

Ignition Systems for Natural-Gas Engines

SAL BAIIO
**SULZER TURBO-
MACHINERY SERVICES**

In 2002, Sulzer Turbomachinery Services acquired Enpro of New Orleans, Louisiana (USA). Renamed as Sulzer Enpro, the company mainly serves chemical, ammonia, pipeline, and oil & gas production industry customers throughout the United States. It specializes in rotating as well as reciprocating equipment field service, equipment repair, and application of selected auxiliary equipment components.

► Sulzer Enpro Ignition & Control Systems, Inc., is one of two Sulzer Enpro companies. It focuses mainly on providing excellence in sales, application of components, and service of accessory equipment for natural-gas and diesel engines, as well as steam

and gas turbines (Fig. 1). The company has qualified factory-trained sales and service personnel experienced in design, fabrication, installation, and trouble-shooting of industrial ignition systems, control and monitoring systems, hydraulic and electric governor



1 Sulzer Enpro Ignition & Control Systems distributes, installs, and maintains ignition systems for large integral engine compressors in gas transmission service, as shown above.

control systems, as well as automated oil and grease systems. Sulzer Enpro Ignition & Control Systems maintains a large inventory in a climate-controlled area and is on call 24 hours a day.

The industries represented in its customer base include oil and gas production and exploration companies, gas transmission companies, oil and gas refineries, chemical plants, engine dealers and rebuilders, and marine towing companies. The customers are located both onshore in Texas, Louisiana, Arkansas, Mississippi, Alabama, Florida, Georgia, Tennessee, and Kentucky, and offshore on drilling and production platforms.

Digital Ignition System

The mid-1980s marked the beginning of a revolution in the gas engine ignition business. Sulzer Enpro Ignition & Control Systems, an authorized distributor of Altronic* CPU ignition systems, helped usher in a new era for

operators of reciprocating natural-gas-fueled engines.

Critical engines driving compressors, generators, and pumps have traditionally utilized mechanical, self-powered ignition systems of varying vintages and technological sophistication. The introduction of this new technology, devoid of any moving parts and relying only upon a handful of engine-mounted pickups, offered users a quantum improvement in operational efficiency, fuel economy, and reduced maintenance. It also paved the way for the introduction of follow-on technologies including ignition diagnostics and automatic spark characteristic control. The latest iteration of the CPU technology, the CPU-2000, brings all of these capabilities and more to users of large reciprocating natural-gas engines and integral compressors.

The Altronic CPU-2000 system (Fig. 2 and 3) for large gas engines and its sister product, the CPU-95 for medium and high-speed natural-gas engines, have changed the way customers think about their

ignition system. No longer is it simply a provider of energy to the engine's spark plugs, ignition systems like the CPU-2000 are now completely responsible for the accurate delivery of that spark energy, for automatically adjusting the timing of its delivery, energy content and the number of firing events, for diagnosing ignition- and combustion-related conditions, for communicating that information flawlessly to a supervisory controller, as well as for offering the user operational and troubleshooting simplicity. While clearly this is no small task, CPU ignition technology has been brought to literally thousands of natural-gas engines all over the world.

Cutting-Edge Technology

CPU technology is based on a process of "counting and firing" (Fig. 4). Utilizing a magnetic pickup counting holes drilled in the engine flywheel or starting ring gear teeth as an input to determine the position of the crankshaft, the CPU times the firing of each ignition



2 Altronic CPU-2000 modules mounted by Sulzer Enpro on an engine for a natural-gas pipeline company located in central Kentucky.

* Altronic Inc. (www.altronicinc.com) is a worldwide leader in industrial ignition systems for spark-ignited natural-gas-fueled engines.



3 For a refinery in the Caribbean Sea, Sulzer Enpro has delivered an Altronic CPU-2000 ignition system.

output against the engine-firing pattern programmed into the ignition system. Thus, as the crankshaft rotates, the CPU counts the pulses from the flywheel, waits for the appropriate number of pulses as stipulated by the pattern, and fires the output. This process continues in sequence until all of the outputs have been fired and the unit receives a reset from a second magnetic pickup referenced to the flywheel. On larger, integral compressor-style engines, this process is repeated approximately five times per second (300 rpm). For high-speed reciprocating engines operating at 1000–1500 rpm, the process of firing all of the outputs and performing the reset could

4 Magnetic pick-up cables en route back to a CPU-2000 logic module. The installation and maintenance of such ignition systems require trained and experienced personnel.



occur as many as 25 times per second. What this means to the user is highly accurate ignition timing and all of the benefits associated with it, including reduced engine detonation (knock), improved fuel economy, and reduced operating costs.

Installation and Maintenance of Ignition Systems

Over the last 20 years, application experience and innovation has allowed for the introduction of add-on enhancements to this proven technology. The CPU-2000 system can automatically adjust the amount of delivered energy to the spark plug as a means of reducing their rate of erosion and extending their service life while simultaneously insuring reliable combustion. Multi-strike functionality is now incorporated, which allows a user to automatically fire the plug four times in rapid succession to reduce engine misfire. Proprietary system diagnostics, including those monitoring the primary and secondary discharge of the ignition system, are also included to provide the user with a quick and efficient means of detecting problems with the ignition system or the combustion process. Recognizing that it is often operating in concert with other engine monitoring and control systems, the CPU-2000 can also effectively communicate using control protocols such as ModBus RTU.

With over a thousand CPU-2000 systems in the field, and literally tens of thousands of other digital ignition systems in service, this technology is proven. Every day, customers use systems like the CPU-2000 to assure reliable service and improved fuel economy, or

as part of an emission reduction strategy. Sulzer Enpro Ignition & Control Systems continues to offer new and innovative ignition, instrumentation, and control products to gas engine customers in pursuit of operational improvements to their engines. ◀

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