

Reduction of Losses of Conveyor Belt Due To Rupture Caused By Foreign Materials

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Abstract—Losses of conveyor belt due to rupture caused by foreign materials is the major losses of belt in conveyors of any industries Reason of full length belt cut due to foreign material stuck in skirt board . To eliminate the full length belt cut due to foreign material stuck in skirt board provided a Belt Rupture Devices (BRD) in all conveyors after the receiving chute at 5-10mtr distance. Whenever belt get through cut, carrying material will fall on the BRD plate. The moment material weight become more on the BRD plate then the counterweight of the BRD (hardly max 300 gms), limit switch will operate & belt will be stopped and thus prevent further damage to the belt.

Key Words: conveyor system, belt system, fabrication of belt rupture device,

installation of belt rupture device, counter weight provided in belt rupture device, sensor fixing in belt rupture device.

INTRODUCTION

1.1 Conveyors

Conveyors are power equipment's commonly used for to transferring the bulk or unit load continuously or intermittently, unidirectional from one location to another location over fixed path, where the main function is to transmit the material by the help of movement of some parts/machinery of the equipment. Whole setup does not move.

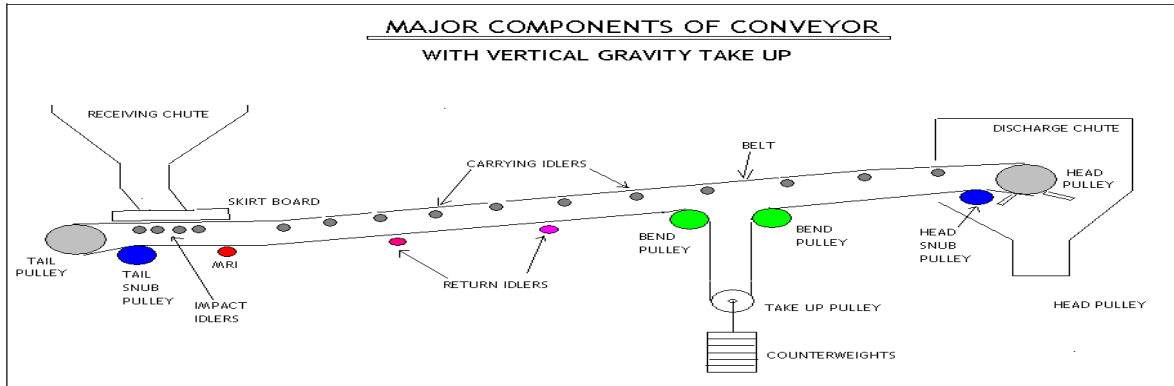


FIG.1 Configuration of conveyor

Conveying equipment is a group of machines which move loads in a continuous flow and sometimes may not lifting gear. Conveyors are efficient way of moving materials. Conveyors are most important mechanical material handling equipment's.

more, the belt rotating around the pulleys. One or both of the pulleys are powered, moving the belt and the material on the belt forward. The powered pulley is called the drive pulley while the non-driven pulley is called tail pulley.

1.2 Study area

The JSW STEEL LTD. Bellay,
Karnataka Raw Material Handling
System.

1.3 Conveyor belt

Conveyor belt is endless loop which move parts or materials from one location to another. Conveyor belts are driven by variable speed electric motors with two or

1.4 TYPES OF CONVEYOR BELT

1. Multi plies Conveyor belt- Nylon Polyester material (EP)
2. Fire and Flame resistant (FR)
3. Heat Resistant conveyor belts (HR)
4. Pipe conveyors
5. Steel cord re-in forced belts. (SC)

2.EQUIPMENT AND METHODOLOGY

2.1 FABRICATION OF BELT RUPTURE DEVICE:

Belt rupture device fabricated by using the mild steel plate and idlers. Mild steel plate welded with idler.

1. Detail of mild steel plate:-

Length of plate	:	1000 mm
Width of plate	:	500 mm
Thickness of plate	:	6 mm

2. Detail of idler:-

Length of idler	:	1200 mm
Diameter of idler	:	139.5 mm

Schematic Diagram of Belt Rupture Device

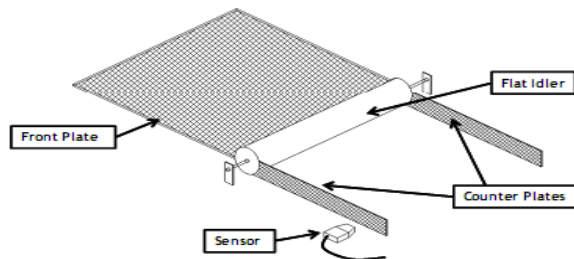


FIG 2.1 Schematic diagram of Belt Rupture Device

2.2 INSTALLATION OF BELT RUPTURE DEVICE:

Belt Rupture Devices (BRD) is installed in all conveyors after the receiving chute at 5-10mtr distance and center of the belt. Whenever belt get through cut, carrying material will fall on the BRD plate.

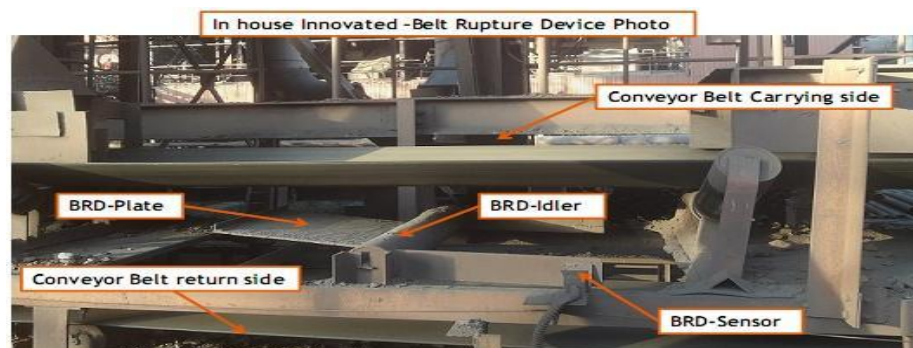


FIG 2.2 In-house innovated –Belt Rupture Device

2.3 COUNTER WEIGHT FIXED ON BELT RUPTURE DEVICE:

When belt rupture device installed in conveyors a counter weight required for balancing the BRD mild steel plate. Counter weight plate fixed with idler in opposite side of MS plate.

2.4 SENSOR FIXING ON BELT RUPTURE DEVICE:

3. COMPARISONS

1. Based on this concept, the in-house Material collection plate (MS) which is counter balanced with known weight with actuation sensor is developed and same is interlocked with conveyor stop interlock.
2. When belt rupture device is operated then counter weight plate lifted up and Sensor not sensing the counter weight plate and stop the conveyor

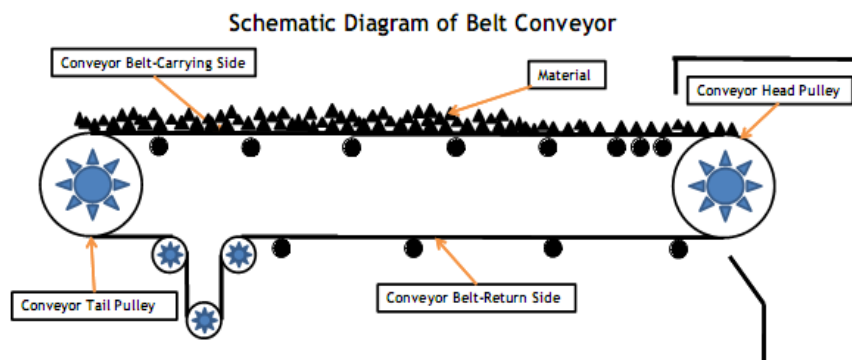


FIG 3.1 Schematic diagram of the conveyor (Before)



FIG 3.2 Conveyor status Before without BRD

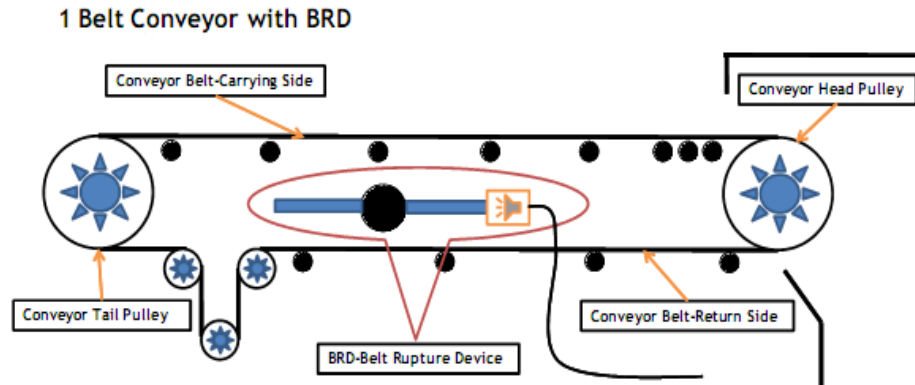


FIG 3.3 Schematic diagram of the conveyor (After)



FIG 3.4 Conveyor status After fixing BRD

2 Belt Conveyor with BRD - Operated & Conveyor stops

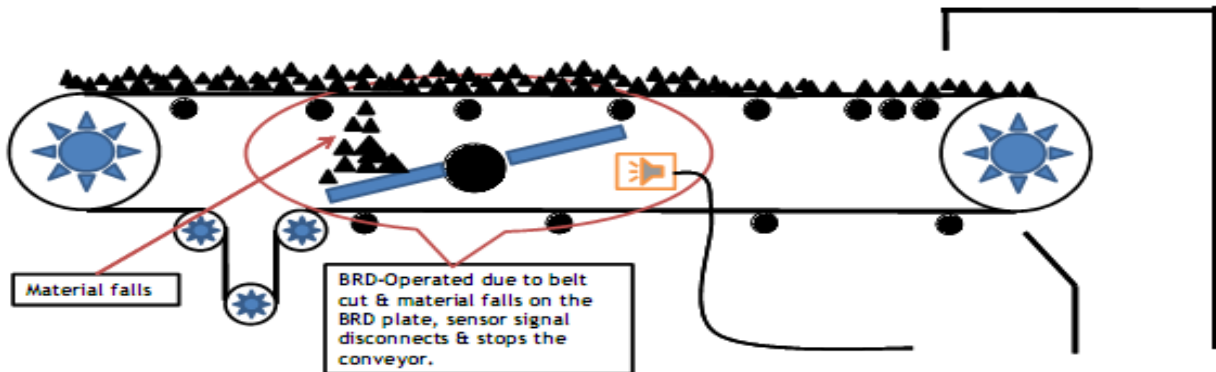


FIG 3.5 Belt conveyor with BRD – Operated and Conveyor stops



FIG 3.6 Belt conveyor with BRD – Operated and C

5. RESULTS AND DISCUSSION

1. Reduction of full length belt through cut:

Belt Rupture Devices (BRD) is provided in all conveyors after the receiving chute at 5-10mtr distance. Whenever belt get through cut, carrying material will fall on the BRD plate.

The moment material weight become more on the BRD plate then the counterweight of the BRD (hardly max 300gms), limit switch will operate & belt will be stopped and thus prevent further damage to the belt.

2. Reduction of belt cost:

Belt rupture device is reduced of full length belt through cut so belt cost is reduced

3. Reduction of belt restoring time:

Belt rupture device is reduced of full length belt through cut so belt restoring time is reduced.

4. Reduction of Railway demurrage charge:

Belt rupture device is reduced of full length belt through cut, belt restoring time is reduced so Railway demurrage charge is reduced.

5. Reduction of Additional truck tippers & wheel loader required for shifting & feeding of raw material to internal customers:

Belt rupture device is reduced of full length belt through cut, belt restoring time is reduced so Reduction of Additional truck tippers & wheel loader required for shifting & feeding of raw material to internal customers is reduced.

6. Reduction of Production affected due to belt cut:

Belt rupture device is reduced of full length belt through cut ,belt restoring time is reduced so Production affected due to belt cut is reduced.

7. Reduction of Continuous supervision and monitoring required while feeding raw material:

Belt Rupture Devices (BRD) is provided in all conveyors after the receiving chute at 5-10mtr distance. Whenever belt get through cut, carrying material will fall on the BRD plate.

The moment material weight become more on the BRD plate then the counterweight of the BRD (hardly max 300 gms), limit switch will operate & belt will be stopped and thus prevent further damage to the belt.

So continuous supervision and monitoring required while feeding raw material is reduced.

CONCLUSION

1. After project has been done to check the work of belt rupture device Whenever belt get through cut, carrying material will fall on the BRD plate.
2. The moment material weight become more on the BRD plate then the counterweight of the BRD (hardly max 300 gms), limit switch will operate & belt will be stopped and thus prevent further damage to the belt.
3. **REGULAR IMPLEMENTATIONS**
 - Inspection of belt, pulley lagging, scrapers, idlers to be done in every day by operator/maintenance and same to be reported to his shift in charge if found defective.

- BRD/ZSS/PULL CHORD operate in running belt, conveyor need to be thoroughly inspected by operation and maintenance before reset installed safety devices.
- Ensuring all safety devices in line and working
- Periodically check up of belt joints and eliminate if found any weak joint.

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