

## High Temperature Capacitance Probes Monitor and Control Windshield Manufacturing Process

### Introduction

Remember the days when windshields were made of flat sheet glass? Not anymore. The complex shapes and designs of today's windows complicate the manufacturing process and significantly increase quality control measures. Maintaining a constant shape and thickness is required to reduce the possibility of failure from stress induced during the quenching process.



### The Problem

In order to maintain proper profile and thickness within a glass furnace the extrusion plate spacing must be maintained at a predetermined gap. Unfortunately, due to process changes and temperature swings this gap can fluctuate significantly in short periods of time. This variation causes the glass thickness to change, producing uneven temperature gradients and creating potentially weak glass panels. To control this critical parameter the manufacturing process requires automated active feedback control sensors installed into a very harsh environment.



### The Solution

Limited space, extreme temperatures and excessive vibration had to be considered in the solution design. After careful analysis, MTI Engineers designed a custom, passive capacitance probe capable of operating at temperatures exceeding 500oC. The probes featured "fail-safe" construction, eliminating the possibility of catastrophic failure should the probe cement be compromised from excessive vibration. The passive design removed all active elements from the measurement

area allowing for stable control of the extrusion gap. MTI selected the Accumeasure™ 1500 capacitance system, which allowed multiple measurement and control points. The high frequency response and minimum phase delay made it the ideal choice for closed loop control.

### The Results

The final probe configuration was a custom ASP-100-CTA sensor with a 0.5" (12.5mm) measurement range. Although the gap only fluctuated by +/-0.005" (125 μm) the large measurement range allowed for an increased probe operating distance and reduced the probability of probe damage. At 500 Hz frequency response the Accumeasure 1500 resolved measurements to less than 50 μin (1.25 μm) and provided continuous monitoring and real-time feedback control. This significantly improved product quality and virtually eliminated any scrap, saving \$1000's in the first month alone.

#### MTI Instruments, Inc.

325 Washington Avenue Extension  
Albany, NY 12205  
PH: +1-518-218-2550  
OR USA TOLL FREE: 1-800-342-2203  
FX: +1-518-218-2506  
sales@mtiinstruments.com  
www.mtiinstruments.com