PCC Structurals
Case Study: Variable Speed Drive Air Compressor[i]

Project Description

There are many manufacturing facilities throughout Nevada. Most of these facilities use compressed air in their manufacturing process. Ten to twenty years ago, it was a common practice to size motors, including air compressors larger than necessary to insure that the capacity needed would be available; after all, energy was relatively inexpensive. Now these air compressors, which are over sized and operating long hours can be a large energy use at a facility. Excess energy can also be used due to the operation of oversized and continuous, full capacity operation of standard air compressors.

Once the "low hanging fruit" of energy retrofit projects have been done, air compressors are often the next project in an industrial plant. Even if an air compressor is not at the end of its useful life, the energy savings of retrofitting with a properly sized, variable speed drive air compressor can often offer an attractive return on investment. PCC Structurals ("PCC") saw just such an opportunity at their facility and changed out a standard 125 horsepower (hp) and 50 hp air compressor with a variable speed drive (VSD) 75hp and a standard 75hp air compressor. PCC is a 72,000 square foot facility located in Carson City, Nevada. The facility makes air and vacuum investment cast components for aerospace, energy and commercial applications.

It is most beneficial to repair line leaks and clean traps before replacing the air compressor(s) to realize additional savings. As this process is difficult and timely, it is often done over time as leaks are detected. This is a continual process at most manufacturing facilities.

Application

A variable speed drive is a "system for controlling the rotational speed of an alternating current (AC) electric motor by controlling the frequency of the electrical power supplied to the motor." Basically, a variable speed drive on an air compressor allows the air supplied to better match the air required. A VSD is also known as a variable frequency dive (VFD), adjustable-frequency drives (AFD), AC drives, microdrives or inverter drives.

By utilizing this principle in a variable speed drive air compressor, PCC was able to reduce the overall horsepower of their facility from 175hp to 150hp. More importantly, they now have the ability to "ramp up" the VSD air compressor as the air requirements increase. Once the 75hp VSD air compressor is operating at or above about 80% capacity, air compressor operation switches to the standard 75hp air compressor and the VSD air compressor again ramps up or down as air requirements change. At full load capacity, a variable speed air compressor uses 2% - 4% more energy (as any VSD does) than a standard air compressor. Having the flexibility in the use of a standard versus a VSD air compressor offers optimal energy efficiency. With a VSD air compressor, the energy use of the plant more closely matches that of the air use and less energy is wasted which makes this project a great idea for PCC.

Project Results

Average Demand Reduction	59.5 kW
Annual Energy Savings	528,860 kWh
Annual Energy Cost Savings	$68,752
Custom Incentive	$31,232

[i] Prepared by KEMA, Inc. KEMA, Inc. is under contract to implement the Sure Bet Program for NV Energy, Inc.