Dynamic Heat Generators & Electric Clutches

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BY MIKE GARVEY, OGURA INDUSTRIAL CORP.

Island City LLC, located in Merrill, Wis., manufactures a range of products oriented to commercial and some specialty military vehicle applications. Unique among their products is a broad range of Dynamic Heat Generators (DHG). What exactly is a DHG and how does it work? Perhaps easier to say is: what it is not? It is not a heat source resulting from combustion or flame, nor is heat generated through an electrical system like resistance heaters. The DHG relies on the hydrodynamic effects of fluid shear, a by-product of which is heat.

Unlike systems that rely on combustion or electrical resistance heating, Island City's DHG is mechanically driven through rotational input. The input can be an electric motor; combustion engine such as gas, diesel, natural gas, or propane; or a rotary input such as a windmill or water turbine. The input of rotational energy results in fluid shear/friction, heating the fluid in the DHG, which is delivered to the point of use via flow of the fluid through the circuit. The enclosed system uses various fluids depending on the individual application. Fluids used with the DHG include: water, glycol, oil, and food products such as honey, maple syrup, corn oil, and tallow. Applications are numerous, but the main ones are heating for vehicle cabins and post heating diesel engines to help meet emissions.

The nature of the heater makes it ideal for use in cold and extremely cold environments. Gene Johnson, Island City's marketing director, notes that some of the earliest units they produced were used to maintain diesel engine temperatures in near Arctic conditions. The DHG can be configured to heat a variety of fluids and tailored to specific applications such as warming vehicle crew cabs, water for cooking and cleaning, as well as pre-heating hydraulic oil to prevent pump damage. The main key strengths of the DHG are fast temperature rise, no ignition source, and its robustness.

Island City's Model A1R300 & A2R300 were designed for school bus applications with a heat generation capacity of 25,000 and 63,000 BTU/HR (10 to 20 absorbed HP) respectively. Larger units span a breath up to 3,500,000 BTU/HR (1,400 HP) with a common operating temperature of 220F. Johnson notes that heat output can be regulated by speed. "For example, the smallest unit rotates at 3,600 rpm produces about 10 HP of heat load but at 3,000 rpm the output is reduced to approximately 6 HP. The electrical clutch offers flexibility to the system as the unit can be modulated."

The DHG can be configured in a number of ways — the most common is with an SAE pump mount on both input and output drive.

In addition to SAE pump mounts and AC mounts, Island City offers mounts for electric motors (NEMA). The NEMA mount allows both mounting to an electrical motor and serves as an output mount for a centrifugal pump in the process industry. Johnson notes, "While we started in the combustion engine market, the business sectors have taken us into many other markets. One of our strengths is our ability to build units which most companies would not even consider."

Island City has been developing electric clutch-driven versions of the DHG in collaboration with Ogura Industrial Corporation in Somerset, NJ. "Our DHGs are in service in very remote locations, northern oil fields for example," said Johnson, "so we insist on high quality and reliability in any DHG system component. Knowing Ogura's reputation in automotive applications and that their mobile pump clutches are designed to function and survive in harsh environments is critical in their consideration as part of our system. The availability of a wide range of torque capacities allows proper matching of clutch torque to DHG requirements. Ogura offers both belt and driveline inputs — providing design versatility, as well."

The on/off operation of the electric clutch provides flexibility in system design, according to Johnson. For example, in an engine-driven system, the engine control unit (ECU) monitors the point at which heat is required, switching on the clutch and turning it off when the desired temperature is achieved. The ability to modulate the system automatically through the ECU greatly simplifies operation and conserves horsepower.

Ogura mobile clutches are adaptable to different electrical systems as well since the clutch can incorporate coils appropriate to the onboard voltage of 12V, 24V, or 48V.

The convergence of company philosophies that demand robust reliable design and construction, wide versatile product range, and adaptability to individual application needs results in a natural fit in very demanding operating environments.

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