# NEXT GENERATION REFRACTORY MATERIAL EMHART GLASS AZLAC 321

**KEN PAUL**
**Emhart Glass, Enfield (USA)**

***Material research has been the corner stone of the Emhart Glass's refractory business for over 50 years. During this period, many of today's industry standard refractory mixes were derived from the company's technology. These mixes include the world renowned refractory #333 mix that is the current standard for container glass industry in applications for feeder tubes and spout refractories. Developed many years ago, this refractory is today the mix that all others are judged against.***

## 1 - INTRODUCTION

With the ever-increasing factory production needs, container glass plants are being asked to reduce down time and increase their outputs. This higher demand generally results in greater glass throughputs throughout the furnace, distributor, forehearth and feeder areas. Glass contact materials are pushed to the limits and generally the result is higher erosion and corrosion wear. Higher throughputs also mean higher furnace exit temperatures that put an increasingly higher demand on the conditioning refractories in these areas.
Emhart Glass Owensville (formerly Laclede Christy) has a long history of innovation in refractory technology and has a full time staff of professionally trained research and development personnel. It was the first to adopt a plastic pressing technique for refractory articles. Through many years of participating in joint R&D projects with many glass producers in the area of refractory technology, Owensville has maintained a leadership role in the advancement of refractory technologies.

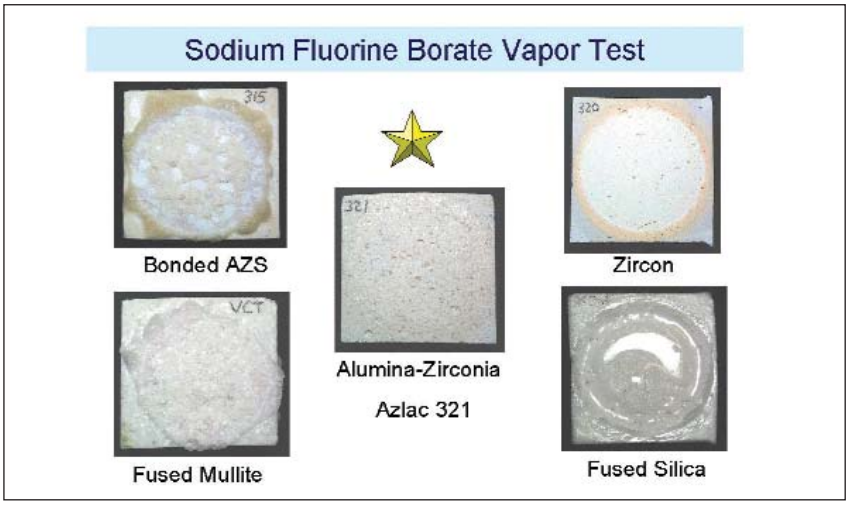
## 2 - NEW FORMULATION

The latest advancement in refractory technology again comes from the Emhart Glass Owensville facility. Azlac 321 is the newest material from the refractory-for-glass experts at Emhart Glass. This material which is made from high purity alpha-alumina and Zirconia is specially designed and formulated to withstand the highly corrosive environments associated with oxy-fuel firing furnaces and other highly demanding applications. It is ideally suited in those environments where alpha-alumina is thermodynamically stable and particularly well suited for boron-containing glasses.
Azlac 321's chemical stability, high MOR (6,000+ psi), high erosion and corrosion resistance and low porosity make this an excellent material for glass-contact refractory shapes. Superior vapor corrosion resistance is also a clear benefit to this new material. See fig. 1 below which shows that this new material is virtually unaffected in vapor corrosion tests with high Sodium Fluorine Borate concentrations. In addition, Azlac 321 has demonstrated good resistance to thermal shock. This important quality results from the combination of high strength and two effective mechanisms for inhibiting crack growth: grain structure and evenly dispersed micro fissures.

## 3 – FIELD TESTS

Field studies have shown that this new material Azlac 321 is far su-

***Fig. 1 - Sodium Fluorine Borate vapor test comparisons.***



perior to current bonded refractories and in some cases better than fused cast refractories.
In field trials on refractory expendables, it has been demonstrated that Azlac 321 can extend the service life of the refractory component by as much as 400% when compared to standard bonded AZS compositions. This superior erosion resistance makes it the ideal material for long run container production lines. At present over 10 major glass producers' worldwide are using Azlac 321 on their high volume (low job change) lines. Many of these glass producers have also been testing this material in spouts, tubes, plungers, stirrers and stirrer covers. Figure 2 below shows a set of Azlac 321 stirrers after 35 days of operation in a colorant section.
Azlac 321 has also found many uses in non-container markets. Burner blocks in oxy-fuel fired furnaces and lip blocks for the flat glass industry have been very popular uses for the new Azlac 321 material. A standard AZS lip block will typically last approximately 6 weeks in production while tests have shown that the same lip block in Azlac 321 will last as much as one year! This increase in refractory life saves the plant down time and eliminates the 6 to 7 extra lip block changes per year.
Interestingly enough, major fiberglass producers are very interested in using Azlac 321 material to replace the chrome refractories in wool glass furnace refractory structures. Trials are presently in progress and initial tests are very encouraging. In early 2003, a complete fiberglass forehearth superstructure system will be supplied in Azlac 321. This application will evaluate the quality and life of large block Azlac 321 structures.
An important economic feature of Azlac 321 is its ability to be processed in a traditional cast format. This affords the economic fabrication of complex shapes without the requirement for expensive mold and finish grinding costs.

## 4 – CONCLUSIONS

We at Emhart Glass are very excited about this new material, Azlac 321 and its potential benefits for the glass producers worldwide. Once again, Emhart Glass Owensville has proven its ability to sustain a leadership role in the development of superior refractory technologies.

***Fig. 2 - Azlac stirrers after 35 days operation in a colorant section.***