

REVIMAC: a notable track record in glass conditioning technology

With a proud track record of over twenty years in manufacturing automation and control systems for Working End and forehearth, REVIMAC continues to innovate with its hollow glass production technologies.

Introduced to the glass market in 2011, Revimac's E-Forehearth has since evolved over the years - passing from supply of the sole control system to that of complete channels, which include refractories, instrumentation and steel structures. Besides the design and supply of "green field" solutions, tailor-made solutions for upgrading and/or retrofitting existing installations have also been realised.

A FOCUS UPON OPTIMIZATION

Special attention is given to customer requests respecting design, for which 'optimization' is the keyword, given that every choice results from calculations and simulations received from the dedicated working software Finite Elements Method (FEM analysis).





Here, optimization concerns the following:

- Dimensioning: choice of working end size and forehearth according to pull and residence time so as to ensure the correct refining and conditioning of the glass;
- Energy saving: choice of the most suitable materials to reduce thermal loss and gas consumption as much as possible;
- Refractory resistance and durability: thermo-structural analysis to minimise mechanical stresses and increase refractories life time;
- Glass conditioning: conduction of thermo-fluid dynamic analysis to render glass cooling more effective under such critical conditions as, for example, a job change.

The above-listed points are absolutely mandatory in the supply of colouring forehearth where the technology of the materials used/produced -as

well as their design- definitely combine in making a difference to glass quality. Here certainly, in terms of NNPB production requirements, the Revimac system demonstrates its capability.

CONTROL SYSTEM RELIABILITY

Revimac's state-of-the-art E-Forehearth is among the most efficient glass conditioning systems on the market. An important unit in the hot-end area of the glass factory, the forehearth's total reliability remains a primary requirement.

REDUNDANCY

Owing to its scope, the control system is designed to be redundant. At its heart is a watchdog-managed twin CPU. With one being the master and the other a hot back-up (as fault troubleshooter), the CPUs are both operational. The concept of redundancy is further extended to the data transmis-

sion channels and signal acquisition modules.

An automatic switch-over is guaranteed in the event of failure, so avoiding any interruption in the process control.

Such non-redundant instruments as pyrometers and thermocouples can be managed in case of failure - assigning a substitute detection instrument until replacement. Here it's even possible upon initial system configuration to pre-assign the virtual replacement of measuring instruments.

Coupled with the software designed and tuned over the year, the components installed within the control system afford it a high level of precision, equipping it to maintain the set temperature with a difference of $\pm 0,5^{\circ}\text{C}$.

COLOURED GLASS PRODUCTION

Colouring forehearth are equipped with a frit dosing system as well as a stirring unit that's

CONTROL SYSTEMS



To remove the zirconia cord problem in the glass conditioning zone, the stirring unit can also be installed in standard forehearth. Three versions of Stirrers are available, each equipped with 2, 3 or 4 blenders respectively. These are spaced according to superstructure configuration and also depend upon customer needs. Here the stirrer unit adopts a gear-driven blade - both to increase system longevity and reliability.

REFRACTORY DESIGN AND LIFETIME

Structural strength is afforded by the Revimac self-supporting roof blocks, with the combination of several applied forces that guarantee the refractory blocks remain in position - thereby ensuring there is no collapsing within the channel, even in the event of severe breakage.

Glass contact channel blocks are manufactured with a 99 per cent alumina content and have

installed to blend the glass, during the process, within the forehearth. Taking severe working conditions into account, here resulting from the high temperatures, special attention has been paid to materials selection, both for the steel supporting frame and for the moving parts subject to wear - thereby improving their reliability while reducing maintenance operations as much as possible.

proven greatly successful over the years.

EFFICIENT DUAL-COOLING

Direct or indirect cooling can be used - the former on the glass surface, the latter by conveying the air through the overhead longitudinal tunnel. Either method is possible, as is a simultaneous combination of the two applied, which further offers independent adjustment of the opening of the two separate cylindrical exhaust stacks.

A SYSTEM THAT'S USER-FRIENDLY

The touch-screen operator interface displays real-time operational data of the forehearth as it's being controlled. Moreover, memorized production recipes are stored to assist operators with reducing down time.

The supervisor System can control up to 3 independent measuring instruments within every zone. Not only. It features a built-in industrial PC touchscreen operator interface as well as a PLC-based hardware that's controlled by a proprietary Revimac FCS Software Package - all equipped with a serial connection for Internet-Linked Remote Monitoring. Finally, individual control remains possible within each LH & RH independent firing zone. ■



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