**Standard Operating Procedure (SOP) for Repairing the Malt Mill**

**Department:** Maintenance  
**Machine Model:** MillMaster 7500  
**Location:** Milling Section  
**Brewery:** Irvine Plant  
**Location:** Malt Mill 100

**1. Purpose**

This Standard Operating Procedure (SOP) provides comprehensive guidelines for troubleshooting and repairing the MillMaster 7500 malt mill. The objective is to ensure consistent milling performance, prevent unscheduled downtime, and maintain the quality of the milled malt.

**2. Scope**

This SOP applies to all maintenance personnel responsible for the upkeep, troubleshooting, and repair of the MillMaster 7500 malt mill. It covers common and complex mechanical, electrical, and operational issues that may arise during operation.

**3. Responsibilities**

* **Maintenance Technicians:** Perform repairs as outlined in this SOP.
* **Supervisors:** Ensure adherence to this SOP and provide additional support when necessary.
* **Operators:** Promptly report any issues to the maintenance team and assist in identifying problems.

**4. Tools and Equipment**

* Basic Hand Tools (screwdrivers, wrenches, pliers)
* Advanced Tools (bearing puller, torque wrench, belt tension gauge)
* Multimeter
* Vibration Analyzer
* Alignment Tools
* Spare Parts (rollers, belts, motors, sensors, bearings, gearboxes)
* Personal Protective Equipment (PPE) - gloves, safety glasses, hearing protection

**5. Safety Precautions**

* Ensure the malt mill is powered off and disconnected from the main power supply before beginning any repair.
* Follow lockout/tagout (LOTO) procedures to prevent accidental startup during maintenance.
* Use appropriate PPE at all times, especially when working with moving parts and electrical components.
* Be aware of potential pinch points, rotating parts, and confined spaces.

**6. Procedure**

**6.1. Initial Assessment**

1. **Machine Shutdown:** Confirm that the MillMaster 7500 is properly shut down. Engage the emergency stop button and disconnect the main power.
2. **Visual Inspection:** Conduct a thorough visual inspection of the malt mill. Look for signs of wear, unusual sounds, leaks, or loose components.
3. **Diagnostic Check:** Use the malt mill’s control panel to review any error codes or alerts. If available, use diagnostic software specific to the MillMaster 7500 to analyze system performance.

**6.2. Common and Complex Issues and Repairs**

**6.2.1. Issue: Uneven Milling**

**Symptoms:** The malt is not milled uniformly, leading to inconsistent particle size, which can affect mash efficiency.

**Solution:**

1. **Inspect Rollers:** Check the rollers for wear, damage, or improper alignment. Uneven or worn rollers can cause inconsistent milling.
2. **Adjust Roller Gap:** Measure the roller gap using a feeler gauge. Adjust the gap to ensure it is even across the entire length of the rollers according to the manufacturer’s specifications.
3. **Replace Worn Rollers:** If the rollers are excessively worn or damaged, replace them with new ones. Ensure the new rollers are correctly aligned and balanced.
4. **Check and Adjust Feed Rate:** Inspect the feed mechanism to ensure it is supplying grain at a consistent rate. Adjust the feed rate if necessary to prevent overloading or underfeeding the mill.
5. **Test Milling Quality:** After repairs, run a small batch of malt through the mill and inspect the particle size distribution to ensure uniform milling.

**6.2.2. Issue: Roller Slippage**

**Symptoms:** The rollers slip during operation, causing a reduction in milling efficiency and potential damage to the mill.

**Solution:**

1. **Inspect Belts:** Check the drive belts for wear, proper tension, and alignment. Loose or worn belts can cause roller slippage.
2. **Adjust Belt Tension:** Use a belt tension gauge to check the tension of the drive belts. Adjust the tension according to the manufacturer’s recommendations.
3. **Replace Worn Belts:** If the belts are excessively worn or damaged, replace them with new ones. Ensure the new belts are properly aligned and tensioned.
4. **Check Motor Torque:** Inspect the motor and gearbox for signs of wear or improper operation. Verify that the motor is providing adequate torque to drive the rollers.
5. **Lubricate Bearings:** Ensure that all roller bearings are properly lubricated. Worn or dry bearings can contribute to slippage.
6. **Test Roller Operation:** After repairs, run the mill to verify that the rollers operate smoothly without slippage.

**6.2.3. Issue: Excessive Vibration**

**Symptoms:** The mill vibrates excessively during operation, potentially causing damage to components and reducing milling efficiency.

**Solution:**

1. **Inspect Rollers and Shafts:** Check the rollers and shafts for wear, misalignment, or damage. Misaligned or damaged components can cause vibration.
2. **Check Roller Balance:** Use a vibration analyzer to check the balance of the rollers. If the rollers are out of balance, they should be rebalanced or replaced.
3. **Inspect and Replace Bearings:** Worn or damaged bearings can contribute to excessive vibration. Inspect all bearings and replace any that show signs of wear.
4. **Check Motor and Gearbox Alignment:** Ensure that the motor and gearbox are properly aligned with the rollers. Misalignment can cause vibration and lead to premature wear.
5. **Secure All Fasteners:** Inspect all mounting bolts, screws, and other fasteners to ensure they are tight and secure. Loose fasteners can cause or exacerbate vibration.
6. **Test Vibration Levels:** After repairs, run the mill and use the vibration analyzer to ensure that vibration levels are within acceptable limits.

**6.2.4. Issue: Electrical Faults**

**Symptoms:** The malt mill fails to power on, or specific components (e.g., motors, sensors) do not function.

**Solution:**

1. **Check Power Supply:** Verify that the mill is receiving power. Inspect the main power cord, connections, and any fuses or circuit breakers.
2. **Inspect Control Panel:** Check the control panel for error codes or alerts. Use a multimeter to test the electrical components for continuity and proper operation.
3. **Test Motors:** Use a multimeter to test the motor windings for continuity. If the motor is not functioning correctly, inspect it for signs of overheating, worn brushes, or other damage.
4. **Replace Faulty Components:** If any electrical components, such as sensors, switches, or relays, are found to be faulty, replace them with new parts as specified by the manufacturer.
5. **Check for Grounding Issues:** Ensure that the mill is properly grounded. Poor grounding can lead to electrical faults and safety hazards.
6. **Test Electrical System:** After repairs, reconnect the power and perform a test run to ensure all electrical components are functioning correctly.

**6.2.5. Issue: Overheating**

**Symptoms:** The mill overheats during operation, potentially leading to motor damage, reduced efficiency, and safety hazards.

**Solution:**

1. **Inspect Cooling System:** If the mill has a cooling system, ensure it is functioning correctly. Check for blockages, leaks, or coolant levels.
2. **Check Ventilation:** Ensure that the mill’s ventilation system is clear and functioning properly. Blocked vents or inadequate airflow can cause overheating.
3. **Inspect and Replace Bearings:** Overheating can be caused by friction in worn or dry bearings. Inspect all bearings and replace or lubricate them as needed.
4. **Test Motor Load:** Use a motor analyzer to check the motor’s load and operating temperature. If the motor is running hot, it may be overloaded or have an internal fault.
5. **Monitor Operation:** After repairs, monitor the mill during operation to ensure it does not overheat. Check the temperature regularly and make adjustments as needed.

**6.3. Final Steps**

1. **Machine Restart:** Once repairs are completed, restart the malt mill and monitor its operation. Ensure that the rollers, motors, and feed mechanisms operate smoothly and without any issues.
2. **Document Repairs:** Record all repairs made, including parts replaced, in the maintenance log. Include any recommendations for future maintenance or potential issues to monitor.
3. **Notify Operators:** Inform the mill operators of the repairs performed and any changes made to the machine’s operation.

**7. Maintenance Schedule**

Regular maintenance of the MillMaster 7500 should be conducted according to the following schedule:

* **Daily:** Visual inspection, basic cleaning, and checking for unusual noises or vibrations
* **Weekly:** Check belt tension, inspect rollers and bearings, and verify proper operation of the feed mechanism
* **Monthly:** Full diagnostic check, inspection of electrical components, and testing of motor and gearbox alignment
* **Quarterly:** Comprehensive inspection, replacement of worn parts, system calibration, and detailed vibration analysis

**8. Troubleshooting Guide**

Refer to the MillMaster 7500 Troubleshooting Guide (Appendix A) for additional information on resolving less common issues.