

# Challenges in Valve Packing During Shutdown

Valves are an important operational component in most, if not all, industrial processing systems. By regulating the flow of the process media, they contribute to ensuring the safety, reliability, and efficiency of the overall system processes. Depending on the type and scale of a particular plant, the number of valves can vary from a few hundred into the thousands. Ensuring that each of these components remains in good operating condition is an essential function of a plant's maintenance and operations team.

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## Why Maintenance is Needed

In almost every situation, maintenance work within a plant results in interruption of the process, also known as down-time, and a loss of overall production capacity, which in turn means lost revenue. For this reason, maintenance activities are ideally planned and scheduled to coincide with a system shutdown. Shutdowns provide for large-scale inspection and maintenance activities and occur on varying intervals depending on the company or industrial segment.

The maintenance activities during a shutdown are critical to ensuring that all equipment and components can reliably operate without any issues until the next planned shutdown. This poses a significant challenge as the scope of work for a typical shutdown can be massive, and the timelines are streamlined



## Fugitive Emissions Summit Americas 2022

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to get the facility back up to operating capacity as quickly as possible. Besides plant maintenance personnel, armies of contractors are often called in to help get the work completed. Failure to complete the work properly can lead to significant issues including start-up delays, equipment failure, safety and environmental concerns, and more. For this reason, it is imperative that all maintenance work is performed by properly trained and qualified individuals.

### Volume of Valves

The potentially large volume of valves that are addressed during a typical shutdown produces its own set of unique challenges. Many industrial producers have found it more cost effective to replace large numbers of valves rather than service them. However, critical service valves, control valves, exotic metallurgy valves, etc., all typically undergo regular and routine maintenance during shutdowns. Shutdown planners need to identify valves that are impacted by the scope of the work and prioritize critical service valves that need to be brought back online first. Valves in steam service, for example, tend to have a higher priority because the steam will be used in other parts of the process before the end of the shutdown.

The potential challenges of addressing all of the valves can be divided into three stages: before, during, and after the shutdown. Each stage focuses on different aspects that need to be handled properly for the overall successful accomplishment of the work.

### Pre-Shutdown Period

The pre-shutdown period is a critical time for identifying the overall “landscape” of the project. Ideally, a survey of the impacted valves will provide critical information, such as, the size and number of bolts, stem diameter, and the type and size of the compression packing being used, that is necessary to properly plan for the upcoming maintenance activities. Valves should be individually inspected and documented, because even valves

of the same nominal size and pressure rating can have distinct dimensions and features. Additionally, the valves should be inspected for evidence of excessive wear or aging that may require special repairs or replacement.

Basically, the legwork done in planning for the shutdown can either make or break the project timeline when the work begins. Moreover, properly identifying the size and style of compression packing being utilized in the valves, along with accurate information about the operating conditions and installation practices, can help packing manufacturers specify the proper torque value to ensure adequate sealing of the stem. Detailed installation instructions take the guesswork out of the process and lead to better overall results at start-up.

It may seem obvious, but when the time comes to start working on any equipment, it is vital that before beginning the area has been cleared and deemed safe (i.e., all equipment has been isolated, locked out, depressurized, etc.). Lack of communication can cause serious and sometimes even deadly accidents that could have in most cases been easily avoided.

### During Shutdown Period

During the maintenance service, several challenges may arise, therefore it is recommended that all activities be carefully monitored and reported. It is common that delays in one area create a ripple effect that will impact additional activities downstream on the schedule. If these are properly recorded and reported, adjustments can be made to avoid additional delays or wasted time and resources. Furthermore, work that is accessible in the same area will prevent unnecessary setup and tear-down times. In general, good planning and continuous “tending” to the project schedule will help minimize delays.

Proper training before the shutdown is helpful, but it provides little benefit in the long run if installers do not have access to the required tools to do the job cor-

rectly. Again, this is where preliminary planning work pays dividends. Knowing what is required for each job means that maintenance teams can be properly equipped with all of the materials, tools, and information necessary to successfully complete the job.

It is important to recognize that excessively long run times can create unique challenges related to valve packing maintenance. Packing that has seen excessive wear can be in poor condition making it difficult to remove. In these instances, specialized tools may be required to properly remove the old packing. Note that the first step in a successful valve repacking job is to remove all of the old packing. It is never recommended to replace only a portion of the used packing. Moreover, if a valve had been experiencing leaks, inspecting the used packing can provide clues about the root cause of the issue. When removing and installing new packing, any compliance related concerns (like fugitive emissions requirements) must also be considered and addressed.

### Post-Shutdown Period

Finally, after the maintenance work is satisfactorily completed, it is recommended that all of the relevant information related to that valve be properly documented. This can help streamline future maintenance and provide helpful information in the result of an unforeseen problem.

Once the shutdown is completed, a report should be issued so that all service occurrences are recorded, in an activity log to keep history. This will also help with planning future shutdown work. Critical equipment should be monitored through maintenance management software or monitoring sensors, that will identify any issues or failures. Knowing the potential challenges that may arise during a valve service in a shutdown, allows us to formulate a plan that anticipates these difficulties, and mitigates or eliminates potential issues. In this way, the service can be completed with high quality, providing safety and reliability for everyone!

### ABOUT THE AUTHOR



Rafael Hideki Wakavaiachi is a Professional Mechanical Engineer graduated from the University of Campinas, Brazil, with international academic experience at Darmstadt University of Applied Sciences, Germany. He has engineering experience in Heat Exchanger manufacturing and currently holds the position of Application Engineer at Teadit. In his present role, he supports clients with the correct specification and application of Teadit’s products, and provides technical training for the commercial team and strategic partners.

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