becomes a Joint-stock Company; the main activity is the production of power electronics equipment**
- ***1999*** **– ICPE ACTEL S.A. becomes a company whose capital is entirely privatized**
- ***Today ICPE ACTEL S.A. is a company that enjoys an excellent reputation in power electronics equipment field.***

ICPE ACTEL S.A.

evolution identifies itself not only with the electric drives development in Romania, but also in the world, because some of them are really premiers.

Thyristors electric drives for the first electromotive in Romania
First electric drives for active cathodic protection ships in Romania
First electric drives for the first electrical propulsion ship in Romania
Electric drives with frequency converters for the trains heating, export Germany and Poland
Static excitation equipment for hydro power plants of Bistrita Valley in Romania
First electric drives for terrestrial and offshore drilling in Romania, some of the them as premiers in the world

GLORIA offshore drilling platform, 1976

PHOENIX Ship - Thyristor electric drives for electrical propulsion motors of 850 kW, 1976

Certification

- ✓ Competence and capacity for design and production of high performance and quality power electronics equipment
- ✓ 55 years experience which enable to perform very customized solutions
- ✓ Certified quality of system and products:
  - for the system, in compliance with ISO 9001, ISO 14001 and OHSAS 18001 standards (certificate SRAC and IQNET);
  - admitted supplier for domains with special requirements as energy, petrochemistry, railway transport, etc. (certificates SC Electrica, SC Hidroelectrica, SC Termoelectrica in Romania)
- ✓ Major business partners:
- SIEMENS SRL - A&D Division - Romania
- SCHNEIDER ELECTRIC ROMANIA SRL
- ✓ Licenses and certificates for products performance and business excellence
- ✓ Suitable technology for products performance
- ✓ and quality

Departments and Facilities

Departments

- ✓ Management
- ✓ Research
- ✓ Design
- ✓ Accountant ship
- ✓ Executive
- ✓ Production
- ✓ Tests
- ✓ Warehouses

Facilities

Lock smithery
Foundry
Milling
Sheet cutting
Polishing
Printed circuit board welding
Winding
Impregnation

Products and services

- **Digital Universal Rectifiers – RUN**
- **DC Motors Electric Drives – EAMC**
- **Asynchronous Motors Electric Drives – EMAS**
- **Static Excitation Equipment – SRATN**
- **Drilling Electric Drives – SDACRN**
- **Products and Technical Solutions on demand**

Milestones for 2009

1. Sextupole:- EM- prototype manufacturing;
   - Power supply-design &prototype (need: control unit);
2. Quadrupole:- EM&power supply-design;
3. Injection magnet:- experimental model.

Thank you for your attention!

NATIONAL INSTITUTE FOR RESEARCH & DEVELOPMENT IN ELECTRICAL ENGINEERING (INCDIE ICPE-CA)

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