



Advances in Controls Bring Centrifugal Technology to the Spotlight

By CAGI Centrifugal Compressor Section

Advances in compressor controls have changed the way compressed air users look at centrifugal compressor ownership. Centrifugal technology has been avoided by many plant operators in the past, due to its seemingly complex nature. Some maintenance personnel have also avoided the use of this technology for years, due to its *high tech* persona. Advances in control technology have made owning and operating a centrifugal compressor no different than any other standard piece of industrial machinery. Familiarity with playing video games or using a tablet will have an operator or technician at ease with using today's control technology. Manufacturers have simplified compressor ownership by maximizing energy savings and increasing overall compressor reliability.

Compressed air can account for as much as 40% of a plants' total energy cost. Compressed air system costs are now under the microscope as companies attempt to save pennies wherever possible. Most manufactures now offer a variety of control modes to best suit the users' application. These new control schemes focus on minimizing blow-off by using various types of updated valve logic. Centrifugal compressors blow-off or vent compressed air into the atmosphere when the system demand falls below the compressors' minimum stable flow. It will vent excess air to prevent the system pressure from rising above its set point if the system demand falls below a centrifugal compressors' minimum stable flow. The airflow can reverse direction and come back into the

impeller or *surge*, if the system pressure exceeds the compressor set point. Blow-off is wasted energy, in addition to preventing surge. One improvement is to use an inlet device to regulate flow rather than blowing off during low system demand. Some systems can completely unload a unit when not required to further reduce energy demand. New philosophies also keep system pressure at minimum operating levels, conserving the maximum amount energy. A savings of 2 psig in pressure is equal to a 1% energy reduction. The latest advances in controls have allowed centrifugal users to take advantage of the real savings this technology has to offer in your compressed air system.

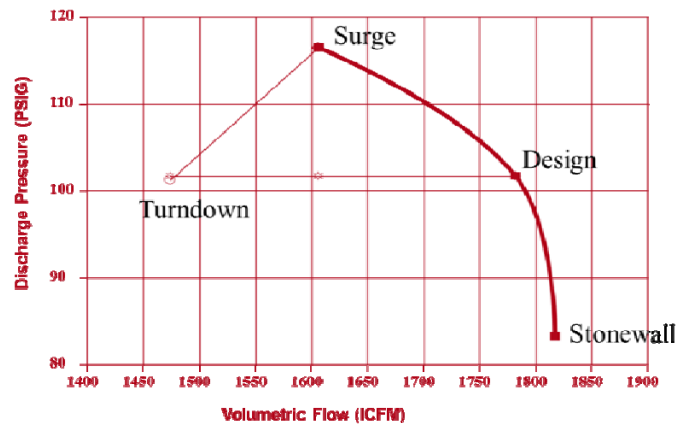
A major advance that has allowed true industrial compressed air users to take advantage of compressed air savings are system controllers. System controllers can save in a variety of ways from increasing the overall efficiency of the system through load sharing to increased reliability of the compressors by leveling the running hours. Load sharing is a control philosophy that can be accomplished with a system controller that allows a group of compressors to work most efficiently as a system rather than individual compressors fighting each other. It can minimize blow-off by throttling the compressors as a group when system demand fluctuates and reduces the overall pressure band by controlling the group rather than each individual unit. Load sharing gives large systems increased pressure stability without wasting valuable compressed air.

There may be additional incentives for these energy savings provided by local utilities.

The ability to sequence is another benefit of a system controller. Sequencing can increase the systems' reliability by leveling the running hours of a group or groups of machines. The compressors will experience wear simultaneously which allows users to reduce the risk of unexpected maintenance and more readily plan regular maintenance intervals. Advanced scheduling is one more method that customers use to maximize the efficiency of their system. Users can choose to schedule demand periods according to lunch breaks, shift changes and other system demand factors leading to significant overall savings. Scheduling gives the system the ability to anticipate these events and begin to load or unload the system accordingly. This control technology allows users with varying demand schedules to maximize the potential energy savings that a centrifugal compressor has to offer. The technology is not brand new, but now that it is readily affordable, industrial users are fully realizing the advantages of centrifugal technology.

New controllers are now also increasing overall reliability by offering users access to more data and automated services. Modern control systems simplify the responsibility of centrifugal ownership by having built in maintenance reminders and some that can even call the factory to order new parts when required. Rotor dynamic trending to predict required maintenance is another way manufacturers have given customers ways to detect maintenances' needs. Manufacturers have upgraded the monitoring features of centrifugal controls to offer users worry free, reliable air system operation.

Advances in control do not only benefit companies buying new equipment. Control panel retrofits on existing equipment and the installation of system controllers in multiple unit installations are great ways to save on the existing system. The advances in new affordable control systems have allowed users of centrifugal technology to add to their bottom line, whether it applies to new equipment or units that have been operating for 20 years. Energy efficiency and reliability are driving the market forward and the advances in centrifugal controls are bringing this technology to the forefront of industrial air.



Please contact the Compressed Air and Gas Institute for more detailed information on the centrifugal compressor technology or answers to any of your compressed air questions. The Compressed Air and Gas Institute is the united voice of the compressed air industry, serving as the unbiased authority on technical, educational, promotional, and other matters that affect the compressed air and gas equipment suppliers and their customers. CAGI educational resources include e-learning coursework on the *SmartSite*, selection guides, videos and the *Compressed Air & Gas Handbook*. For more information, visit the CAGI web site at www.cagi.org.