

CUSTOMER CASE STUDY

InTouch Edge HMI was selected by Sandbags for operation of its sandbag filling machines to improve overall production efficiency and flexibility of communication.

Sandbags
Industry - General Manufacturing

Goals

- To improve the monitoring capabilities and control of existing sandbag machines.
- To enable effective communication between remote sites throughout the U.S. and the Sandbags Network Operations Center in Las Vegas.

Challenges

- The company needed an efficient system to keep pace with producing 2,000 sandbags per hour.
- The large number of drivers needed to interface communications with the machine's SCADA system required a powerful application to manage the substantial HMI engineering and development tasks.

Solution

- InTouch Edge HMI

Results

- Effective communication was established between all Sandbags sites throughout the U.S. and the Sandbags Operations Center in Las Vegas.
- The system can now easily communicate and interface with a variety of disparate devices.
- Real-time data and site video is provided to the operations center for management of site security.

Sandbags Relies on InTouch Edge HMI to Help Save Lives and Property

LAS VEGAS, Nev. – Every year, 4 billion sandbags are produced for use during natural disasters to protect people and property. In addition to becoming lifesaving tools during floods and storms, sandbags are also used to provide a steady base for oil, gas, and water pipelines because they provide consistent, flexible weight that enables them to be effective barriers and ballast in a variety of applications.

One sandbag manufacturer, Sandbags, enlisted the aid of Quantum Automation in creating a system that would improve the monitoring capabilities and control of their existing sandbag machine with AVEVA InTouch Edge HMI.

For this process, sand gets loaded into a hopper on the Sandbags Super 50 trailer. As the conveyor screw turns, equal amounts of sand are loaded into the measuring cylinders. The sand then drops on the next screw rotation into the sandbags.

The sandbags are then sewn automatically and dropped onto the conveyor. They are then hand loaded into large totes, which are placed onto a flatbed truck delivery to customer sites.

Creating a process for efficient filling of sandbags

Sandbags partnered with Quantum Automation to improve the efficiency of its sandbagging process machine. Initially, the original machine automation was to be controlled by a C programming language application running under Linux.

During the early Alpha Development Phase of the machines, it quickly became apparent that the large number of drivers needed to interface communications with the machine's SCADA system, combined with requirements of its Las Vegas-based Sandbags MES Network Operations Center, required a powerful application, along with substantial HMI engineering and development costs.

Use of C programming language also would make security, updating, and ongoing maintenance of the machines unreasonably expensive and complex.

This required a completely different solution, so Quantum Automation implemented the Advantech UNO-2184, running Windows 7 Professional computer. It provided the ability to use native InTouch Edge HMI drivers to integrate the machine processes.

Additional required design features included alarming, Microsoft SQL Server Connectivity for MES and historisation, emailing, FTP file transfers, graphics and design tools, intellectual property protection, embedded ActiveX controls, OPC, reporting and PDF exporting, a usable symbol library, thin-client configuration, trending, and troubleshooting.

Fortunately, all of these applications were included in InTouch Edge HMI, enabling the team to avoid using the extremely difficult C programming language application which would involve a great deal of development time and effort.

There were other technical challenges as well. The Sandbags machines, located at various sand quarries within the United States, needed to communicate via Cellular Modem, Wi-Fi, or LAN (Local Area Network) back to the Sandbags Network Operations Center. Each location provides video streaming from two on-site Industrial IP cameras.

The machines also send local ambient environmental information taken from an on-board AirMar® WeatherStation®, along with machine status and utilisation metrics from the PLCs and the operator interfaces back to the Sandbags Operations Center. These design features required a solution that could easily communicate and interface with all these disparate devices.

InTouch Edge HMI Dashboard illustrates critical operations information

On each Sandbags Super 50 Machine, there is an Advantech UNO-2184 industrial computer running Windows Professional with a runtime version of InTouch Edge HMI. Each operates an eWon EW2620A, which is a secure cellular remote access router providing VPN (Virtual Private Network) remote access, alarm notification, and software updates. The eWon unit also utilises remote troubleshooting of the PLC and operator interfaces as well.

The Sandbags Super 50 Sandbag Machine also features a Moxa AWK-5232-US Industrial IEEE 802.22a/b/g/n dual wireless AP/Bridge/Client. When the device is in the “Wi-Fi Communications Mode,” InTouch Edge HMI sends streaming video from both cameras plus the PLC data along with the AirMar WeatherStation application which communicates real-time, site-specific weather information back to the Sandbags operations center.

Located in the Sandbags Network Operations Center, an Advantech HPC-7480 Mission Critical Server runs Windows Server 2008, along with a Windows 7 Professional machine, and an InTouch Edge HMI application displaying the operation. A detailed operations dashboard shows weather information, alarms, location, and the overall performance of the machine.

Currently, the eWon eFive VPN Appliance communicates to 25 individual sandbag machines in the field. However, it can be upgraded to communicate with 100 remote machines in the future.

Detailed on-site monitoring improves operation efficiency

The on-site video streamed from the machine provides security, operational assurance, and visual communications to assist the company in making the jobsite more efficient. In addition, by recording the entire sandbagging process operation, it provides a video record in the event of an injury or other incident at the jobsite.

The AirMar WeatherStation has a GPS to determine where each Sandbags Machine is located for asset management tracking requirements. It also provides wind direction and speed, along with barometric pressure for forecasting precipitation and weather events, in order to determine if they need to stop production because of extreme weather-related issues.

Each PLC and operator interface provides round-the-clock control and status of each machine. The PLCs track sandbag counts from the two conveyors and compares the count against the maximum theoretical speed to determine process efficiency.

It also provides a total bag count for the day, week, month, job, etc., for billing and MES purposes at the Sandbags Network Operations Center. The PLCs also monitor the status of the generators for maintenance cycles, and the metrics are used for overall process availability calculations.

Historical MES data and metrics are also stored pertaining to the production of the sandbags and machine operation, such as yield, bags per hour or day, and weather data. Emergency button usage for each machine is also tracked throughout the system.

The integration was completed on the Sandbags Super 50 sandbag machines by Dynapac, with special attention given to component/electrical grounding to minimise EMI (Electromagnetic Interference) and RFI (Radio Frequency Interference).

Since sand is abrasive and can quickly damage computers, and since many of the company’s sites are located in remote or inhospitable areas where the temperature extremes can reach more than 120°F (48.9° C) during the day, the electronic components are placed in stainless steel enclosures fed with clean, chilled air to reduce the internal temperatures, which helps shield EMI and RFI.



Field operators can use wide range of mobile devices

InTouch Edge HMI provided engineering assistance in configuring the web-based thin client and the mobile access applications, which are used for the iPad and Android mobile devices used on-site and at the Sandbags Network Operations Center.

AVEVA InTouch Edge HMI enables OEMs, panel builders, and end-users to quickly create intuitive, secure, and highly maintainable HMI applications for intelligent machines, and on a variety of small-footprint devices such as cell phones and PDAs using embedded operating systems.

Customers can seamlessly integrate machine and panel data directly into the Supervisory HMI system, making machine information more accessible to operations and management for a broader understanding of the entire operation. It also provides greater control, faster response times, higher operating efficiencies, and lower total cost of ownership.

The results

Sandbags plans to build approximately five more of the Super 50s and five Super 44s, with each machine using InTouch Edge HMI runtime application on an Advantech UNO-2184s residing on board.

This created a much more professional, easier to maintain final product resulting in greater projected operating efficiencies, substantially lower overall project developmental costs, and provided the project managers with predictable results and the success of the project.

The integration of InTouch Edge HMI with the Sandbags' Super 50 machines, enables the company to continue providing emergency organisations, such as FEMA and local agencies, the ability to protect and save more lives and property.