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NEWS RELEASE

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PLASTIC INTAKE MANIFOLDS – A COMMODITY?

The last five years have witnessed tremendous developments in engine design. For gasoline engines, design changes have included:

- The introduction of direct injection engines by a number of European OEMs after the earlier introduction of direct injection by Mitsubishi
- Use of variable cam systems with varying levels of complexity
- Further improvements in fuel economy and emission control

For diesel engines, developments have included:

- Move to direct injection and common rail systems by European OEMs
- Improvements in emission control especially particulate control

We may divide the areas of engine performance improvements into four major groups:

1. Consumer Preferences – This includes improved torque/rpm performance, styling of the engine and engine noise characteristics.
2. Improved Fuel Economy – The European market continues to show a strong desire for improved fuel economy. Engine manufacturers are looking at *downsizing* engines but at no loss of engine performance. Magnesium will play an important role in this trend.

3. Emissions Reduction - As Europe moves to EURO IV and EURO V and the US starts to implement the Federal Tier 2 and California's LEV II regulations, it continues to be imperative for engine suppliers to reduce emissions. A major reduction in emissions will be required in order to meet California's near zero emission requirements.

4. Cost Reduction – In the increasingly competitive vehicle marketplace, OEMs have placed increased attention on the need to reduce production costs. Materials optimization, modular components and facilitated assembly are all carefully considered for new engine introductions.

Air induction systems and modules play an important role in facilitating the engine to meet the above requirements. Such modules may include:

- Air intake system components (intake manifold, throttle body, air ducts, resonators, mass airflow sensor and air filter)
- Fuel injection system
- Ignition system
- Selected emission control components

The intake manifold forms a core component in an air induction system since it impacts the flow of air into the engine and acts as a *carrier* for a number of diverse engine components. Recent developments in intake manifold designs have included:

- Nylon 6 emerging as the dominant material for Europe and North America produced intake manifolds
- The continuing use of metals, including aluminum and magnesium, for some intake manifolds
- Vibration welding becoming the dominant process for plastic manifolds
- The use of active manifolds is increasing as OEMs seek improved performance and emission reduction (active manifolds allow the geometry of the manifold to be changed depending on engine speed)

- The use of exhaust gas recirculation (EGR) continues but its impact on material selection is sometimes small when EGR coolers or internal recirculation is used

- Noise, vibration and harshness (NVH) continues to impact the design and cost of intake manifolds

- New technologies such as active valvetrains could reduce the complexity of intake manifolds

Plastic intake manifolds have played an important role in improving engine performance while allowing OEMs to reduce the costs of their air induction systems. Exhibit One shows the breakdown in materials used for intake manifolds in Europe and North America. The exhibit shows that nylon is now used for the majority of intake manifolds in these systems.

Initial plastic intake manifolds were produced in nylon 6,6 with a lost-core process. A myriad of processes are now used as shown in Exhibit Two. The move to vibration welded manifolds has led to an increased use of nylon 6 compared with nylon 6,6. The processing window for nylon 6 is wider than that of nylon 6,6 for vibration welding.

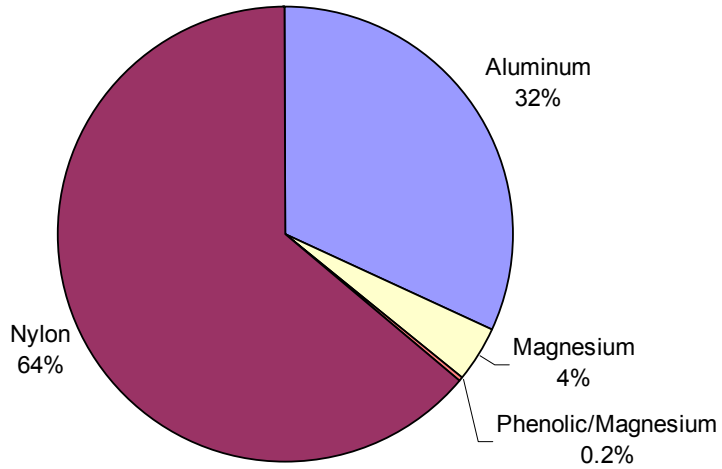
A number of intake manifold suppliers have considerable technical expertise. There is concern that plastic intake manifolds will become a commodity as OEMs strive for cost reductions. The funding of the development and engineering of highly technical parts will become increasingly difficult. OEMs will choose whether to further develop complex valvetrain systems or rely on complex air intake manifolds for meeting tomorrows' air induction needs.

The ITB Group, Ltd. (Novi, Michigan) has completed a comprehensive global analysis of the air induction market. This in-depth report considers industry dynamics amongst the induction system suppliers, the impact of evaporative emissions on induction system designs, engine and air induction design trends, and an in-depth engine-by-engine analysis of intake manifold production processes, materials and suppliers.

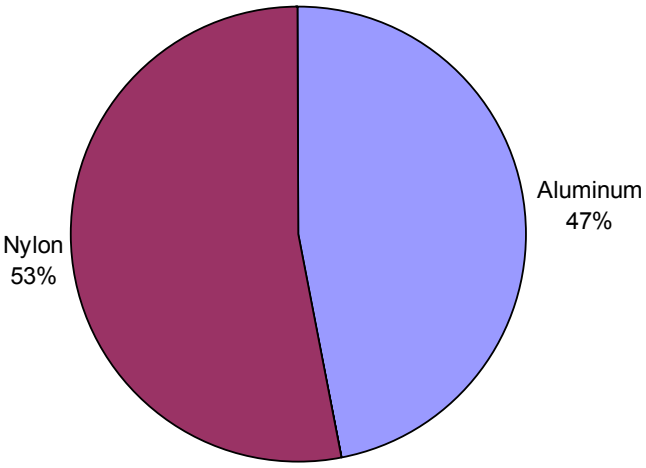
Exhibit One

Breakdown of Intake Manifold Materials by Percent of Vehicles 2003 Model Year

Europe



North America

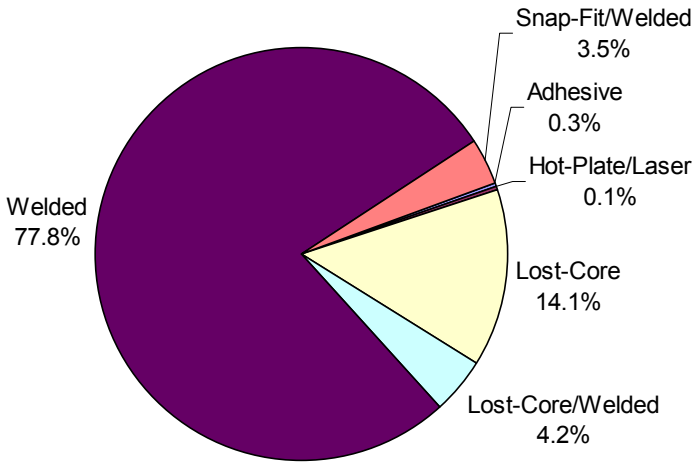


Source: The ITB Group, Ltd.

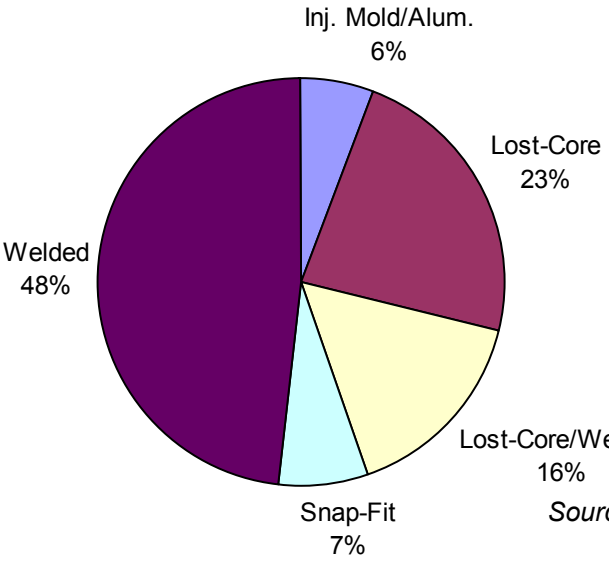
Exhibit Two

Plastic Intake Manifold Production Process by Percent of Vehicles 2003 Model Year

Europe



North America



Source: The ITB Group, Ltd.