

COST 526 - 'Automatic Process Optimization in Materials Technology' – (APOMAT)  
**Final Report – 31 July 2005**  
**Summary sheet**

Project Code	CZ 5
Title	Optimization of Casting of Corundobaddeleyt Material EUCOR
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**Funding Situation** (for the whole project)

Amount of money received specifically for COST	62 kEuros
Other resources partially used for the project	0 kEuros

**International Collaboration** (mention group and type of work done in collaboration during the whole project)

The internal collaboration during project solution was accomplished by optimization strategies consultations with other COST participants. Great deal of them was realized during COST 526 WG Meetings. One of the most inspirational was during the 4<sup>th</sup> WG Meeting in Krakow especially with the French participants.

**Industry participation** (mention name of companies and work done in collaboration during the whole project)

EUTIT Ltd, Cast Basalt and EUCOR, Stara Voda, Czech Republic - experimental measurements, verification of a new technology

**Meetings, visits, exchange of scientists, short term scientific missions**

(mention main events during the whole project)

Location, date

COST 526 1 <sup>st</sup> Joint Working Group Meeting	St.-Dié des Vosges, France, 21-22 May 2002
COST 526 2 <sup>nd</sup> Joint Working Group Meeting	Budapest, Hungary, 28-29 November 2002
COST 526 3 <sup>rd</sup> Joint Working Group Meeting	Brussels, Belgium, 26-27 May 2003
COST 526 4 <sup>th</sup> Joint Working Group Meeting	Krakow, Poland, 27-28 November 2003
COST 526 5 <sup>th</sup> Joint Working Group Meeting	Angers, France, 13-14 May 2004
COST 526 6 <sup>th</sup> Joint Working Group Meeting	Brno, Czech Republic, 18-19 November 2004
First Invited COST 526 Conference APOMAT	Morschach, Switzerland, 30-31 May 2005

## **Main Outcome of the project** (mention only the major points)

The main objective of the project was to optimize the casting technology of the ceramic material EUCOR aimed especially on high size products. During the solution following main outcomes were achieved:

- the simulation model build up with the appropriate process arrangement
- the necessary material properties identification (heat conductivity, heat capacity etc.) for wide temperature range of the process, including high temperatures
- process simulation verification by temperature course measurement at selected points using special high-temperature thermocouples, measurement arrangement design and approach to data processing
- optimization of the original casting technology using modified gradient method focusing on required directional solidification preventing the product "freezing" from molten material refilling
- evaluation of possible technological precautions including riser and product insulation, methods of reheating, riser shape and riser dimensions design
- according to the technology aspects and customer demands as the most appropriate there was chosen the approach using riser shape and dimensions optimization
- optimized riser design and casting technology arrangement leading to the riser with elliptical profile with the verification in foundry plant

## **Publications, related to this project**

Published

- [1] Heger J., Stetina J., Kavicka F., Sekanina B. and Ramik P.: Pilot calculation of the temperature field of the ceramic material EUCOR. In Proceedings of the 7th International conference Heat transfer VII, Halkidiki, Greece, April 2002, p.223-232
- [2] Heger J., Kavicka F., Sekanina B. and Stetina J.: Investigation of the temperature field of the ceramic material EUCOR. In Proceedings of the 13<sup>th</sup> international scientific conference "Application of the experimental and numerical methods in Fluid mechanics", Oravsky biely potok, Slovakia, April 2002, p.18-23
- [3] Heger J., Kavicka F., Sekanina B., Stetina J. and Ramik P.: Calculation of the temperature field of the ceramic material EUCOR. In Proceedings of the 42nd International foundry conference, Portoroz, Slovenia, May 2002, p.6-17
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- [5] Molinek J., Vaclavik L., Kavicka F., Sekanina B. and Stetina J.: The experimental investigation of the temperature field of the ceramic material EUCOR. In Proceedings of the 21st International conference of the departments of fluid mechanics and thermomechanics, Tatry, Slovakia, June 2002, p.86-92
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Submitted for publication

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In preparation

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Will you continue the actual cooperation with your partners after the end of the action?

Yes

No

Would you participate in a possible "spin-off" action continuing the present one?

Yes

No

Will you continue your present work/collaboration with another European action?

Yes

No