

Green Foundry LIFE

**Inorganic binder system to minimize emissions, improve air quality,
purify and reuse of contaminated foundry sand**

LIFE17 ENV/FI/173

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Green Foundry LIFE

(LIFE 17 ENV/FI/000173)



- The main objective of the Green Foundry project was to **decrease the environmental impacts** of the European foundry industry **by introducing new inorganic binder systems in ferrous foundries**.
- Inorganic binders would have a significant **positive environmental and economic impacts** leading to increased competitiveness of the industry.
- Currently there are about 4,000 foundries in EU and about 1,700 of them are ferrous foundries.
- Roughly 1% of all foundries (ca. 40) are using new inorganic binder system and most of them are aluminium foundries.
- We are aware of 5-6 ferrous foundries using new inorganic binders.



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Coordinating Beneficiary:

Meehanite Technology Ltd, Finland



Valu mehaanika

Valumehaanika AS,
Estonia



Fonderie di Assisi
Spa, Italy

Associated beneficiaries:



Foundryteam Ltd,
Finland



Centre Technique
des Industries de La
Fonderie, France



Fundiciones ARABA SL, Spain



AGH University of Science
and Technology, Faculty of
Foundry Engineering, Poland



Department of
Engineering,
University of Perugia,
Italy



Viljavuuspalvelu
Eurofins
Viljavuuspalvelu Oy
Ltd, Finland



Finnish Foundry
Industries
Association of Finnish
Foundry Industry, Finland



IFAM
Fraunhofer Institute for
Manufacturing
Technology and
Advanced Materials,
Germany



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Green Foundry project objectives:

- 1. Decrease hazardous air emissions from the casting process by 80-90%** – the project aims to replace the currently used organic binders with new inorganic binders
- 2. Improve the indoor air quality by 70-80% for a safer work environment** – organic binders emit hazardous casting fumes and fine particles like binder aerosols
- 3. Improve the use of natural resources** – using inorganic binders would allow foundries to use the foundry sand more efficiently. Project aims to **demonstrate different methods for cleaning and re-using the surplus foundry sand.**



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1/7/2018-30/6/2022

- 4. Provide encouraging examples for the industry on an EU level by implementing the new inorganic sand molding systems in iron and steel pilot foundries** in Italy, Finland and Estonia.
- 5. Produce the necessary practical tools for the industry** with required information on **the implementation of inorganic sand molding systems** in ferrous foundries.
- 6. Disseminate the results on EU level** for immediate implementation of the best practices
- 7. Provide Smitheries and Foundries BREF with BAT publication** including technical solutions of inorganic binder systems in ferrous foundries.



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Main actions:

1. **Small scale tests casts** were made in Finland and Poland to measure total emissions of the casting process. The measurements were made for ferrous castings using both organic and inorganic binder molds.
 - Total emissions from the most **typical organic binders and 5 different inorganic binders were measured.**

Responsible partners:

AGH University in Poland

Karhula Foundry in Finland

AX-LVI Consulting in Finland



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1/7/2018-30/6/2022

Main actions:

2. **Total emissions** of five pilot foundries were measured from following foundries

- Stainless steel foundry using organic binder system (Karhula)
- Two iron foundries using organic binder system (URV and Valumehaanika)
- Iron foundry using inorganic binder (Valumehaanika)
- Steel foundry using inorganic binder system (water glass, Stavanger Steel)
- Aluminium foundry using new inorganic binder system (KSMCasting).

3. **Indoor air quality** was measured and compared in four of the foundries.

Responsible partner: AX-LVI Consulting



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1/7/2018-30/6/2022

Main actions:

4. Full production scale test series with inorganic binder system molds and cores were made in three ferrous foundries:

- **Karhula Foundry (steel)** demonstrated *three different inorganic binder systems* in making molds and cores for stainless steel castings in size range of 15...2500 kg
- **FOM Tacconi in Italy (steel)** demonstrated *two different inorganic binder systems* in core making for alloyed iron casting in size range of 10 kg. The cores were inserted into green sand molds.
- **Valumehaanika (iron)** in Estonia demonstrated *two self-setting inorganic binder systems* in making molds and cores for gray cast iron castings in size range of 5..200 kg



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1/7/2018-30/6/2022

Main actions:

5. Surplus foundry sand recycling options were tested and compared for inorganic and organic binder sands. Different reclamation methods as **thermal reclamation method, mechanical, hydromechanical and ultrasonic methods** were demonstrated.

Centre Technique des Industries de la Fonderie in France
Association of Finnish Foundry Industries in Finland.



6. Purification methods for surplus foundry sand were demonstrated as **composting method and washing method**. The goal was to find ways to reuse surplus foundry sand e.g. in geo-construction or soil material instead of landfilling or to recycle the cleaned sand back to foundry.

Fundiciones Araba in Spain
Meehanite Technology in Finland.



Thank you!

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