Application Profile: Metal-to-Plastic Conversion

From Metal to Plastic: Transforming Carburetor Performance

An Opportunity for Partnership

A leading U.S.-based OEM of small engines set out to modernize its engine platform by replacing its traditional zinc and aluminum carburetor with a more advanced, efficient and scalable solution. The company's goals were ambitious: improve part performance, reduce cost and variability, eliminate secondary machining and meet evolving environmental standards, all while increasing production speed, quality and reliability.

Recognizing that its existing metal approach – dependent on die-casting, extensive machining and frequent tooling replacements – could no longer keep pace with performance expectations or manufacturing demands, the OEM saw an opportunity to pursue a metal-to-plastic conversion that could redefine small engine reliability.

The Challenge: Engineer and manufacture a highly complex, tight-tolerance plastic carburetor body – a component historically produced in zinc or aluminum because of the precision, durability and fuel-resistance it demands. Achieving the same dimensional stability, chemical resistance, airflow precision and long-term durability in plastic required pushing the limits of injection molding. The OEM turned to Hoffer Plastics to overcome these challenges.

Innovation in Action

To help its customer improve engine performance, reduce cost and variability, streamline production and meet evolving sustainability standards, Hoffer used a custom high-performance engineering-grade plastic formulation specifically for this high-demand fuel-system application. The advanced material maintains stable fuel pathways and precise airflow while dramatically reducing deposit formation – delivering cleaner, more consistent atomization, improved long-term reliability and fewer field failures than traditional zinc or aluminum components.

PRODUCT ADVANTAGES

Consistent Fuel Performance and Reliability: The custom resin blend maintains cleaner and more stable fuel pathways by resisting deposit formation and mitigating the clogging that commonly occurs within the metal part. This leads to improved air-fuel mixing, smoother operations regardless of fuel quality and a dramatic reduction in field failures and warranty claims.

High-Volume Scalability & Fast Response: Transitioning from die-cast metal enabled a manufacturing model with impressive cycle times, fewer tooling interruptions and significantly lower raw material inventory requirements. Hoffer's optimized molding strategy allows emergency fulfillment within as little as 48 hours, a level of responsiveness that metal cannot come close to.

Sustainability and Energy Efficiency: The plastic design delivers a much smaller environmental footprint than zinc or aluminum, using less energy, producing less scrap and improving logistics efficiency. Its lighter weight improves handling, simplifies assembly and streamlines transportation, supporting a cleaner and more efficient production model.

Commitment to Quality

With tolerances as strict as those found in machined components, Hoffer implemented daily Coordinate Measuring Machine (CMM) inspections across millions of parts, real-time process monitoring and disciplined tool maintenance supported by its in-house toolrooms. Additionally, communication was the cornerstone of success – constant knowledge-sharing, rapid troubleshooting and clear expectations for performance, risk and validation.

"Converting the carburetor from metal to plastic required a highly complex process that demanded close collaboration and deep technical expertise from the Hoffer and customer teams. Taking the proper time for R&D and ensuring transparent, proactive communication with the OEM so we could anticipate challenges and resolve issues in real time were critical to bringing this project to life. The transformation resulted in faster speed to market, a dramatic reduction in carbon footprint and performance gains that exceeded expectations. This shift also delivered significant cost savings to the customer and introduced a more efficient manufacturing process that was not possible with the metal design."

Marion Metz
Business Development Manager, Hoffer Plastics

Delivering Measurable Results

The OEM's transition from a machined metal carburetor to a precision molded plastic design delivered significant improvements across performance, cost and operational efficiency.

Stronger, More Reliable Field Performance – The new plastic design produced a substantial reduction in field failures, strengthening customer satisfaction and reducing warranty exposure.

Lower Cost & Higher Efficiency – The elimination of machining, combined with faster molding cycles and simplified logistics, delivered:

- Lower cost-per-part.
- Shorter production lead times.
- Increased production capacity and agility.
- Greater operational flexibility and responsiveness.

Rapid Return on Investment – Within the first year of full-scale production, the OEM recouped more than the entire investment in tooling, development, testing and program launch.

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