Compressed Air? There is a Better Way

New compressors aren't always the answer

Replacing unreliable compressors is often a smart choice.

Sometimes there is a better choice.

A wallboard plant had two systems; the board mill compressed air system and the rock mill compressed air system. Each system had two 100 hp compressors all of which constantly overheated. When they did, they had to scramble to turn on a machine manually every time a unit shut down. Three units ran the plant so a shutdown had them walking on pins and needles.

Yes, air was a major nuisance; however, there were problems far bigger than the air system to deal with. What could they do to fix the nuisance? They did what was reasonable and fast. Two replacement compressors were added to this year's budget and two were added to next year's budget. The cost was in the $70,000 range each year.

The company however decided to attack the problem differently. And that would entail defining the problem(s) more precisely first.

Rather than rely on a company who had a vested interest in selling more equipment, corporate elected to bring in an independent consultant to define the problem first by asking questions on their business, their production processes and the air system.

The interview process cost the gypsum board manufacturer zero money and minimal time and it produced surprising results. The broader perspective showed that there was an opportunity to reduce operating costs, avoid a significant capital outlay on compressors while improving productivity in the plant and it was probable that it could be done as a ROI project.

The crucial step in achieving these results was to understand how the system was running, where could demand improve and how the supply could be set to react to the new realities.

The cost to do this was reasonable so the technical work proceeded.

The plant originally ran on three compressors, however, on going efforts had gotten them to the point where two compressors could run the plant. One key point to the work was that if improvements could be found above and beyond what had already occurred, immunity would be granted to anyone even partly responsible for decisions made in the past. The evolution of most air systems is based on reasonable decisions based upon what people knew at the time. The poor performance is usually attributable to lack of information which was what the consultant was here to deliver.

Since this plant had bigger issues than compressed air the attention it received was when a problem interrupted production. They had learned to live with the pain. For example, there was glazing of the dust collector elements

which led to premature replacement. There were minor pressure issues at the wet transfer station. There were moisture issues that some thought were a big problem while others thought quite minor.

Hundreds of thousands of data points were collected on the demand side, in the distribution system and the supply side. The consultants interviewed multiple individuals to determine what processes turned on at what time. They examined each user of air and determined the individual consumption and if each one could be run equally effectively using less air. The overall plant existing average plant demand was 477 cfm with spikes that forced them to run the third machine. The auditors showed the client how they could pull the spikes out of the system and reduce the average demand to 352 cfm which was less than the capacity of one compressor. In addition, the auditors determined that while it was believed that the wet transfer station was the highest user, there were three other applications that used more air.

The piping system was analyzed and that showed it to be adequate for the current loads as well as the reduced future load. The two main gauges at the wet transfer station (which were used to determine whether there was a problem in the system or not) turned out to be off by 10 and 20 psig respectively. While the piping was a bit convoluted, amusingly, the downstream gauge read the higher pressure.

Exhaustive measurements were made of the two compressor rooms to determine how the machines were operating and what could be causing the moisture problem.

The data showed that there were multiple root causes of the moisture problem including heat exchanger performance issues, a potentially incorrectly sized dryer, maintenance issues, excessive room temperatures and even drainage issues which led to two tanks filling up partially with water. The problems complexity made it impossible for dry air to be delivered to the plant.

The compressor brands were well known for reliable operation, however, the standard control method used to control them made it difficult to know what an individual machine was doing and to coordinate their response effectively. That meant that more compressors were often on than were required to deliver adequate air and once the compressor was on, it had to be manually turned off.

The Final Analysis

Looking at this 400 hp system from a wider perspective showed the plant they could reduce their operating costs on this system by 50%. Approaching the air system improvements through precise analysis as opposed to replacing the compressors, yielded $159,000 of bottom line results over a two year period including $50,000 per year in reduced operating costs.

	Original	Project	Savings
Capital Costs	$140,000	$82,300	$57,700
Annual Operating Costs	$109,397	$58,491	$50,906
Two Year Costs	$358,794	$199,282	$159,512

The payback for the project, 19 months, was good enough to justify add a new compressor to the project if they wanted and still meet the internal return requirement. Air quality would improve significantly resulting in longer life of production equipment and baghouse elements. New compressors are often a good idea; their just not always the best.

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