Risk management for fused refractories

In the latest of his exclusive articles for Asian Glass, P. Carlo Ratto* discusses how manufacturers of low-cost fused refractories are having to manage the risks associated with their production in order to achieve a more profitable outcome.

Two years after the beginning of my cooperation with Asian Glass magazine, it is time for an update of the global marketing situation of fused cast refractories, in a world still heavily scarred by the depression in Europe, by a moderate recovery in US and by a sustained growth in the BRICS; within the high-growth economies (essentially recovering the development gap versus the first world in a globalized economy), there have been, however, clear symptoms of slowing, particularly within the China locomotive. This is, in general terms, a quite obvious consequence of a progressive compensation of the initial economical gap.

In various occasions, talking about low-cost players, I have stressed the fact that technological evolution, quality of products and implementation of services have not followed (at least not enough) the increase of manufacturing costs and that, inevitably, this will bring, pretty soon, to an hardly sustainable marketing situation.

This trend is not significantly changed, in spite of the attempt of various western entities to sponsor the penetration of low-cost fused cast in the west, in change of a number of possible advantages, ranging from the completion of a refractory-for-glass portfolio to providing a turn-key project to end-customers, or simply enjoying a commercial commission while appending services to the mere low-cost refractory.

While a great number of mid to small size glassmakers have been and are still reluctant to trade a certain level of financial benefits for a difficult-to-figure-out degree of risk, the major global players in the container glass (and in a lesser extent for western float-makers) have generally endorsed the idea of capitalizing the financial advantage of procuring low-cost (still in the range of 30%), assuming they could have managed the associated risks, mostly relevant to the intrinsic refractory quality, thanks to their outstanding know-how in the area of glass furnaces management.

To be noted that while the procurement price advantage is a definite number, the risk component is extremely difficult to evaluate, not foreseeable without a long term analysis and mostly dependant on subjective speculations.

The new fact appearing in the most recent years is a certain level of major technical accidents with furnaces lined with low-cost refractories, level that seems to be higher than the historical occurrence. It is very clear that this type of considerations must be handled with extreme caution for a number of technical (small statistical population, long time for the statistic analysis) and environmental factors, like the difficulty of gathering information considered classified by most glassmakers.

Major accidents

In spite of that, it is my personal feeling that accidents like major glass leakage from furnace’s bottom and out of control levels of refractory-related glass defects have a possibly increased frequency in the recent years.

The causality connection with the application of low-cost fused cast refractories is, of course, another debatable topic, but it is a fact that there seems to be no other major changes in the furnaces technology or management that could be in relation to an increased occurrence of major accidents.

It is to be stressed that a major glass leakage from a paver or a riser, leading to emptying the tank in its basement (accident that we have seen more than a few times in the last few years), with all direct and indirect consequences, has a financial impact well exceeding the very furnace value for a group, capable of compensating the marketing issue through alternative production units. The same occurrence could represent a deadly risk for a small company dealing with one or two fusion units. It is a fact that, should a causality relationship with the use of low-cost fused cast be univocally demonstrated, then no cost advantage could justify the continued usage of these refractories.

It is also a fact that some major global glassmaker, after some “suspicious” case of refractory related severe problem has, prudentially, banned one or more specific refractory providers.

In addition, and much more on a general view that includes financial factors, we are likely in view of a change, for global companies fully devoted to low-cost procurement, toward reconsidering some level of procurement from western manufacturers for the most demanding applications or for some specific furnace.

Having said so, and very far from willing to spread panic about low-cost procurement, I need to make it clear that not all low-cost refractories born alike from the very many relevant producers (among them RuITai, DY, SGS, ACRC, CSR and a few more being the top full-Chinese players), and, even more important, that most of the accidents allegedly related to these materials could have been prevented, if the procurement process was properly followed on the technical ground.
Manageable risks

In other words, the level of risk associated to exotic refractory sourcing can be managed through measures originating from a deep understanding of the fused cast manufacturing technological platform.

These measures, warmly recommended to whoever decide to face a low-cost fused cast procurement, include a number of critical steps:

1) Glassmakers need to know which low-cost is the most suitable for their procurement needs. They will receive proposals from different actors involved with different manufacturers, all of them claiming the best quality, the best references and the role of Chinese market leader. Without an independent and informed support will be impossible to select one or more company and to initiate with them the next stage of technical negotiation.

2) Supplier’s technical specifications analysis is the best way to understand the technological level and the standard process capability of a given manufacturer. The critical evaluation of their standard specifications provides the opportunity to make punctual requests for critical qualitative parameters well in advance of the possible order so that the manufacturer will tune the in-process quality control to prevent conflicting situations during final inspection. Negotiating these aspects is the best occasion to understand the technical consistency of a given player and to establish a fair level of confidence. Auditing a prospect supplier to determine its real reliability is also an advisable approach, particularly for large companies aiming to find a mid-term provider for multiple furnaces.

3) Preparing a detailed RFQ to issue to a low-cost potential provider is a different process, compared to the same request directed to a western supplier, unless the purchase is done based on a turn-key project from an engineering company. In this case, though, keep in mind that there are areas of potential conflict between the interest of your bundle provider and your own. When you deal with a low-cost player, you must not give for granted any detail that you do not have to mention to the big western suppliers; location of casting scars, surfaces cleaning, surfaces grinding but also handling, packaging procedure are just examples of items that must be properly specified to prevent conflicting situations at the tail of the process.

4) Inspecting a furnace at a low-cost provider facility is also matter for specialists; there is a number of specific details that should be checked in order to prevent troubles later on, when the refractories will be in operation. The generally substandard level of process control and standardization, typical of most low-cost manufacturers, calls for a more detailed (we should say capillary) control of parameters such as bulk density; always to be remembered that a single block problem makes a furnace problem when at glass contact (sidewall or paving tile).

It is important to say that, in most cases, risk factors can be mitigated or even eliminated when applying the needed level of specific know-how.

Professional independent support in managing the a.m. four points, as above mentioned, has obviously a cost, but this is a very minor fraction of the financial advantage linked to a low-cost procurement that, in such way, is now made possible.

“Crossbred” furnaces

Another point of ongoing discussion is the possibility of assembling furnaces with fusedcast refractories of different origin; it has been longly considered safer procuring low-cost fused cast for superstructure, at least for an initial approach. This was done based on the idea that the substandard performance risk for superstructure materials could be lower than the risk associated to failure at glass contact.

As a matter of facts, if it is true that corrosion resistance is more critical for glass contact applications, then it is equally true that quality of AZS fused cast in superstructure has very large impact on glass quality, when relatively complex parameters like exudation are considered.

The new factor coming in the play in recent times, as also explained in recent occasions, is the advent of new materials for superstructure, a new generation of sinter AZS with extreme resistance to nephelitic conversion and zero exudation (in addition to several other pluses like the possibility to be pre-cast in very large shapes), produced by Special Shapes Refractory Co. of Alabama.

The combination of SSRCo superstructure and low-cost fused cast in glass contact, procured with a high degree of risk factors control, is a solution adopted by some global top level glassmakers that have, in such way, efficiently optimized the value/risk equation.

Within this global scenario, how did perform the micro-niche of fused cast refractories for the glass industry?

The future

Wrapping up the concepts above mentioned, we can say that low-cost fused cast refractories are still providing a very significant price advantage, in spite of being less and less profitable for the manufacturers.

Low cost procurement is still linked to a certain degree of risk and the appropriate management of technical risk factors is key to the possibility of capitalizing the cost advantage.

In the past, some Company has somehow disregarded these risk factors, suffering from a number of very expensive furnace-related issues, possibly associated to refractory performance.

Today, independent support is made available to the glass industry, to greatly reduce the risk factors at a very minor cost, when compared to the price advantages offered by a conscious low-cost procurement.

In addition, new hybrid solutions (AZS fused cast and sinter AZS) are nowadays gaining traction in the process of optimizing the cost per value equation.

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