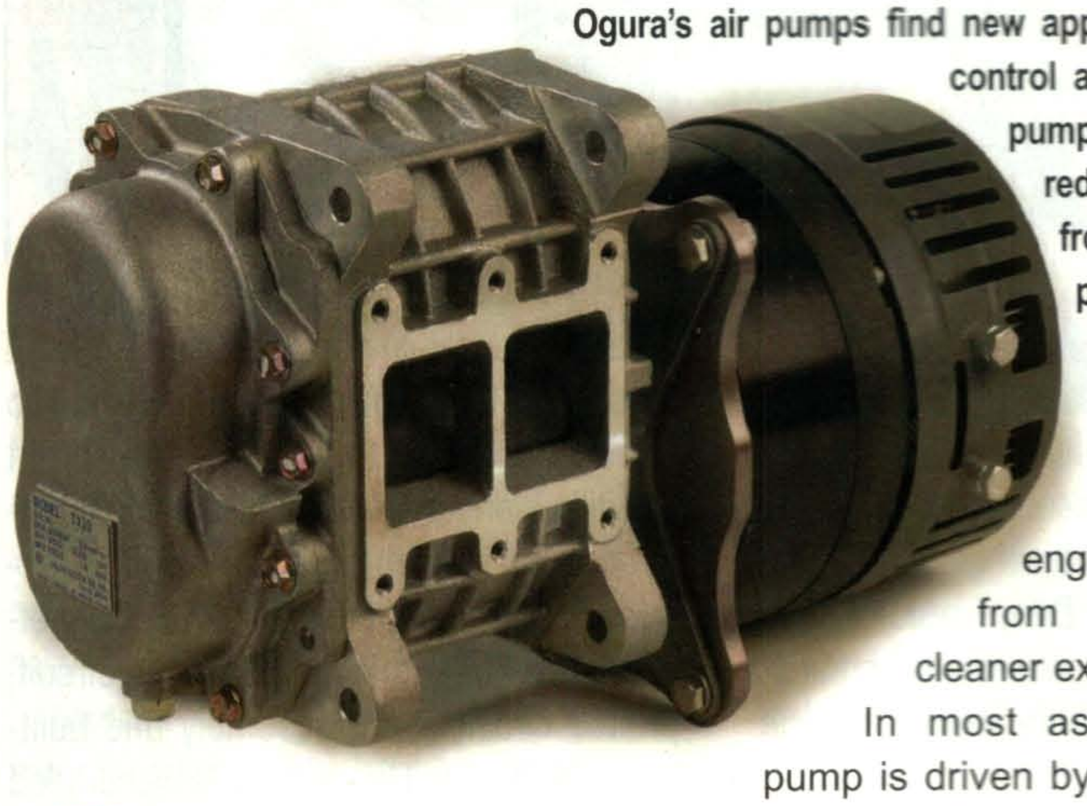
Air Pumps Find New Applications



Ogura's air pumps find new application in emissions control and fuel cells. The air pump (shown here) helps to reduce unburned gases from reaching the tailpipe by injecting oxygen into the exhaust stream.

Oftentimes, a product designed for one function is found to have applications not initially intended in the preliminary engineering plan. This was the case for electromagnetic clutch and brake manufacturer Ogura Industrial Corp.'s air pumps. While initially designed as a supercharger for gas and diesel engines, the air pumps were quickly discovered to work as an emissions control device for diesel engines and to reduce parasitic load on fuel cells.

Ogura's air blowers work by pulling air through a pair of smooth meshing rotors turning in opposite directions. Air is trapped in the pockets formed between the rotors and housing, and is pumped from one side to the other during every revolution of the rotor. The rotors are controlled by an electric clutch and have a Teflon coating, allowing them to resist wear and contamination.

As an emissions control device, the air pump helps to reduce unburned gases from reaching the tailpipe. The air pump injects oxygen into the exhaust stream to burn the hot exhaust gases that otherwise would escape through the engine exhaust. The injection of air is performed after the combustion chamber, so no additional engine power is gained from the blower, just cleaner exhaust, said Ogura.

In most assemblies, the air pump is driven by a poly V-belt connected to the crankshaft. To increase fuel economy, Ogura's air pump has an electromagnetic clutch controlled by the vehicle's computer, which disengages the pump from the system during driving cycles when the pump is not needed, such as during deceleration. In some applications the air pump also supplies air to the catalytic converter to reduce emissions of HC, CO_2 and NO_x, Ogura said.

In Proton Exchange Membrane (PEM) fuel cell applications the air pump is used to control the cocktail of air, water and hydrogen going into the fuel cell to generate electricity. By using an efficient blower, the PEM fuel cells have the ability to produce more power, weigh less and have less bulk versus conventional fuel cell assemblies, Ogura said. The air pumps are close coupled and direct driven by brushless dc motors powered by the fuel cell. According to Ogura, the air pumps are highly efficient, allowing them to reduce the parasitic load on the fuel cell in addition to reducing overall size and system cost.

In a fuel cell application, Ogura's air pump controls the air, water and hydrogen going into the fuel cell to generate electricity. The air pumps are close coupled and direct driven by brushless dc motors powered by the fuel cell.

Ogura's superchargers were originally designed to provide a boost of power in engines from 0.5 to 10 L, creating a transient torque increase of up to 300% at 1000 rpm, Ogura said. By using the supercharger, the company said, OEMs can specify a smaller engine as the supercharger provides the increase in torque and horsepower needed by the application.

The superchargers/air pumps are targeted toward applications that require high torque at low speeds or vehicles that have frequent start/stop cycles or are required to accelerate on hills. They can also improve the performance of off-road equipment, experiencing differences in unloaded and loaded weights. Ogura's supercharger is currently used in the 3.6 L Volvo Penta KAD42 diesel for marine applications and in the Kawasaki Ultra 250X jet ski with a 1.5 L engine rated 250 hp.

Based in Somerset, N.J., Ogura has 14 manufacturing facilities located in Japan, Southeast Asia, China, North America, South America and Europe. Its product portfolio includes more than 3000 clutch models, brake systems and air pumps. dp