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# CNC Router Tool Magazine Drive Belt Tension Adjustment & Preventative Maintenance

## 1.0 Maintenance Objective & Frequency

The objective of this procedure is to inspect and adjust the tension of the tool magazine drive belt on a CNC router to ensure reliable tool indexing and prevent belt slippage, premature wear, or tool change failures. Proper belt tension maintains accurate positioning of the tool magazine, reducing downtime and preventing damage to the magazine drive mechanism.

This PM is to be performed every 500 operating hours or quarterly, whichever comes first. Additionally, perform this procedure whenever tool change errors, unusual belt noise, or visible belt sag is observed.

## 2.0 Lockout/Tagout (LOTO) & Safety

- **Electrical Isolation:** Disconnect the main power supply to the CNC router at the disconnect switch. Apply a personal lock and tag. Verify zero energy state using a voltmeter at the control cabinet.
- **Pneumatic Isolation:** Close the main compressed air supply valve to the machine. Bleed any residual air from the tool magazine pneumatic cylinder by actuating the manual override on the solenoid valve (if equipped).
- **Mechanical Lockout:** Ensure the tool magazine is in a safe, locked position (e.g., park position) before accessing the drive belt area. Use a mechanical stop or block if necessary to prevent unintended rotation.
- **Mandatory PPE:** Safety glasses with side shields, cut-resistant gloves (ANSI A4 or higher), and steel-toed safety boots.

## 3.0 Required Tools, Parts & Lubricants

- Belt tension gauge (e.g., Gates Sonic Tension Meter or mechanical tension gauge, range 0-100 lbs)
- 10mm combination wrench
- 13mm combination wrench
- Torque wrench (0-50 Nm range) with 13mm socket
- Straightedge (300mm minimum)
- Clean lint-free cloths
- Isopropyl alcohol (99%) for cleaning belt and pulleys
- Replacement drive belt (OEM part number, if replacement is required)
- Medium-strength threadlocker (e.g., Loctite 242)

## 4.0 Step-by-Step Maintenance Procedure

1. Perform Lockout/Tagout as per Section 2.0. Confirm zero energy state before proceeding.
2. Remove the tool magazine access cover (typically secured with 4x M6 bolts using a 10mm wrench). Set the cover and fasteners aside in a clean area.

3. Visually inspect the drive belt for signs of wear, cracking, glazing, fraying, or missing teeth. If any damage is found, replace the belt per OEM instructions before proceeding with tension adjustment.
4. Clean the belt and both pulleys (drive and driven) using a lint-free cloth dampened with isopropyl alcohol. Remove all debris, grease, and old belt residue. Allow to dry completely.
5. Using the 10mm and 13mm wrenches, loosen the four mounting bolts on the motor mounting plate (two per side) that secure the drive motor to the adjustment slots. Do not remove bolts; only loosen enough to allow sliding.
6. Apply tension to the belt by sliding the motor away from the driven pulley using the adjustment screw (if equipped) or by manually pulling the motor. Use the belt tension gauge to measure tension at the midpoint of the belt span. Adjust until the tension reads 45-55 lbs (200-245 N) for a standard 25mm wide belt. Refer to OEM specifications if available.
7. While maintaining tension, tighten the four motor mounting bolts to 25 Nm using the torque wrench with 13mm socket. Apply a drop of medium-strength threadlocker to each bolt before final tightening.
8. Verify belt alignment by placing a straightedge across the face of both pulleys. The belt should run parallel to the straightedge with no visible offset. If misaligned, loosen bolts and adjust motor position laterally, then retighten to 25 Nm.
9. Re-check belt tension after tightening. If tension has changed, repeat steps 6-8 until tension is stable within spec.
10. Manually rotate the tool magazine by hand through one full revolution to ensure smooth operation and no binding. Listen for any rubbing or clicking sounds.
11. Reinstall the access cover and torque the four M6 bolts to 10 Nm.

## 5.0 Verification & Return to Service

1. Remove all LOTO devices and restore power and compressed air to the CNC router following proper startup procedures.
2. Jog the tool magazine through a full tool change cycle (all stations) in manual mode. Verify that each tool is indexed accurately and no error codes appear on the controller.
3. Run a test program that performs three consecutive tool changes using different tool numbers. Confirm smooth operation and correct tool pickup.
4. Listen for any abnormal belt noise (squealing, chirping) during operation. If noise is present, re-check tension and alignment.
5. Record the belt tension reading, date, and technician name in the maintenance log (ServiceGrid or paper log). Sign off on the PM work order.
6. Return the machine to production. Monitor the first hour of operation for any tool change issues.

**Regulatory Disclaimer:** This document is a generic maintenance template provided for educational and informational purposes only. It does not constitute professional engineering or reliability advice. The end-user assumes all liability for validating all step sequences, torque specs, and LOTO protocols against specific machinery OEM manuals before deployment to a live production floor.