

## Helmet Visor With Transparent Heater Technology for Defogging

*Application Note*

### PROBLEM

A helmet visor typically does not allow adequate ventilation between the occupant and outside air temperature. As a result, it can fog up or become coated with condensation, especially during critical operations when respiration rate is high, such as motor racing.

Past methods to solve this problem have involved attaching hoses or ventilation systems to the helmet. These attachments make the helmet awkward to wear and hard to maneuver.

Other methods have used a transparent heater with embedded wire between transparent polyester. This approach creates obstructions in the field of view.

### SOLUTION

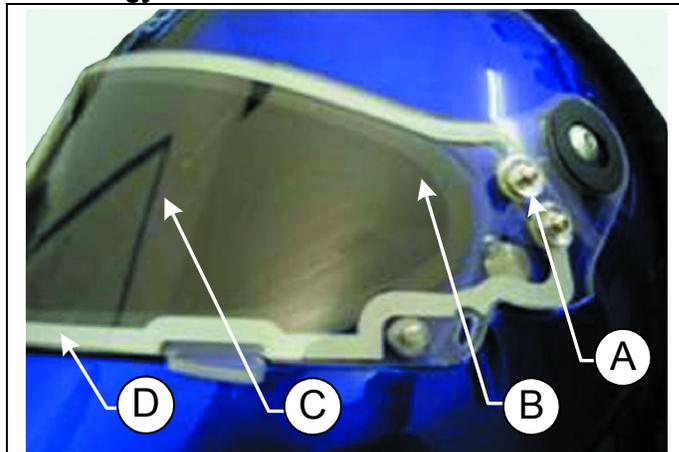
Honeywell, through the use of its ITO (Indium Tin Oxide) transparent heating technology, has designed a helmet visor with selective heating zones and multi-axis curvature lamination. (See Figure 1.) This technique successfully:

- Eliminates the cumbersome hoses and ventilation systems that can make the helmet difficult to wear.
- Eliminates the embedded wire between the transparent polyester, thereby increasing visibility.
- Allows the use of a more robust connection system when compared to embedded wire heaters. The snap-on connection system links to a wiring harness that allows connection to any power source, such as a vehicle or a portable battery.

### OVERVIEW OF PRESENT HONEYWELL TRANSPARENT HEATER TECHNOLOGY

- Sputtered ITO on transparent polyester film
- Printed silver or carbon bus bars to carry current
- Typical 85 % to 90 % visible light transmission (application dependent)
- Operating temperature range of -40 °C to 85 °C [-40 °F to 185 °F]
- Output up to 0.155 W/cm<sup>2</sup> [5 W/in<sup>2</sup>] (application dependent)
- Single temperature output (excluding loss factors) across surface
- Custom zone heating available

**Figure 1: Helmet Visor with Transparent Heater Technology**



<b>A</b> Quick release, snap-on connection system
<b>B</b> Face shield
<b>C</b> Heating area
<b>D</b> Conductors

### TRANSPARENT HEATER VISOR APPLICATIONS

- Motorcycle, automobile racing and sports helmets
- Military optics such as shields, night vision devices, aircraft canopies and rifle scopes
- Luxury sport and racing optics
- Luxury watches and time pieces

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