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### **NEWS RELEASE**

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### **INNOVATIONS IN GLAZING AND SEALING SYSTEMS**

Despite the current intense pressures for reduced cost, a number of innovations are taking place in the automotive window and sealing market. Probably the most significant innovations are the developments in thermoplastics to replace glass and rubber seals.

#### Glazing

A number of incremental innovations have been introduced over the last few years for traditional glazing systems. These have included:

- Laminated windows that provide reduced noise transmission into the vehicle.
- Tempered and laminated windows that reduce the extent of infrared transmission into the vehicle. This reduces the energy load on vehicle air conditioning systems.
- In a few cases, the use of colored glass so as to provide an upgraded look to the vehicle.
- Smart windows that allow for the optical properties of the window to be changed by the vehicle driver. For example, the Ferrari Superamerica allows the driver a choice of a number of settings for light transmission.

A foundation has been created during the last few years for the replacement of glass by plastic glazing. This has involved development of suitable:

- Materials
- Coatings
- Molding equipment and tools

We do not expect a major replacement nor a 1:1 replacement of a simple glass panel by a plastic panel. The replacement will occur where plastics' key benefits can be realized such as weight reduction, increased geometric flexibility, part integration and the use of an alternative supply base. For example, sunroof suppliers could mold the window rather than purchase a piece of glass. Exhibit One shows the growth in plastic glazing over the last few years.

The increase in plastic glazing is due to development in a number of key areas:

- Large part molding capabilities – suppliers, including both material and equipment suppliers, have been developing methods that allow for the large part molding of plastic windows with a minimum of internal stress. Such stress reduces the durability of coatings and leads to inferior optical properties.
- Innovative tooling – mold mechanisms have been developed that facilitate the reduction of stresses. An example of this is an approach that starts with a wedge-shaped opening.
- Coatings – plastic glazing requires hard coats in order to prevent abrasion. Suppliers claim that some of the latest approaches provide abrasion resistance close to that of glass.

### Thermoplastic Weatherseals

For a number of years, thermoplastic elastomer suppliers have been attempting to provide materials for dynamic exterior seals. They have met resistance by the OEMs' risk aversion and the extruders who have their own captive EPDM compounding capabilities.

In recent years, primarily in Japan, thermoplastic seals have started to replace EPDM. The replacement has occurred for belt line seals and glass run channels since:

- For belt line seals, component cost can be reduced by a combination of thermoplastic and rigid polypropylene replacing EPDM with a metallic reinforcement.
- The door designs of many Japanese vehicles allow the benefits of thermoplastics in a glass run channel to be exploited. Thermoplastics biggest impact is in the cost of corner moldings, which for smaller parts have a larger impact on the overall cost.

Recently, thermoplastics have found a number of applications on European and North American vehicles. Exhibit Two shows the growth of thermoplastics for glass run channel applications.

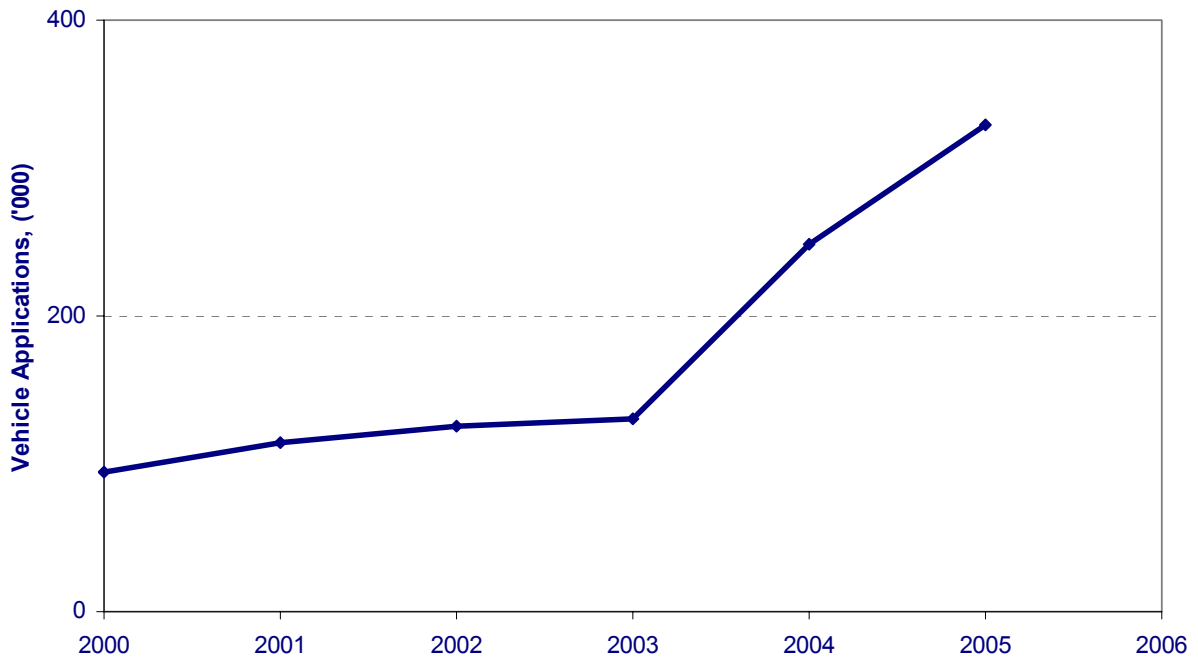
This recent growth has resulted from a number of factors including:

- Interest by a number of OEMs who felt that they can realize cost and performance benefits
- Aggressive marketing by material suppliers
- Innovations by traditional weatherseal extruders that optimize the benefits of thermoplastic seals
- Entrance of a number of smaller thermoplastic extruders that did not have in-place investments for the compounding of EPDM and resultant extrusion of EPDM seals.

The ITB Group, Ltd. (Novi, Michigan) has completed a new report analyzing the global window and exterior sealing market. The above is an abstract from this 396 page report that considers industry dynamics, design and styling trends, emerging technologies, sourcing trends and market developments. A material, process and supply analysis by vehicle in Europe, Japan and North America is provided.

Exhibit One

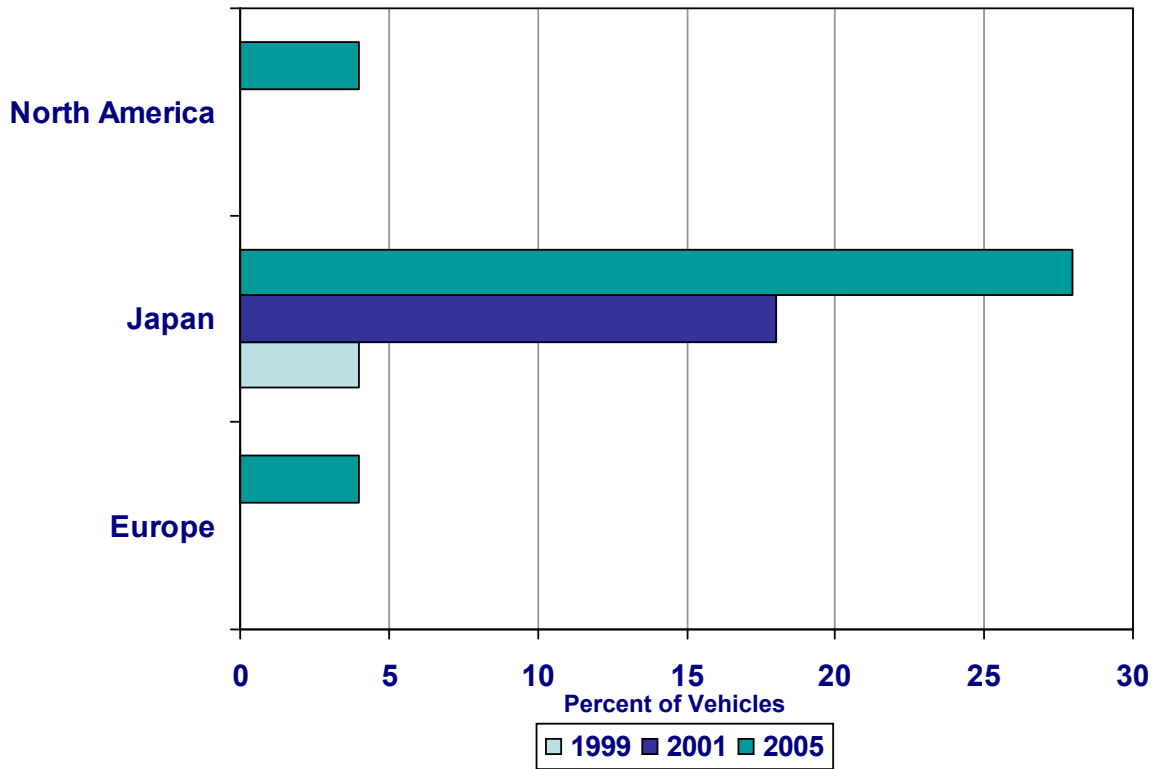
**European and North American Evolution of Plastic Automotive Windows**



Source: The ITB Group, Ltd.

Exhibit Two

**Growth in TPE Glass Run Channel Applications**



Source: The ITB Group, Ltd.