



From and for People Involved with the Performance and Maintenance of Electrostatic Precipitators

NEUNDORFER PRODUCT ADVANCEMENTS

At Neundorfer, we are passionate about the products and services we create for our customers. In fact, the new MVC-4 voltage controls and POS 7.0 software are our most recent advancements in functionality and user interface, developed and refined using ongoing end user feedback. Plus, our experienced experts are always ready to adapt or customize our precipitator and control products to customers' exact needs. As you read more about the MVC-4 and POS 7.0, we think you will be as excited as we are with the benefits offered.

MVC-4 Launches — Close Call Drives Improved Safety

A few years ago, Karl Artz, senior design engineer for Neundorfer, Inc., had a close encounter that drove the development and safety focus of MVC-4, the advanced voltage control technology recently introduced by Neundorfer. Karl was working with a customer on a tight deadline to retrofit a number of MVC-3 voltage controls. As with other voltage controls, upgrading the logic of the MVC-3 controls required calibration inside energized cabinets, meaning that Karl had to open the door to each cabinet (typically housing at least 480V power), alternately putting his head inside the cabinet as he made adjustments or sticking his arm inside while he craned his head around the outside to check the display panel. Things were moving pretty quickly as Karl moved from cabinet to cabinet, calibrating the retrofit controls.

Then he came upon a cabinet with a malfunctioning display panel. In the interest of time and efficiency, Karl decided to return to this cabinet later, leaving the power on but closing the door and moving on to the next cabinet. Turns out, that was an excellent decision.

Within minutes after Karl closed the door, an aged electrical terminal connection failed inside the cabinet he had just left behind, resulting in a flashover inside the cabinet, tripping the main control room breaker. "It sounded like a shotgun blast," said Karl. "There was a tremendous energy release and a big explosion." Then came the almost



immediate realization that he would have been seriously injured—or even killed—had the display panel functioned properly and he was still calibrating inside the cabinet.

Karl walked away from the experience with conviction—he was determined to develop the next-generation of voltage controls with enhanced safety. While some competitive voltage controls claim no calibration, calibration is actually required on the outside. "I knew we could develop a solution that made it possible to avoid working inside high voltage cabinets

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NEUNDORFER PRODUCT ADVANCEMENTS

New POS 7.0 Focused on Improved User Experience

POS 7.0, the latest innovation in precipitator optimization software from Neundorfer, is no ordinary software update. “Our primary goal for POS 7.0 was to create user interface enhancements and customizable information,” electrical engineer Jeff Preston said. “We kept our focus on ease-of-use and more powerful functionality for the customer, whether they use POS every day or much less frequently.”

Enhancements to the software are user-directed, meaning that Neundorfer takes in end-user feedback on an ongoing basis and makes changes to the software accordingly, in order to improve functionality and utility for customers. Neundorfer stays in touch with customer needs by collecting their input in more formal settings, such as the annual POS Users’ Group meetings (see related article in this issue), as well as in more ordinary situations. According to Jeff, there are two everyday mechanisms for assessing customers’ experience with POS. “The volume of technical support calls is a good gauge of customer issues and opportunities for improvement,” he said. “Also, just simple observation during field service calls tells us a great deal about how customers actually use POS and where they’re having difficulties or creating workarounds that we can address.”

In the development of POS 7.0, Neundorfer began with the latest generation industrial control software, layering in the improved functionality and ease-of-use that customers seek. Improvements in screen navigation and layouts are evident throughout POS 7.0, with more visually appealing screens and more intuitive access to whole system or component status updates.



Precipitator Optimization System
VERSION 7.0

More specifically, improved user interface means that end users have easier access to live data and desired reports, providing them with more timely and accurate information for optimizing precipitator performance. For programming functions, the new Wizard screens give users step-by-step programming instructions, saving time by speeding up the learning process.

Enhanced reporting capability is also a key advancement in POS 7.0. Customizable reports and displays deliver customer-specific information and better precipitator control. Trending capabilities are also easier

to use and more flexible. Commonly used operating displays, now with live data, can be customized and placed readily in view for up-to-date information. Data from different sources can even be combined into a single report and exported directly to an Excel spreadsheet. Plus, the data logging and report generator features of POS 7.0 simplify CAM monitoring and reporting.

“It’s tough to do justice to all the improvements we’ve added to POS 7.0,”

Jeff points out. “We’re happy to provide interested customers with a demonstration of the new software—that’s really the best way to see firsthand how much easier it is to use and how much more it delivers in functional performance.”



MVC-4 *continued from page 1*

by eliminating the need for any calibration.” At that point, Karl embarked on what would turn out to be a four-year research and development project to deliver MVC-4, building on the proven, reliable MVC-3 technology and adding new, compelling benefits as well:

- No calibration required—none
- Easier installation and servicing
- Advanced hardware with much faster processing power (10x) and much more integrated memory (8x)
- Improved retrofit capability

Plus, MVC-4 has the capacity to accommodate technology and

communication advancements for many years to come. “We wanted to go beyond a halfway solution to the safety issue,” said Karl.

While safety drove the development of MVC-4, the technology provides much more, with significantly more processing power and memory capabilities as well as more compact, integrated logic and control boards for easier installation and retrofits. Improved, streamlined connectivity and advanced networking options are additional features, incorporating self-diagnostic capabilities and remote operations.

Visit the “Products” pages at www.Neundorfer.com for more information or to download the product brochure.

CASE STUDY: Fly Ash System Overhaul

Background

Neundorfer, Inc. was contracted to upgrade and improve the fly ash evacuation system at a large power generation plant. The customer's ash system evacuates fly ash from a total of 20 precipitator hoppers on three separate precipitators (i.e., Units 1, 2 and 3).

This particular fly ash evacuation system is fairly unique in that it uses both vacuum and pressure to pneumatically convey the ash from the hoppers to a storage silo. The fly ash is pulled from the hoppers under vacuum to a collector in the transfer house. Once in the transfer house, the ash is emptied from the collector through airlock feeders into another transport line and conveyed under pressure to the silo. The transfer house contains two separate systems, designated A and B. The A System consists of a vacuum pump, a collector with a bag filter, two airlock feeders and a blower. The B System consists of a vacuum pump, a primary collector with two airlock feeders, a secondary collector with a bag filter and one airlock feeder, and a blower. A spare blower and vacuum pump are available for use on either system. Under standard operation, the A system handles Units 1 and 2 while the B system manages Unit 3. However, either system can individually handle ash from all three units.

The Issue

The customer had reliability concerns with their current technology. The user interface for the control of the ash system was a large panel with control switches and indicator lights. They were relying on discrete relays and cam timers, most of which were obsolete, to operate the existing transfer house system. The configuration required a maze of wires, modified and/or abandoned over the years, with no current documentation, which meant that if something went wrong, troubleshooting and recovery was complex and difficult. And the system provided very little flexibility to make any needed adjustments.

Each of the precipitator hopper evacuation systems was running on its own evacuation program; the customer sought to consolidate to one PLC from a central point, with an HMI. In

addition, it was important to avoid outages on any of the three Units, meaning that either the A or B system had to remain fully functional throughout any system upgrade.

The Solution

First, Neundorfer worked with the customer to understand the existing configuration and its function. Then Neundorfer was able to build a separate control panel with an Allen Bradley SLC 500 PLC to control the operation of the whole system. The system changeover was accomplished without outages, by alternating shutting down, wiring and testing first system A, and then system B.

A remote I/O communication interface was set up between the old PLC-5 I/O and the new PLC so the field wiring for the hopper evacuation control would not have to be modified at all, thereby reducing costs. In addition, the user interface was upgraded to an Allen Bradley Panelview Plus 1500 with a touch screen to provide enhanced graphical and supervisory support for the new system. A guided radar level sensor was added to each of the feeders



under the primary and secondary collector to read the level of ash in each feeder. Also, a pressure transducer was added to the airlock feeders to monitor the internal pressure. Along with the hardware upgrades, Neundorfer was able to configure their SmartAsh software and install it on a PC in the control room to provide an additional HMI along with intelligent alarming and ash collection data, all customized to the customer's operation and functional requirements.

The function of the ash system is continuously monitored by the patent-pending Neundorfer SmartAsh software, recording each gate actuation for hoppers and feeders, level and pressure readings from feeders, and all of the line vacuum and pressure signals. The data recorded is used by the operator to determine the most effective settings for the hopper and feeder timings. By monitoring the vacuum signal along with hopper gate actuations, the SmartAsh software determines how much ash is pulled from each hopper. The software is set up to alarm if no ash has come out of a hopper over a certain time period. This is the first warning that a hopper may not be functioning properly.

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2006 POS Users' Group

The 11th annual POS Users' Group was held for the first time in the new Neundorfer facility. The three-day seminar ran from May 23rd to May 25th with 22 attendees, ranging in precipitator experience from less than one year to more than 10 years. Seminar participants traveled from Illinois, Mississippi, Missouri, North Dakota, New York, Ohio, Oregon, Pennsylvania and Wisconsin, with nearly 70% representing the utility industry and the remaining attendees from the cement, chemical and paper industries.

The first day of the seminar started with a tour of the new facility, followed by a panel discussion of Precipitator Fundamentals and then a case history that involved participants in the evaluation and solution of a simulated customer problem with a precipitator. The day concluded with a barbecue at the Neundorfer facility.

On the second day, smaller subgroups were formed and took part for the morning in round-robin, 30-minute drill sessions designed to provide firsthand knowledge and understanding of Neundorfer software products, including:

- MVC Operations
- MicroRap Operations
- POS Data Management
- Optimization
- SmartAsh

After lunch, an additional case study workshop focused on another precipitator problem with prizes awarded by majority of votes to groups with problem identification and solutions that were 1) most insightful, 2) most creative, 3) most entertaining, 4) most enthusiastic and 5) shortest. Guest speaker Marlin Anderson rounded out the day with Steve Ostanek by engaging the group in a presentation about emerging technology. Heinz Englebrecht was also on hand as a guest speaker.



Kyle Campbell conducts a drill session on SmartAsh. Around the table counterclockwise starting in the near left: Greg Woods (Associated Electric Cooperative, Inc., Clifton Hill, MO), Jeremy Tatarzyn (Lehigh Northeast Cement, Glens Falls, NY), Jim Silk (AEP, Columbus, OH), Don Hammett (Neundorfer), Kyle Campbell (Neundorfer), Steve Martin (E.I. DuPont, Pass Christian, MS), Halle Rose (Neundorfer), Chuck Ashworth (Associated Electric Cooperative, Inc., Clifton Hill, MO)



Relaxing in the new courtyard. From Left to Right: Bart Mabry (Holcim, Inc., Clarksville, MO), Bill Colbert (Holcim, Inc., Clarksville, MO), Mike Neundorfer (Neundorfer), Craig Brackman (Neundorfer), Jeremy Tatarzyn (Lehigh Northeast Cement, Glens Falls, NY)

Is Informative and Fun

On the final day, all participants attended a panel discussion on the latest Neundorfer product introductions—the MVC-4 and POS 7.0 (see related articles on page 1 and page 2 respectively). The presentation included a real-time demonstration of the new POS 7.0 software and its enhanced functionality. Both new products were being installed with customers for beta testing at the time of the POS Users' Group.

The session concluded with a survey of participants which provided great feedback on the seminar—participants expressed a better understanding of precipitator basics and troubleshooting as well as enhanced confidence in Neundorfer and our products. Other comments regarding desires for more hands-on training and case studies will contribute to the content development for future POS Users' Group sessions. All in all, the survey results indicate three days very well spent for Neundorfer and for our customers who attended.



Heinz Englebrecht (left) and Marlin Anderson (right)



First evening barbecue



Bela Toth explains MVC operations in a drill session. From Left to Right: Steve Martin (E.I. DuPont, Pass Christian, MS), Chuck Ashworth (Associated Electric Cooperative, Inc., Clifton Hill, MO), Bela Toth (Neundorfer), Greg Woods (Associated Electric Cooperative, Inc., Clifton Hill, MO), Jim Silk (AEP, Columbus, OH)



Investment in Customer Service for a Solid Future

Recently, our customers have commented that Neundorfer, Inc. seems to be investing in more and better human and production resources as well as improvements in our technology while other companies in our industry are cutting back. We're glad our customers are noticing! It is a very conscious effort on our part—we are making new investments in a deliberate, disciplined manner.

Some of our most important investments are perhaps the least apparent. Because our people are the most valuable resource in serving our customers, we have gradually added engineering, field service and administrative staff over the past couple years. Getting the right people “on the bus” in the right “seats” is a continuous process. We have recruited energetic, smart and experienced staff in the past year or so to help us expand our range of services and ensure the best possible customer care. We find that if we take our time, and involve everyone in the selection process, we can maintain and improve our culture to stay focused on customer service, teamwork and personal responsibility. As soon as possible after hire, we also try to get our new people into the field to meet customers, climb around precipitators and get familiar with what we do for our customers—and why.

We have also invested more heavily than ever before in staff training. Our objectives are to develop broader technical and process understanding and

better project disciplines. To that end, Neundorfer staff have designed and participated in lunchtime training sessions as well as weekend and workday seminars. We firmly believe we are better able to appreciate and understand customer



technical needs and collaborate on creative solutions as each of us broadens our technical knowledge.

Another solid Neundorfer investment is in product improvements. Recently, we have invested significant research and development in product advancements for SmartAsh, Smart Purge, POS and MVC, as well as SO₃ molten and granular feed systems and control. All of these product improvement investments are based on direct customer feedback. One immediate result of our investment in these products, training methods and technology is definitively improved levels of participation and quality of customer training and feedback in our May 2006 POS Users' Group Meeting (see related article).

A more obvious investment over the last year was in our facility—we have more than doubled the size of our facilities in

that timeframe. Even more important is the efficiency we have gained through improved communication and process flow in our new facility, improving our customer response time and quality. We have added windows and skylights for improved working conditions and efficiency. Our office, production and meeting spaces were intentionally designed to facilitate more and better communication and team interaction. Many of you visited our new facility for the recent POS Users' Group meeting and saw the dramatic difference. We invite everyone to visit us at our facility a few minutes east of Cleveland, Ohio.

Neundorfer technology has also improved, with investments in more computing power and faster communication. We have added server and personal computer capability, and upgraded cell phones and personal computers to help our staff serve customers more quickly and with better information. This year, we also purchased new software modules to help us better monitor and manage customer projects.

Neundorfer continues to make investments that result in the creation of value for our customers. We make these investments with great care in order to minimize debt, maintain the stability of our company and continue to create and share knowledge. We offer our genuine thanks to our customers for the opportunity to serve them and seek continuous improvement.

—Mike Neundorfer

TROUBLESHOOTING TIP: Secondary Voltage Dividers

Accurate transformer rectifier (T/R) feedback signals enable precipitator voltage controls to work at their peak performance. These signals are also important tools when troubleshooting poor-performing sections. One of the most important feedback signals is secondary voltage or kV. Secondary voltage is one of the most commonly incorrect signals in many installations. Fortunately, inaccuracies in the signal are easy to verify and correct.

If secondary voltage is operating at unusually low levels yet the primary voltage indication is “normal” for the amount of current being displayed, you may suspect an inaccurate kV feedback signal. One way to check is to estimate the secondary voltage and compare to the actual reading.

Secondary voltage can be estimated by using the following formula:

$$\frac{\text{Primary Current} \times \text{Primary Voltage} \times .7}{\text{Secondary Current}}$$

Example:

T/R set running 73 Amps, 440 Volts and 500 Ma (.5A)

$73A \times 440V \times .7 = 44,968 \text{ Volts or } 45 \text{ KV}$

.5A

This formula can be used to calculate the secondary kV in the case of a missing signal or to check out a suspicious signal. This method

is only accurate if the conduction angle is above 100 and the other three signals have been calibrated.

If the signal is not reading correctly, your next step is to recalibrate and verify the signal per your control manufacturer’s guidelines. Use caution when calibrating feedback signals – you are working on a live control with high voltage!

Voltage dividers provide the signal that allows the voltage control to read and monitor secondary voltage, protecting the T/R set from over-voltage which can damage diode bridges and the secondary transformer. How do you know if your voltage divider has failed or is failing? If your voltage control shows no reading in the secondary voltage readout display but is still operating, and other operating values are “normal,” then you would reasonably suspect the divider has failed.

If a voltage divider has failed, replace it. Many voltage dividers are located in the T/R set tank. Retrofit dividers are available that can be installed in the high voltage switch enclosure or bus duct. (Visit www.Neundorfer.com for examples of retrofit voltage dividers)

Getting optimal performance out of your precipitator and protecting your equipment relies on accurate operating signals to the voltage controls. Maintaining these signals is simple and, with proper care, yields long-term benefits.

Case Study *continued from page 3*

More reliable than high-level probes and alarms, the SmartAsh system detects and identifies maintenance problems that could lead to high hoppers before the hoppers fill. The SmartAsh system even provides a hopper ash collection history to aid in evaluating precipitator performance.

The Results

With the hardware and SmartAsh software changes to the fly ash evacuation system, the customer has access to process information previously not available. As a result, the customer has a lot more information about the system and its

operation, allowing them to solve problems more quickly and operate more efficiently.

The graphical interface provides indication of what position every gate should have in the system, giving operators a quick visual indication. All aspects are user-configurable through password-protected setup screens. Plus, robust statistical tools are now readily available for analyzing the system and its performance. By removing the physical obstacles of the previous configuration, system modifications and improvements are now possible with simple logic changes. As a result, the customer has a more flexible control

system with a greater level of diagnostic and troubleshooting capabilities.

Additional Benefits

- High-vacuum latch repeat for each hopper – increases the amount of ash removed from each hopper.
- Level sensor in the airlock feeder – senses how full the feeder is, instead of using time-based cycles, accelerating the dumping process.
- Electronic tag-out procedure – provides safer control when isolating/disabling or re-enabling equipment.
- System operation can be remotely monitored (off-site) through the Smart Ash system.



NEUNDORFER NEWS

Neundorfer People Are Our Most Important Asset

One of the marks of a company's success is its ability not only to attract high-quality new employees, but to retain those with desired talents and expertise. Neundorfer is extremely proud to recognize the exemplary service of our 10-year and 20-year anniversary employees as well as to welcome our two newest employees.



20 Years

Joe Chabail (9/15/86)
Dave Mussey (6/24/86)



10 Years

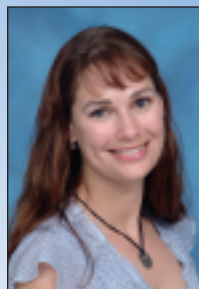
Dave Novotny (6/17/96)
Jeff Preston (9/03/96)
Dan Quirk (9/10/96)

New Neundorfer Team Members



Halle Rose joined Neundorfer in March 2006 as a Team Administrator, assisting with sales, accounting and the establishment of an ongoing effective team structure. Prior to working with Neundorfer, Halle conducted psychological and sociological research in gerontology for three years. As her research project

came to a close, Halle was drawn to the opportunity with Neundorfer because her position would require continuing technical and scientific skills. Halle has a Bachelor of Arts degree in Biomedical Humanities from Hiram College and is two classes away from completing her Master's Degree in Public Health. Even though Halle's spare time is at a premium with a six-year-old daughter, two dogs and a full work and school schedule, she is currently making time to learn to play tennis.



Also a new Team Administrator, Nicki Simcox started with Neundorfer in May 2006, playing a major role in coordinating the recent POS Users' Group meeting, in addition to providing administrative and sales support. Nicki worked as an admissions officer for a time at Lock Haven University in Pennsylvania after

earning her Bachelor of Science degree there in Biology and Chemistry. Following that position, Nicki joined the Army, serving active duty as a translator, stationed in Hawaii (where she met her fiancé). She also worked for a time in administration, planning and as a shift manager for Frito-Lay before volunteering for special military training that later prepared her to serve active reserve duty as an interrogator in Iraq for ten months. Nicki and her future husband relocated to Cleveland and will be married in April 2007. In her leisure time, Nicki enjoys all types of sports activities, including biking and surfing (although Lake Erie isn't quite the same as Hawaii).



NEUNDORFER PRECIPITATOR KNOWLEDGE

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