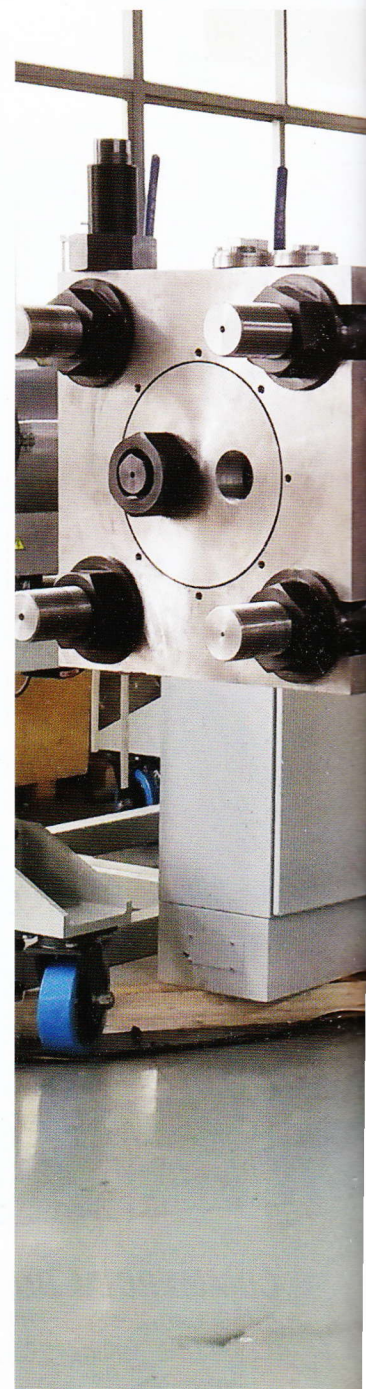


THE DEFENSE IS IN THE DETAILS

Proactive training, knowledgeable operators and even new technologies can mitigate fire risk.

By Tim Albrecht



Dryers and associated equipment are the culprits in one to two large fires per year across the U.S. ethanol industry, according to data from ERI Solutions Inc. “Dozens more small incidents occur each year, as well as hundreds of near misses, says Nathan Vander Griend, president of ERI Solutions.

Fires are inevitable, says Josh Thompson, chief technology officer for Thompson Dryers, so producers should focus on mitigating the risk and having systems and knowledge-

able operators in place to assist when one occurs. “Dryer fires in my opinion are a little bit like the pilot adage, ‘There are pilots that have landed with the landing gear up and those that are going to.’ Meaning, all dryers are going to have a fire and anyone saying anything different is a little too optimistic.”

Ethanol producers have several options when it comes to mitigating the risk of fires in their dryers. A thorough understanding of the root causes, as well as proper training on equipment operation are good starts. New technologies and products focused on fire safety can help, too.

Root Causes

The first part of mitigating dryer fires is looking for the root causes and then working to eradicate them. Within a dryer, the heat is an ignition source and the DDGS are the fuel, Thompson says. “The only thing you need is air (to start a fire), and that’s the big thing you want to keep out of a dryer.”

Thompson Dryers sells dryers, but also consults for plants on any brand of dryer. Preventing air entry is a common service. “We’ll look for where air is getting in,” Thompson says. “We can design fixes for that. It’s usually sealing or explosion venting that doesn’t



SHIPPING OUT: This Rayman Elements Inc. six-section compression dryer soon will be shipped to a customer. Company President Samantha Western says Rayman Elements entered the ethanol industry with its dryer technology to help reduce fire risk at plants.

PHOTO: RAYMAN ELEMENTS INC.

seal. We also help plants with proper use of exhaust gas recycle.”

If a dryer is working properly, a fire or explosion is nearly impossible during normal operation, Thompson says. Rather, they happen during what he calls upset conditions. “An upset condition can be considered startup and shutdown, because those aren’t normal running operations. Also, any kind of mishap that happens during normal operations, such as conveyor failure or any kind of equipment failure.” Such dryer malfunctions could fall into a few categories: power service interruption, instrumentation and control

system issues, fluctuations in flow rates, and upstream process deviations or malfunctions.

“Typically, the worst-case scenario is an inlet screw failure where the dryer doesn’t get wet feed,” Thompson says. “Or if anything causes the exhaust-gas recycle to not operate properly, which would almost guarantee a fire. On a lesser scale, a drum stopping from rotating. After that, almost any kind of failure would cause a fire.”

Knowledge and Training

As with all potentially dangerous equipment, dryers require detailed training and

knowledge. “Those responsible for operating such systems should be provided accurate and detailed procedures, training on those procedures and possess a thorough understanding of the consequences of deviation from those procedures,” Vander Griend says. “Understanding not just what to do, but why it is done that way is vitally important.

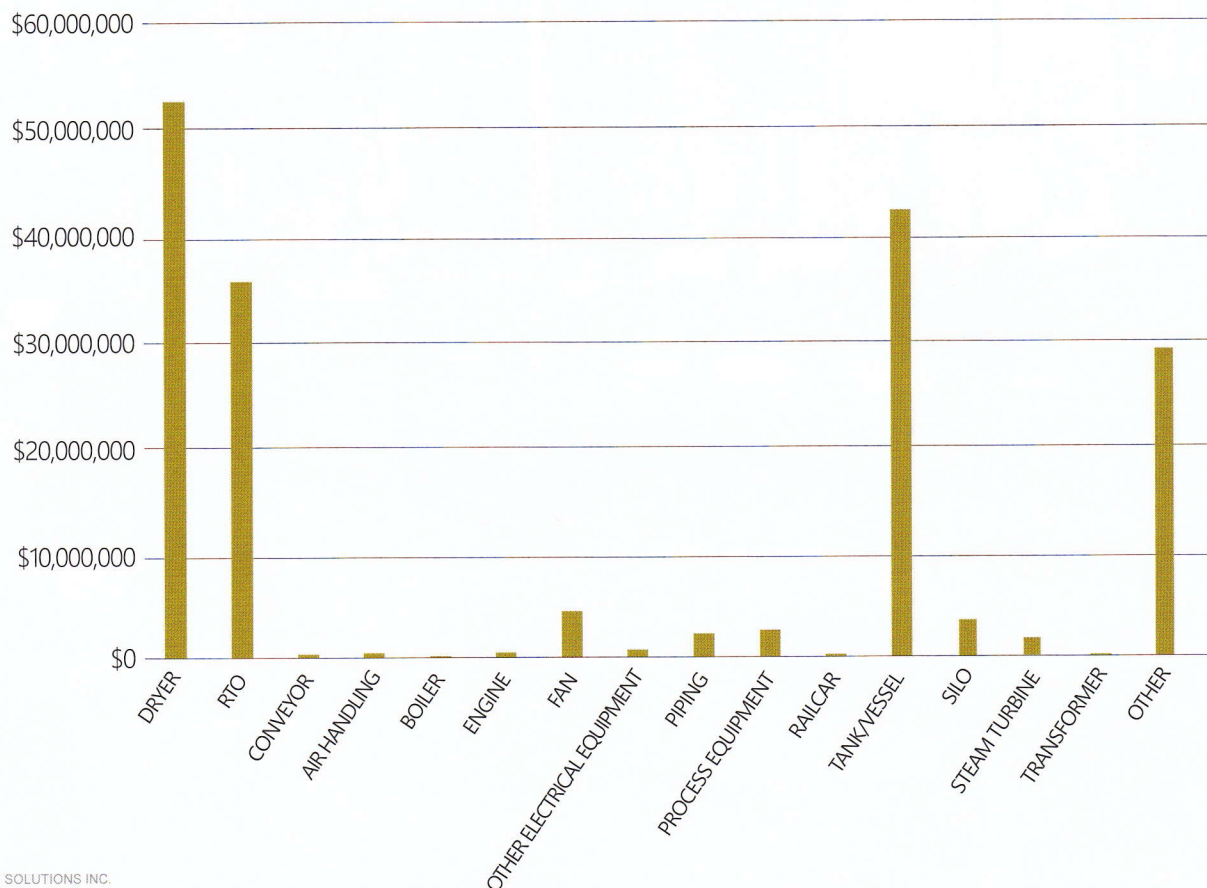
“One of the things I’ve seen many times is loafing, or idling, the dryer, where the dryer is completely running and the burner is functioning at a low-fire position,” Thompson says. “If a dryer has been used, it will have material in the system and running that mate-



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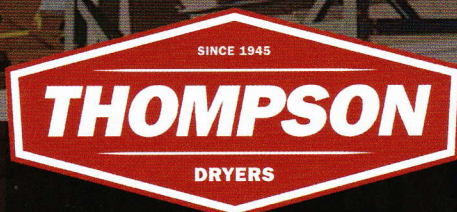
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DRYER SAFETY

rial through the dryer with the burner on over a long period of time will lead to a fire or explosion eventually.”

Another common issue is an operator's improper response to a mechanical failure, he adds. “For example, if a cycle unplug isn't cleaned out in time, the system needs to be shut down to clear it out. If the wet feed auger stops for whatever reason, such as anything upstream where wet product can't get into the drum, the system needs to be immediately shutdown and steam needs to be applied to that system to avoid fire.”

Technological Advancement

As technology in all aspects of the ethanol industry improve, innovations are being applied to ensure the safety of dryer systems, as well.

In an effort to provide more analysis of dryers, Thompson Dryers installs oxygen sensors on its systems. “By putting an oxygen sensor on the dryer, a plant can tell how much oxygen is in their system and that oxygen in the system costs them money they shouldn't



ON TIME: This new dryer system at a 70 MMgy ethanol plant will start ahead of schedule and on budget.

PHOTO: THOMPSON DRYERS

be spending on fuel,” Thompson says. “Also, oxygen allows fires to happen, so by limiting oxygen with the oxygen sensor, you're limiting that problem.”

Rayeman Elements Inc., originally specializing in cattle feed supplements made from DDGS, entered the ethanol market with its dryers largely to mitigate fires in the

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DRYER SAFETY

Rayeman Elements' dryer system is designed in sections, which allows the material to flash off its moisture during the transition from each row. This allows for flexibility to produce modified wets, while still producing dry grains, Western says.

"The material goes through sections of counterrotating, intermeshing screws," she says. "As the material comes in contact with the screws, it creates its own heat, which is part of the reason it doesn't need to run at high temperatures. As the material goes through and as the vacuum pump removes the water, there's not a potential for burning or combustion."

Rayeman Elements, Thompson Dryers and other companies continue to improve their technologies for efficiency and safety. But regardless of brand name and built-in safeguards, producers must consider fire mitigation at all times, Vander Griend says. "It may not be a legal or regulatory requirement, but it is certainly a wise business decision."

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UPGRADED AND RESTARTED: Josh Thompson, chief technology officer for Thompson Dryers, restarts an ethanol plant after a dryer system upgrade.

PHOTO: THOMPSON DRYERS

industry, says Samantha Western, company president. Rayeman Elements' dryer employs a safer and simpler bulk densification system, she says. "We felt if we could develop something that eliminated those kinds of potential disasters, it could be a viable process and product for ethanol plants."

The system runs on electricity at a cooler 320 to 350 degrees Fahrenheit inside the barrel, compared with standard drum dryers running at an average of 800 degrees. "We turn the heat on the barrels to get the ma-

chine started and running, but then use very little electricity after that, as the material goes through a shearing process within the screws and flights, and generates much of its own heat," Western says. It also doesn't have any pressure. Together, these factors reduce the chance of fires or explosions, Western says.

"It also reduces operating costs because it runs on electricity," she says. "The bulk of the electricity it uses is upon initial startup. Then it runs continuously from there using only about 30 percent of its motor load."

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