

Delphi Integrated Air/Fuel Modules (IAFMs)

Delphi Integrated Air/Fuel Modules (IAFMs) represent a systems approach to air/fuel control and measurement, consisting of an intake manifold and selected air/fuel components. Integration of active tuning and mixture motion devices enables vehicle and engine manufacturers to realize improvements in engine power, torque, fuel economy and emissions performance. In addition to the intake manifold, the modules can include:

- Fuel rail and injectors
- Electronic throttle control or mechanical throttle body
- Exhaust gas recirculation (EGR) valve
- Electronic actuators/solenoids (valve operation)
- Canister purge solenoid
- Positive crankcase ventilation (PCV) valve
- Intake manifold absolute pressure (MAP) sensor
- Engine cover (noise reduction and/or appearance improvement)
- Associated brackets and fittings
- Integrated gaskets and seals
- Captured fasteners for simplified installation
- Intake manifold air temperature (MAT) sensor

► Benefits

For standard Delphi IAFMs with aluminum manifold construction:

- High burst strength (elevated degree of structural integrity)
- Excellent radiated noise behavior
- High temperature resistance
- High stiffness for vibration-sensitive applications

For standard Delphi IAFMs with vibration welded composite manifold construction:

- Mass reduction
- Lower cost
- Reduced thermal conductivity
- Air flow pass surface improvement

Both the standard aluminum and standard composite Delphi IAFMs feature pre-tested modules with integrated components, including captured fasteners and integrated gaskets and seals to help manufacturers simplify installation, reduce manufacturing time, and help improve reliability.



Delphi Composite 6-cylinder Integrated Air/Fuel Module with active tuning



Delphi Composite 8-cylinder Multi-piece Vibration Welded Integrated Air/Fuel Module

For Delphi IAFMs with Active Tuning:

- Variable runner length or active plenum tuning provides engine torque enhancement over a broad RPM range.
- Mixture motion valve provides the ability to change the air turbulence inside the combustion chamber by closing during engine starts and light loads. Increased turbulence allows the engine to operate more efficiently, thus enabling exhaust emissions reduction and fuel economy improvement.
- Charge motion control valve (CMCV) is in closed position at engine start and light load condition. The closed valve generates large airflow tumbling motion inside the engine cylinder, which helps improve fuel economy and reduce exhaust emissions. The CMCV is in open position during heavy load engine operation to help achieve maximum engine power output. The CMCV offers lower cost than an air pump-based system to help meet California Air Resources Board (CARB) Super Ultra Low Emission Vehicles (SULEV) emissions requirements.
- Various electronic actuators with position sensing to meet customer requirements, including non-contact technology for accurate, reliable, and durable position sensing.



**Delphi Composite 4-cylinder
Integrated Air/Fuel Module**

▶ Typical Applications

Delphi makes IAFMs for passenger cars and light duty trucks, motorcycles, marine, power equipment, and other combustion engine applications. Delphi designs and manufactures intake manifolds in both metal and composite materials. Delphi's metal manifolds are appropriate for applications that use the manifold as a structural member of the engine or a conduit for exhaust gas, or in low production volume applications. Delphi's composite manifolds offer reduced mass, advanced design to aid engine performance, and are appropriate in most other applications.

▶ Performance Advantages

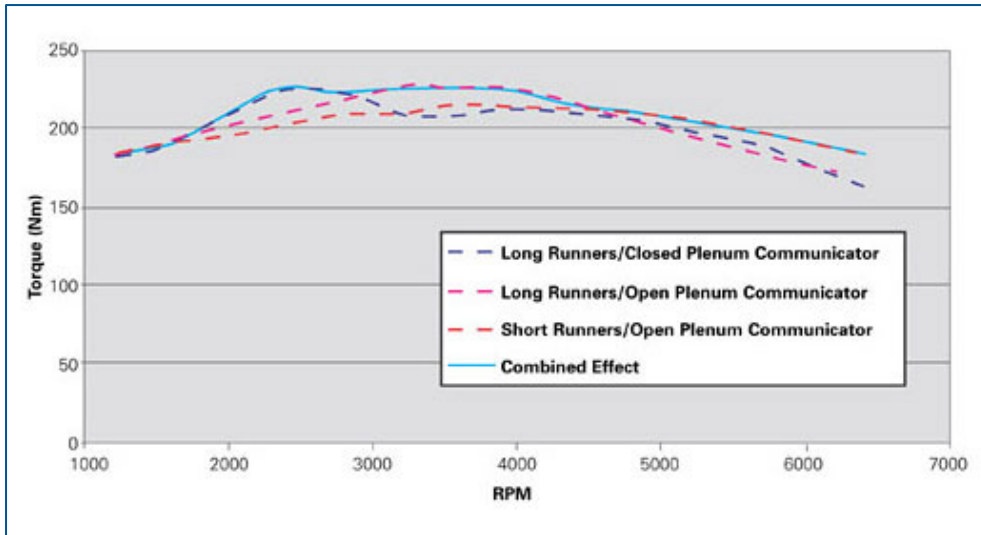
Delphi's IAFM production experience with automotive, motorcycle, marine engine applications can help guide manufacturers in the selection of the most appropriate materials and configurations for individual applications.

All Delphi IAFMs are developed with the latest analytical design techniques. Components and modules are bench validated in our fully equipped laboratories to verify conformance to customer performance and durability requirements. Engine and vehicle level product performance, such as engine power, and torque output, noise levels, and emissions can be characterized in our engine and vehicle dynamometer test facilities. Delphi also offers a broad range of other capabilities, such as flow and pressure performance at the system level, which can be accomplished by computational analysis and confirmed with physical test results.



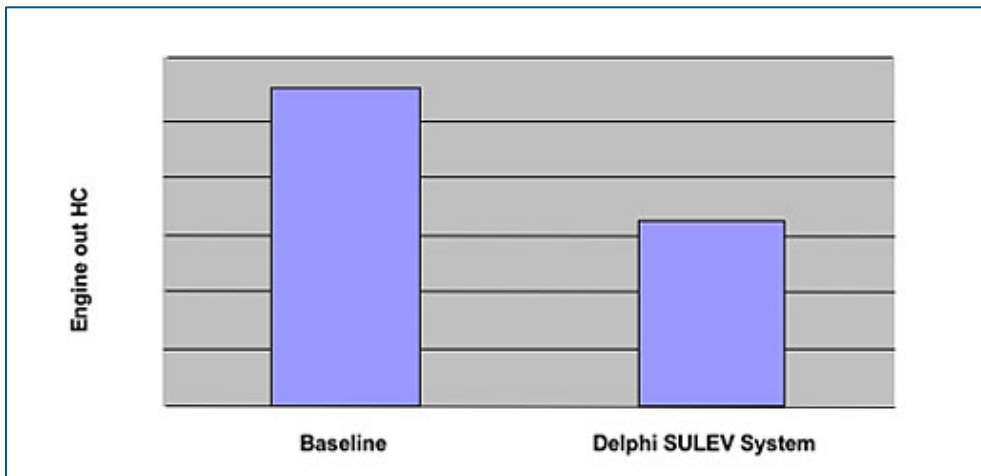
**Delphi Non-automotive
Integrated Air-Fuel Module**

▶ **Combination Active Tuned Manifold — Predicted Torque**



Delphi combines the active runner and plenum to create a flat, more consistent torque curve that provides improved torque over the entire engine speed range.

▶ **Delphi SULEV System with Charge Motion Control Valves**



Delphi charge motion control valve technology is a key enabler to help manufacturers meet California Air Resources Board (CARB) Super Ultra Low Emission Vehicles (SULEV) emissions requirements without an air pump.

▶ **The Delphi Advantage**

Delphi offers the benefits of more than 20 years' experience in the development and production of integrated air/fuel modules. Delphi has technical and application centers to support IAFM development in North America, South America, Europe, and the Asia-Pacific Region.

As a global leader in engine management systems technology, Delphi can help manufacturers around the world meet emissions requirements, improve fuel economy and enhance performance. Delphi is a source for high value solutions and our systems expertise is built into every product. Delphi's flexible engineering approach encourages collaboration. And, Delphi has a thorough understanding of automotive markets around the world and a global network of resources.