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PUBLISHED 3Q 2020

Is Your Boiler or Mechanical System Ready for Restart?

Safely Restarting Operations after Extended COVID-19 Shutdowns

August 27, 2020

Industries across the globe are beginning to restart operations after extended boiler and mechanical system lay-ups amid COVID-19 shutdowns. Because catastrophic boiler explosion, equipment degradation, and further loss of production can occur following a prolonged shutdown, it is important for plant owners and operators to outline detailed restart procedures before bringing boilers and mechanical equipment back online. This should include a recognition of the risks associated with the equipment preservation method the facility originally selected, as well as assessments for equipment corrosion. Facilities should also consider whether additional shutdown and startup cycles would deteriorate the lifetime of the equipment should a second idle or shutdown period be required. Taking a thoughtful and deliberate approach to these preparations can help owners and operators optimize the safety and effectiveness of their restart operations.

Understanding the Risks of Equipment Preservation

Boilers and other work horse pieces of mechanical equipment are not typically shut down for extended periods. In the rare event that a shutdown occurs, facility owners and operators traditionally consider the repercussions of the shutdown and align on the ideal method of equipment preservation. Unfortunately, the uncertainty and speed associated with the COVID-19 pandemic may have prevented many plants from preparing for an extended shutdown. As a result, equipment may be in worse shape now than when it originally went offline.

Facilities that have implemented wet lay-ups of boilers or mechanical systems may experience accelerated equipment corrosion or degradation if fluids were not properly prepared before storage and monitored during the extended outage. If left unchecked, a boiler explosion or failure could potentially occur on restart.

In contrast, equipment that has been preserved via a dry lay-up with nitrogen or carbon dioxide will likely experience less corrosion damage. However, dry storage is not without risks, as leaks in boilers or pipes can expose nearby users to asphyxiation hazards. We recommend that equipment operators take additional safety precautions when restarting equipment that has been preserved via a dry lay-up. Potential safeguards to consider include increased room ventilation, atmospheric monitoring, and implementing a safe work permitting system.

Importance of Developing Detailed Restart Procedures

In an ideal situation, a plant would outline both a detailed shutdown and preservation procedure for plant boilers and mechanical systems, as well as a detailed restart procedure. The nature of the pandemic may have understandably prohibited some facilities from taking a comprehensive approach to their shutdown

and preservation planning. Even so, plant owners and operators can still benefit from developing detailed restart procedures. These plans should include a recognition of the risks associated with the equipment preservation method originally selected, as well as assessments for equipment corrosion.

When evaluating corrosion, it is important to understand whether the equipment preservation method or a preexisting cause led to its development. Because large power generation and industrial boilers typically stay online for years before they are taken offline for a major service, a shutdown may highlight the presence of equipment issues that either were not identified or prioritized during traditional operations or were exacerbated by the forced shutdown. Facilities should also be aware that repetitive shutdown and startup cycles can deteriorate the lifetime of equipment that is not generally designed for repetitive cycles of this nature. This consideration may be especially relevant if facilities find themselves in a second wave of shutdowns in the coming months.

How Exponent Can Help

Exponent's multi-disciplinary team of thermal scientists, metallurgists, and mechanical and electrical engineers has extensive experience investigating boiler and mechanical system failures and can partner with facilities to conduct risk assessments and develop procedures for the safe and effective restart of industrial equipment. Our knowledge of how equipment can fail, coupled with our experience with boilers and other specific pieces of mechanical equipment, allows us to help optimize both startup and shutdown plans.

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