■ Continental Controls' Mixing Venturi VM-350. The venturi is available in three sizes with variations within each size to accommodate a range of engine sizes. The size and number of fuel injection ports are adjusted for each engine type as necessary. The dimensions of the VM-350, sized for 350 hp engine with stoichiometric air/fuel ratio are 5 in. (12.7 cm) length, 6 in. (15.2 cm) diameter, flanges as required.

AIR/FUEL MIXING VENTURI FOR NATURAL GAS ENGINES

Continental Controls Corporation Introduces Its Mixing Venturi VM-350 for Gas Engine Fuel Systems

A new and interesting product innovation has appeared on the market recently. Continental Controls Corporation has developed a venturi air/fuel mixing system, which, according to Rick Fisher, vice president, sales and marketing for the San Diego, California, U.S.A.- based company, will replace carburetors on natural gas-fueled engines. The mixing venturi, designated VM-350, is a device designed to precisely mix the fuel and air to be admitted to gas engines. It also has an option that measures the air flow to the engine. It is used with the Continental Controls ECV5 emissions control valve to replace the carburetor and pressure regulator on both rich-burn and lean-burn natural gas-fueled reciprocating engines.

The VM-350 and ECV5 can be used with any single or dual-bank natural gas engine in any application where one or more carburetors are used to meter fuel. The fuel metering is very precise in the venturi, which means, engines using two or more carburetors can be balanced to provide the same air-fuel mixture from two or more venturis. The ECV5 emissions control valve is used with an appropriate O_2 sensor to accurately control the fuel mixture for compliance with emissions regulations.

Applications of the VM-350 include rich-burn and lean-burn gas engines as

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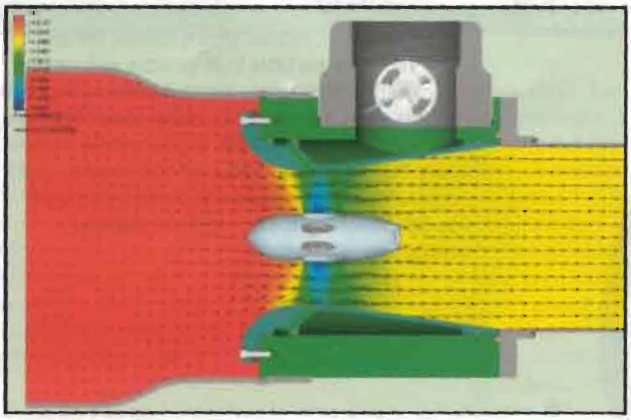

■ Crossection view of Continental Controls' air/fuel mixing venturi. The air inlet of the venturi is on the left. The dark green area is the measurement of throat pressure and is a result of the airflow through the venturi as sensed by the holes around the throat area. The gas inlet is on the top of the venturi. Gas is injected through multiple holes located around the periphery of the throat and the many holes located in each of the air foils connected between the venturi wall and the hub.

well as dual-fuel engines. For rich burn, the combination of venturi and ECV5 constitutes a true electronic carburetor for natural gas engines and when used with an O_2 sensor in the exhaust, it is an ideal devise to maintain a stoichiometric fuel mixture required for use with a three-way catalytic converter. With lean-burn engines, a wide range O_2 sensor is used with the ECV-5 and venturi to maintain a constant lean mixture or Lambda. The mixture can be programmed to change with the load signal if required. The wide range O_2 sensor is provided by CCC as a part of the system.

In dual-fuel engines, gaseous fuel is metered into the air stream of the engine with pilot-oil ignition to reduce the consumption of liquid fuel and emissions. The system also can be made to operate stoichiometricly or lean-burn with the use of the appropriate O_2 sensor.

During operation, the air to the engine flows through the venturi. The pressure at the throat of the venturi is sensed and is available at an external port. The pressure at the port can be measured with a manometer-type instrument. A calibration chart is provided to relate the pressure measurement to the volumetric air flow to the engine.

The gas fuel is injected into the air stream at the throat of the venturi through the many injection ports distributed along the circumference of the venturi and on both sides of the air foils located between the hub and the circumference of the venturi throat. The distribution of these ports assures fuel and air will be well mixed. The total area of the gas injection holes is sized to provide a pressure drop that matches the venturi pressure drop in such a way that the fuel injection pressure is near zero at all load conditions. If the heating value of the fuel drops and a larger volume of fuel is required to maintain the mixture, the ECV-5 increases the injection pressure to maintain the correct mixture automatically.

The mixing venturi can be supplied with a 4-20 mA output signal proportional to air flow. The air flow is proportional to horsepower. This signal is used as a load signal to the ECV-5 emissions control valve and provides a "feed-forward" control to change the pressure if required for different engine loads, eliminating the lag associated with the O_2 sensor and transportation delay of the fuel mixture through the engine. ■

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