Preventive Maintenance Schedule for CNC Lathe (Model: ProMax-3500)

This schedule is designed to maximize uptime, extend equipment lifespan, and preemptively address issues related to tool wear, coolant performance, electrical stability, and mechanical strain.

Daily Tasks (Total Estimated Time: ~25–30 minutes)

1. **Pre-Shift Inspection & Cleaning (10 minutes):**
    - **Tasks:**
        - Visually inspect the machine for any signs of damage or misalignment.
        - Remove debris, chips, and dust from the work area and machine surfaces.
    - **Importance:**
        - Prevents buildup that can interfere with moving parts and ensures a clean environment for optimal operation.
2. **Coolant & Lubricant Check (7 minutes):**
    - **Tasks:**
        - Verify coolant levels, clarity, and temperature.
        - Check oil levels and ensure lubrication points are functioning.
    - **Importance:**
        - Maintains proper thermal management and reduces friction, preventing overheating and mechanical wear.
3. **Tool and Fixture Quick Review (5 minutes):**
    - **Tasks:**
        - Conduct a brief visual check of cutting tools and fixtures for any obvious signs of wear or damage.
    - **Importance:**
        - Early detection of tool degradation helps avoid quality issues and unexpected downtime.
4. **System Diagnostics Review (3 minutes):**
    - **Tasks:**
        - Check the control panel for any alerts or error codes, and verify sensor readings (e.g., temperature, vibration).
    - **Importance:**

        - Ensures that any minor anomalies are promptly addressed before escalating into major issues.

Weekly Tasks (Total Estimated Time: ~1.5–2 hours)

1. **Comprehensive Mechanical Inspection (30 minutes):**
    - **Tasks:**
        - Inspect key mechanical components such as bearings, belts, and drive assemblies for wear or misalignment.
        - Look for loose fasteners and signs of abnormal vibrations.
    - **Importance:**
        - Detects early mechanical degradation to prevent unexpected breakdowns and maintain precision.
2. **Detailed Coolant System Maintenance (25 minutes):**
    - **Tasks:**
        - Clean coolant filters and flush lines if discoloration or debris is present.
        - Inspect the coolant pump and reservoir for proper function.
    - **Importance:**
        - Ensures efficient heat dissipation and minimizes the risk of overheating and associated damage.
3. **Lubrication System Deep Check (20 minutes):**
    - **Tasks:**
        - Clean and inspect lubrication channels; re-lubricate components as needed.
        - Verify that automatic lubrication systems are delivering the proper amount of oil.
    - **Importance:**
        - Reduces friction and wear on moving parts, ensuring smooth operation and prolonging component life.
4. **Sensor Calibration & Log Review (15 minutes):**
    - **Tasks:**
        - Verify and recalibrate sensors (temperature, vibration, load) if necessary.
        - Review system logs to identify any recurring issues.
    - **Importance:**

        - Accurate sensor readings are crucial for early detection of problems and maintaining overall machine health.

5. **Backup & Software Check (10 minutes):**
    - **Tasks:**
        - Back up CNC control software settings and review any recent firmware updates or alerts.
    - **Importance:**
        - Keeps the control system updated and ensures quick recovery in case of software issues.

Monthly Tasks (Total Estimated Time: ~3–4 hours)

1. **Full Mechanical & Electrical Overhaul (1 hour):**
    - **Tasks:**
        - Perform a thorough inspection of all mechanical components, including gears, couplings, and electrical connections.
        - Tighten or replace any worn or loose parts.
    - **Importance:**
        - A comprehensive check minimizes the risk of unexpected failures by addressing wear before it impacts performance.
2. **Deep Coolant System Cleaning & Replacement (45 minutes):**
    - **Tasks:**
        - Drain and clean the coolant reservoir, replace filters, and inspect coolant hoses.
    - **Importance:**
        - Prevents clogging and ensures that the cooling system maintains optimal efficiency under high-load conditions.
3. **Complete Lubrication System Servicing (30 minutes):**
    - **Tasks:**
        - Clean lubrication reservoirs, replace lubricants as recommended, and check for leaks in the system.
    - **Importance:**
        - Consistent lubrication is key to reducing friction-related wear and avoiding mechanical overstrain.
4. **System Performance Test & Calibration (30 minutes):**

- **Tasks:**
    - Run a full diagnostic test cycle, verifying that all operational parameters (spindle speed, feed rate, temperature, vibration) are within optimal ranges.
- **Importance:**
    - Validates the overall health of the machine and ensures that all adjustments made during maintenance are effective.

5. **Documentation & Preventive Parts Replacement (15–30 minutes):**
    - **Tasks:**
        - Update maintenance logs with observations, sensor readings, and any replaced parts.
        - Proactively replace consumable items (e.g., drive belts, seals) as per manufacturer recommendations.
    - **Importance:**
        - Keeping detailed records supports trend analysis and proactive scheduling of future maintenance tasks, reducing unplanned downtime.