



**LEE INDUSTRIES**  
*Processing Perfection.™*

# Scheduled Service Checklist

**Take advantage of upcoming plant shutdowns to ensure high performance from your processing vessels**

Scheduled plant shutdowns are approaching quickly, which makes now the time to set your service plan for all the critical production vessels in your plant.

The cost of vessel equipment failure in process industries can be significant, whether from expensive repairs or production downtime. The ability to prevent these costs is why over 40% of companies in process industries actually view their plant maintenance as a source of higher profits to their operations<sup>1</sup>.

Based on our experience, companies with a planned maintenance program can virtually eliminate unexpected vessel downtime and their corresponding financial losses.



# Preventive Inspection and Scheduled Replacement

## Your Two Critical Maintenance Objectives

To best manage your critical production vessel assets, divide your service planning into two categories:

1

### Preventive Inspection

2

### Scheduled Replacement

With proper attention to both, you can keep small issues from becoming major vessel repairs that can shut down production for hours, days or even weeks.

#### Preventive Vessel Inspections:

##### What to Check

Regular vessel inspections, performed throughout the year, keep your kettles, tanks and agitators operating without interruption.

Here are the key components of production vessels, how to inspect them and common signs of component failure requiring immediate service:

- **Jacket integrity:** Jacket leaks are sometimes obvious in production vessels, and sometimes not, depending on whether the vessel has an exposed jacket. Conduct a visual inspection for obvious leaks, but if a problem is suspected, a pressure test should be performed to identify and assess jacket leaks. If leaks are discovered, they must be repaired and certified by an ASME Code Technician and Inspector.
- **Agitator shaft alignment:** Examine your agitator shaft for unusual or excessive vibration or noises during product mixing, which can indicate a bent or misaligned agitator shaft. Not only can misalignment impair mixing performance, it can also impact other parts in the drive. In extreme cases, misalignment can lead to a broken agitator shaft, a custom part that could take up to several weeks to replace.
- **Drive, gearbox, and motor bearings:** Unusual grinding noises can also be a sign of worn bearings or bushings, either in the gearbox or the electric drive motor. Check for wear (e.g., roundness) and replace as needed.
- **Gearbox:** Inspect gears for chipped or missing teeth or other signs of excess wear and replace as needed. Worn gear teeth can cause gear slippage and further gear damage during operation. While inspecting the gearbox, also check associated gearbox bushings, seals, and drive bearings for noisy operation, wear, excessive play or leakage.
- **Vessel safety features:** Periodically check for proper operation of vessel safety switches, lid lifting hinges and hydraulic lift operation.

#### Scheduled Replacement:

##### What to Replace on a Preemptive Basis

While your maintenance team should inspect your plant's production vessels throughout the year, we've found the processing companies that experience little or no unscheduled downtime pro-actively inspect and replace critical vessel parts during their planned plant shutdowns.

Preemptive replacement is particularly recommended for key wear parts, such as vessel agitator drive bearings and seals, which can fail suddenly and cause major issues (e.g., bent agitator shaft or product contamination from oil leakage). Replacement can be based on predetermined criteria, such as the number of hours of each vessel's running time, or the number of months since the part was last replaced.

Here are the parts in vessel drive assemblies that are most often preemptively replaced on vessel drive assemblies during scheduled preventive maintenance shutdowns:

- **Seals:** Replace seals in drive, gearbox and agitator shaft assemblies to prevent leakage and contamination.
- **Scraper blades:** Replace agitator scraper blades and pins before they chip or break.
- **Bearings:** Replace gearbox and agitator drive bearings and — less frequently — electric motor bearings.
- **Bushings:** Replace gearbox and agitator shaft bushings.
- **Ball valves:** Replace o-rings and seals on sanitary ball valves to prevent leakage and assure correct operation.

Whether you are processing food, beverage, bio/pharma, chemical or petroleum products, Preventive Inspection and Scheduled Replacement are important elements of an effective vessel maintenance program. Your upcoming maintenance shutdown is the perfect opportunity to get off to a great start.

# Service Checklist



CAUSE

**Unscheduled Downtime**  
Due to unexpected equipment issues



## Perform Regular Inspection

	Component	What To Inspect
✓	Jacket/vessel body	Pressure test to check for vessel integrity, jacket leaks, or leaks in attached fittings or lines
✓	Agitator	Check for vibration or noise due to agitator shaft misalignment
✓	Driveshaft connection	Check bearings and bushings for wear; check seals for wear or leakage, check driveshaft fit for wear or excessive play
✓	Gearbox	Check for noisy operation due to chipped or worn gears; check gearbox bearings, bushings, and seals for wear or leakage
✓	Motor	Listen to motor to check for grinding or scraping noises which may indicate worn bearings; visually inspect motor fan for dirt or dust obstruction
✓	Safety features	Check safety switches for correct operation; check operation of lid lifting hinges and mechanisms
✓	Ball valves	Check for leakage on outside of valve body, disassemble, clean, and replace service parts as needed



## Scheduled Replacement

	Component
✓	Bearings <i>(drive, gearbox, agitator shaft)</i>
✓	Bushings <i>(drive, gearbox, agitator shaft)</i>
✓	Seals <i>(drive, gearbox, agitator shaft)</i>
✓	Scraper blades and pins <i>(agitator shaft)</i>
✓	Ball valve o-rings and seals





## Semi-Annual Vessel Service from Lee Industries

Lee Industries skilled, factory-trained service technicians are available to assist you with your upcoming Winter plant shutdown service needs. Our semi-annual vessel service program includes:

- **Vessel inspection and testing:** Complete vessel inspection and operation testing
- **Pressure testing:** Vessel pressure testing
- **Drive inspection:** Inspect motor, gearbox and driveshaft
- **Agitator shaft:** Agitator shaft alignment check and adjustment
- **Complete drive system check:** Inspect and replace gearbox drive gears, bearings, bushings and seals, as needed
- **Complete drive wear parts check:** Inspect and replace drive and agitator bearings, bushings and seals
- **Complete vessel safety check:** Inspect, adjust or repair vessel cover lift mechanisms; cover/lid hinges; manway covers; automatic shutoff switches and other operator safety features
- **Scraper blades:** Inspect and replace scraper blades and pins
- **Ball valves:** Inspect and replace ball valve seals and o-rings as needed

### Lee also provides these vessel services:

#### **New vessel installation support**

Proper installation and startup of every new Lee vessel is critical to preventing damage to your vessel and other expensive installation-related problems. As an added service, Lee can provide a certified field service technician to support your installer or rigging company by ensuring proper unloading, lifting, transport, placement and final installation of your new vessel.

#### **On-call service contracts**

The Lee Total Service agreement provides year-round vessel service for your plant, for an affordable annual cost that is often less than your current plant service costs.

#### **Spare parts inventory recommendations**

We'll help you determine what you need to ensure you have the right parts on hand to avoid long downtime.

#### **On-site service training**

Lee can train your plant maintenance team to perform inspection, service and key component replacement on your plant's production vessels.

CONTACT YOUR LEE REPRESENTATIVE TO SCHEDULE SERVICE FOR YOUR PLANT SHUTDOWN.