

Grant agreement no. IEE/07/585/SI2.500402

Foundrybench

Foundry Energy Efficiency Benchmarking

Intelligent Energy – Europe (IEE)  
SAVE – Industrial Excellence in Energy

## **D 24 Workshop presentations and reports**

Document ID: Foundrybench\_D24\_31122011  
Revision [1.0]

Author:TECNALIA

Distribution: Public (PU)

Due date of deliverable: 31.12.2011

Actual submission date: 31.12.2011

Start date of project: 1.1.2009

Duration: 36 months

Project website: [www.foundrybench.fi](http://www.foundrybench.fi)

*The sole responsibility for the content of this deliverable lies with the authors. It does not necessarily reflect the opinion of the European Communities. The European Commission is not responsible for any use that may be made of the information contained therein.*

## TABLE OF CONTENTS:

1.	PREFACE.....	3
3.	SECOND WORKSHOP..... VIRHE. KIRJANMERKKIÄ EI OLE MÄÄRITETTY.	
4.	THIRD WORKSHOP.....	9
5.	FOURTH WORKSHOP.....	10
6.	FIVETH WORKSHOP.....	16

## **1. PREFACE**

The Foundrybench project's overall goal is to foster energy efficiency and rational energy use in the metal casting sector. The project involves directly at least 15 participating foundries and contact by survey with more than 800 foundries in order to have data to improve their energy efficiency by providing them with clear information on their energy use and energy flows. A pool of energy saving options generated through these energy analyses will be described in a guide of the best energy saving solutions for foundries. An online database to reach a wider foundry sector audience will be launched. An Energy Efficiency Index for the metal casting industry will be developed, taking into consideration the production technology and product type. The benchmarking results will be actively promoted among foundries and policy makers to improve the foundry industry's energy performance. The project consortium consists of eight partners from Finland, Sweden, Germany, UK, Spain, France and Poland. The partners are recognised consultants, research institutes and industry associations.

During the development of the project it will carry forward several workshops in order to explain to the majority of the European foundries and to the sectors those are interested in the results of the Foundrybench (several workshops will hold in order to explain to all interested sectors the results of the Foundrybench). It is for we will do them in each partner's country (The workshops are going to celebrate in each partner's country including Italy). The first workshop was in Paris, the second in Sweden, the third in Spain, the fourth in Germany and the last one in Italy. Every workshop has different goal and the idea was to invite associated foundries in each country and foundry related business.

As it is explained below, every workshop has a matter of particular technical subject:

**1<sup>st</sup> Workshop;** TECHNIQUES to consider achieve for energy efficiency and Training seminars.

**2<sup>nd</sup> Workshop;** ANALYSIS OF ENERGY EFFICIENCY SITUATION from the point of view of CEMAFON, European Foundry Equipment Suppliers Association and the foundries: Georg Fischer from Germany, JAFAR S.A. from Poland, HUT and MESSO from Finland and Volvo Foundry from Sweden.

**3<sup>rd</sup> Workshop;** DATABASE good practices save energy and presentation of FOUNDRYBENCH at GIFA 2011.

**4<sup>th</sup> Workshop;** PRESENTATION the first's results of the Foundrybench project in the WFO Technical Forum on June 29<sup>th</sup>, leaflets and poster in the 12<sup>th</sup> International Foundry trade fair GIFA. The GIFA is the most important trade fair for foundry technology in the world with Düsseldorf between 28<sup>th</sup> June and 02<sup>nd</sup> July 2011. The GIFA is the platform excellent business activity and is the indicator for the innovations which will orientate the future and all of this against the background of impressive, as corroborated that in 2007 there were 1.754 exhibitor companies and 78.000 visitors.

**5<sup>th</sup> Workshop;** Presentation of the last results of the project by the title: How to make foundries more energy efficient? in the AIB (Brescia Industrial Association), Brescia (Italy).

The FOUNDRYBENCH project developed:

- The creation of a common foundry energy analysis method.
- The creation of a benchmarking tool.
- The creation of an energy efficiency index for foundries.
- The creation of a database of best energy saving practices.
- The creation of a good practice guide on energy.

## **2. 1<sup>ST</sup> WORKSHOP**

The first workshop was attended in Sevres (France) from 21<sup>st</sup> to 24<sup>th</sup> of September. The agenda included Foundrybench Steering committee meeting and two day training seminars.

Participants: Hermia, IMMCO and AXCONS (Finland), IfG (Germany), SFA (Sweden), FRI (Poland), CTIF (France) and TECNALIA (Spain).

The objective of the meeting was to create a debate on the different measurement methods to agree on a common way to carry out the measurements of energy audits in foundries and learn how those measurements should be done. This way, all participants would have same methodology to evaluate the energy along the audits in foundries.

During the three days of meeting, implementation committee, theoretical explanations and practical exercises were done. France exposed the importance of the meeting in the context of the measurements and described the points that would be analyzed along the

meeting. CTIF led the training seminar about general discussion on training energy analysis reporting and training arrangements.

Axcom and IMMCO explained how the measurements of energy should be carried out in the following processes:

Prima energy (electricity, fuels), Furnaces (induction, flame, cupola), Heat treatment, Flue gas and combustion efficiency, Cooling, Compressed air, Heating, Ventilation and dedusting, Heat recovery, Indoor climate and Foundry technology.

Along the meeting foundry processes, heat recovery and ventilation and compressed air systems were analyzed. IMMCO and IfG explained Cupola furnace and INASMET showed induction furnace technology.

The measurements in these processes should be done using different tools presented in the meeting of Sevres. During the theoretical and practical explanations Axcoms showed the proper working of the following tools:

Ultrasonic liquid flow in pipes



Liquid flow 2 Ultra-Sonic transducers Clap-on fixture

IR-thermometer



For remote control of surface temperature of pipes, furnaces and kilns

Combustion Analyzer



Oil, gas, coke furnaces  
and kilns Combustion  
efficiency gauge

---

Gauge of Liquid Pipe Flow



Gauge for liquid Line  
regulator valve  
adjustment of heating  
and cooling systems

---

Electricity Analyzer



Consumption of  
electricity for separate  
drives and driving  
powers 3-phase current.

---

Clap-on Ampmeter



El. power consumption  
of separate electricity  
Lines 1-phase current

---

Pressure Indicator



Pressure level control of  
compressed air systems

---

Vane anemometer for grille flow

Pitot-tube (Small Pitot-

---



tube for velocity and static air pressure measurements)

---

Thermometer



Thermometer with dry and wet bulbs to measure air temperature and humidity

---

Data Logger



Standard signal (V/mA) data logger

In addition, foundry processes and the most important energy audit parameters were explained, analyzed and discussed, reaching some interesting agreements for future activities.

The conclusions of training were presented. In addition, D3 “Description of common energy analysis methods, tools and reporting templates appropriate for the purposes of the project” was discussed and some annexes were presented.

### **3. 2<sup>ND</sup> WORKSHOP**

The second workshop was celebrated from 23 to 25 of February in Skövde (Sweden). The agenda included Foundrybench meeting with all the partners and analysis of energy efficiency situation from the point of view of CEMAFON and the foundries: Georg Fischer from Germany, JAFAR S.A. from Poland, HUT and MESSO from Finland. In addition, new Volvo Foundry in Sweden was energetically studied, analyzing the influence of the energy saving measures in the different processes.

CEMAFON is the European Foundry Equipment Suppliers Association and was founded in 1972. They incorporate the relevant national associations and as such all major manufacturers of foundry machinery and plants, furnaces and products for the foundry industry in Europe.

The objective of the meeting was to agree a common way to carry out the measurements of energy audits in foundries and learn how should that measurements be done. This way, all participants would have same method to evaluate the energy along the auditions in foundries.

Germany presented CEMAFON. There was long discussion about how Foundrybench and CEMAFON can cooperate. CEMAFON will probably be added as observer of project and can help in dissemination actions and could be net worker to equipment industry.

Involve CEMAFON in the activities carried out by Foundrybench is an important objective due to their capacity to relate and connect foundry industries to Foundrybench project.

Finland presented ideas and time schedule of interim report. There are quite many deliverables what has to deliver with interim report.

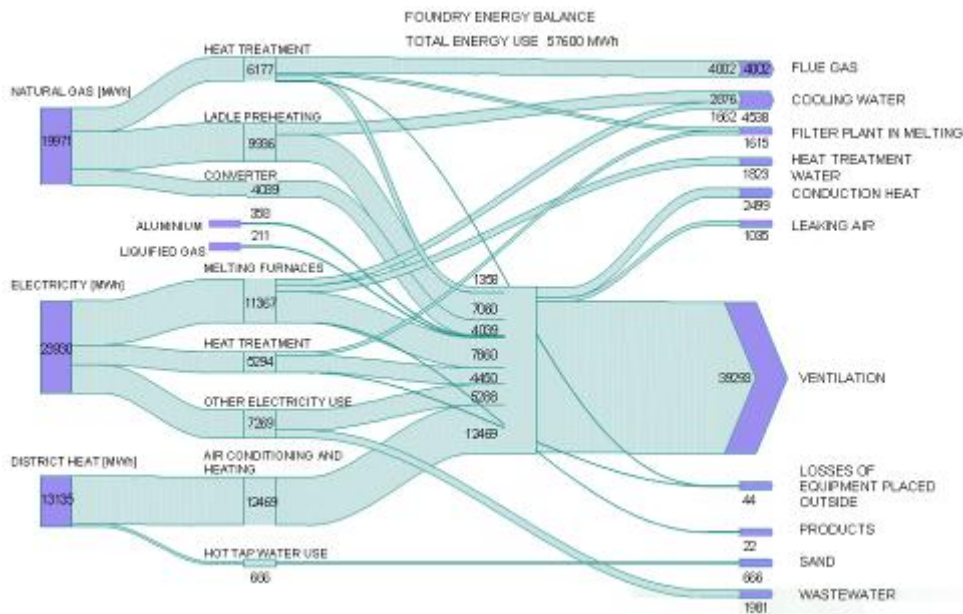
IFG presented ideas for GIFA exhibition. IfG have a stand in GIFA and Foundrybench can be presented there. Foundrybench will keep project meeting in GIFA where also visitors can be invited. Foundrybench will be presented in a lecture on the WFO Technical Forum, probably by AXCOM. The printed information for GIFA should make in April 2011. Also CEMAFON will have a session about furnace energy issues in GIFA. IfG will make arrangements for GIFA.

Finally, Foundries Georg Fischer from Germany and JAFAR S.A. from Poland analyzed the energy efficiency options in their foundries. Both foundries presented an interesting point of view of the energetic problems in the different foundry processes and also put forward some interesting ideas for future foundry industries.

In workshops “deeper discussion of foundry specific EEI calculations” and workshop “for energy analysis in foundries (questions, problems, calculations ...)” AXCOMS and HUT

explained the process of collecting data a different foundry processes of audits and calculations realized, showing results.

Sweden showed the main energy consumptions and the main indicators affecting to different factors in the processes.



Introduction to the trip to Skövde and presentation of simulation model of the Volvo foundry was realized in order to learn how a new foundry works.

Finally, the strategic of the new VOLVO foundry was discussed comparing the new industrial plant with the old one. In addition, the influence of energy efficiency in the layout and research of the foundry was analyzed.

#### 4. 3<sup>TH</sup> WORKSHOP

The second Workshop is going to celebrate from 29 of September to 1 of October in San Sebastian (Spain).

This second workshop was after the meeting of the 3<sup>rd</sup> Commission CAEF was celebrated on 15<sup>th</sup> May and it was explained all about the Foundrybench project to all the presents that are from different universities and several technological centres from European countries as Finland, Germany, Sweden, Poland, Portugal and Spain.

The main points to be discussed are:

Present the reports of the energy audits in WP3

Present the deliveries that should be finished in M21.

And it was explained the methods used to manage the survey and the good practice in foundries in relation energy efficiency.

Furthermore, the **Spanish Federation of Foundry Associations (FEAF)** is planning to participate in the meeting. The aim is to analyze the energy consumption and efficiency in foundries and analyze the steps that are carrying out to improve them.



## 5. 4<sup>TH</sup> WORKSHOP

The meeting of the fourth workshop is going to celebrate during the edition of the GIFA in 2011. The 12th International Foundry Trade Fair GIFA will take place in Düsseldorf between 28 June and 02 July 2011. It is the most important trade fair for foundry technology in the world celebrated every four years, last one in 2007. The GIFA is the platform for excellent business activities and is the indicator of the innovations which will orientate the future of the foundry. At the same time there is trade fair as Metec, Thermprocess and new Cast.

In the GIFA partners were ready to attend a Congress GIFA in relation with Efficiency Energy. We presented the first results of Foundrybench by our partner Dr M.Tapola from Axcom and the audience was attend and participated asking many questions in the question time.



The main agreed activities are the presentation of Foundrybench project in the conferences and the elaboration of a poster explaining the activities and objectives of Foundrybench and leaflet.



The poster was presented in several critical points at the GIFA area trade fair. The poster is showed in the figure below and in the next figure shows the detail of the poster handling in a column.

## The Benchmarking of Foundry Energy Efficiency



**FOUNDRYBENCH Project**  
 Contract number: IEE/07/585/SI2.500402  
 Project duration: January 1<sup>st</sup> 2009 to December 31<sup>th</sup> 2011

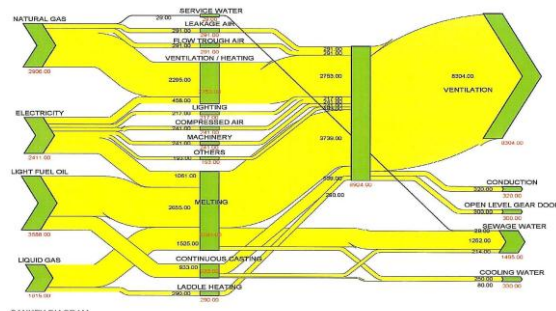
### Objectives and actions

#### Objectives:

- To raise awareness among foundry sector decision-makers of the importance of reducing energy use and to stimulate the spread of best practices among the target foundries that are aimed at improving their energy efficiency.
- To develop a database of the best energy saving practices in foundries that contains practical information on energy saving solutions and their effect on energy consumption and economic costs.
- To develop a well-targeted foundry specific benchmarking tool based on a uniform and professional assessment of foundry energy use that can be applied in different types of foundries, products, and climatic conditions.

#### Actions of the project partners:

- To develop and agreed common methodologies and tools for analysing the energy efficiency of the foundries.
- To implement energy analyses in the participating foundries.
- To provide comparative data to build the energy efficiency index (EEI).
- To make recommendations on how to improve the energy efficiency in foundries.



WP1: Management		
WP2 Development of common energy analysis method and observation of its application	WP3 Implementation of energy analyses in cooperating foundries	WP4 Benchmarking energy saving performance between participating and other foundries
WP5 - Guide of the best energy saving practices in foundries		
WP6 - Communication and dissemination		
WP7 - Common dissemination activities		

### Results

As the result of the Foundrybench project, European foundries can reduce their energy use.

To achieve this aim, the Foundrybench project developed:

- The creation of a common foundry energy analysis method.
- The invention of energy saving potentials in foundries.
- The creation of a benchmarking tool.
- The creation of an energy efficiency index for foundries.
- The creation of a database of best energy saving practices.
- The creation of a good practice guide on energy saving potentials and opportunities for foundries.



\*Different methods of energy use measurement

### Partners

- Hermia Ltd, Finland (Coordinator)
- AX-LVI Consulting Ltd, Finland
- Institut fuer Giessereitechnik gGmbH, Germany
- SweCast AB, Swedish Institute of Casting Technology, Sweden
- Foundry Research Institute, Poland
- Centre Technique des Industries de la Fonderie, France
- The International Meehanite Metal Co Ltd, United Kingdom
- Tecnalía, Spain





At the same time was presented a brochure presenting the project brief. And more than five hundred leaflets were distributed at GIFA visitors and between the own partners of the Foundrybench project.

# FOUNDRYBENCH

## The Benchmarking of Foundry Energy Efficiency FOUNDRYBENCH Project

Contract number: IEE/O /585/SI2.500402

Duration: January 1<sup>st</sup> 2009 to December 31<sup>th</sup> 2011

**FOUNDRYBENCH** project, European foundries can reduce their energy use. To achieve this aim, the Foundrybench project developed:

- The creation of a common foundry energy analysis method.
- The invention of energy saving potentials in foundries.
- The creation of a benchmarking tool.
- The creation of an energy efficiency index for foundries.
- The creation of a database of best energy saving practices.
- The creation of a good practice guide on energy saving potentials and opportunities for foundries.

### PARTNERS:



AX-LVI Consulting  
Ltd. Finland



Hermia Ltd. Finland  
(Coordinator)



Centre Technique des Industries  
de la Fonderie, France



Institut fuer Giessereitechnik  
GmbH, Germany



SweCast AB, Swedish Institute  
of Casting Technology, Sweden



Foundry Research  
Institute, Poland



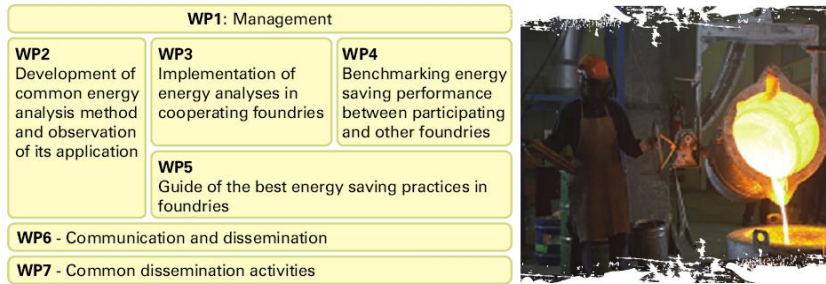
The International Meehanite  
Metal Co Ltd, United Kingdom



Tecnalia, Spain

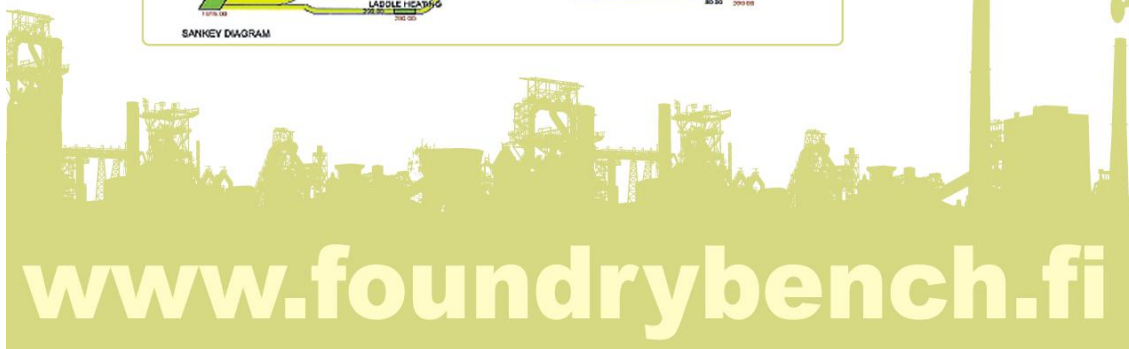
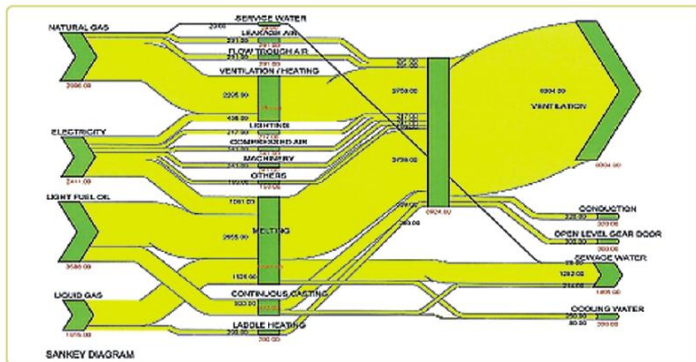
Actions of the project partners:

- To develop and agreed common methodologies and tools for analysing the energy efficiency of the foundries.
- To implement energy analyses in the participating foundries.
- To provide comparative data to build the energy efficiency index (EEI).
- To make recommendations on how to improve the energy efficiency in foundries.



As the result of the Foundrybench project, European foundries can reduce their energy use. To achieve this aim, the Foundrybench project developed:

- The creation of a common foundry energy analysis method.
- The invention of energy saving potentials in foundries.
- The creation of a benchmarking tool.
- The creation of an energy efficiency index for foundries.
- The creation of a database of best energy saving practices.
- The creation of a good practice guide on energy saving potentials and opportunities for foundries.



## 6. 5<sup>TH</sup> WORKSHOP

The 5<sup>th</sup> Workshop was taken place in Milan in Assofond (Italian Foundry Association) and on 23 and in Brescia in the AIB (Brescia Industrial Association) was presented a workshop by the title: How to make foundries more energy efficient?. The auditorium was Italian foundries principally general, technical and production managers. More than 40 foundries were attended the workshop.

The agenda of the workshop was as follow:

- Energy efficiency in Foundries and Foundrybench project (Markku Tapola AX-Cons Ltd)
- Benchmarking results (SFA)
- Good Practice Guide (Joachim Helber, IfG)
- Case: Good practice from Italian foundry
- Energy Saving: Selected Solutions of Good Practices
- Ladle preheating (FRI, Jacek Przybylski)
- Cupola technologies (CTIF, Jean-Marc Piatek)
- (IMMCO, Pekka Kemppainen)
- Induction furnace good practices to reduce kWh/t & plasma new heating process for maintenance furnaces (Tecnalia, Patricia Caballero)
- Heat storage – Storage of recycled energy for heating of premises, minimizing variations in the heat system and reducing peak load (Per Sommarin, Emma Svensson)
- Induction furnace operation (IfG, Joachim Helber)
- Heat recovery of Gas fired heat treatment furnaces and Fettling shop filtration plants (AX-Cons Ltd., Markku Tapola)

