# PRODUCTION PROCESS

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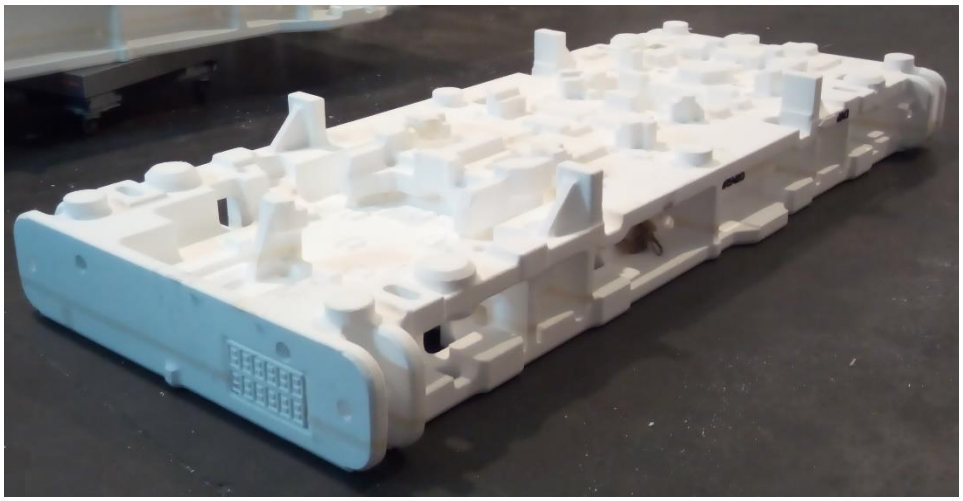
Fumbarri was founded in 1956, focussing its activity on small-medium serial parts to several sectors.

Later on, the company specialised in bigger parts and it is in 1990s when Fumbarri successfully positioned itself as a European benchmark in automotive industry, mining and cement industry, printing, plastic injection, valves and machine tool.

Thereafter and based on the acquired experience, and thank to the new demands from other sectors such as wind energy, nuclear energy or special machine constructors, Fumbarri places itself as a developmental partner for heavy castings due to the implementation of innovation to casting technologies.

## 1. Polystyrene Pattern

Iron castings are obtained by Lost Foam technique (a pattern is made from polystyrene foam).



## 2. Processing and Control

The model is verified and weighed on a scale. This weight and the relation between polystyrene and iron density determine the iron quantity that must be poured into the mould.

## 3. Pattern Painting

The foam is coated with ceramic investment, also known as refractory coating, (water-base), preventing that molten metal penetrate into the sand, causing burn-on.

## 4. Pattern Drying

The foam cluster is placed into a wall cavity where coating is dried.

## 5. Moulding

After the coating dries, the cluster is placed into a metallic moulding box, known as ‘flask’.

Once that the model is in the flask, it is covered with no-bake sand which is mixed with a chemical binder/catalyst system.

After the sand mould is compacted, it forges and gets the enough consistency in order to withstand the ferrostatic pressure.

## 6. Flask Tying

Once that moulding is done, the flask is closed and the pouring cups are placed. Moreover, counterpoises are placed on the box in order to avoid its opening and; therefore, a metal leak due to iron's hydrodynamics force.

## 7. Melting and Metallurgy

Rotary Oxy-Combustion Melting Furnaces are used in order to accomplish molten metal, transforming raw materials (iron ingot + steel + returns + ferroalloys) from solid to liquid.

When temperature reaches 1.450 – 1.500ºC, molten metal is unloaded from the furnace to the ladles.

A Spheroidizing treatment, which consists in adding magnesium to the molten metal, is needed in order to obtain Spheroidal Casting (GGG / EN-GJS).

During this treatment, oxides are produced and they must be removed. This process is called de-slagging.

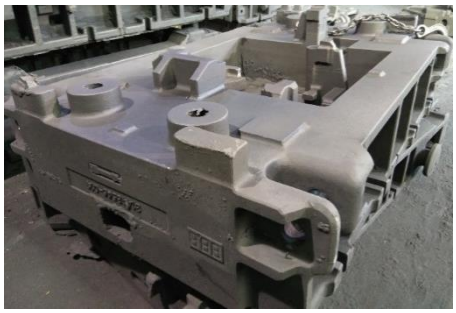
Molten metal is then poured into the mould. The polystyrene foam pattern left in the sand is decomposed by molten metal, which replaces the pattern and precisely duplicates all the features of it.

## 8. Demoulding and Shot-Blasting

After the pouring process, the flasks need to cool down to a temperature below 400ºC. This time is calculated based on the type of piece and its weight. Then, the flasks are opened and demoulded.

Shot-blasting is used to clean, strengthen or polish iron castings by projecting steel granules onto them, removing the coating, sand, etc. that still remain attached to the casting.





## 9. Deburring

Deburring by using hand tools such as emery, jackhammer, etc. is done in order to remove the gates, risers, husks, coating and sand.


After deburring, it is needed to carry out another shot-blasting.

## 10. Final Inspection

Geometric inspection, hardness test and visual inspection are done to control that iron castings are exempt from external defects. In addition, and at the request of the Client, non-destructive testing (NDT) is done.

## 11. Painting

Castings are coated with antioxidant paints.