

# Processing

SOLUTIONS FOR THE PROCESS INDUSTRIES

## ACE14 Preview

### Blue-White Industries, Booth #705

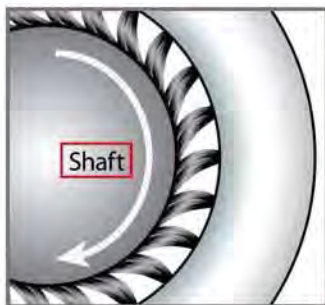
The CHEM-PRO M™ series metering pump from Blue-White Industries has the features and attributes industry pros have wanted, but couldn't find in diaphragm metering pumps. These features include: NSF 61 listing — a must in municipal water systems; 200:1 turndown; large, easy-to-read LCD screen that displays the pumps' output rate; 4-20mA output standard on all models; robust #316 Stainless Steel pump head cover for added strength; and comprehensive three-year warranty. The CHEM-PRO M also features Blue-White's exclusive single-piece DiaFlex™ Diaphragm. **For more information on the American Water Works Association's Annual Conference & Exhibition, turn to page 40.**

Blue-White Industries  
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## Featured Article



### Protect VFD-actuated motors from electrical bearing damage

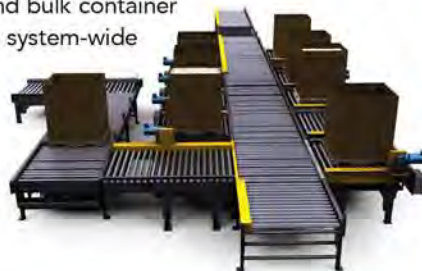
If a bearing problem is fixed right and proper mitigation applied, it only need be done once. Better yet, a good technician can use the latest diagnostic techniques — including vibration analysis, thermography and shaft-voltage testing — to head off electrical bearing damage from the get-go, nipping it in the bud, so to speak. **Learn more on page 6.**

### Mechanical Conveying Systems

NBE mechanical conveying systems for bulk material containers and packaging are critical to the effective transfer of material during production operations. NBE mechanical conveyors offer integrated, NTEP-certified batch weigh systems, accurate to +/- .01%, up to a total container capacity of 4,500 pounds. NBE NTEP-certified weigh systems provide valid, accurate and consistent weighing in bulk bag and bulk container filling applications. NBE integrated automation brings system-wide conveyor controls together in a single, menu-driven, touch-screen interface. **For more information on conveying, turn to page 18.**

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### Alleviate Headaches Caused by Faulty Steam Traps

Implementing an effective steam trap management program using TLV's TrapMan® and TrapManager® technology for condition testing and reporting helps identify faulty steam traps and relieves the headaches caused by leaking energy and the resulting backpressure. The TrapMan® makes an accurate, automatic diagnosis of steam trap operating condition, and the powerful TrapManager® database software allows for detailed analysis and reporting.

**For more information on plant maintenance & safety, turn to page 44.**

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### Toxic Gas Multi-Actuator Valve Controller



The Duplex Model II control system quickly closes up to two Eclipse actuators on toxic gas cylinders and ton container valves

when activated by panic buttons or remote gas sensors. The Duplex Model II computer system applies 30 foot-pounds of torque for test closures and 50 foot-pounds of torque for emergency closures of the cylinder valve. With a Duplex Model II, SCADA systems can be provided with actuator closure status and error codes to quickly analyze problems and take the appropriate corrective action. **For more information on valves & actuators, turn to page 26.**

Halogen Valve Systems, Inc.  
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# Flexible screw conveyor moves cat litter pellets gently

**Screw self-centers within tube, providing clearance and limiting product damage**

Cat litter is usually made from sodium bentonite clay, a material that is relatively inexpensive and highly absorbent, but obtained by environmentally controversial strip mining.

A new sodium-bentonite-free cat litter, produced by PURR-fect Solutions, LLC in its Salt Lake City plant, is made from fly ash, a byproduct of coal-fired power plants that is normally dumped into landfills, which is itself another environmental concern.

PURR-fect Solutions is a spinoff from Ceramtec Inc., a research-and-development company responsible for the process, in which fly ash — a fine powder consisting mainly of alumina and silica oxides — is formed into pellets by mixing it with an aqueous solution.

The fragile wet pellets are moved by a Flexicon flexible screw conveyor to a circular fluid bed dryer, which reduces their moisture content from about 5 wt% to 0.3 wt%. The pellets are then mixed with clumping agents and odor-control ingredients to derive the final product.

The litter's absorption properties are similar to those of bentonite and it is cost-competitive with other products on the market, says Chett Boxley, general manager of PURR-fect Solutions and a former Ceramtec researcher.

Conveying the wet pellets to the dryer is a critical part of the process, he says. "The pellets are somewhat fragile, and when you



**The fragile wet pellets are moved by a flexible screw conveyor to a circular fluid bed dryer, which reduces their moisture content from about 5 wt% to 0.3 wt%.**

transport them it's very important that you preserve the morphology and size distribution of the particles."

## Geometry prevents degradation

PURR-fect Solutions found a solution with the flexible screw conveyor. It consists of a

rotating, flexible steel screw in a 10 ft. long by 4 in. OD tube. The screw is rotated by a 2 hp (1.5 kW) electric motor with gear reducer located at the top end of the conveyor above the discharge point, eliminating material contact with seals.

**"The pellets are somewhat fragile... it's very important that you preserve the morphology and size distribution of the particles."**

A key feature of the design is that the screw automatically self-centers within the tube, providing clearance between the screw and the tube wall. This provides sufficient space for particles to flow without damage.

Boxley was introduced to flexible screw conveyors by Clark Draney of Sandy, Utah-based Process Control Equipment, a manufacturers' representative who had worked with Ceramtec. Boxley decided against bucket elevators due to their higher cost and the possibility of fugitive dust.

The cat litter manufacturing process begins with pneumatic conveying of fly ash from a storage silo to a pan pelletizer, where it is mixed with an aqueous solution that contains an activator to promote pellet formation. The resultant pellets contain about 5 wt% moisture, as noted earlier, and range in size from

## Reduce Your Risk

Combustible dust hazards exist in your processing facility. Monitor production equipment for hazardous conditions on:

belt & pneumatic conveyors	cutters
dryers	screening
mixers/blenders	storage bins
hammer mills	silos
extruders	dust collectors
pelletizers	bag houses

- Detect **sparks** and **burning embers**.
- Extinguish before the filter.
- Divert hazardous material flow.
- Detect **heat build up** in silos, bag houses and storage bins.
- Trigger extinguish and deluge valves, abort gates and fire traps, equipment shutdown or PLC actions.

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The flexible screw conveyor moves the pellets at a 45 degree incline to the fluid bed dryer.

around 100 to 6 mesh (140 to 3,350  $\mu\text{m}$ ).  
The newly formed pellets drop into a small

hopper, pass through a transition adapter and into the inlet of the flexible screw conveyor, which conveys the pellets at a 45 degree incline to the fluid bed dryer.

### Screw design is critical

As it happened, PURR-fect Solutions learned by experience about the importance of the appropriate screw geometry. "At first we picked a less-expensive spiral that we thought would work," says Boxley, "but the pellets rubbed against the wall at the entrance to the conveyor. This smeared the wall and caused the screw to bind."

Boxley acknowledges that "it was our mistake. When we told Flexicon about it they helped us to do some troubleshooting and got us the right screw."

PURR-fect Solutions has been running the conveyor since the startup of its pilot plant in November 2012 and has had no trouble with it, says Boxley. "All we do is give the motor an occasional squirt of oil," he says.

The tube interior does not require any cleaning, he adds. It can be evacuated by reversing the screw and removing the pellets from the

bottom of the conveyor, but that doesn't have to be done. "At the end of a production run we just throw in a bucket of dry pellets to get the last of the pellets out of the tube," he says.

At present the start-up company is producing about 650,000 lb/yr of cat litter, which is sold to regional pet stores. The pilot plant is operated for only a few hours per day and production can be easily tripled by going to an eight hour shift.

PURR-fect Solutions runs the motor at only about 90 rpm, but it can operate at twice that speed without harming the pellets, says Boxley, noting that the speed is dictated by the capacity of downstream equipment.

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