

FNBU - IMS-BAS embedded systems

This best practice presents Innovative technology solutions for the formation of high-quality castings using the methods of casting and low pressure casting of gas pressure in the IMS at the Bulgarian Academy of Sciences (BAS).

The complex approach for producing castings of high-quality covers: prediction of the product quality and process parameters by modeling; alloy and melt quality control; smooth filling of the mold cavity; fast cooling for achieving fine grain structure; controllable directional crystallization; elimination of non-metal inclusions and porosity; control of the whole process, reproducibility of process parameters and product quality.

The structure of the project includes:

- Engineering team;
- Management department;
- Quality control department;
- Marketing department;
- Implementation department,
- Team for CAD-CAM Design, for simulation of the process of casting formation and for the optimization of the process of casting formation and casting quality.

The research activity, in particular, comprises studies of the crystallization processes, structures and properties of new metal and non-metal materials, counter-pressure casting of ferrous and non-ferrous metals and alloys included, plastic working and welding processes, physics, physical chemistry and heat treatment of new alloys, amorphous and microcrystalline metals and alloys, ecological technologies, machines and equipment for the production of the new materials and products thereof.

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SWOT ANALYSIS

Strengths:

- An innovative industrial process is presented build on top of engineering inventions from the Bulgarian Academy of Sciences;
- The BP is a result of evolution for a long period of time that guarantees its testing and evaluation;
- The BP is already of wide use;
- Reduction of metal and energetic consumption, in accordance with the environmental standards;
- Prediction of the product quality and process parameters by modeling;
- More reliable production and achievement of small waste of the end production;

- Innovation of an already widely diffused technology, in fact the gas counter-pressure casting method is used in more than 25 countries where there are more than 660 machines working.

Weaknesses:

- The BP presentation has to be seriously improved: list of clients announced but not shown, some text is still in Bulgarian, photos of certificates and awards have to be removed, the whole project team not only the main partner should be presented in chapter 7;
- IMS-BAS has the distribution rights of MAGMASoft for Bulgaria. It is not clear if there are any IP rights associated with the BP methodology and services;
- No evaluation and feedback mechanisms have been foreseen;
- A marketing strategy has not been developed.

Opportunities:

- The BP addresses different sectors of economy that provide a competitive advantage for Europe like aerospace and automobile industries;
- The system already proved to be a successful product being used in various applications in different countries;
- The current trend of the market provides good opportunities, since non-ferrous alloys are very required and are increasingly replacing ferrous alloys (steel and cast iron) in many applications (above all in the automotive sector);
- The potential industrial partners are many, in fact the producers of parts for automobiles (main potential partners) are very much diffused and, moreover, they are increasing the use of non ferrous metals (mainly aluminum).

Threats:

- Economic crisis poses a threat to the methodology presented by the BP. Its applicability in specific sectors of economy relevant to manufacturing makes the overall methodology prone to the problems that the manufacturing sector experiences in times of turmoil;
- There is a strong dependence of the sector from the trend of the end markets. In fact if some of the outlet sectors of the non ferrous alloys (i.e. automotive, building, electronics) present quite good prospective, others (engineering, chemical) do not foresee great increments in their use of aluminum, copper, zinc etc.