

# EUREKA PROJECT E!1806- ROTOR 1

## 1. General description

<b>Project</b>	E! 1806- ROTOR 1	<b>Status</b>	Finished- 22-Mar-2004
<b>Title</b>	<b>Powder Metallurgy High-Accuracy Rotor Die-Forming Technology And Equipment.</b>		
<b>Class</b>	Project	<b>Technological area</b>	New Materials
<b>Start date</b>	01-Oct-1997	<b>End date</b>	01-Apr-2000
<b>Duration</b>	30months	<b>Total cost</b>	0.64Meuro
<b>Partner sought</b>	No		
<b>Summary</b>	The Aim Of The Project Is To Develop Multi-Operational Rotor Die-Forming Technology And Suitable Equipment, Combining Compacting, Sintering, Coining, Retreating And Control For Production Of Precision Parts From Powder Materials.		

## Budget and duration

Phase	Budget(Meuro)	Duration (Months)
Feasibility phase	0.05	3
Definition phase	0.08	5
Implementation phase	0.39	16
Full Exploitation	0.12	6
<b>Total</b>	<b>0.64</b>	<b>30</b>

## Member contribution

Member	Contribution	Position	Since
<b>Poland</b>	<b>68.14%</b>	<b>Notified Finished</b>	<b>22-Mar-2004</b>
Ukraine	14.56%	Notified Finished	22-Mar-2004
Sweden	11.00%	Notified Finished	22-Mar-2004
Czech Republic	6.30%	Notified Finished	22-Mar-2004

## Participants

Company	Country	Type	Role
<b>Inop - Metal Forming Institute</b>	<b>Poland</b>	<b>Research Institute</b>	<b>Main</b>
Form, Spol S.R.O.	Czech Republic	SME	Partner
East Ukrainian State University/Metal Forming Department	Ukraine	University	Partner
Hoganas Ab	Sweden	Large company	Partner

## 2. Project outline

### Project description

The industry has severe demands in the development of automatic production technologies and suitable equipment based on powder metallurgy (PM) to achieve mass production of complex-shaped structural parts at relatively low cost.

The complexity and diversity of types of PM technological operations involving compacting, sintering, repressing, coining, retreating, part dimensions control and packing, gives rise to the necessity to apply new sorts of powders and design and develop special complexes based on the principle of automatic rotor machines using computer programmed control of the technological process.

New, advanced high accuracy technology to compact the powder composites without plasticizers can change the technology used at present. It will improve dimensional accuracy, increase parts density, simplify sintering technology and finally raise productivity and competitiveness on the market.

The project envisages the development of advanced automatic compacting technologies, increasing the stability of technological and dimensional parameters, as well as coining, repressing, sintering, heat treatment technologies and technical control procedures for production from various powder materials. On the base of rotor machines, a special automatic rotor complex will be developed and manufactured to achieve the above-mentioned technological processes with the capacity of 180...400 parts per minute.

So that this project can be achieved more efficiently, an international cooperation in R&D is necessary to apply new sorts of powders and develop and optimize the technology and equipment, as well as the participation of the industry in manufacturing the equipment and its application for a great series production of parts of the 'bushing' type.

The creation of a new type of technology and equipment on rotor principles will enable production process characteristics to be improved and promote its application in European industry.

### Technological development envisaged

Multifunctional technologies of compacting, sintering and powder controlling, combined in one continuous cycle significantly raise productivity, improve parts accuracy and quality and decrease their cost.

Combining different technological operations in one production cycle reduces energy consumption and as a result, the power-intensity of the process. In particular, the development of rotor sintering technology in a protective atmosphere will enable energy consumption of sintering assemblies to be sharply decreased at the expense of localised heating of powder compacts.

The optimization of composite materials compacting technologies without plasticizers will enable products to be upgraded and the whole technological process and rotor

principle behind its development to be stabilised. Removing the plasticizing agents from powder mixtures and the application of rotor sintering technologies diminishes gas evolution and outburst and, ultimately improves the ecological characteristics of the process.

## Markets application and exploitation

The automotive, electronic and other branches of industry demand new, highly productive advanced technologies and equipment to efficiently mass manufacture complex-shaped high accuracy parts.

Automatic rotor die-forming technologies of producing the precision parts from powder composites without plasticizers enable:

- all operations in one production cycle to be joined and, as a result, to reduce manufacturing working hours;
- a two to fivefold productivity increase in the process to be achieved;
- machining operations to be removed from the technological cycle;
- savings in metal consumption;
- ecological purity (culture) of production to be improved.

The objective of the project is to develop multi-operational rotor die-forming technology and suitable equipment for large batch production of precision high strength parts from powder materials. This technology joins the technological operations of compacting, sintering, coining, retreating and technical controlling in one production cycle, that enables productivity and competitiveness on the market to be raised and ensures a full multi-functional product inspection in the automatic cycle.

The results will be implemented immediately in the industrial conditions, for instance in industrial companies in Polmo, Lomianki (POLAND), where the elements of new powder technology will be used.

Rotor die-forming lines may also be installed in the Czech, Russian and Polish powder metallurgy industries.

## Project codes

### BSI

AI	quality control
CKC.C	density
JB	energy consumption
PP/PX	production equipment
TEH	composite materials
UVI	powder metallurgy

### NACE

2840	Forging, pressing, stamping and roll forming of metal; powder metallurgy
292	Manufacture of other general purpose machinery
2924	Manufacture of other general purpose machinery not elsewhere classified
295	Manufacture of other special purpose machinery
7310	Research and experimental development on natural sciences and engineering

### 3. Main participant

**Company** **Inop - Metal Forming Institute**  
??Jana Pawla 11, 14  
61-139 Poznan  
Poland

Tel +48 61 657 05 55  
Fax +48 61 657 07 21

[www.inop.poznan.pl](http://www.inop.poznan.pl)

**Contact** **Prof. Volf Leszczynski**  
Scientific Consultant

Tel +48 61 657 0555 ex. 329  
Fax

[weinert@inop.poznan.pl](mailto:weinert@inop.poznan.pl)

**Organisation type** Research Institute  
**Participant role** Main

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### Contribution to project

The development of new powder technologies of compacting high density parts without plasticizers. Investigations into the structure and properties of the powder parts.

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### Expertise

Has great experience of research and industrial powder metallurgy technologies as well as in the design of special equipment (presses and heating machinery). The Institute has the right research equipment to study the structure and properties of powder materials as well as the technological parameters of the process. INOP has close relations with Polish producers and users of powder parts on the basis of the long term cooperation in the form of projects and services which it carries out for them.

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### 4. Partner

**Company** **Form, Spol S.R.O.**  
??Porucika Hosi, 512/2a  
747 11 Kozmice  
Czech Republic

Tel +420 595 032 419  
Fax +420 595 043 627

[www.formcz.cz](http://www.formcz.cz)

**Contact** **Ing. C.Sc. Bohumil Jedovnický**  
Head Of Laboratory

Tel  
Fax

**Organisation type** SME  
**Participant role** Partner

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## Contribution to project

Power metallurgy parts research and development on generating the technological and material data to design the rotor production complex.

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## Expertise

As far as the area of forming machines construction is concerned, FORM has directed its attention at the area of sheet working by blanking, punching and notching, including the specific mechanization and automation facilities. In the area of forming technology, its services are aimed at both hot and cold sheet metal and bulk forming. The Company's also has very important activities in the Q (Quality) centre.

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## 4. Partner

**Company** **East Ukrainian State University/Metal Forming Department**  
??Block Molodyozhny, 20a  
348 034 Lugansk  
Ukraine

Tel +380 642 466 788  
Fax +380 642 461 364

**Contact** **Prof. Aleksander Anatolyevitch Stoyanov**  
Assistant Professor, Department Manager

Tel  
Fax

oomd@vugu.lugansk.ua

**Organisation type** University  
**Participant role** Partner

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## Contribution to project

A study into the complex rotor technological operations involving pressing, sintering and repressing the parts from alloyed powders to define the parameters of complex rotor machines.

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## Expertise

The University has longterm experience in developing powder metallurgy technologies for the manufacture of high density precision parts from ferrous and non-ferrous metals. The Metal Forming Department of the University has developed special procedures and devices for the investigation of the structure and properties of powder materials in the process of compacting, sintering and repressing. This experience is reflected in about 20 publications on the subject being investigated in international scientific journals over the last ten years.

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## 4. Partner

**Company**                      **Hoganas Ab**  
                                      ??(Not Available),  
                                      263 83 Hoganas  
                                      Sweden

                                      Tel +46 42 33 81 82  
                                      Fax +46 42 33 81 88

**Contact**                      **(Not Available)**

                                      Tel  
                                      Fax

**Organisation type**            Large company  
**Participant role**              Partner

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## Contribution to project

Powder metallurgy materials development for rotor technology applications. Examinations of different powders for the technology applications without plasticizers.

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## Expertise

Swedish company producing iron and steel powders with a turnover of about 2000 million SEK. The production units in SWEDEN consist primarily of two plants for the production of sponge iron and a plant for water atomised powders. Final reduction is carried out in a number of annealing furnaces. A new plant for the manufacture of alloyed powders and powder mixes has been on stream since the beginning of 1990. Powder mixing is also a major activity. HOGANAS AB is already involved in two running BRITE-EURAM projects and one COST project. Their R & D budget is about 4% of turnover.