# Minneapolis–St. Paul International Airport

Minnesota's Minneapolis-St. Paul International Airport, located just south of the twin cities, is situated on 3,400 acres of land with two terminal buildings, 76 jet-loading gates, three runways, and over 17,000 parking spaces. Servicing 13 passenger airlines, three international carriers, and 19 freight carriers, the heavily trafficked airport serves more than 35 million passengers per year and was recently ranked as the seventh busiest airport in the country per number of passengers.

The airport is currently in the midst of its five-year MSP 2010 plan, a $2.8 billion expansion program encompassing improvements to the airport terminals, airfield, parking facilities, and roads. Completed renovations include the addition of moving walkways and construction of a new 3,500 square foot conference center. Other improvements involve automating several key plumbing-related systems. For these projects, MSP has contracted the services of Minnesota Control Company.

Specialists in industrial automation and process control, Minnesota Control Company is using a collection of Opto 22's popular serial products including the G4 I/O modules, B100 brain boards, and SNAP-LCM4s (with fiber-optic repeaters) for automating and monitoring the airport's domestic and retail hot water supply, which includes all water used in the main terminal and its various concourses for public restrooms, restaurants, and so on.
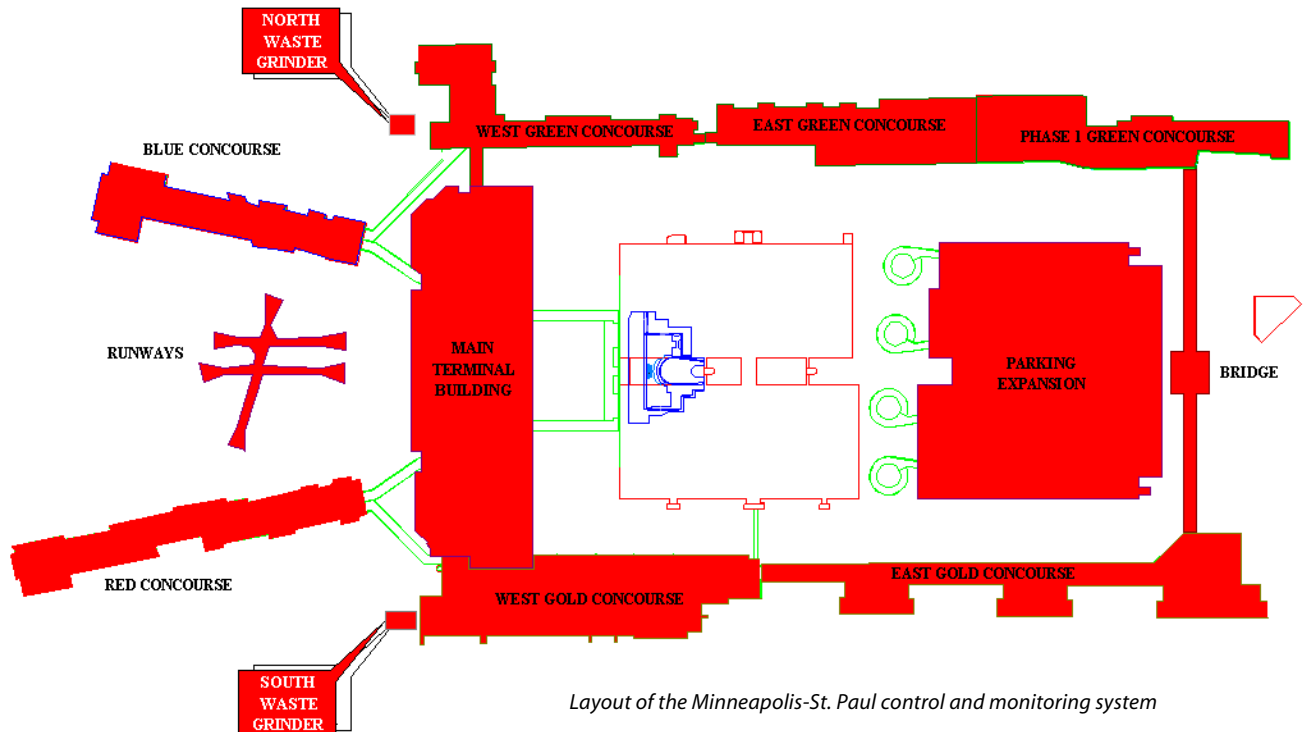
Layout of the Minneapolis-St. Paul control and monitoring system

This same hardware is also used in the valet parking lot's automated car wash to ensure that hot water and soap levels are adequate.

Other critical systems at the airport now automated and controlled by Opto 22 hardware include the aircraft waste grinder systems, which are used to treat all wastewater from the aircraft's chemical toilet holding tanks before it enters the city's sewer system. A number of grinder stations are located throughout the flight line area to perform these services for the various airlines as needed.

Also now automated is the terminal's waste cutoff control system. "Originally, all waste from the terminal would flow into large holding pits and passageways underneath the main terminal where it would then be pumped out into the city sewer system," explains Tim Fox, MSP's Foreman of Plumbing Facilities. "But with all of the recent development and expansion here, many underground areas are now being used for offices and storage. As a result, any backups in

Domestic hot water control panel outfitted with Opto 22 SNAP controllers and I/O system

these areas would now create a severe bio-hazard and make the airport subject to scrutiny from labor unions, OSHA, and other regulatory agencies."

Now that the waste cutoff control systems are installed, the system can sense fault conditions and immediately shut down all sewer and water supply lines should emergency conditions occur. "Having a backup safety system like this in place not only ensures our regulatory compliance but also gives all of us a little more peace of mind," says Fox.

The photos above show one of the numerous mechanical rooms with hot water plumbing systems. This system is controlled by the domestic hot water control panel.

About Minnesota Control Company

An industrial automation and process control specialist, Minnesota Control Company is located in Waseca, Minnesota, about 50 miles south of Minneapolis-St. Paul. The company specializes in system integration, industrial automation, product design, and control panel building for customers in several industries, including food production, fluid handling, glass coatings, metal, mining, transportation, water control, water filtration, and wastewater treatment.

Minnesota Control Company is also the only registered Opto 22 system integrator in the state. Not only does the company design and build its control systems with Opto 22 hardware, it also sells new and replacement Opto 22 components and has completed projects for customers in Minnesota, South Dakota, Wisconsin, Iowa, Illinois, Indiana, Ohio, Missouri, Nebraska, Canada, Mexico, and China.

Remote waste cutoff control panel with pit level control

Minnesota Control Company has also deployed Opto 22 systems for MSP to monitor floor drains on the roofs of all the airport buildings. "Standing water is a problem on any flat roof," says Mike Behsmann, President of Minnesota Control Company. "We have some very harsh winters here in Minneapolis, and though the airport buildings all have heated roofs, when the snow up there melts, you have to have some kind of system in place to ensure proper drainage and prevent flooding and water damage." The solution was to install proximity sensors near the drains to ensure there were no blockages.
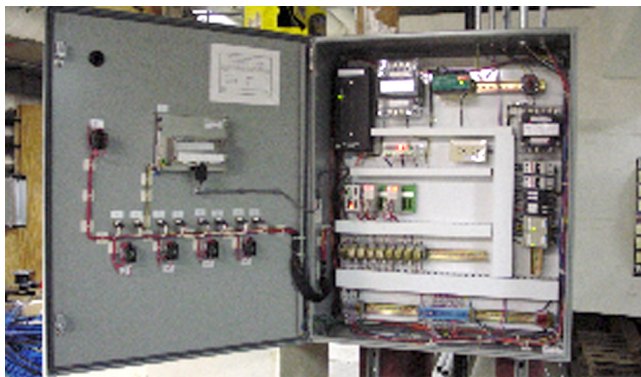
The MSP's waste cutoff control panel with remote operator interface and emergency backup manual controls

These sensors connect to the G4 I/O system, which is configured to notify airport plumbing personnel when and where a drainage problem occurs.

The same technology used in the roof monitoring equipment was modified and used in numerous catch basins, underground tunnels, and service pits underneath elevator shafts throughout the airport. In these underground areas, Opto 22's SNAP hardware monitors the sump pump system and other mission-critical activities and equipment.
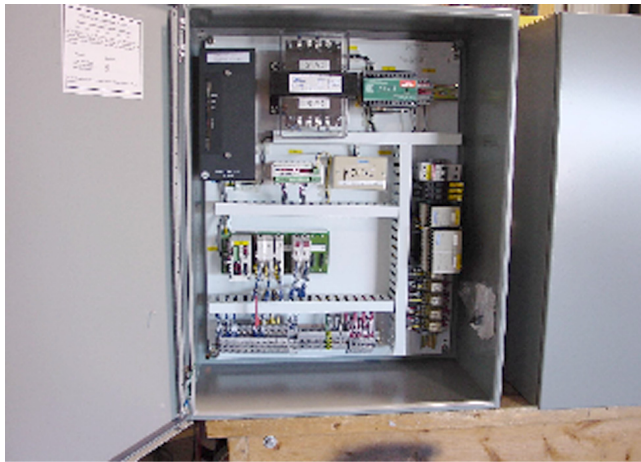
All of this system data is delivered back to a fiber-optic local area network (LAN) running InTouch™ industrial automation software from Wonderware®. InTouch provides remote control functions plus real-time and historical statistical analysis and performance trending. Specter Instrument's Win-911® and Win-411® software is used to detect predefined alarm conditions and generate alerts via video, audio, pager, or standard voice telephone.

One of the many roof monitoring panels using Opto 22 G4 I/O with SNAP-LCSX Controllers

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Benefits of the Implementation

To date, all the automation projects completed by Minnesota Control Company at MSP have been well received by the customer and have contributed to the airport receiving some very positive recognition. Thanks in part to the improvements made by Minnesota Control Company as part of the MSP 2010 plan, in July 2001 the International Air Transport Association named Minneapolis-St. Paul International the "Best Large Airport in North America" and sixth best in the world for overall customer satisfaction. Earlier in 2001, the *Wall Street Journal*, in a review of the nation's 20 busiest airports, awarded MSP a four-star rating. The publication rated the airports based on a number of factors, including the number and range of amenities available to travelers and the quality and cleanliness of the restrooms. MSP has also been praised by other international airports for its efficient snow removal operations, which have resulted in the airport being closed less than two hours a year, on average, by adverse weather.

Moving Forward

Currently underway is the construction of two new concourses that will require two domestic hot water systems, one waste grinder system, and four more sump pump monitoring and control systems.

The Minneapolis-St. Paul Airport is on track to be completely automated by 2010. Next on the list for Minnesota Control Company is the baggage handling and terminal snowmelting equipment. To meet the challenges of automating these facilities, Behsmann says that he will gradually be turning towards Opto 22's Ethernet products. "I've been using Opto 22 hardware for over 20 years and SNAP Ethernet just offers so much more in terms of faster communication and connectivity options for automation, control, and remote monitoring types of applications."

Behsmann also plans to explore the advantages of deploying Opto 22 Wireless LAN I/O for Ethernet networks. "We're obviously going to need FAA approval, but it's definitely something we'd like to utilize in the future."

One of the many sump pump panels outfitted with Opto 22 SNAP controllers and I/O systems

About Opto 22

Opto 22 manufactures and develops hardware and software products for applications in industrial automation, remote monitoring, and enterprise data acquisition. Using standard, commercially available Internet, networking, and computer technologies, Opto 22's SNAP systems allow customers to monitor, control, and acquire data from all of the mechanical, electrical, or electronic assets that are key to their business operations. Opto 22's products and services support automation end users, OEMs, and information technology and operations personnel. Founded in 1974 and with over 85 million Opto 22-connected devices deployed worldwide, the company has an established reputation for quality and reliability. Opto 22 products are sold through a worldwide network of distributors, partners, and system integrators. For more information, contact Opto 22 headquarters at 800-321-OPTO or visit our Web site at www.opto22.com.

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