RUSKIN INSPECTOR SYSTEM VS OTHER AUTOMATION OPTIONS

Every large building, including most hospitals, has a building automation system. These automation systems are designed to maintain the interior climate comfort and required ventilation including the correct number of air exchanges per hour. A modulating combination fire-smoke damper can be part of the environmental control system, eliminating the need for a "redundant" modulating control damper assembly. Redundant damper assemblies increase pressure drop and subsequent fan power consumption. A modulating combination fire-smoke damper, controlled in environmental mode by the automation system can be used to control a variable air flow. For the purpose of testing and monitoring a damper-open and a damper-closed switched are used to prove the damper's position is as expected.

Two position dampers are usually assumed to be open when energized, so unless the damper is part of the environmental control system it serves little purpose to monitor its position. When the damper is monitored by the automation system for the purpose of remote testing, two digital inputs are required. One input indicating damper-open and one input indicating damper-closed. To facilitate automated damper testing one digital output is required and is used to interrupt power to the damper during a test. When indicator lights are required to indicate damper status on a remote panel then two additional outputs are required to control the operation of these lights. This would require five digital points per damper, two inputs and three outputs.

What if we want a light that indicates the damper is faulted? Then add another output for an alarm or indicator light on the damper. This would be a total of six digital automation points per damper. A minimum of three points and a maximum of 6 points are required, depending on the required sequence of operation and whether or not remote indicator lights at or near the damper are required. Each point adds cost. (The Ruskin Inspector system has remote indicating LEDs on every damper indicating damper open, damper closed, faulted, powered, traveling and communicating)

The time it takes to develop a graphic user interface (GUI) adds to the cost of the automation system. The GUI is used to facilitate easy identification of the dampers in the system, their current status and location in the building. Control programming for a touch screen to control the operation of the damper from the GUI will take some time depending on the size and complexity of the system. (Touch Screen GUI is standard on the Ruskin Inspector System)

Control programs are written to facilitate damper monitoring and alarm generation when a damper is not in its expected position. A periodic testing sequence with event and fault logging must be written and tested to make sure it works and that it doesn't generate nuisance alarms. An automation system must accommodate automated damper testing and report generation to document damper testing is being done to meet testing requirements for the authority having jurisdiction. (These are standard features of the Ruskin Inspector system)

A well designed system should show the damper status and generate the following alarms:
Damper OPEN – Normal Condition

Damper commanded Closed, No Fault
Damper CLOSED – Fault Condition
Damper test, FAILED to Close
Damper test, FAILED to Open
Damper missing, Loss of communication, (typically caused by local power loss)
Damper NOT OPEN OR NOT CLOSED, Traveling (or modulating)
(The Ruskin Inspector System GUI has the above features as standard)

Building automation control is accomplished through a network of one or more dedicated controllers with input output (IO) points located on each major piece of equipment. Additional IOs are added to accommodate the required point count based on the number of sensors and devices controlled by the building automation system. Control programs are developed to support the desired sequence of operation. Small universal controllers often have four or eight inputs and two or four or more outputs, depending on the brand and features required.

For example, in a building with fifty, two-position combination fire-smoke dampers, the automation system would need to have or add 150 digital points for a total of three I/O points per damper.

Price per point estimates are typically used to cover the cost of control hardware, engineering, installation, wiring, control programming, commissioning and building operator training. The price for these systems can be anywhere from $150 to $650 per point or more depending on the size and complexity of the system. Prices widely vary from vendor to vendor based on market dominance in different geographic areas of the country. Each controller requires a base program to support the device with a control program that will execute the sequence of operation. Development of these building automation control programs can take anywhere from several weeks to several months to develop. (The Ruskin Inspector System utilizes distributed I/O with one FSDI-C card per damper and utilizes a standard control program)

Using the building automation system to accomplish remote damper testing and monitoring can often be price prohibitive if left in the hands of the automation company.

The Ruskin Inspector System is a dedicated system, designed specifically for the purpose of fire-smoke damper monitoring and periodic testing. This system has been installed at college campuses, science building, medical centers, jails, hospitals and office buildings in the US and abroad. This damper testing and monitoring solution is completely separate from the building automation system has been available from Ruskin for over a decade.
This proven technology includes features developed specifically for the testing and continuous monitoring of fire-smoke dampers using distributed IO cards, one per damper. It is a PC based system using an imbedded Windows operating system, touch screen control and an industrial PC with no moving parts. Dedicated damper testing and monitoring systems include automated testing and easily facilitates continuous monitoring while fully automating required testing, logging test results for the

authority having jurisdiction. (These features could be supplied on a building automation system given enough time and money.)

The Ruskin Inspector FSD PC (Fire-Smoke Damper PC) monitors each damper using a dedicated fire-smoke damper interface, one per damper. The interface cards are built specifically for this application with the correct amount of IO required per damper. Interface cards are powered with the same voltage used to power the fire-smoke damper actuator so separate control power for each damper interface is not required. The interface cards include LED indication showing the status of the interface card and the connected damper. Fire-smoke damper interface cards for typical two-position dampers have two inputs and one output with two auxiliary inputs for the purpose of monitoring the status of other associated equipment such as smoke detectors or air measurement equipment. Fire-smoke damper interface cards are also available to interface with modulating and three position balancing dampers. The fire-smoke damper interface cards communicate with the FSD PC using a two wire network that can be connected in a daisy chain fashion using open end or closed loop connections.

The FSD PC with touch screen provides a user friendly graphic interface showing the status of each damper with color keyed icons using green for normal or open and red for faulted. Simply touching a damper icon on the FSD PC screen displays its specific information including size, actuator type and location. The FSD PC continually monitors all the dampers in the system and generates an alarm anytime a damper is no longer in its expected position. Using the displayed information it is then possible to facilitate immediate repairs when necessary because all the damper's information, model number, size, actuator type, location are displayed on the screen.

Periodic testing is accomplished using Windows Scheduler to set how frequently dampers are to be tested. The desired month, day, and time is easily set. The result of each test is logged for the authority having jurisdiction, documenting that the system is being regularly maintained and tested. Because this testing can be accomplished with no additional cost, frequency can be as often as is practical. Like an automated lawn-watering system, the system automatically starts and then cycles through each zone or in this case each damper, until all the dampers in the building have been tested. Dampers that are critical for the operating rooms or for large supply and return ducts can be selected for omission from automated testing and are then tested remotely when it is verified that the space is not in use or the AHU can be safely shut down and restarted. Automation sequences can be easily developed that will temporarily stop AHU fans and then restart when the supply and return or all dampers in a zone have been closed and reopened. The system is designed to close only one damper at a time so as not to disrupt normal activities or building pressurization. All dampers can be tested at the same time during a scheduled shutdown or sequentially. If testing is interrupted for any reason the testing continues with the next damper in the system instead of starting over.

When considering a system that has manually operated remote damper test switches and panel mounted indicator lights, also consider a fully automated system with all the capabilities of a building automation system that can be installed for nearly the same labor and hardware costs but provides many more features typically only found in a building automation system.