Maintenance Manual for Quarry Conveyor Belts

1. Introduction

1.1 Purpose

This manual specifies the daily maintenance, regular inspection, fault diagnosis, maintenance operations and safety precautions of quarry conveyor belts (including fabric-core rubber conveyor belts and steel cord conveyor belts). It is designed to guide on-site operators and maintenance personnel to carry out standardized maintenance work, reduce equipment failures, extend the service life of conveyor belts, ensure the safe, stable and efficient operation of the quarry conveying system, and reduce production and maintenance costs.

1.2 Scope of Application

This manual applies to the maintenance work of fabric-core rubber conveyor belts and steel cord conveyor belts used in various quarry scenarios, including horizontal conveying, inclined conveying, transfer impact sections, closed corridors and open-air operations. It is applicable to on-site operators, maintenance personnel and management personnel engaged in the operation and maintenance of quarry conveyor belts.

1.3 Basic Principles

- Preventive Maintenance: Adhere to the principle of "prevention first, combination of prevention and treatment", strengthen daily inspection and regular maintenance, and eliminate potential faults in advance.
- Standardized Operation: All maintenance operations must comply with the requirements of this manual, relevant national/industrial standards and on-site safety regulations to avoid safety accidents and equipment damage caused by irregular operations.
- Adapt to Working Conditions: Combine the harsh working conditions of quarries (high wear, high impact, high dust, large temperature difference) to carry out targeted maintenance, focusing on key parts such as cover rubber, joints and edge rubber.
- Traceability Management: Establish complete maintenance records, record maintenance time, content, personnel and fault handling results, so as to trace and analyze equipment operation status.

2. Daily Maintenance (Daily Inspection and Routine Maintenance)

2.1 Daily Inspection (Before Startup, During Operation and After Shutdown)

2.1.1 Inspection Before Startup

- Surface Inspection: Check the surface of the conveyor belt for obvious damage, such as cracks, delamination, core exposure, lack of glue and foreign objects (sharp debris, large blocks of material) attached; check the edge rubber for wear, warping and cracking.
- Joint Inspection: Check the joint of the conveyor belt for delamination, cracking, looseness and abnormal wear; ensure that the joint is flat and consistent with the belt body, without protrusions or depressions.
- Auxiliary Equipment Inspection: Check whether the rollers, idlers, tensioning devices, deviation correction devices and cleaning devices are normal; ensure that the rollers and idlers rotate flexibly, without jamming or abnormal noise; the tensioning device is in a normal working state, and the conveyor belt has appropriate tension.
- Environmental Inspection: Check the surrounding environment of the conveyor belt, remove accumulated materials, dust and debris around the rollers and idlers; check whether there are obstacles affecting the operation of the conveyor belt.

2.1.2 Inspection During Operation

- Operation Status: Observe the operation of the conveyor belt, check for deviation (the deviation amount shall not exceed 5% of the belt width), slipping, abnormal vibration and noise; ensure that the conveying speed is stable and the material conveying is uniform.
- Temperature Monitoring: Touch the conveyor belt, rollers and idlers with hands (pay attention to safety to avoid scalding) to check for abnormal overheating; the normal operating temperature shall not exceed 60°C.
- Material Conveying: Check whether there is material leakage, blockage or deviation during material conveying; timely clean up the material stuck on the conveyor belt and auxiliary equipment to avoid wear and deviation caused by uneven force.
- Joint Status: Continuously observe the joint during operation to prevent sudden failure of the joint due to impact or wear.

2.1.3 Inspection After Shutdown

- Cleaning Work: Clean the surface of the conveyor belt, remove the material residue, dust and debris on the working surface and non-working surface; clean the rollers, idlers and cleaning devices to avoid material accumulation affecting the next operation.
- Damage Inspection: Recheck the surface and joint of the conveyor belt, and mark the small cracks, wear and other defects found for subsequent maintenance; check whether the edge rubber is worn and whether the core layer is exposed.
- Auxiliary Equipment Maintenance: Check the lubrication of rollers and idlers, and add lubricating oil if necessary; check the tightness of the tensioning device and adjust it in time if there is looseness.
- Record Work: Record the operation status, found problems and handling measures of the conveyor belt in the daily maintenance record book.

2.2 Routine Maintenance (Daily Regular Work)

- Cleaning: Clean the conveyor belt and auxiliary equipment at least once a day to avoid dust and material accumulation affecting the operation; for open-air operation, clean the rainwater and sundries on the conveyor belt in time after rain.
- Lubrication: Add lubricating oil to the bearings of rollers and idlers once a day to ensure flexible rotation; use high-temperature resistant lubricating oil in high-temperature environments and low-temperature resistant lubricating oil in cold areas.
- Tension Adjustment: Check the tension of the conveyor belt once a day. If slipping or deviation occurs, adjust the tensioning device in time; the tension shall be uniform to avoid local stress concentration.
- Small Defect Treatment: For small cracks (length <50mm, depth <2mm) and local wear on the surface of the conveyor belt, use special repair glue for timely repair to prevent the defects from expanding.

3. Regular Maintenance (Periodic Inspection and Maintenance)

3.1 Period Classification and Maintenance Content

According to the operation frequency and service life of the conveyor belt, the regular maintenance is divided into weekly maintenance, monthly maintenance, quarterly maintenance and annual maintenance. The specific content is as follows:

3.1.1 Weekly Maintenance (Once a Week)

- Comprehensive Inspection: Conduct a comprehensive inspection of the entire conveyor belt, focusing on the joint, edge rubber and high-wear sections (such as transfer points and crushing mouths); check for delamination, cracking, core exposure and other defects.
- Auxiliary Equipment Inspection: Check the wear status of the cleaning device (scraper, brush), and replace the worn parts if necessary; check the deviation correction device for flexibility and adjust it in time.
- Tension Calibration: Calibrate the tension of the conveyor belt, ensure that the tension meets the operating requirements, and record the tension value.
- Repair: Repair the small defects found in the weekly inspection, such as filling cracks and repairing local wear.

3.1.2 Monthly Maintenance (Once a Month)

- Belt Body Inspection: Measure the thickness of the cover rubber at the working surface and non-working surface of the conveyor belt (especially the high-wear sections), and record the data; if the thickness is less than 3mm (working surface) or 2mm (non-working surface), plan to replace the conveyor belt or repair it.
- Joint Inspection: Use a ruler to check the flatness of the joint, and detect the joint strength if necessary; if the joint is loose, delaminated or cracked, re-vulcanize or repair it.
- Auxiliary Equipment Maintenance: Disassemble and inspect the rollers and idlers with abnormal operation, clean the bearings and replace the worn bearings; check the tensioning device for wear and deformation, and repair or replace it if necessary.
- Lubrication: Conduct comprehensive lubrication of all rotating parts (rollers, idlers, tensioning devices), and replace the lubricating oil if it is deteriorated.
- Record Analysis: Analyze the daily and weekly maintenance records, summarize the fault prone points, and formulate targeted maintenance measures.

3.1.3 Quarterly Maintenance (Once Every Three Months)

- Comprehensive Detection: Use professional equipment to detect the tensile strength, transverse tear strength and joint efficiency of the conveyor belt; check whether the performance indicators meet the requirements of the technical white paper.
- Belt Body Maintenance: For the conveyor belt with serious local wear, use cold vulcanization repair technology to repair the wear area; for the conveyor belt with uniform wear but insufficient thickness, evaluate whether it needs to be replaced.
- Auxiliary System Inspection: Check the electrical control system of the conveyor belt, including sensors, switches and control cabinets, to ensure normal operation; check the safety protection devices (emergency stop switch, deviation switch) to ensure sensitivity and reliability.

- Environmental Adaptation Check: For open-air conveyor belts, check the aging status of the cover rubber (cracking, hardening), and carry out anti-aging treatment if necessary; for cold areas, check the low-temperature resistance of the conveyor belt.

3.1.4 Annual Maintenance (Once a Year)

- Overall Evaluation: Conduct a comprehensive evaluation of the service life and operation status of the conveyor belt, including cover rubber wear, core layer damage, joint status and performance indicators; formulate a replacement plan for the conveyor belt that is about to reach the service life.
- Complete Overhaul: Disassemble and overhaul all auxiliary equipment (rollers, idlers, tensioning devices, deviation correction devices), replace worn parts and aging components; clean the entire conveying system.
- Calibration and Adjustment: Calibrate all detection instruments and control systems to ensure accurate detection and stable control.
- Maintenance Summary: Summarize the maintenance work of the whole year, analyze the causes of major faults, optimize the maintenance plan, and improve the maintenance efficiency.

3.2 Maintenance of Special Parts

3.2.1 Cover Rubber Maintenance

- Wear Maintenance: For local wear, use special wear-resistant repair glue to fill and repair; for large-area wear, use cold vulcanization or hot vulcanization to paste wear-resistant rubber sheets.
- Aging Maintenance: For the conveyor belt with aging cover rubber (cracking, hardening), apply anti-aging agent to slow down the aging speed; if the aging is serious, replace the conveyor belt.
- Damage Maintenance: For cracks and delamination, cut the damaged area into a regular shape, clean the surface, apply adhesive, and paste the rubber sheet for vulcanization repair.

3.2.2 Joint Maintenance

- Hot Vulcanized Joint Maintenance: Check the joint for delamination and cracking regularly; if there is a small defect, use hot vulcanization repair technology to repair it; if the joint is seriously damaged, re-vulcanize the joint.
- Cold-Bonded Joint Maintenance: Check the tightness of the joint regularly; if it is loose, re-bond it with cold-bonded adhesive; cold-bonded joints should be inspected more frequently, and replaced with hot vulcanized joints if necessary.

3.2.3 Edge Rubber Maintenance

- Wear Maintenance: For edge wear, apply repair glue or paste rubber strips to repair; if the wear is serious and the core layer is exposed, cut the damaged edge and re-vulcanize the edge rubber.
- Cracking Maintenance: For edge cracks, clean the crack area, apply adhesive, and paste rubber sheets to repair; avoid the crack expanding to the belt body.

4. Fault Diagnosis and Handling

4.1 Common Faults and Handling Methods

Fault Phenomenon	Possible Causes	Handling Methods
Conveyor belt deviation	1. Uneven tension of the conveyor belt; 2. Rollers and idlers are not parallel; 3. Material deviation during conveying; 4. Wear of edge rubber; 5. Installation deviation of the frame.	1. Adjust the tensioning device to ensure uniform tension; 2. Adjust the rollers and idlers to keep them parallel; 3. Correct the material conveying direction to avoid deviation; 4. Repair or replace the edge rubber; 5. Adjust the frame to ensure it is horizontal and straight.
Conveyor belt slipping	1. Insufficient tension; 2. The surface of the conveyor belt is wet or has oil stains; 3. Excessive load; 4. Wear of the driving roller.	1. Increase the tension through the tensioning device; 2. Clean the surface of the conveyor belt and driving roller to remove water and oil stains; 3. Reduce the conveying load to avoid overloading; 4. Repair or replace the driving roller.
Joint delamination/cracking	1. Poor joint quality; 2. Impact of materials at the joint; 3. Aging of the joint adhesive; 4. Excessive tension.	1. Re-vulcanize or re-bond the joint; 2. Add a buffer device at the transfer point to reduce material impact; 3. Replace the aging adhesive; 4. Adjust the

		tension to avoid excessive stress at the joint.
Cover rubber wear/exposure core	1. High wear of materials; 2. Material with sharp edges and corners; 3. Insufficient thickness of cover rubber; 4. Lack of cleaning, material accumulation and wear.	1. Repair the wear area with wear-resistant glue or rubber sheets; 2. Screen the materials to remove ultra-sharp blocks; 3. Replace the conveyor belt with insufficient cover rubber thickness; 4. Strengthen daily cleaning to avoid material accumulation.
Abnormal noise during operation	1. Jamming of rollers or idlers; 2. Lack of lubrication; 3. Wear of bearings; 4. Deviation of the conveyor belt and friction with the frame.	1. Clean the rollers and idlers to remove jamming objects; 2. Add lubricating oil; 3. Replace worn bearings; 4. Adjust the conveyor belt to avoid friction with the frame.
Conveyor belt tearing	1. Sharp debris mixed in materials; 2. Material impact is too large; 3. Joint failure; 4. The conveyor belt is stuck by obstacles.	1. Stop the machine immediately, remove the sharp debris and obstacles; 2. Use vulcanization technology to repair the tear; 3. If the tear is too large, replace the conveyor belt; 4. Add a debris removal device to prevent sharp objects from entering the conveying system.

4.2 Fault Handling Principles

- Safety First: When a fault occurs, stop the machine immediately, cut off the power supply, and set up a warning sign to avoid safety accidents; do not handle the fault during operation.
- Quick Response: After a fault occurs, quickly diagnose the cause, formulate a handling plan, and minimize the impact on production.

- Root Cause Treatment: When handling faults, not only eliminate the surface phenomenon, but also find the root cause, take targeted measures to avoid repeated faults.
- Standard Operation: All fault handling operations must comply with the requirements of this manual and safety regulations, and professional personnel shall be arranged to operate if necessary.

5. Maintenance Safety Precautions

- Before carrying out any maintenance work, must stop the conveyor belt, cut off the power supply, and lock the power switch to prevent accidental startup; set up a warning sign at the operation site.
- Maintenance personnel must wear personal protective equipment (safety helmet, gloves, safety shoes, etc.) to avoid injury caused by debris, sharp objects or equipment operation.
- When working on the inclined conveyor belt, use safety ropes to prevent falling; do not work alone, and arrange special personnel to monitor.
- When using vulcanization equipment, strictly follow the operation procedures of the equipment, pay attention to high temperature protection, and avoid scalding; the vulcanization site must be well-ventilated, and no flammable and explosive materials are allowed.
- Do not use damaged or unqualified maintenance tools and materials; the repair glue, lubricating oil and other materials used must meet the technical requirements.
- After the maintenance is completed, check the maintenance area again to ensure that no tools, debris or other objects are left on the conveyor belt or auxiliary equipment; test run the conveyor belt for a short time to confirm that it operates normally before formal operation.
- Maintenance personnel must be trained and qualified before taking up the job, and be familiar with the structure, performance and maintenance procedures of the conveyor belt; unqualified personnel are not allowed to carry out maintenance operations.

6. Maintenance Record Management

6.1 Record Requirements

- Establish a special maintenance record book, which shall be filled in truthfully, completely and clearly by the maintenance personnel; the record content shall not be altered or missing.

- The maintenance record shall include: maintenance date, maintenance type (daily, weekly, monthly, quarterly, annual), maintenance content, found problems, handling measures, handling results, maintenance personnel, inspector and other information.
- The maintenance record shall be filed and kept, and the retention period shall not be less than 3 years, so as to facilitate traceability and analysis.

6.2 Record Analysis and Application

- Regularly analyze the maintenance records (monthly, quarterly), summarize the fault prone points, wear rules and maintenance effect of the conveyor belt.
- According to the analysis results, optimize the maintenance plan, adjust the maintenance cycle and content, and improve the maintenance efficiency and quality.
- Use the maintenance records to evaluate the service life of the conveyor belt and formulate a reasonable replacement plan.

7. Supplementary Provisions

- This manual shall take effect from the date of issuance. For matters not covered herein, refer to the relevant national/industrial standards and the technical white paper on conveyor belts.
- This manual shall be explained by the issuer. If there is technological upgrading or equipment update, this manual will be revised in a timely manner and notified separately after revision.
- All on-site operators and maintenance personnel must strictly abide by the requirements of this manual to ensure the safe and stable operation of the conveyor belt.

（注：文档部分内容可能由 AI 生成）