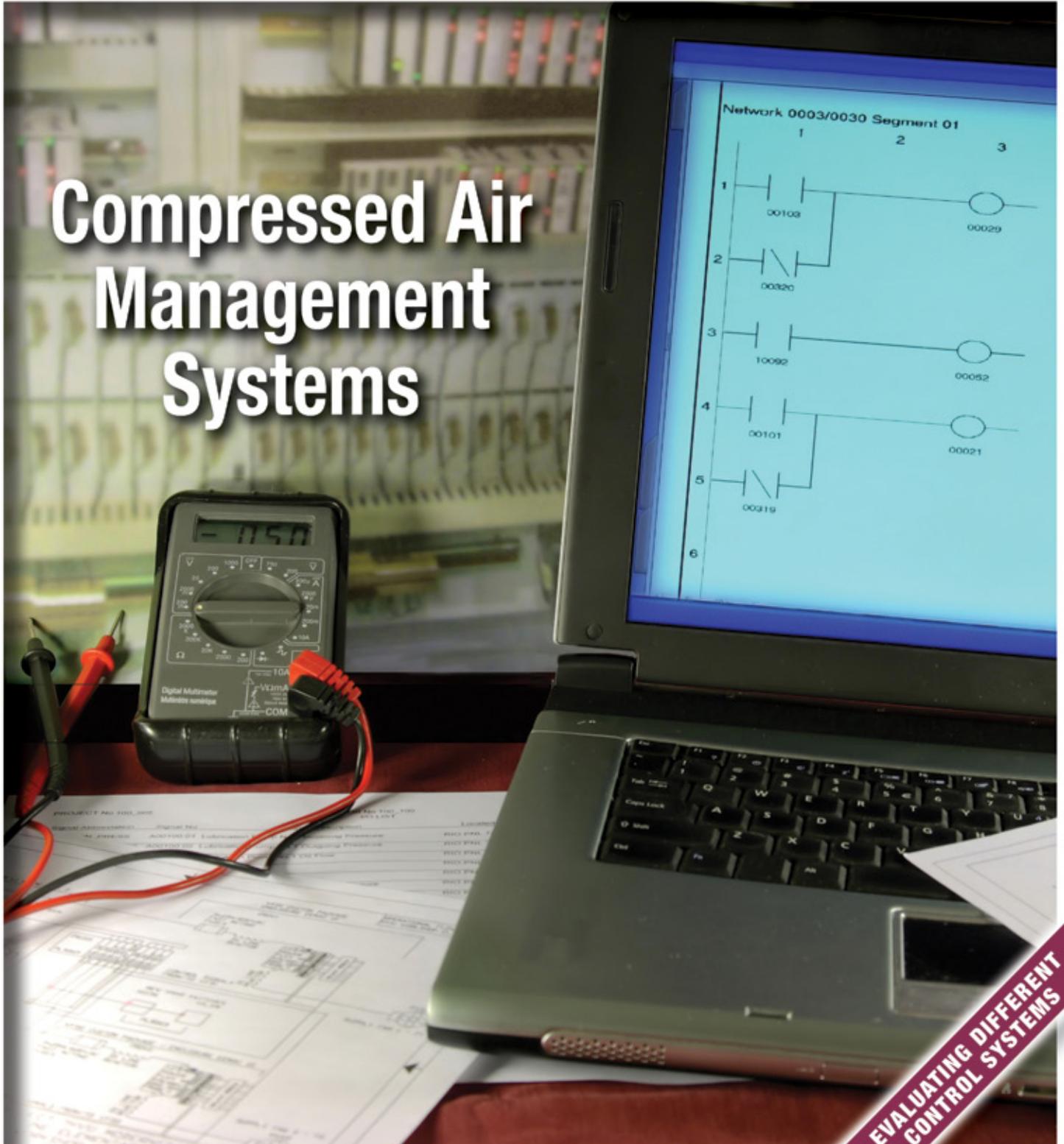


October 2009

COMPRESSED AIR

BEST PRACTICES[®]

Compressed Air Management Systems



EVALUATING DIFFERENT CONTROL SYSTEMS



THE TECHNOLOGY PROVIDER

Compressed Air Management Systems Assist Sustainability Programs

BY COMPRESSED AIR BEST PRACTICES®

Compressed Air Best Practices® spoke with Mark Reed, President, and Dusty Smith, Director of Engineering, Pneu-Logic Corporation.

Good morning. How is “sustainability” changing the market for compressed air management systems?

Good morning. We are finding significant changes in the industry with regards to which managers are involved in our discussions. With energy awareness and costs at high levels, we now find that “C-level” executives and plant managers are becoming much more interested in compressed air systems and the opportunities available to drive costs down. In the past, we sold compressor controls primarily to plant engineers and maintenance managers who were very experienced in the operational aspects of production systems. We now spend more time discussing energy-saving opportunities with chief operating officers and chief executive officers, as well as with the plant team.

The second change is the topic itself. We are no longer simply discussing compressor controls. We are examining compressed air management, as a whole, with the client. This involves topics like management reporting with regards to kW consumption, dollar costs and greenhouse gas emissions.

This takes the conversation to the “C-level”, as we are impacting sustainability programs in a positive manner. Executives are really interested in reducing their carbon footprint and eventually monetizing their carbon credits. Our PL4000 technology can track and aggregate carbon credits. Now, you have a manageable tool supporting a corporation’s ability to realize a payback on their energy initiatives.

What advances in application trends are you experiencing?

A significant advancement in application trends is in what we call “managing zones”. This is when the compressed air management system provides the client with the ability to look at different “zones” in the system. Some of our clients have an expansive compressed air network with two or three compressor rooms, along with production floor compressors. Our PL4000 technology is being used to enable managers to break up the network into separate “zones”, and monitor and manage them.

Zones can involve managing air quality. As an example, an aluminum extruder had a plant floor air compressor providing compressed air to a painting process. Desiccant dryers were installed to provide the low-dew point air required. The duty cycle was very intermittent, and the customer said they knew they were “over-drying” the compressed air, which, in turn, was creating unnecessary energy costs. We worked with them to make this process a “zone” we would manage with our technology. We placed dew point sensors in-line, and were able to automate the performance of the desiccant dryers to avoid the unnecessary energy costs — while maintaining the correct dew point. Alarm functions were also set up to send automatic alarm emails to managers if dew point or energy costs deviated from the accepted specification for the zone.

Zones can also be specific demand-side air users. A customer was experiencing abnormally high maintenance and replacement costs on a pneumatic power wrench. Upon examination, the root cause was that the wrench was receiving compressed air at a pressure of 100 psig — instead of the specified 45 psig. We placed pressure transducers at the location and started monitoring and managing the pressure of this “zone” with very positive results.

What impact on maintenance costs can these management systems have?

That is a great question, because maintenance is a topic many people don't think about when discussing compressed air management systems. Our clients have found that maintenance can be one of the largest beneficiaries of our systems!

Our compressed air management systems can enable users to switch from “time-based” to “condition-based” maintenance programs for their installed air compressors and compressed air treatment products. The technology will monitor actual usage patterns and data log the multiple air compressors, dryers and filters. We can monitor run-time and oil temperature in the air compressors. The technology will also automatically rotate air compressors to even out run-times.

Factories spend a lot of money on the consumables required to appropriately maintain their compressed air equipment. By helping them switch to “condition-based” maintenance programs, we can help them reduce these costs and improve productivity by reducing the number of maintenance interruptions.

Are there any new trends with financing and/or rebates?

Our technology allows for exciting advancements in financing options. The measurement and data-logging technology we deploy enables us to provide what we call “proof-statements” to our clients, documenting the actual and verified performance of their compressed air system. When we compare this to the data gathered during our base-lining studies, the customer is able to receive hard proof of the realized energy savings and carbon emission reductions.

These more highly sophisticated measurements have helped us to develop new financing partners and opportunities. We are developing a new program where customers do not need to supply any up-front capital to install our systems. The customer makes their payments based upon documented energy savings. We have a customer who is paying for their system, over a four-year period, based upon the realized energy savings of our compressed air management system. This is a managed service, guaranteeing ROI for the customer. We anticipate an increase in these types of contracts.

With regards to rebates, we are seeing more funds become available through BC Hydro and other public utility departments that underwrite portions of big projects. For smaller systems, the Oregon Energy Trust is very active here. We recently introduced new management products, namely the PL500 and PL1000, designed for smaller compressed air systems. The Oregon Energy Trust has us do a simple walk-through and then make a recommendation. The Trust will rebate up to 50% of the equipment purchase cost for the customer. A third party does the verification measurement for the Oregon Energy Trust.



“Our PL4000 technology can track and aggregate carbon credits.”

— Mark Reed, President,
Pneu-Logic



Dusty Smith of Pneu-Logic tunes a PL4000 compressor management system



Mark Reed, President of Pneu-Logic Corporation

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How do your systems interface with in-house controls?

We sell direct to strategic accounts like Weyerhaeuser, Toyota and FEMSA. This will continue to be a big part of our strategy because it breeds customer intimacy. Although we are primarily an engineering and technology firm, it is critical that we remain close to major users so that we can continue to develop ground-breaking technologies.

An example of this is what we call our “Distributed Compressor Module”. We have given plant engineers at some of our strategic accounts access to the invisibility files in our PLCs. We work with FEMSA, the brewery operator, which has standardized on Allen Bradley PLCs. Boeing is another corporation with a strong bias towards Allen Bradley platforms. They appreciate our flexibility and technology capabilities in providing full integration into their in-house systems. Our open systems and architecture enables us to go into multi-vendor environments. We have a generic SCADA server that accommodates most DCS systems that we encounter in the United States through a Modbus TCP connection.

I see you have received an award for international sales?

Yes. In May of this year, we were honored to receive, from the City of Portland, the Mayor’s International Business Award in the New Exporter category. We have found demand for our technologies in foreign markets like South Africa and Mexico, where customers are paying 15–20 cents per kilowatt/hour. Industries that use a lot of compressed air, like pulp and paper, mining, metal fabrication and Tier 2 automotive companies, have given us the opportunity to do a lot of engineering work successfully with them.

What sales channels do you deploy?

Aside from our direct strategic accounts, we also have a large private label agreement with Norgren. They have a business unit called Norgren IQ “Technology by Pneu-Logic”. Norgren is using its global base of customers and its expertise in pneumatics to take our technology to market. We are also in the process of announcing a new OEM agreement with a compressor manufacturer. Pneu-Logic also works with select air compressor sales and service companies who are focused on reducing the energy costs of their customers.

Let’s discuss technology. When is a lead/lag controller appropriate?

Pneu-Logic offers compressed air management solutions for all compressor installations, large and small, as we recognize that each facility has a unique set of circumstances. There is a lot of small manufacturing here in Oregon, with 25 hp systems that can really benefit from these types of controls.

First, let’s define “lead/lag”. Inconsistency in the industry has created some confusion around the usage of this term. We see “lead/lag” controllers as potentially appropriate for installations with two air compressors — one is lead (the base demand compressor) and one is lag (trim). Other firms use lead/lag terminology for multiple air compressors, where one is lead and multiple others are lag. Even more confusing is that some firms say lead/lag and actually refer to lead as the trim compressor.

We feel it’s easier to think of trim and base controllers. That’s how we define our PL500 pressure-based system. We find that there are far too many compressor controllers that work off of electro-pneumatic controls (pressure switches and/or timer relays). These systems are inexpensive to purchase, but almost impossible to tune because of the pneumatic components, which can have a wide range of tolerance.

There is a big advantage to using one pressure transducer vs. two or three switches on traditional systems. Three mechanical components (pressure switches) have to be set with a dial, and it is common to see them work against each other. Another issue can be accuracy. The accuracy range may be larger than the load/unload band. Within the HMI, you can visualize what is happening to plant pressure from the single transducer, see the compressor pressure and make decisions and tuning adjustments.

The Pneu-Logic PL500 uses a Web-based HMI with one pressure transducer — which dictates control of both air compressors. It has a micro-controller, permitting monitoring, reporting and management functions. Monitoring individual load and unload, restart delays and pressure trending can all be done through Internet Explorer. If you have a network, you can monitor what is happening in your compressor room — even if you have “just” two small air compressors.



A Pneu-Logic Master Controller Installed at a Lumber Mill

Let's discuss "Sequencers".

We believe that sequencers can be used in installations with more than two air compressors and, importantly, in plants with consistent demand profiles. They are also effective when the air compressors are of similar size and output efficiency.

Pneu-Logic offers the PL1000, which has a PLC version and a microcontroller version. It is browser-based and requires no software to be utilized. When you have similar-sized air compressors (like three or four 300 hp air compressors), you can simply sequence them because they are all the same size (if they are all created equal from an efficiency standpoint). If you have mixed air compressor manufacturers of the same size, you can still use a sequencer by identifying the most efficient as trim and base. While measuring pressure rate-of-change, we deploy a targeting pressure sequencer using a single pressure transducer and pressure point. All sequencers are pretty similar, but still differ in the minutia. Most have set points and emergency pressure points and utilize pressure rate of change.

Plants with a lot of varying loads can have problems with sequencers using pressure rate-of-change controls. This is very hard to tune in effectively. For this reason, we often see sequencers that are not implemented properly. They can become a nuisance, or even detrimental to a plant. Many are shipped to a plant and are not properly installed or tuned.

How about master controllers?

The PL4000 Master Control System is designed for multi-compressor installations of differing technologies where demand may fluctuate widely. A master controller can account for air flow demanded. A mine might have several centrifugal air compressors and some smaller rotary screw air compressors. This type of client has to decide which air compressor to start, based upon airflow. When demand is going down, do you shut down the big centrifugal or the smaller rotary screw?

This is where the master controller technology performs the critical function of measuring actual efficiency of each air compressor, and then making the right decision on which air compressors to operate. We add on a layer of monitoring functionality of pressure, flow and power, and this discovers that not all air compressors are created equal! A master controller provides an efficiency index for each air compressor (cfm per kW) index, ranks the air compressors and deploys them in the control algorithm.

Another situation for a master controller is when you want to take into account certain demand events — like a production line that starts up at a certain time. The plant might also have some piping issues and no budget for repairs. A master controller can adapt to custom situations like this. This is the most flexible solution.

Finally, as mentioned before, master controllers offer sophisticated monitoring and reporting capabilities with regards to kW, flow, pressure, energy costs and carbon emissions.



Eric Bessey, Chief Project Engineer for Pneu-Logic, configures a PL4000 Master Controller

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FS-Elliott Co., LLC
5710 Mellon Road • Export, PA 15632-8948
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Why do your master controllers focus on airflow?

We use air flow meters to get a reading on the air flow profile of the plant. We prefer mass air flow meters that are pilot-tube type or thermal mass flow meters. Both technologies are relatively inexpensive and have some measure of repeatable accuracy.

They must be installed at the exit of the compressor room, where one can measure total air demand. You can put them on each air compressor or, if there is a common header at the exit, you can put it there. If you have dryers that are purging, you should locate the flow meter upstream as they are just another form of demand.

Once you know flow, you have choices that sequencers don't have. You can now decide to trade three air compressors for one. A sequencer always goes from compressor #1 to compressor #2 to compressor #3 and so on — a master controller using flow gives you total flexibility.

How do you manage remote/differing locations?

Remote IO cards can be used to have one master controller manage multiple air compressors in several locations. It's almost always a hard-wire situation. We have used radio in a couple of situations. We had a river and a major road separating compressor rooms once, and we did use radio and industrial wireless solutions. The microcontrollers on the compressors

can function as the remote IO card in most cases. Modbus protocol is popular in North America, and PROFIBUS protocol is popular in Europe. This is very cost effective, since you don't have to double-instrument. You can use the pressure transducers native to the air compressor, along with the compressor's remaining instrument set.

What lies in the future for Pneu-Logic?

Pneu-Logic is focused on reducing industrial energy consumption. We estimate that, since 2005, we have helped our top 30 customers save over \$20 million in energy costs. We will continue to develop technologies and sales channels to keep achieving these goals.

This takes us back to the topic of "zones". If a plant engineer wants to manage compressed air, refrigeration, steam and water in a common console, we expect in the future to help him break the processes down into zones. We will provide engineering with the same user interface and track savings zone-by-zone. Pneu-Logic is a management and control provider of all these integrated services. We have started with compressed air, and will evolve into other processes where we can leverage our patents and engineering capabilities. **BP**

For more information, please contact Mark Reed, Pneu-Logic Corporation, Tel: 503-718-0126, e-mail: mark.reed@pneulogic.com, www.pneulogic.com.

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Increase your productivity & reliability
Minimize your carbon footprint

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Pneu-Logic's PL4000 control system not only measures pressure and pressure rate of change, but also total air-flow supplied. The PL4000 manages and controls the operation of each compressor in order to most efficiently meet the actual system-wide demand for compressed air.

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Contact us at 866.348.5669 or info@pneulogic.com