

Building Automation Systems

Many people wonder what Building Automation Systems do. Building Automation Systems (BAS) are mainly used in commercial HVAC (Heating, Ventilating and Air Conditioning) control systems and energy management system applications. Building Automation itself is an energy management system which saves management companies and building owners by efficiently controlling air conditioning, lighting and heating comfort systems and thus staying “green”. BAS is where mechanical and electrical systems and equipment are joined with microprocessors that communicate with each other and to a computer. This computer and controllers in the building automation system can be networked to the internet or serve as a stand-alone system for the local peer to peer controller network only. Additionally, the BAS controllers themselves do not need a computer to operate efficiently as many of these controllers are designed to operate as stand-alone controllers and control the specific equipment they are assigned to control.

LSUHSC-Shreveport uses Johnson Controls, Inc.’s Metasys, a sophisticated BAS software. All of LSUHSC building controllers are connected as a network via LAN/ARCNET. LSUHSC has several workstations strategically located around the campus from which technicians can monitor or command or program BAS controllers and equipment. A computer in LSUHSC Physical Plant is setup as a server to all the workstations and also serves as a data backup workstation. This server can be accessed remotely from anywhere in the world to let an on-call technician monitor remotely from LSUHSC. The total number of BAS controllers exceeds 3000 field devices.

With a few exceptions, each building automation controller has their own program and has the ability to communicate to other Direct Digital Controlled building automation controllers. It is important for the building automation system controllers to communicate to each other. If the network fails for whatever reason then the system may still function (because the BAS controllers in building automation systems are stand-alone) but it will not function as efficiently as designed. Building Automation Systems grows more and more complex as time passes but it will save in energy and maintenance costs if installed and programmed properly. Energy Management Systems and Building Automation Systems (can be one in the same) are definitely the way of the future and are replacing older less efficient systems every day.

A set-up in a multi-story automated building would have many building automation controllers serving different types of air conditioning and heating equipment (BAS is not limited to just HVAC applications). Every building is different and it is important for the BAS engineer to select the proper HVAC BAS control system and programs to control the various types of HVAC systems in a particular automated building. For building automation systems to be effective, it is important that the BAS system is installed and tuned properly. Some advantages of a good HVAC BAS building automation system are:

- Building Automation System (BAS) should allow the owner to set up schedules of operation for the equipment and lighting systems so that energy savings can be realized when the building or spaces in the building are unoccupied.
- Building Automation System (BAS) should allow the equipment optimal start with adaptive learning. Optimal start is allowing the equipment to be brought on in an ordered

and sequential manner automatically on a schedule before the building is reoccupied so that space set points can be realized before occupation. Adaptive learning allows the system to compare space temperature, outside air conditions, and equipment capabilities so that the equipment can be turned on at an appropriate time to ensure space set points are achieved before occupation.

- Building Automation System (BAS) should have trim and respond capabilities. Based on zone demand the set point for various heating and cooling sources will change according to demand from the zones. In a VAV system all the VAV boxes are served from a central air handling unit. If all the zones are at set point then the supply air temperature set point of the air handler is automatically changed to prevent mechanical cooling from occurring when it is unnecessary. When the zones grow warmer the supply air temperature set point is automatically lowered to allow mechanical cooling to satisfy demand. Older systems have a single supply air temperature set point of 55° Fahrenheit which requires the compressors to cycle even when it is not necessary.
- Building Automation System (BAS) should have the ability to monitor energy usage including the ability to meter electric, gas, water, steam, hot water, chilled water, and fuel oil services.
- Building Automation System (BAS) in conjunction with the appropriate mechanical system set-up should offer economizing based on enthalpy calculations and/or CO2 set point control.
- Building Automation System (BAS) should have such BAS control algorithms as reset schedules for heating plants, static pressure control, and other systems where energy savings can be realized through these predictive programs.
- Building Automation System (BAS) should offer load shedding when power companies are at peak demand and need business and industry to cut back on power usage to prevent brown outs. Building Automation Systems allow the owner to cycle various things off like water heaters or drinking fountains where use of these things will not be noticed even though they are off.
- Building Automation System (BAS) should offer the ability to send alarms via email, pager, or telephone to alert building managers and/or technicians of developing problems and system failures.
- Management companies who acquire a good building automation system (BAS) can have BAS set up to bill tenants for energy usage.
- Building Automation Systems (BAS) should have the communications abilities to be integrated with other building automation control systems and TCP/IP. BACnet compatible or other open source communication protocol is a plus.