GENERAC®
INDUSTRIAL POWER

MILWAUKEE SCHOOL OF ENGINEERING
Milwaukee, Wisconsin

CASE STUDY

CHALLENGE:
Provide reliable and redundant power to an educational building with a supercomputer.

SOLUTION:
Generac 600 kW MPS solution consisting of two paralleled 300 kW generators.

RESULT:
A redundant solution utilizing multiple Generac natural gas units providing reliability and flexibility while ensuring peace of mind.

"We wanted to get the absolute top of the line items we could get across the board."

Safeguarding Next-Generation Technology

Students at Milwaukee School of Engineering are abuzz. Rooms are filled with students learning on the leading edge of technological revolution and it is all thanks to the university's latest project. MSOE's newest building is helping to make the university an educational leader in artificial intelligence (AI), cyber security, deep learning, cloud computing and other next-generation technologies. The $34 million Dwight and Dian Diercks Computational Science Hall is a 65,000-square-foot facility that provides modern classrooms, innovative laboratories, an auditorium and spaces to support companies who collaborate with MSOE. A major feature of the facility is a data center, which houses a NVIDIA GPU-powered AI supercomputer. The supercomputer offers undergraduate students the ability to apply their learning in a hands-on environment to prepare for their careers by computing and solving real-world problems in their course work.

"A supercomputer has no limits," said Rick Thomas, information technology director, MSOE. "It is very high speed and allows you to do massive amounts of computations all simultaneously, where a normal computer is bound by a processor." Thomas said for the students at MSOE, it provides an unique experience that will help them in their future careers. "We were very fortunate to be able to grow a new program with a supercomputer at the core," he said. "They are learning how to program to use a supercomputer, it's learning how to get the results they are looking for and how to not waste time and cycles and all at a higher level that most other schools don't have access to."

The supercomputer, Rosie, is housed in a state-of-the-art data center on the second floor of Diercks Hall. Rosie's name was inspired by the women who programmed one of the earliest computers - the Electronic Numerical Integrator and Computer (ENIAC) and captured in the documentary "Top Secret Rosies - The Female Computers of WWII". More than 100 of the most advanced NVIDIA GPUs power Rosie. Thomas said one of the most critical pieces to operating a supercomputer is power. "Supercomputer queries often run hours into days," he said. "Power is absolutely critical for us because if we lose power in the middle we will have lost that whole bed of work and it all has to

APPLICATION:
Education

SYSTEM CONFIGURATION:
600 kW MPS

MODELS:
2 x 300 kW Natural Gas

be re-set up, re-established and re-started and nobody wants that."

It isn't just the data that would be lost. According to Dr. Blake Wentz, professor and MSOE's owner's representative for the Diercks Hall construction, it would be catastrophic to the equipment itself. "If the computer lost power, it would probably overheat and melt," he said. "The real problem is not the computer shutting off; it's the air conditioning system shutting off to it. There is roughly $1.5 million worth of equipment in that room. It is very important to make sure the power stays on."

To protect their new investment, MSOE determined there was a need for a backup generator. Before specifying a generator, there were many things to consider, including total electrical demand load. It was determined the total electrical demand load for the facility was estimated at 1550 kVA with the total load being placed on the generator at 600 kVA. The major applications that needed to be backed up included the supercomputer standby loads, facility emergency loads and a 20-percent growth factor for the facility loads. Another key factor was spacing. The campus is located in a compact metropolitan area and outdoor space for the generators was limited.

Keeping all considerations in mind, MSOE turned to Generac and Wolter Power Systems for help. In the end, the system that was recommended included two Generac 300 kW 480/277 V natural gas standby generators. "Due to the compact nature of the project, a rooftop application was necessary," said Jason Lelewicz, Wolter Power Systems. "We first needed to make sure we had small, light units for weight distribution on the roof. The area was so compact, traditional cranes could not be used to transport the units to the roof. A specific crane had to be built onsite to handle the installation." For protection against the elements, the generators have a weatherproof, Level 1 acoustic enclosure.

Generac and Wolter Power specified a Modular Power System (MPS) for redundancy and scalability. Generac's MPS makes generator paralleling easier by removing the need for traditional switchgear. With integrated paralleling, MSOE can start with a smaller kW to meet their initial power needs and can add on units as their power needs grow.

"We have planned for the future of what five or ten years from now would look like," said Wentz. "There is a pad ready for a third generator that we can add later because if we expand out the supercomputer, the load just keeps getting bigger. But the redundancy to make sure that no matter what happens; the computer was safeguarded, that was important."

The corresponding electrical distribution is located in a dedicated emergency electrical room in the garage, which is also where the automatic transfer switches are housed. The paralleling electrical distribution feeds four automatic transfer switches serving the fire pump, life safety loads, optional standby facility loads and optional standby supercomputer loads respectively. The major life safety systems include the fire alarm systems, door

security systems, life safety lighting and exit signs. The major standby loads include IT rooms on each level, supercomputer loads and the associated mechanical equipment.

MSOE said providing backup power to the supercomputer was important, but not as important as life safety systems. “It is an academic facility,” said Wentz. “There are a lot of students running around and we really want to make sure that they are safe. In case something were to happen, we want to guarantee that they can get out of the building quickly and safely without any issues.” Generac was able to guarantee that at least one of the two generators would be serving life safety loads within ten seconds.

MSOE and Generac have had a long-standing relationship and MSOE said the relationship is a natural fit. “Our students have a really strong work ethic,” said Jeff Snow, vice president of development, MSOE. “The values that we have as an institution and the values our students graduate with align very well with those of our corporate partners.”

MSOE said it was an easy choice to go with Generac. “The big driving factor for us was simply with this supercomputer and with this building, we were not going to spare any expense,” said Wentz. “We wanted to get the absolute top of the line items we could get across the board for everything.”

Wolter Power and Generac are extremely proud to be a part of this project and are pleased to be able to help support the future leaders of our economy. “This was a special project to be a part of,” said Lelewicz. “With the help from Wolter Power and Generac, young engineers will have the opportunity to understand and develop new ways to improve data center up time.”