An ongoing story of success...

Eredi Scabini has been on the refractories market for almost 75 years, during which time it has grown steadily to become what it is today: a company known by both birth and international renown, which has always believed in the importance of good business practice to offer products and services of quality, with ever-improving performance and more and more advanced technologies, with the aim of achieving growth not only for itself but above all for its customers.

To enable this to come about, the company’s organisation has also undergone major changes over time: as production has increased in terms of both quantities and number of types, the company has expanded its premises to accommodate the new equipment and the new staff required.

The latest expansion took place in the first half of this year, when the company purchased another 5,000 sqm of factory buildings next to its headquarters.

Today, Eredi Scabini has a total operating area of about 60,000 sqm, on two separate sites. The plants are close together and are both strategically located in the Milan hinterland.

The complete includes 3 different monolithic and preformed production plants, as recently extended with 2 new high-temperature furnaces of impressive capacity, several warehouses for raw materials and products in transit, and a brand new control room entirely dedicated to the supervision and design phase, which processes and accompanies the birth of the products and services offered to customers: the ATO - Technology Centre, opened at the end of 2019.

The new ATO focuses professionals of vast experience, including engineers, chemists and designers, who cooperate and exchange ideas on a daily basis in a well-organised process, to create products and services of excellence. It is equipped with state-of-the-art technological tools including WaveLength Depressive R-X-Ray Fluorescence spectrometers, Electric Furnace Machine for production of beads (300 cm8 analysis), compression and flexural strength test press and also large sized press-ovens, equipment for analysis of apparent density and porosity, particle size, viscosity and much more.

Eredi Scabini is a sound, prosperous business, with a solid past and excellent future prospects, thanks to its innate ability to evolve and grow consistently up to date.

**Flextrong™: unity is strength!**

‘Flextrong’ is a name of Eredi Scabini process development and patented technology recently. However, thanks to its distinctive characteristics it has highly advanced success, becoming one of the most important products; it is widely used in industries requiring high levels of performance and involving particularly tough conditions. Being Flextrong™ is the exclusive Eredi Scabini product family with versatile applications for steel, iron and steel, aluminium, copper and cement. What makes Flextrong™ so special?

First and foremost, we have to point out that Flextrong™ is not a ceramic product but is a composite material. Companies are characterised by the combination of at least two different, physically separate sub-layers, with different properties. The construction thus produced has new chemical and physical properties not provided by the individual constituent materials. One excellent example of a composite material is reinforced concrete: where concrete and steel materialise their individual identities, but cement to generate a product with unique characteristics, the result is a highly resistant and durable load-bearing structure, while the concrete is more resistant to the corrosive loads.

The individual constituent parts of the composite are the MATRIX and the REFRECTOR. To flextrong™ matrix consists of a CERAMIC material, while the reinforcement is in METAL. Flextrong™, therefore, is a fibre-reinforced composite material. The matrix is typically in the viscous fluid state in order to fill all the spaces and bond perfectly with the fibres, thus helping to protect the fibres from physical and chemical attacks. The jet of all the forces, on the other hand, is given to the composite's strength and resistance to mechanical stresses. Flextrong™ has a ceramex matrix made from a special superplastic, high-fidelity, micrographic refractory material, which gives the product hardness and mechanical properties, while the large quantity of special steel fibres, with controlled orientation, give it flexibility.

Preformed are easier said than done!

Eredi Scabini was one of the first, if not the first one of the very first refractories industry companies to believe in and invest in the development of the technology for producing preformed shapes, as an alternative to bricks and castables. More than 10 years ago, we have now passed since those early days, and time has confirmed the wisdom of the decision made back then, while initially being often used only as a first product, for "accessory" components such as buffer blocks or the barrier blocks or heating furnaces, today, such use is even afternoons in foundries for irons and metals, even for special liquids. Thanks to their characteristics, the use of preforms has set new performance benchmarks which have become an essential part of the furnaces. As a result, we have a portfolio of over 100 different preformed solutions, including considerable monolithic furnaces for aluminium, vertical furnaces for vacuum production, furnace blocks and ladles for arc furnaces, EAF, steel sectors, resistors for inox and industrial furnaces, and many more for the complete utilisation of the world's largest channel-type furnaces, with capacity of 3000 tons (here examples of preformed, always present in the Newsletters). We are proud of being believed and invested so much in this project. Over the years, the work that has followed in both production and performance analyses, in the workshop focus of application, has enabled the company to specialise and design new increasingly adequately preformed, larger in size and more important in function. Industry experts of the world have been responsible for the creation of in-depth knowledge of the new materials and their characteristics in the most widely different conditions, diseases, contrary to what some said, the weight being, having only a very small proportion of the production processes, however, we do not know any other method able to guarantee better results, or any competitor who has achieved results which were even remotely near to our standards. Today, Eredi Scabini is really the only company able to design and produce preformed widths up to 15 mm, and with amazing performance. The market knows us, and we know them and this is fantastic because we have no opportunity to offer us major new challenges.

*Highlights*

- An ongoing story of success...  
  [Flextrong™: unity is strength!](#)  
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**Highlights**

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**Preformed are easier said than done!**

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**Advances in refractory technology and the impact on industrial applications**

- **Flextrong™**
  
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    - **Matrix:** 
      - **Graphite**
    - **Refractor:**
      - **Graphite**
      - Nital 10% of the weight with denatured alcohol
  - **Properties:**
    - **Density:** 3200 kg/m³
    - **Porosity:** 40% of the weight with denatured alcohol

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Engineering & Flexstrong®: a winning combination for a long-lasting solution for tunnish cover.

Flexstrong® is a hybrid ceramic matrix composite reinforced with high resistant steel. The product has excellent resistance to thermal shock, impact, fracture and corrosion as well as to contact with molten metals. The product is used to reduce both refractory linings or metal casings.

The customer is an European electric steel mill which produces about 100,000 tonnes per year of carbon steel using a 100 tons EAF, a LF and two continuous casting (CC) machines, with a capacity of 15 and 20 tons respectively.

The customer had significant problems on steel slabs resulting from 32 last rim sections. Most critical areas were the joint between steel and off-beats. To avoid costly plating loss, MARKO STRONG® Flexstrong® HT was recommended by the customer. The solution was to replace both sections after just 30 heating cycles. First, Switch® designed and produced a new tunnish cover, consisting of 3 parts, the middle section in Switch® NF (Photo 7) and the two side sections in Switch® HT. This test performed with this new design gave very encouraging results: 100 heating cycles of Photo 3 compared to the 30 achieved previously.

In the test of these results, the customer decided that thermal and to use the Switch® HT solution for the entire ECR tunnish cover and then to do the same for the CCD. The new design of Switch® Flexstrong® HT is still in use, it is both cost-effective and safe.

Alfablock®: once again, a graduation with honours.

Alfablock® is the Switch® nanolaminated preformed shape with amorphous Silica-Aluminas binder which features an exceptional resistance to corrosion and thermal shocks.

The customer is an electric steelworks that produces about 3,500,000 tonnes of steel per year. The described has two EAF (Electric Arc Furnace) of 150 and 190 tns. The main issues experienced by the customer was the lack of the 150 tns EAF with a production of about 30 tns per day.

The solution was highly effective: the Alfablock® lifetime went from 2 to 4 weeks of operation. Thus, the customer was very satisfied with the results. Solved the problem of lining wear and the need to purchase new steel. This was the second week of operation (Photo 6), the steel section after a thickness of 55% of the initial thickness (Photo 5).

As a result of the fourth week of operation, the steel section has a thickness of 48% of the initial thickness. Furthermore, the Switch® Flexstrong® assembled shapes surface remained clean and the wear was not uniform over the entire area. Thanks to its characteristics of high thermal shock and chemical resistance, the Alfablock® solution proved to be absolutely the right choice. The Switch® Flexstrong® preformed shapes passed another test, and with this the customer graduated with all honours.

Drystone®: The best monolithic safety lining solution.

Drystone® is a fine line of dense dry compaction made with mineral or basic raw materials for installation by dry contact construction. The products in this line can be used as either safety or working linings and with other materials or refractory parts.

For the steel industry, Drystone® is specifically designed to be installed behind the brick working lining, creating a joint less, maintenance less. At the operating temperature, the product develops a high strength and low, generally the first to maintain a loose back up to stop metallic linings.

The customer is a major European steel group which produces about 300,000 tonnes of steel. The steelworks has a 100 tns and one 250 tns electric arc furnace with the relevant ladles. The customer has already been using Drystone® for the safety lining of the 100 tns ladles as an alternative to the conventional alumina brick for a substantial period of time. In view of the constant maintenance less achieved, the customer recently decided to use the same solution for the 250 tns ladles.

While the 150 tns ladle is cylindrical in shape, the 250 tns ladle is central.

The use of our dry compaction product meant that the safety lining was able to hug the metal structure precisely, smoothing the perfect supporting surface for the brick working lining with some of the edge typically found with brick working linings. Moreover, the use of our Drystone® dry compaction ram for the safety lining was combined with the use of ISOYME® Microplex as insulating lining on the metal structure. The combination of insulating and safety lining applied as casted above provided the customer with strong savings and a joint free solution, which was therefore able to withstand any metal infiltrations.

Flexstrong® makes another goal.

Flexstrong® is a hybrid ceramic matrix composite reinforced with high resistant steel. The product has excellent resistance to thermal shock, impact, fracture and corrosion as well as to contact with molten metals. Flexstrong® HT, offering a new combination of ceramic matrix and metal reinforcement, is intended for applications that require greater resistance to mechanical stresses at high temperatures, severe shifting atmospheres.

The customer is the largest Italian electric steel mill, for the production of carbon steel laminates, with two 150 and one 300 tns furnaces and an annual production of over 3,500,000 tns.

The customer used the ladle protection screen drawer with conventional castables, which lasted around 250/450 castings at the same cost and required frequent maintenance.

After evaluating the customer’s need as a whole, Switch® supplied the design and production of the screen drawer using Flexstrong® HT, a hybrid ceramic matrix composite with a refractory steel reinforcement that, due to its excellent resistance to thermal shock, has allowed a solution to be found.

Thanks to this new solution, in fact, the customer has considerably increased the number of castings, going from 30/40 to 250, and has saved all kinds of maintenance.

REFERENCES

REF. N.19

Photo 1 - Cast iron cover sections

Photo 2 - Middle section in Flexstrong® HT

Photo 3 - Middle section in Flexstrong® HT after 100 cycles

REFERENCE

REF. N.30

Photo 1 - Alfablock® cast delta section performed shape

Photo 2 - Alfablock® cast delta section after 3 weeks

Photo 3 - Alfablock® cast delta section after 3 weeks

Photo 4 - Alfablock® cast delta section after 4 weeks operation and more than 150 ladles

REFERENCE

REF. N.50

REFERENCE

REF. N.27

REFERENCE

REFERENCE
Longer lasting EBT lining with Flustone® SP.

Flustone® SP is a line of raw material castable containing excellent flowability allowing application by self-distribution. They are used mainly for working linings requiring high resistance to abrasion and/or for application by metal and slag. They are self-bonding, allowing lining to be repaired by applying the same product to the worn surface without changing the lining.

The client is a steelworks belonging to one of the largest European steel producers of the world, manufacturing products and auxiliaries for the metal industry, mostly using open hearth furnaces and steelworks. The steelworks was one of the early adopters of Flustone® SP, a remarkable casting grade capable of self-bonding during pouring which allows full distribution. It contains only a very small part of liquid, with excellent resistance to abrasion, high mechanical strength and high thermal shock resistance. This high performance product, specifically developed for steelworks maintains its essential fluidity during pouring of the hot metal, partially due to the self-bonding properties, facilitating the operator’s work during installation and speeding up the repair job on the furnace. While in the past, the product’s fluidity in the existing working wear parts is usually maintained during the furnace’s daily cycle with pouring. After the first report this customer immediatelycontacted us and approved the strength of our bond to the austenite and the reduction of the number of repairs necessary which proved to be every 95 - 98 weeks, using just 150 kg of material.

Furthermore, the customer found that Flustone® SP maintains the uniformity and diameter of the EBT hole much shorter time, mitigating the entanglement of primary iron into the ladle. The slag is very rich in oxygen, causing a lower ferrosilicon yield, the need to add more of these materials causing extension of the hole inside the furnace and, last but not least, more aggression toward wear of the refractory lining in the ladle slag trap.

Eredi Scabini delivers record-breaking ladle lid lifetime: 5 years (+500%)

CAST-UL® is a line of micro-porous insulating and super-insulating castables for installation by casting or self-bonding. Developed for applications up to 1700°C on both hot face and second face, they are an excellent alternative to insulating bricks and ceramic fibers. Compared to ceramic fibers, in addition to their higher mechanical strength and lower thermal conductivity, there are also no reductions on their use when avoiding environmental and occupational health and safety concerns overbes. Specific products have been developed for use in direct contact with metal surfaces.

The customer is an electric steelworks with about 180,000 tons per year of steel, which is produced in a furnace to serve the petrochemical, energy and automotive markets. The plant is equipped with a 1,000-ton electric furnace, two vacuum degassing systems and two ladle furnaces, each 100 t ladle. This customer used to line the ladles, preheating the ladles with ceramic fibers, aware of the relative environmental problems, the cost-intensive limitation on high temperatures and the risk of burning due to the lack of fans. On the hot tip of the ladle no insulating (photo 2). The customer was very interested to exploit the technology very frequently, replacing the entire lining after just 17 months service. Moreover, during the operation the metal structure was stressed and deformed because the time was not long enough to realize the necessary resistance due to the continual expansion and heating.

Eredi Scabini designed and produced a specific solution that led this ladle to improve efficiency thanks to CAST-UL® insulating castables, with density of 1.5 g/cc and a maximum temperature of up to 1650°C combined with excellent mechanical strength (photo 2). The first, on the other hand, was casted using a Flustone® product, a refractory castable with high mechanical strength and thermal shock resistance, to increase the resistance to the harmful condition on this ladle. Dry slag and iron avoid the deformation of the metal structure. With the Eredi Scabini solution, the customer managed to eliminate all repairs and to reach the 85% lifetime in over 5 years in advance (+500%). Today all the blister lines are in the best conditions.

With RESISTONE™ the slag pit of electric arc furnace lasts at least 3 time as long.

As well as being large size of refractory castables and preferred shapes, the company has a line of products specifically developed for the industrial foundry sector to extend mechanical and chemical resistance combined with heat: RESISTONE™ RESISTONE™ products are installed by procedures similar to those used for construction elements, but deepens extremely high mechanical strength within just a few hours and can be used up to 1400°C, even in contact with metal and slag substances. Its rapid installation and ease of use are make RESISTONE™ excellent for maintenance purposes.

The customer is an Electric Arc Furnace steel producers in the production of special alloy steels. The 250,000 tons produced annually are forged with the group for the railway and energy market. The steelworks contains a 70 t electric arc furnace, a 25 t ladle, and two ladle furnaces, this customer used to line the walls of the slag pit with precast construction concrete and metal plates. The lining’s lifetime was very short, to the point where the entire surface had to be completely replaced every 6-8 months (photo 1), causing off scheduled production shutdowns. At the same time, the structures of the metal plates were modified by the heat, and they lost their lasting power. The customer complained of run-off problems and also saw the deterioration of the metallic structures induced by the workers assigned to clean the slag pot. Eredi Scabini came up with an idea of using specific products for different parts of the slag pit, to causes the best possible performance in relation to each single problem. The bottom of the wall, subjected to thermal shock due to contact with the slag and mechanical shock from iron coming from the ladle, was lined with RESISTONE™ HT BE a composite with excellent mechanical strength and thermal shock and abrasion resistance. The upper section of the wall, subjected to high temperatures from the slag, was lined with RESISTONE™ HT, a suitable with good mechanical and thermal abrasion resistance (photo 2).

Thanks to the Eredi Scabini solution, the customer has no longer been forced to complete maintenance in every six months, about three times, maintenance work has been limited to a few partial repairs at between intervals. For the customer, this has meant considerable reductions in maintenance costs and the major benefit of a slight operation at all times.

800 castings with Flexstrong® HT lip ring.

Flexstrong® HT is a performs ceramic material composite reinforced with heat resistant steel product. The product has excellent resistance to thermal shock, impact, friction and abrasion as well as contact with metal and stainless steels. The Flexstrong® HT, offering a new combination of ceramic matrix and metal reinforcement, is intended for applications that require greater resistance to thermal stresses or high temperatures, even in existing atmospheres.

Furnished through the strategic alliance of two major players in the world steel industry, the customer is a domestic and European market’s leading producer of boron and high carbon steel. The company has long production experience. The steelworks is equipped with an electric arc furnace, an all-in-type electric steel works and two continuous casting lines, for a total steel production capacity of 600,000 t/year. The steel, produced in the ladles of the EREDI followed by the downwind continuous treatment, combined with ladle and wall corrosion using a system ("thermobar furnace") with hot metal and water electrolysis of a "thermobar furnace" system with full rolling and automation on the previous steel and argon. After a long campaign, three process improvements have been realized, forcing the customer to cease continuous improvements at large expense for continuous maintenance.

The customer asked Eredi Scabini to come up with an alternative which would be more resistant to attack by the steel and gas and more durable, in fact the alternative was achieved. After installing the needs stated by the customer, Eredi Scabini suggested construction of the flex ring section in Flexstrong® HT. With design in six sections located to the ladle shape, this innovation provided much simpler installation. The solution was immediately approved by the very new addition of easy and easier cleaning and removed the off-gas slag from the containment material. The ring maintained the characteristics in use, with minimal wear and deformation of the sections.

The customer has now completed its 15th campaign, of 800 castings, each, and it has only been necessary to replace one or the six sections of the lining section. This operation was very simple, and was performed by steelworks staff themselves.

The customer substantially reduced the Flexstrong® HT lip rings on all its ladles, helping the steelworks to achieve an increase in production and lower-time consumption.

For further information: sales_dept@erediscabini.com
Papers

Refractory concrete: knowing and limiting the explosion hazard.

In general, water performs various functional tasks in refractory castables. It seizes the open gaps; serves as a lubricant between particles after the open pores have been saturated. It interacts with other elements in the dry state to create new chemical compounds (identical or chemically bonded water) and facilitates the formation of additional bonds (adhesion) facilitating the product's use and service life. It prevails temperature barriers where required (the temperature in the mass does not rise to the maximum in the zone where certain amounts of water is added) and provides surface protection during initial heating by "sweating" of the kiln surface in the furnace. Basically, just water presence corresponds with such behavior; but it has a considerable amount of time at a temperature to exceed 60 to 120°C to transform water into steam. This steam tends to bubble, to reduce the total porosity and minimizes the density, which is directly proportioned with the overall density of the refractory mass.

In the furnace, water is converted into steam, and the total porosity is decreased, while the density of the mass increases. Steam, because of its greater density, tends to bubble, reducing the total porosity and thus the overall density of the refractory mass.

In our previous investigations (Bukhari et al. 2018), we have shown that steam pressures of 10-15 kg/cm² were causing the mass to expand considerably. Therefore, it is required to keep the mass in the kiln for at least 10-15 days for complete dehydration. This period is required to ensure that the mass is completely dry and free from any residual moisture before being subjected to any further treatment.

Steam pressure has been found to be effective in reducing the porosity of the mass and improving its density. However, it is important to note that the use of steam pressure should be monitored carefully to avoid any potential damage to the kiln or any other equipment involved in the process. The steam pressure should not exceed the limits specified for the kiln, and the duration of treatment should be appropriately controlled. Furthermore, the use of steam pressure should be accompanied by other methods of drying to ensure complete dehydration of the mass. This is important to avoid any residual moisture, which could affect the quality of the refractory mass. Overall, the use of steam pressure is a highly effective method for reducing the porosity and improving the density of refractory castables. It is recommended for use in situations where complete dehydration is required to achieve the desired quality of the mass.