

Drive & Control profile

Converting Trash to Electricity



Montenay's old hydraulic system was designed in Germany and used a main power unit with gear pumps stacked together and submersed in tanks, making them difficult to access and repair.

Like the old saying goes, one man's trash is another man's treasure. And in the case of Montenay Energy Resources of Montgomery County, Inc. (www.montenayenergy.com), a waste-to-energy facility located in Conshohocken, PA, many a man's trash is being burned to produce an unending treasure of electricity.

Go with the Flow

Each day Montenay Energy processes tons of household garbage and municipal solid waste at its 20-acre site. Here the

waste is converted to thermal energy, which is used to produce electricity for 30,000 homes. No, it's not magic, but it is pretty amazing that this facility can burn trash 24 hours a day and reduce the solid waste by 90 percent in volume and by 75 percent in weight. For every 100 tons of trash, Montenay Energy generates more than 50 megawatts of electricity and sends just one-tenth of the volume to the landfill in the form of ash. Many, including the Environmental Protection Agency, approve of this process as an

Challenge

Upgrade the hydraulic system that controls the rate at which trash is fed into the incinerator and revise the entire power unit for each boiler.

Bosch Rexroth Solution

- Four top plate pump motor groups each with A10VSO pressure-compensated pumps and new electric motors.
- Pressure controller to maintain constant pressure within range of the pumps.
- Proportional flow control valves to control the fluid flow independent of pressure and temperature variations.
- Valves controlled by existing PLC.

Benefits

- Reduction in the number of gear pumps powered by one electric motor from six to one.
- Variable in-feed speed.
- Optimum feed rate and burning quality.
- No downtime.

alternative to discarding tons of garbage in landfills, especially since the garbage never stops coming.

Recently, Montenay Energy upgraded the system that helps control the rate at which trash is fed into the incinerator. Many difficulties plagued the older hydraulics responsible for this portion of the process, but with the help of the Bosch Rexroth Hydraulics service group in Bethlehem, PA (www.boschrexroth-us.com), Montenay successfully incorporated the new equipment into its facility.

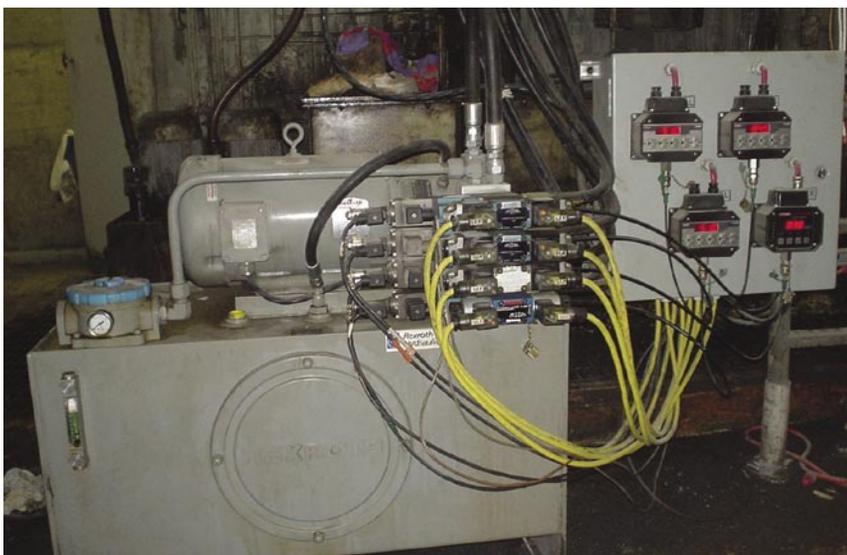


The system had 24 submersed gear pumps that set the cylinder movement rate for multiple sets of identical cylinders.

For years Bosch Rexroth has managed the hydraulic systems used in waste-to-energy facilities from New York to Newark. Typically, hydraulics is used within the incineration process to ram or feed the trash into a large boiler and then extract the ash. When Montenay needed to enhance its current hydraulics

system, plant operations and maintenance manager John Polidore consulted with Bosch Rexroth service engineer Keith Metz. The two had worked together on a previous project

at Montenay to solve a corrosive hydraulic fluid problem. According to Polidore, he was so pleased with the results of their initial work and the ensuing relationship with Metz that he felt comfortable calling on Bosch Rexroth again for help on this major overhaul.



Airline Hydraulics Corporation helped Bosch Rexroth test the new power unit operating the entire feed system for one boiler to prove the unit could control the cylinders using the model 2 FRE 6 valves and VT 5010 driver.

Montenay's hydraulic system was designed in Germany and used a main power unit with 24 submersed gear pumps. The gear pumps set the flow rate for multiple sets of identical cylinders that feed the trash into the boiler by controlling the movement of grates within the boiler. The grates are moving plates inside the boiler that shuffle the trash along as it burns. The problem with the design, as Polidore knew and Metz quickly discovered, was that because of the use of fixed displacement pumps the grates were moved and then stopped for a

variable period of time, depending on the process conditions. During the stopped periods, weldments would frequently occur causing the grates to seize and prevent movement. This in turn would eventually force the unit to be removed from service for repairs. In addition, the gear pumps were stacked together and submersed in a tank, making them difficult to access and repair.

Metz offered Polidore an approach that called for the replacement of Montenay's 24 gear pumps with four Bosch Rexroth A10VSO-DR size 18 pumps, which are pressure compensated. A pressure controller maintains a constant pressure within the range of the pumps;



The new gear pump design has reduced the number of gear pumps to one per electric motor. Previously, six gear pumps were powered by one electric motor. (The unit will actually be positioned with the motor on top and the pump hanging down submersed in the fluid tank.)



The gear pumps pass the flow through Rexroth model 2 FRE 6 proportional flow control valves, which allow an electrical signal to control the fluid flow independent of pressure and temperature variations.

therefore, the pump supplies only the amount of hydraulic fluid required. The pumps then pass the flow through Bosch Rexroth model 2 FRE 6 proportional flow control valves. Proportional flow control valves are two-way valves that allow an electrical signal to control the fluid flow independent of pressure and temperature variations. Each valve assembly comprises a proportional solenoid with inductive positional transducer, a metering orifice and a pressure compensator. The valves are controlled by Bosch Rexroth VT 5010 electrical amplifier cards with electrical position feedback, and the cards are commanded by Montenay's existing PLC.

Polidore accepted Metz's proposal and Bosch Rexroth assembled a temporary unit at its facility and delivered it to Montenay as a complete power unit for testing. Airline Hydraulics Corporation (www.airlinehyd.com), a Bosch Rexroth distributor located in Bensalem, PA, helped to test the



Bosch Rexroth revised the entire power unit for each boiler using four top plate pump motor groups each with Rexroth A10VSO pumps and new electric motors.

power unit operating the entire feed system for one boiler to prove the unit could control the cylinders using the model 2 FRE 6 valves and VT 5010 driver.

“Working together, all the components in the Bosch Rexroth hydraulics package have successfully allowed Montenay to ensure cylinder synchronization,” said Bill Hludzinski, Airline Hydraulics sales engineer.

Once the testing was complete, Montenay asked Bosch Rexroth and Airline Hydraulics to revise the entire power unit for each boiler using four top plate pump motor groups, each with Bosch Rexroth A10VSO pumps and new electric motors. Previously, six gear pumps were powered by one electric motor. That number has now been reduced to one gear pump per motor. Along with manifolds, Airline Hydraulics and Bosch Rexroth were also responsible for tying into Montenay's existing system and field piping

to complete the installation. In addition, each boiler required eight model 2 FRE 6 valves and eight VT 5010 driver cards and associated electronic hardware.

Polidore was responsible for writing the front-end software program that applies the internal boiler conditions and allows the hydraulics to react to operating conditions.

“Using conditions such as temperature and pressure, the hydraulic system controls the motion of the boiler in-feed. Electricity is then ultimately generated from the steam produced by the boiler,” described Polidore. “The system is capable of varying the in-feed speed based on boiler operating parameters.”

Metz added that the pressure-compensated pump and pressure-compensated proportional valve control the hydraulic flow throughout the cylinder cycle to achieve optimum feed rates and burning quality.

Montenay successfully operated the temporary test unit during the entire changeover process because, as Polidore stated, “The plant cannot afford downtime and the trash never stops coming.” He says Montenay manages a facility in California, where they are planning to upgrade their in-feed systems with the new Bosch Rexroth hydraulics design.

Rexroth
Bosch Group