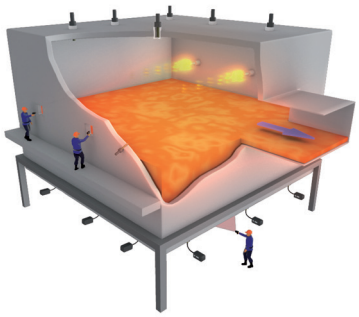
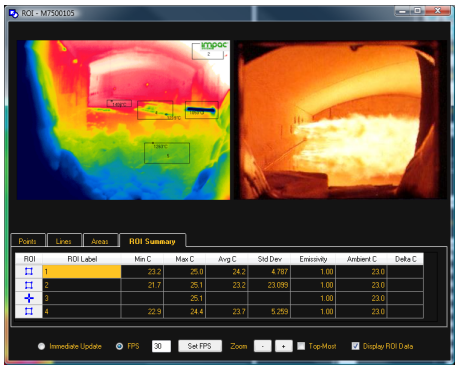
Application Note

FLAT GLASS MELT TANK MONITORING



Obtaining reliable temperature measurement in the melting tank



View of the melt tank with LumaSpec RT software

The Opportunity

Improved monitoring of the glass temperature can help ensure product uniformity and improve efficiency by reducing cycle time by controlling the melting process.

Energy consumption represents approximately 21% of the total cost of float glass production. The glass melting tank is where the process starts with sand, limestone, soda ash, and cullet fed into a furnace for melting. Furnaces can use fossil fuels or electricity for the heating process which represents about 80% of the total energy usage. While fossil fuels still remain relatively economical, nowadays electrical boosters are often used to enhance capacity or temperature uniformity.

Temperature Concerns

In glass production, viscosity is the most important parameter, and is directly related to the glass temperature. Bulk glass temperatures can be measured with radiation pyrometers more accurately and economically than traditional thermocouples. Choosing the proper pyrometer wavelength allows one to penetrate deep into glass and measure the bulk temperature accurately. Improved monitoring of the glass temperature can help ensure product uniformity, as well as reduce cycle time by controlling the melting process, thereby improving efficiency.

Protecting Critical Assets

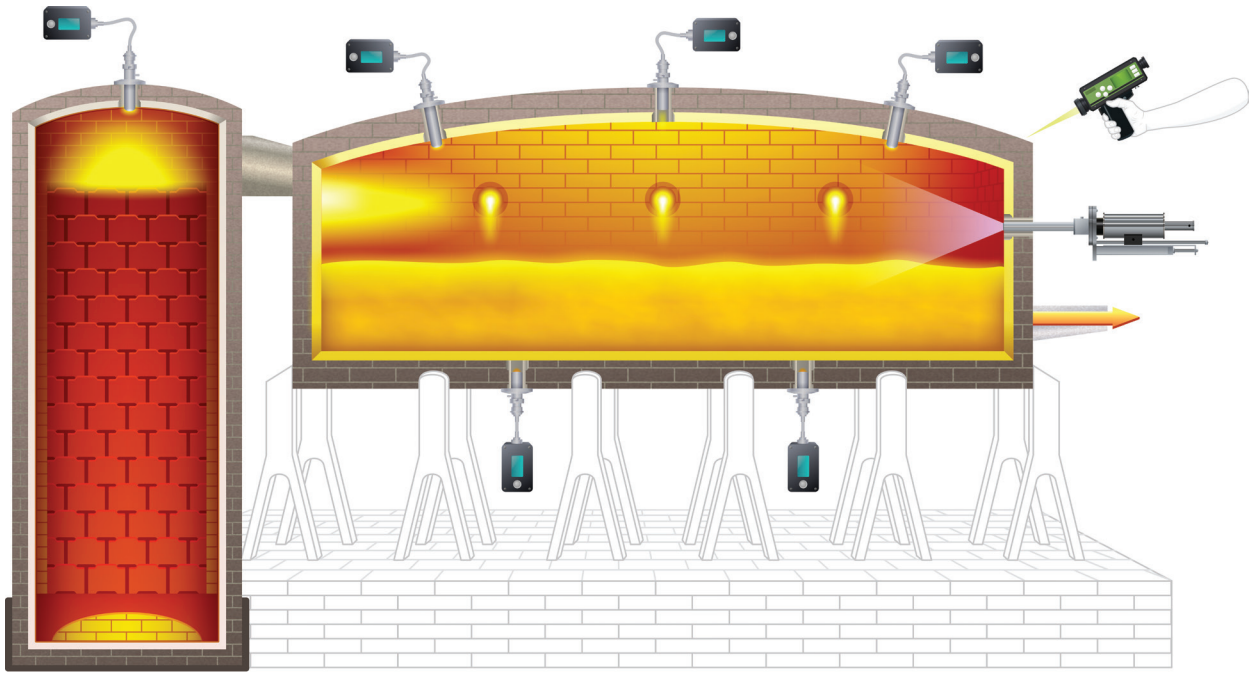
With the high temperature required for glass processes, the refractory in the melting tank faces severe challenges and should be monitored carefully. Molten glass is very corrosive, so the refractory for the bottom of the melting tank is of special grade and quite expensive. The refractory used for the crown area always encounters the highest temperature in the melting tank, so its life can be shortened if temperature is not monitored and controlled well. Port arch temperature provides good information of the furnace condition and is important for combustion monitoring as well. Monitoring the bridge-wall temperature can provide a furnace temperature profile to avoid overheating.

All of these applications can be addressed with radiation pyrometers or thermal imagers. When electrical boosters are used, radiation pyrometers also offer an advantage that the measurement is immune to the electrical current.

Our Solution

LumaSense has developed a complete solution for monitoring the glass melt furnace. This rugged, industrial design incorporates field proven components and is easy to retrofit into existing thermocouple wells such as on the crown refractory. The system can help optimize the furnace operation by measuring the bulk glass temperature, monitor or controlling burner output, and monitor the health of the refractory components.

- **IS 50-LO & LO/GL pyrometers**: Short wavelength infrared pyrometers that can be mounted in existing thermocouple wells, or through viewports, for internal refractory monitoring.
- **IS 8 pro and IGA 8 pro**: Portable pyrometers for mobile refractory monitoring and inspection with built-in measured data storage.
- **FurnaceSpection:** A wide-angle, water-cooled, and air-purged boroscope lens penetrates through a port to continuously monitor through natural gas flames the internal furnace refractory and glass temperatures.
- **ThermalSpection for Refractory:** A non-contact thermal imaging system mounted external to the melt tank to provide real-time, automated monitoring, and fault detection.



- ✓ **Direct, accurate measurement of the glass bulk temperature for improved control of the melting process**
- ✓ **Full thermal image profiles of the glass furnace to monitor & control firing profiles, and visualize furnace uniformity**
- ✓ **Improved monitoring of critical crown, bottom and side refractory components**

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