ATTACHMENT 461
CONVEYOR SYSTEMS
Compiled by
AFREPREN/FWD
COGEN FOR AFRICA PROJECT
2017
Contents

• Introduction
• Types of conveyor systems
• Maintenance of conveyor systems
• Application of conveyor systems
Introduction

- A conveyor system is a common piece of mechanical handling equipment that moves materials from one location to another.
- Conveyors are especially useful in applications involving the transportation of heavy or bulky materials.
- Conveyor systems allow quick and efficient transportation for a wide variety of materials, which make them very popular in the material handling and packaging industries.
Types of Conveyors

There are several types of Conveyor system, which include:

- Belt conveyors
- Live roller conveyors
- Chain conveyors
- Gravity conveyors
Belt Conveyors

Belt drives can be divided into two groups: friction drives and positive drives.

- Friction drives transmit power through the friction that exists between the belt and the pulley.
- Positive drives" rely on the engagement of the belt’s teeth with grooves on the pulley.
- Belt conveyors are used for the controlled movement of a large variety of both regular and irregularly shaped products that can vary in weight.
• The items being conveyed are carried by the top surface of the belt.
Live Roller Conveyors

• A live roller is just that, meaning the driving source of the roller is either a friction belt, V-belt, round belt, or chain, and the roller actually sits on top of the driving source so that when the driving source runs, the roller spins.

• This is the most cost-effective way to get packages from point A to point B.
Live roller conveyors, are used in preference to belt conveyors where:

- Temporary utilization of the items being conveyed is a requirement.
- Items are stopped momentarily, such as at traffic control points.
- Items must be turned (ex., turned 90° on the conveyor).
- Side loading or unloading is required, involving a sliding motion across the bed rollers.
Chain Conveyors

• Chain conveyors utilize a powered continuous chain arrangement, carrying a series of single pendants.
• The chain arrangement is driven by a motor, and the material suspended on the pendants are conveyed.
• Chain conveyors are used for moving products down an assembly line and/or around a manufacturing or an agro industry.
Chain Conveyors

- Many industry sectors use chain conveyor technology in their production lines. The tea industry uses chain conveyors to transport harvested tea leaves from the farm to the factory.
Gravity Conveyors

- Gravity conveyors provide an economical means of transporting product where the conveyor does not need to be powered.
- Probably no other type of conveyor is applied to so many gravity material handlings uses as roller and wheel conveyors, which are capable of handling various packaged materials efficiently for distances as short as 2 feet or as long as 100 feet.
- Goods ranging from tea leaves and packed flowers can be moved by gravity.
A conveyor system that is designed properly will last a long time with proper maintenance. Here are six of the biggest problems to watch for an overhead type conveyor system. Overhead conveyor systems have been used in numerous applications in horticultural and tea farms.

1. Poor take-up adjustment: this is a simple adjustment on most systems yet it is often overlooked. The chain take-up device ensures that the chain is pulled tight as it leaves the drive unit.

2. Lack of lubrication: chain bearings require lubrication in order to reduce friction. The chain pull that the drive experiences can double if the bearings are not lubricated.
3. Contamination: paint, powder, acid or alkaline fluids, abrasives, glass bead, steel shot, etc. can all lead to rapid deterioration of track and chain. Contamination is the leading cause of bearing failure.

4. Product handling: it is important that each new product be deemed acceptable for conveying before being run through the materials handling equipment.
5. Drive train: parts of the drive train should be kept in proper shape. Broken O-rings on a Line shaft, pneumatic parts in disrepair, and motor reducers should also be inspected.

6. Bad belt tracking or timing: in a system that uses precisely controlled belts, such as a sorter system, regular inspections should be made that all belts are traveling at the proper speeds at all times.
Application of Conveyor Systems

Overhead conveyor system at James Finlay Kitumbe Tea Factory.
Application of Conveyor Systems

• Overhead conveyor systems are a combination of chain and gravity conveyors.

• In Kenya, the use of diesel-fueled trucks to transport green tea leaves from the estate to the factory resulted in emissions of greenhouse gases, as well as dust on the all-weather road around the tea fields.

• To solve the problem with the diesel-fueled trucks, James Finlay Kitumbe tea factory decided to construct an overhead conveyor between the estate and the factory.
Application of Conveyor Systems

• As for their bottom line, a cost-benefit analysis of the project between the months of December 2012 to August 2013 showed a net benefit of KES 23,674,739 (some $270,000 at the time).
• This was approximately KES 2,630,567 ($30,000) per month.
• The total capital they invested was KES 60,000,000 ($685,000);
• The payback period was just two years.