

STEEL AGGREGATE BUSINESS PLAN - A CASE OF SUCCESS IN BRAZIL

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Introduction

ArcelorMittal Piracicaba uses ferrous scrap for the manufacture of rebar for the building sector. Currently, it is the fourth largest semi-integrated mill in Brazil in terms of crude steel production, and the largest in the state of São Paulo, with a capacity of 1 million tons/year. The constant actions directed towards the Environment, due to the fact that the unit is located in the state with the most restrictive and rigorous environmental laws, have made Piracicaba's plant one of the Brazilian references in environmental management. The unit adopts an integrated management system, in which the involvement of all employees is essential to achieve the objectives, and transparency in actions contribute to improve the organisational climate.

Piracicaba's industrial process starts from the reception of ferrous scraps, which are processed and sent to the Electric Arc Furnace (EAF) for the production of billets. These are destined for the Steel Rolling Mill, where they are transformed into the final product, rebar for reinforced concrete. The fact that recycled ferrous scrap is the main raw material contributes significantly to the preservation of natural resources.

To increase the efficiency of its processes, ArcelorMittal Piracicaba adopted cleaner production mechanisms, such as: exchanging the use of heavy fuel oil by natural gas (this reduced the particulate emissions of the rolling mills to almost zero); installing a Shredder and other equipment in an outdoor yard, to increase the quality of the scrap through the elimination of its impurities; using a water treatment plant with around 98% recirculation rate; installing additional acoustic protections in the production area, etc. However, the steelmaking process inevitably generates a large volume of residues on a daily basis. Electric Arc Furnace Slag is the main one, representing around 130 kg per tonne of crude steel produced in Piracicaba.

Motivations

Despite being classified as a non-hazardous waste according to Brazilian standards,¹ the correct utilisation of steel slag in Brazil still represents difficulties to the industries, mainly due to restrictions and lack of positioning of the environmental agencies about new forms of application. In São Paulo state, for example, there are only two uses authorised by the Environmental Agency: Sub-base on roads/paving and manufacture of concrete artefacts - even with the existence of all the studies, projects and actions at the global level proving that the slag, after going through a treatment process, becomes a valuable by-product: the Steel Aggregate (Figure 1).

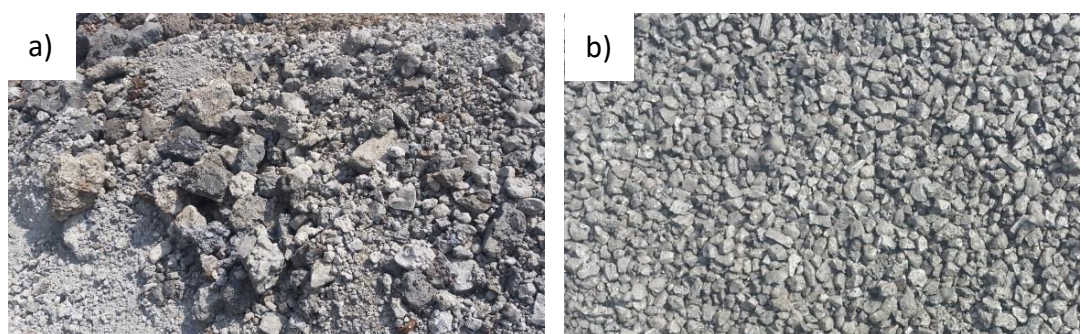


Figure 1: Visual differences between a) Steel Slag and b) Steel Aggregate

In addition, ArcelorMittal Piracicaba did not have a professional dedicated to the development and commercialisation of by-products; the Steel Aggregate was not attractive (did not have a product aspect), lacked marketing material and even updated technical specifications. For all these reasons, its utilisation was continuously smaller than the slag generation, causing the formation of internal stocks. After a few years, these stocks had become so big (around 200k ton) that there was no more physical space left to store any new slag that was being generated.

Therefore, in order to avoid the high costs with the dispatch of slag to external landfills or with the licensing of new storage areas, the company had to rethink its strategy, preparing actions to solve the growing problem. The goal was to introduce Steel Aggregate into the market in a safe manner, but much more aggressively.

The Business Plan

After directing a professional of the Environment department to be dedicated to the "By-products" theme, the proposed challenge was to implement a Business Plan for the Steel Aggregate, with the objective of prospecting new costumers, creating needs and making all the necessary adjustments to enter the local market, competing directly with natural aggregates. The Business Plan is an instrument widely used in

the segment of Administration, for better understanding of the market and product of a new business.

The first step was adjusting the steel aggregate to the same physical and visual appearance of the natural aggregates. To do this, negotiations and adjustments were made in the slag beneficiation plant, mainly aiming at meeting the commercial gravel granulometric sizes available in the market. It was a relatively simple action, since it involved the acquisition and installation of new strainers, as the crusher was already powerful enough to reduce the size of the particles.

Subsequently, the company searched for knowledge regarding the Tax Framework of the Steel Aggregate, to assist in its price definition. At the same time, it carried out a mapping of regional competitors, to find information such as prices, delivery methods, packing, among others. This study concluded that the region had 18 producers of natural aggregates, within a radius of approximately 40 km. It also made it possible to know the prices charged by the competitors, in order to define a competitive value for the Steel Aggregate, considering that it was an unknown product in the region, and therefore, with many barriers of prejudice to be broken regarding its quality. To identify the potential customers, market research considered cities with more than 150 000 habitants in the same 40 km radius from the production site. It highlighted 12 potential customers, evidencing a total consumption potential of almost 10 000 tons/month, which represents nearly the entire monthly generation of slag.

The next task was to establish a schedule of physical and chemical analysis for the Steel Aggregate, initiating a more robust quality control, related especially to its density and expansion rates. The results met standards² for using in paving, and also matched the characteristics of the natural aggregates, even surpassing some of them, such as Los Angeles Abrasion. In Piracicaba, since the unit started separating Steel Slag from the Ladle Furnace Slag back in 2007, there were no more registers of any kind of problems related with expansion of the by-product. In fact, in 2017 the plant made some tests with a fresh new generated slag, sending it to analysis - the expansion rates results were below 1% as well.

The final step was to create marketing material, for making presentations to potential clients and to distribute in events, seminars and congresses (Figure 2). At that point, prospective clients were approached, and the first results began to show up.



Figure 2: Booklet to promote the Steel Aggregate

Results

The low-cost and innovative initiative (considering the Business Plan was developed for a residue, not for a product) avoided a cost of more than 2 million dollars with external landfills, and created a monthly revenue from the sale of Steel Aggregates of about U\$ 6K. The recycling rates of the unit increased, KPI's were created and ArcelorMittal's name became known in the by-product market. The creation of the Business Plan and all of its actions have made the Steel Aggregate from Piracicaba the best of ArcelorMittal's Brazilian plants, in terms of quality. In two years, the slag stocks were completely emptied, making possible new uses for the former storage areas. Nowadays, the slag processing plant operates only with the daily generation of the material.

The good results also influenced the top management to establish a new vision for the ArcelorMittal Long Carbon America (LCA) business, creating a specific structure for By-products. The actions developed at ArcelorMittal Piracicaba are currently being replicated at other LCA sites, under the coordination of the new By-products structure.

References

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