Application Note

STRESS-FREE SHEET GLASS PRODUCTION USING INFRARED TEMPERATURE MEASUREMENT

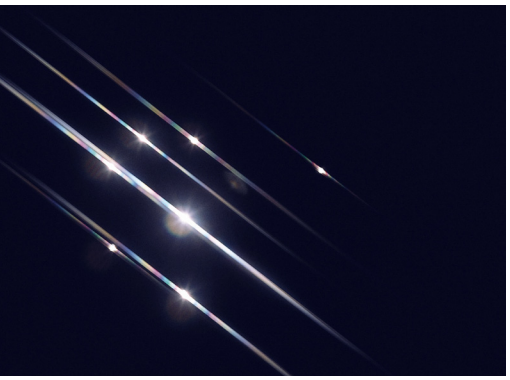

Figure 1: Ultra-thin glass presents a challenge for obtaining accurate temperature measurements due to very low emittance.

Figure 2: The IN 6/78-L pyrometer

Measuring Task

Measuring the temperature of ultra-thin glass (less than 1 mm thickness) can be a difficult task. Products such as cell phones and tablets incorporate this high-quality glass and require a low-defect rate. As the number of portable electronics that utilize ultra-thin glass rises, the need to monitor and ensure the quality of ultra-thin glass products drastically increases. Currently, manufacturers measuring ultra-thin glass must be creative in their temperature measurement processes.

In general, non-contact measurements work best if the emissivity of the object to be measured is high, i.e. transmittance and reflectance, are low. For flat glass, non-contact measurements are usually carried out at 5 µm as most glass (including quartz glass) with a thickness of approximately 1 mm or more has a sufficient emissivity at that wavelength (usually more than 90%). Below 5 µm, glass becomes mostly transparent, and in the often used wavelength of 8 ... 14 µm, reflectance is very high.

Avoiding transmittance or reflectance is very important for glass applications as the background or the walls in the ambient environment of the glass can be hotter than the glass itself and could negatively affect the measurements.

For glass used in displays of any kind (e.g. for smart phones, tablets, etc.), the tendency is to use thinner glass (< 1 mm) due to weight and energy reasons. But when using a 5 µm instrument for such thin glass, the material is no longer opaque. The transmittance rises and background signals can no longer be neglected at this wavelength.

Our Solution

The IN 6/78-L is a pyrometer at a central wavelength of 7.8 µm (range 7.5 µm to 8.1 µm) that instrument enables measurement of thin glass, including those less than 1 mm in thickness. The IN 6/78-L sets a new standard for thin glass temperature measurement on manufacturing lines around the world.

In the area around 7.5 µm, the transmission in glass with 0.2 mm thickness is sufficiently small and the reflection at 8.1 µm is still small enough. The anti-reflective lens, created using semi-conductor material, greatly reduces the enivironment sensitivity.

With a sensor-based design on a full digital core, the IN 6/78-L pyrometer enables a wide temperature range and improved accuracy over standard process temperatures. Infrared temperature measurement ensures improved accuracy, resulting in better control of the production process and lower stress to the glass sheet.

Benefits

- ✓ Stress-free sheet glass production
- ✓ Superior product design and quality
- ✓ Small form factor for easy integration
- ✓ Global support by locally available application engineers

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