



# Countermeasures for trouble on Belt Conveyor operation

**Registration available**

**Material drop,  
Belt slip,  
Belt tear break,  
Blocking chute  
Fire accident, etc.**

**WEBINAR**  
Countermeasures  
for trouble on  
Belt Conveyor operation

Nov. 12<sup>th</sup>, 2020 / 17:00 – 17:50 (UTC+9)

# PRECAUTIONS for the webinar



Your microphone is muted during the webinar.



Please use the Q&A column on the right side of the screen if you have any question.



Questions are welcome at any time.  
You can send a text on the Q&A column at any time.



We will have the Q&A session at the end to reply to your questions.



If we don't have enough time to reply to your question, we'll send an answer later by separate email.

# Who is Matsushima Measure Tech?

Company name	<b>Matsushima Measure Tech Co., Ltd.</b>
Founded	<b>1946</b>
Products and services	<p><b><u>Level Sensing</u></b> Radar level transmitter, Various level switches, Customized level measuring systems for harsh applications.</p> <p><b><u>Dust Sensing</u></b> Various dust monitoring sensors for industrial dust collector, piping, stack, open workplace, clean room, etc.</p> <p><b><u>Safety Sensing</u></b> Safety switches for belt conveyor, conveyor belt automatic adjusting carrier, belt tear detector, belt cleaner, etc.</p> <p><b><u>Robot System</u></b> COBOT (Human Collaborative Robot) system, automation engineering, etc.</p> <p><b><u>Others</u></b> Actuators, Position sensors, etc.</p>
Network	<p><b>Subsidiaries</b> in: China and South Korea <b>Distributors</b> in: Taiwan, Indonesia, India, Thailand, Malaysia, Vietnam, Philippines, Australia, Mongolia, Russia and US</p>
Reference	Steel, Cement, Power, Metal, Fertilizer, Chemical, Food, Mining, etc.

# **Today's topics**

1. **Countermeasures for trouble on belt conveyor operation**  
(Mr. Kazuhito MAEDA, Marketing Manager at MMT)
  - a. Typical troubles / accidents
  - b. General countermeasures
  
2. **Proposal from Matsushima Measure Tech Japan**  
(Mr. Mamoru OMURA, Regional Sales Manager at MMT)
  - a. Indispensable safety sensors
  - b. Unique sensors for productivity improvement
  
3. **Question and Answer session**

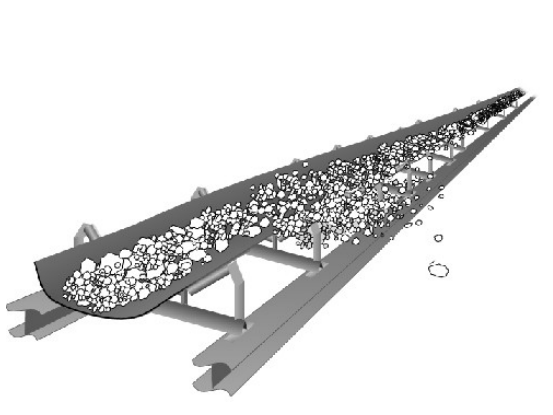
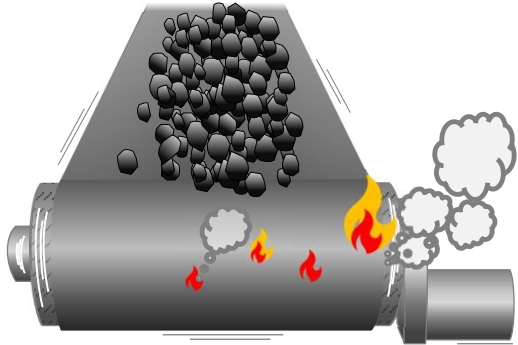
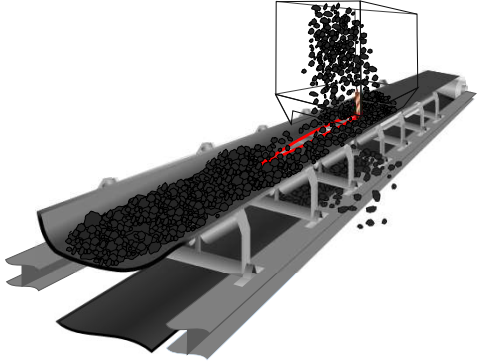
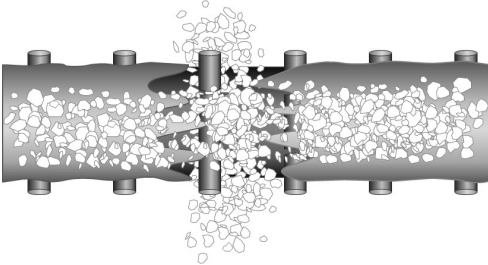
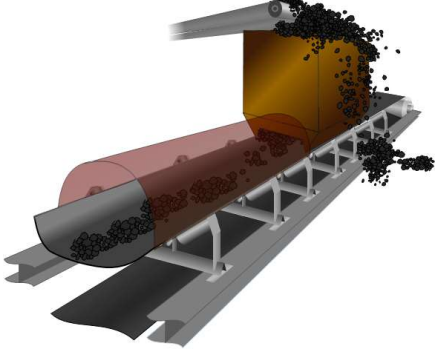



**= Webinar =**

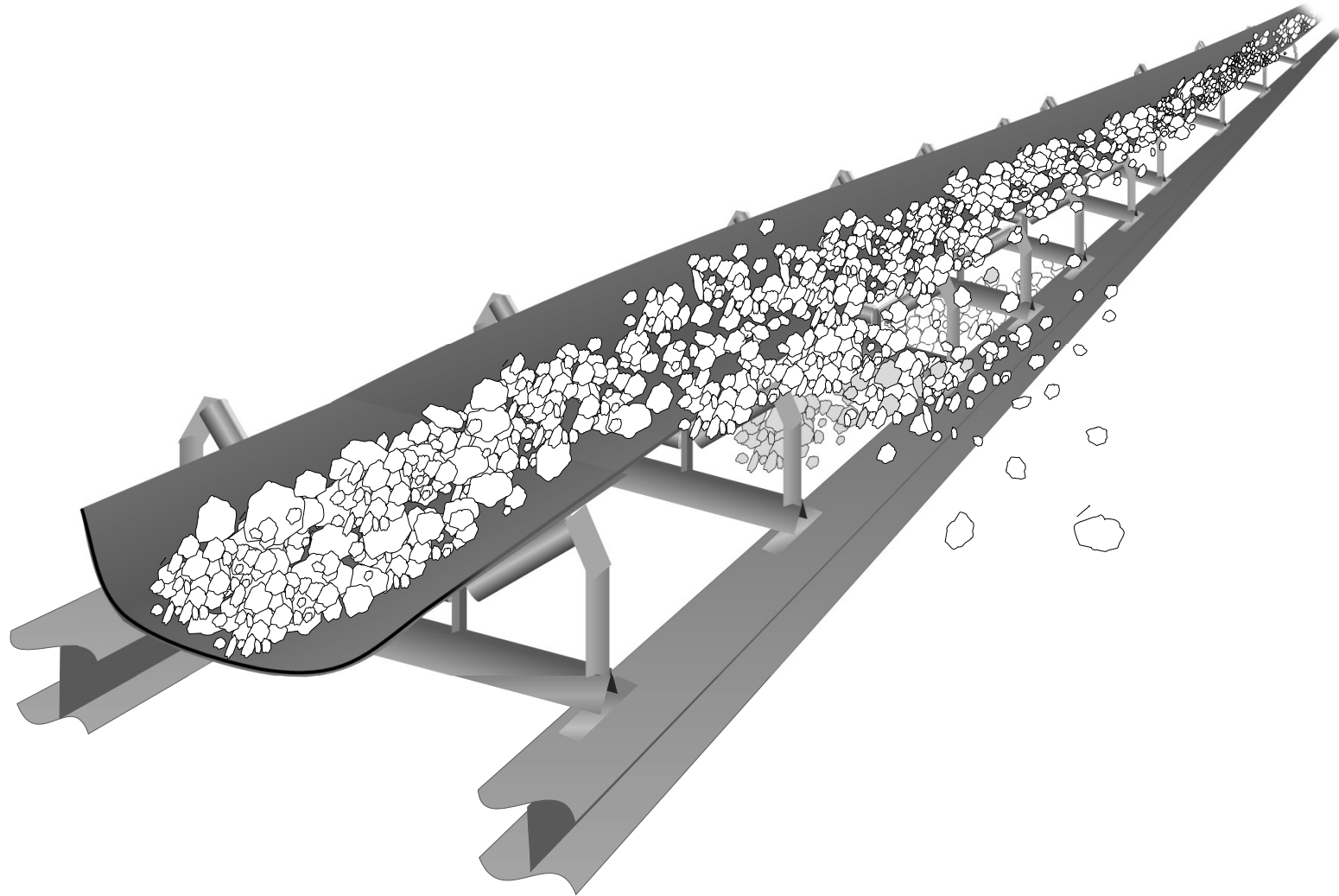
# **Countermeasures for trouble on belt conveyor operation**

- **Date** : **November 12<sup>th</sup>, 2020**
- **Time** : **17:00 – 17:50 at Japan(UCT+9)**
- **Presenter** : **Mr. Kazuhito MAEDA  
Marketing Manager  
at Matsushima Measure Tech Co., Ltd.**

# Typical troubles and accidents

Material drop	Fire accident	Belt tear accident
 A 3D perspective view of a conveyor belt filled with white material. Several pieces of material are shown falling off the side of the belt.	 A 3D perspective view of a conveyor belt with a large pile of black material. A fire is shown burning on the belt, with flames and smoke rising from it.	 A 3D perspective view of a conveyor belt with a large pile of black material. A red line indicates a tear in the belt, and material is shown falling through the gap.
Belt cut break	Blocking chute	Being caught in machine
 A 3D perspective view of a conveyor belt with a large pile of white material. The belt is shown broken in the middle, with material falling through the gap.	 A 3D perspective view of a conveyor belt with a large pile of black material. The material is shown blocking the chute, preventing it from moving.	 A cartoon illustration of a worker wearing a yellow hard hat and a green uniform. The worker is being pulled into a machine, with a lightning bolt symbol indicating a shock or danger.

# 1. Material drop



## Main causes (for material drop)

1. Pulley or roller has got dirt, build-up, adhesion, etc.
2. Roller is not rotating properly or broken.
3. Transporting material is changed. (loaded on side, etc.)
4. Skirt rubber is damaged or load material is bitten inside.
5. Conveyor belt is damaged.
6. Environmental situation change (heat, wind, moisture...)



**Conveyor belt snaking or misalignment**



**Material drop**

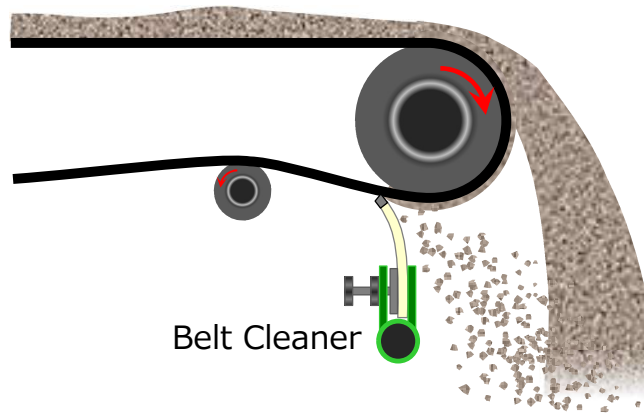


**Production loss, Maintenance cost raise**

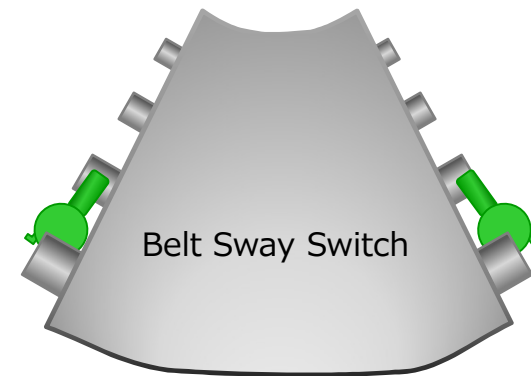


# Countermeasures (for material drop)

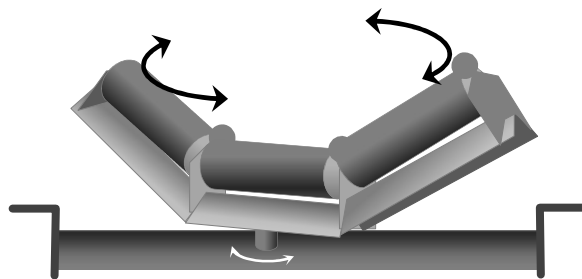
Remove build-up material



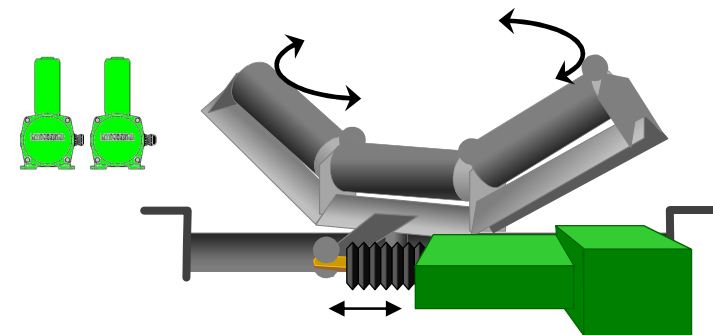
Detect misalignment and stop



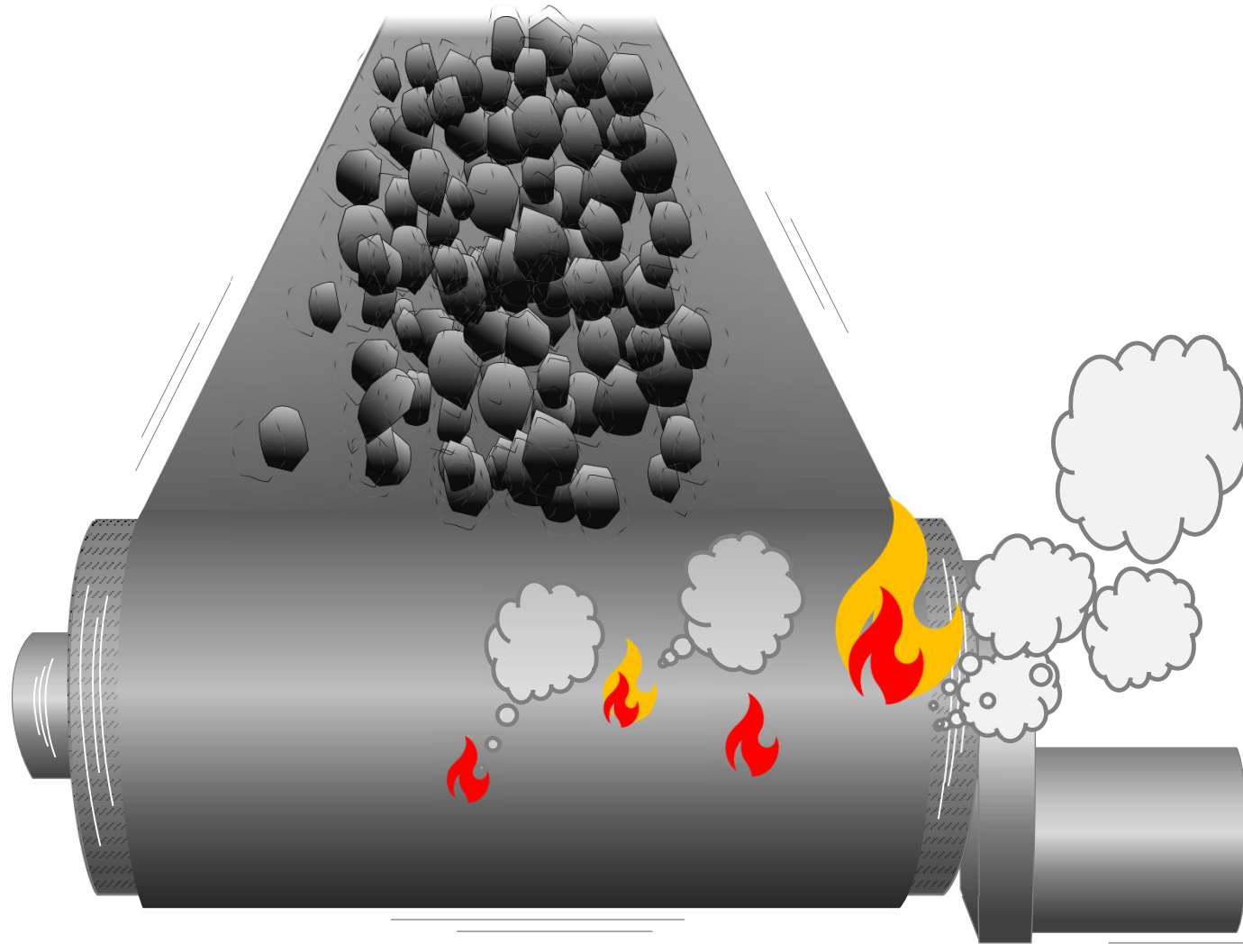
Self-aligning mechanical carrier



Motor-operated Adjusting Carrier



## 2. Fire accident



## **Main causes** (for fire accident)

1. **Belt slip between conveyor belt and drive pulley.**
2. **Heat due to malfunction of rotating parts (bearing, etc.).**
3. **Friction heat between misaligned belt and frame.**
4. **Heat generated from accumulated dust at roller stand, etc.**
5. **Ignition from the site work using fire.**



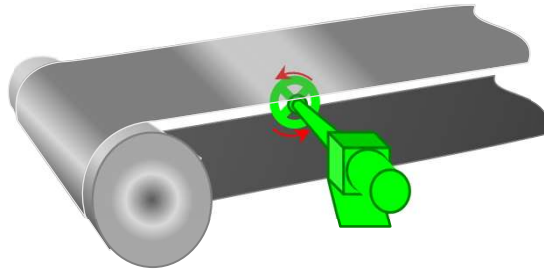
**Fire accident**



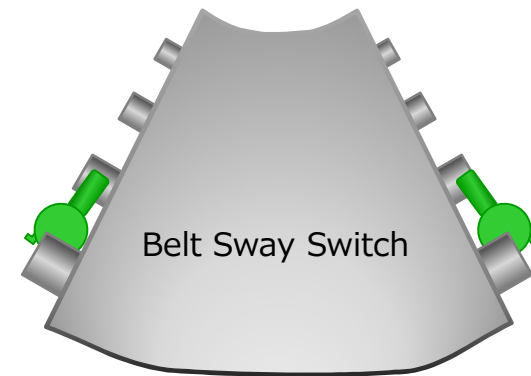
**Production loss, Maintenance cost raise,  
Human injury, Health damage, Air pollution**

# Countermeasures (for fire accident)

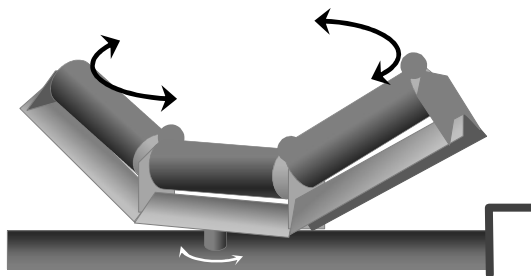
Detect slip and stop



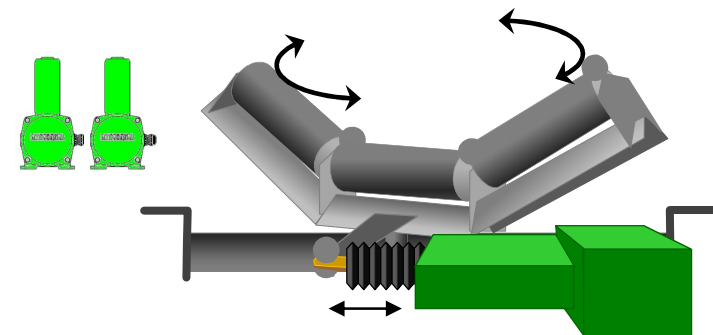
Detect misalignment and stop



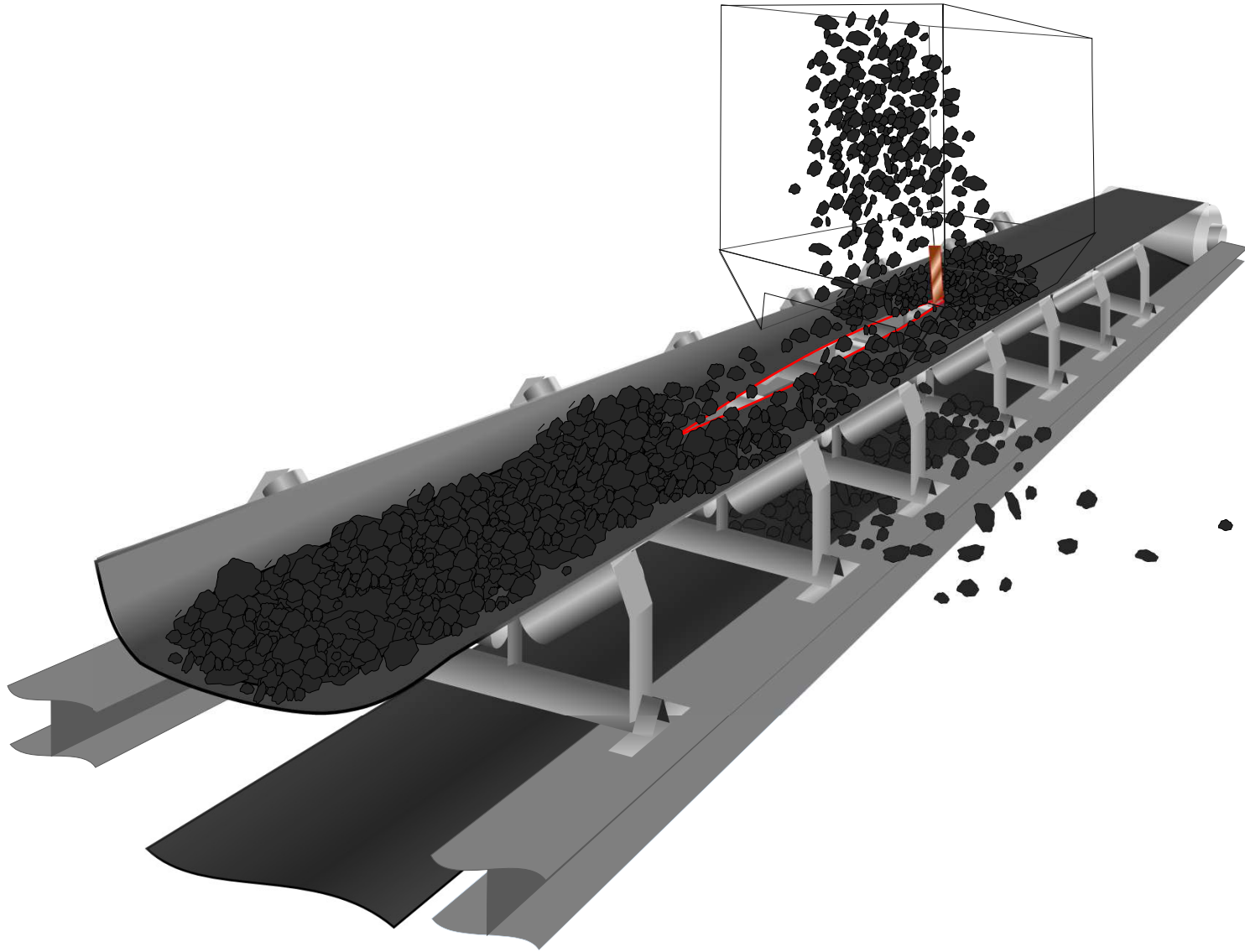
Self-aligning mechanical carrier



Motor-operated Adjusting Carrier



### 3. Belt tear (rip) accident



## **Main cause** (for belt tear accident)

The main cause is ;

**Wrong material or obstacles like sharp solid or metal mixed in the transporting material sticks through the conveyor belt and stuck in the impact roller just below the transferring chute.**



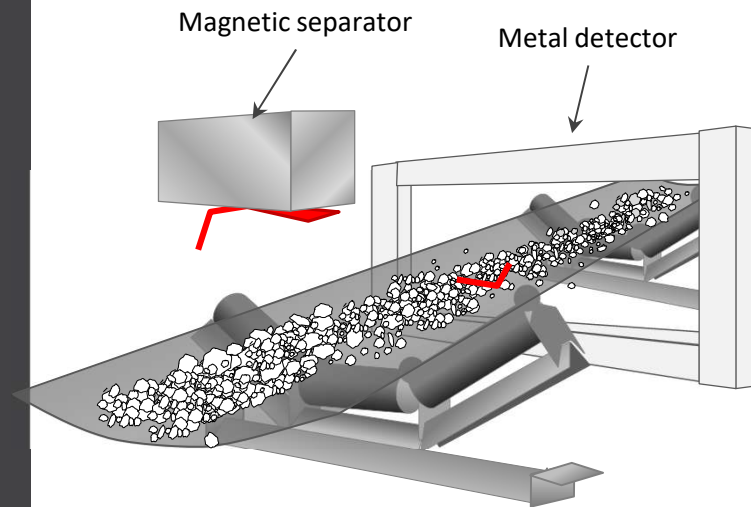
**Belt tear accident**



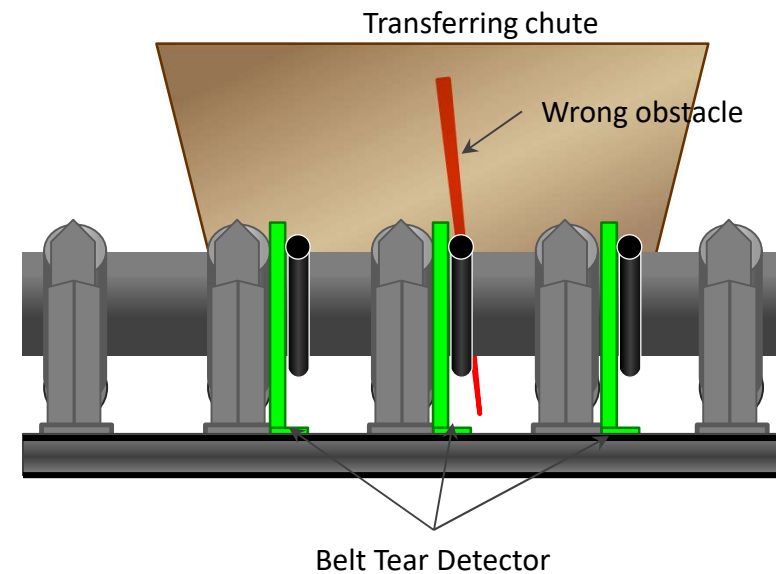
**Production loss, Maintenance cost raise**

# Countermeasures (for belt tear accident)

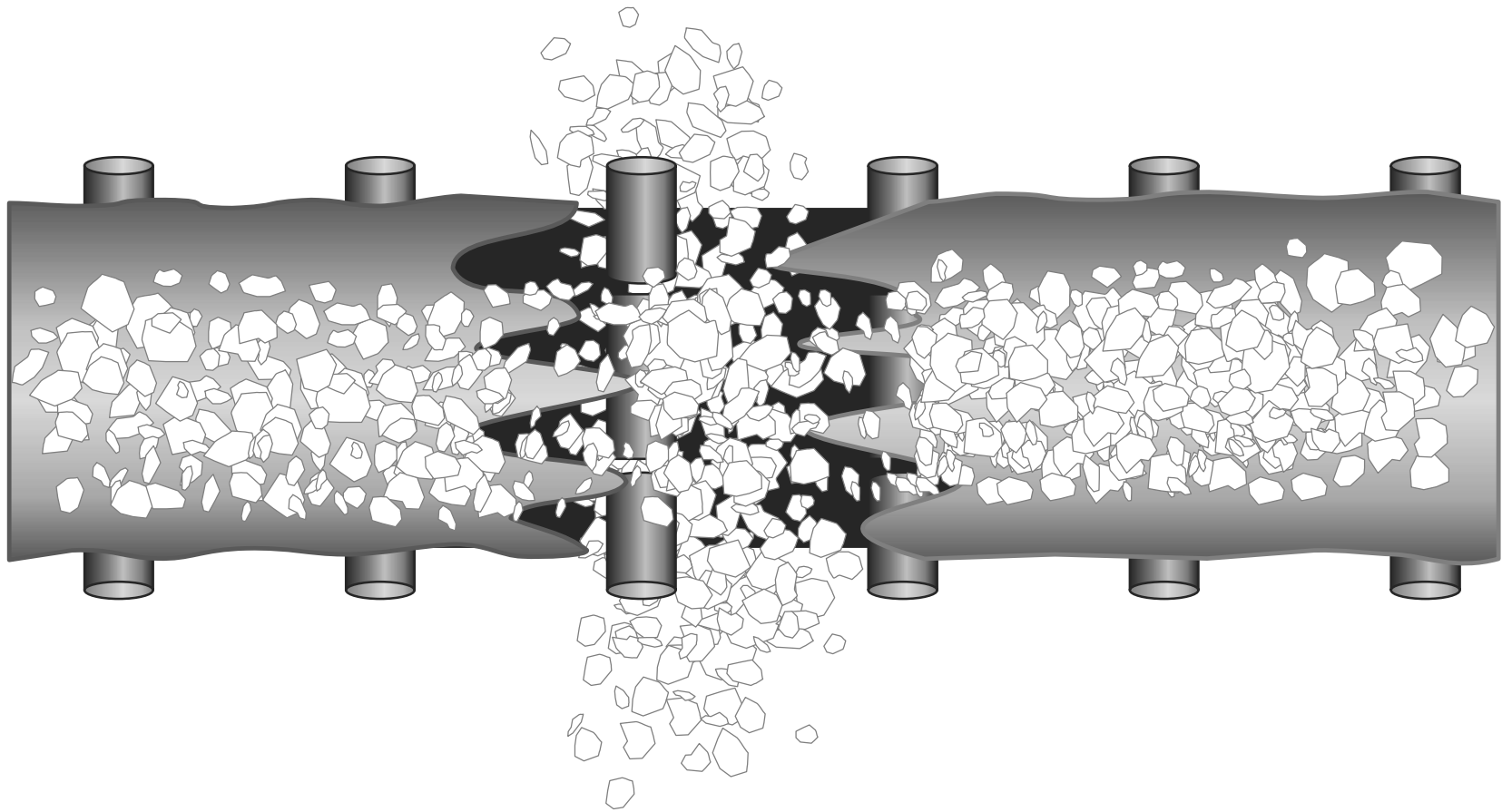
Detect metal material  
and remove them by  
separator



Detect the stuck situation and  
immediately stop the conveyor



## 4. Belt cut break accident





## **Main causes** (for belt cut break accident)

1. **Frequent belt slip between conveyor belt and drive pulley.**
2. **Rubber of belt surface is worn and the fabric is exposed.**
3. **Crack or scratch on the inner fabric observed (10% over).**
4. **Belt tear damage or scratch.**
5. **There are many repair portions.**



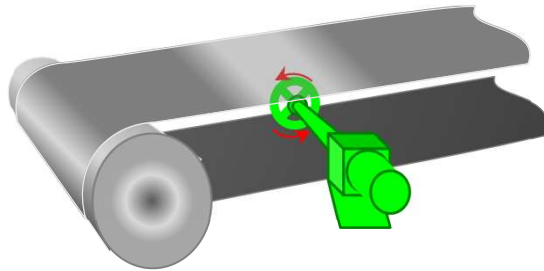
**Belt cut break accident**



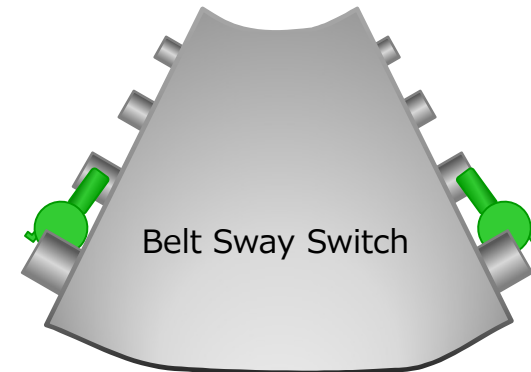
**Production loss, Maintenance cost raise,  
Serious human injury accident**

# Countermeasures (for cut break accident)

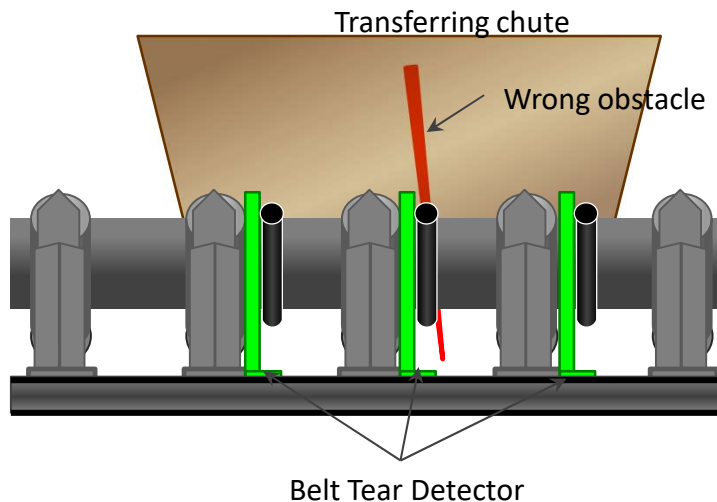
Detect slip and stop



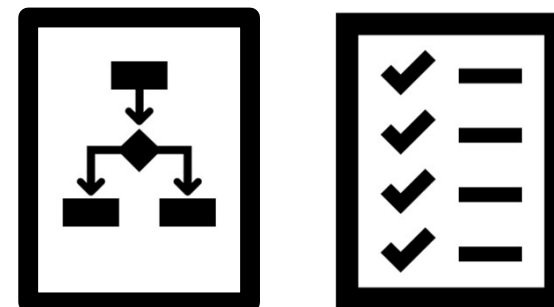
Detect misalignment and stop



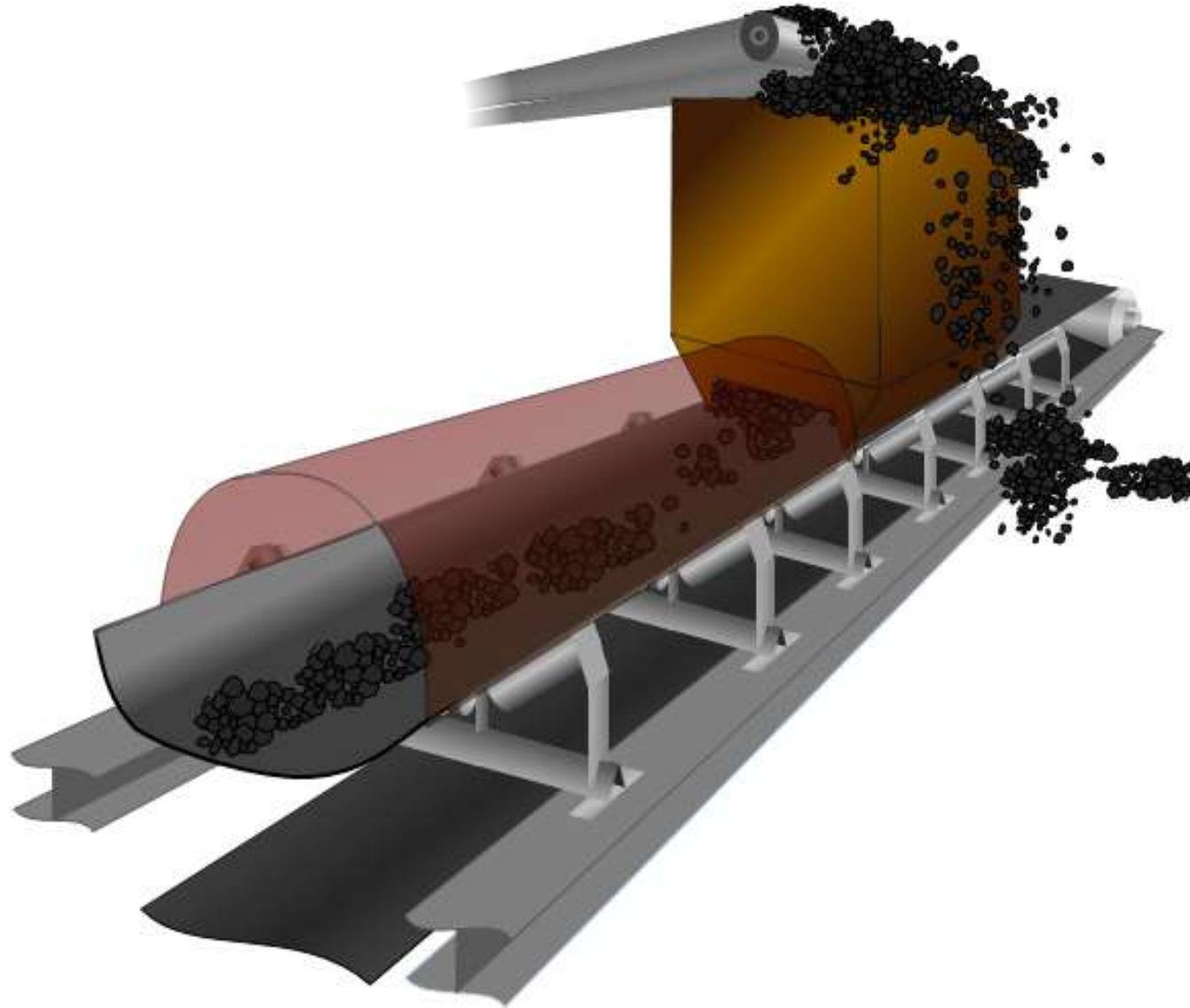
Detect the stuck situation and immediately stop the conveyor



Establish criterion to replace belt



## 5. Blocking chute ⚠



## **Main causes** (for blocking chute)

1. Conveyor belt is slipping, load material is not going forward and stay below the transferring chute.
2. Transporting material is stuck in the transferring chute and not charged on the belt conveyor.



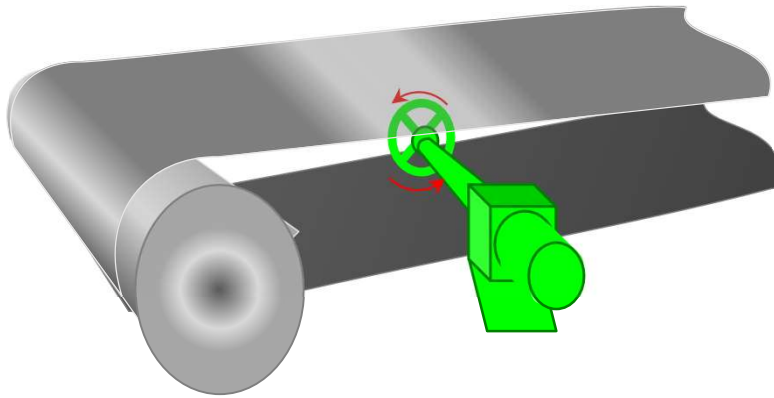
**Blocking chute accident**



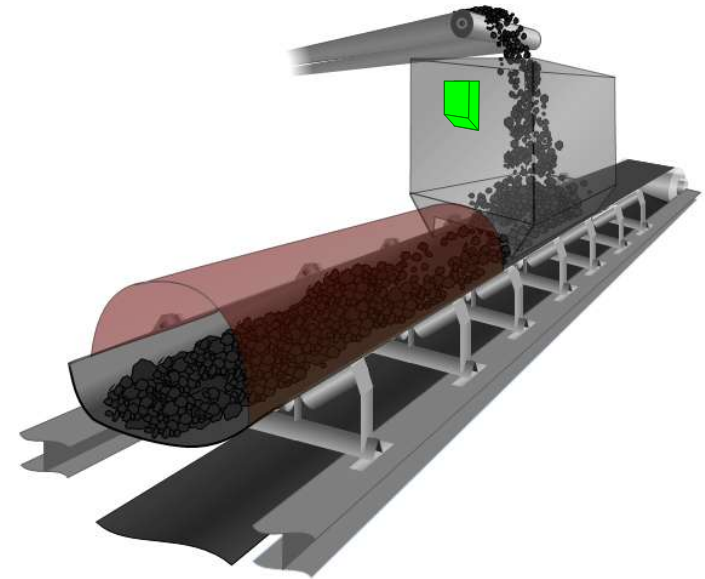
**Production loss, Maintenance cost raise,  
Environmental pollution**

## Countermeasures (for blocking chute)

Detect slip and stop



Detect the blocked situation and immediately stop the conveyor



## 5. Caught in machine



## **Main causes** (for being caught in machine)

1. **Someone started the conveyor during the repair work.**
2. **Self-driving system started the conveyor during the repair work**
3. **Did the build-up removing work without stopping the conveyor.**
4. **Unintentionally touched with rotating pulley at the conveyor not having safety cover.**

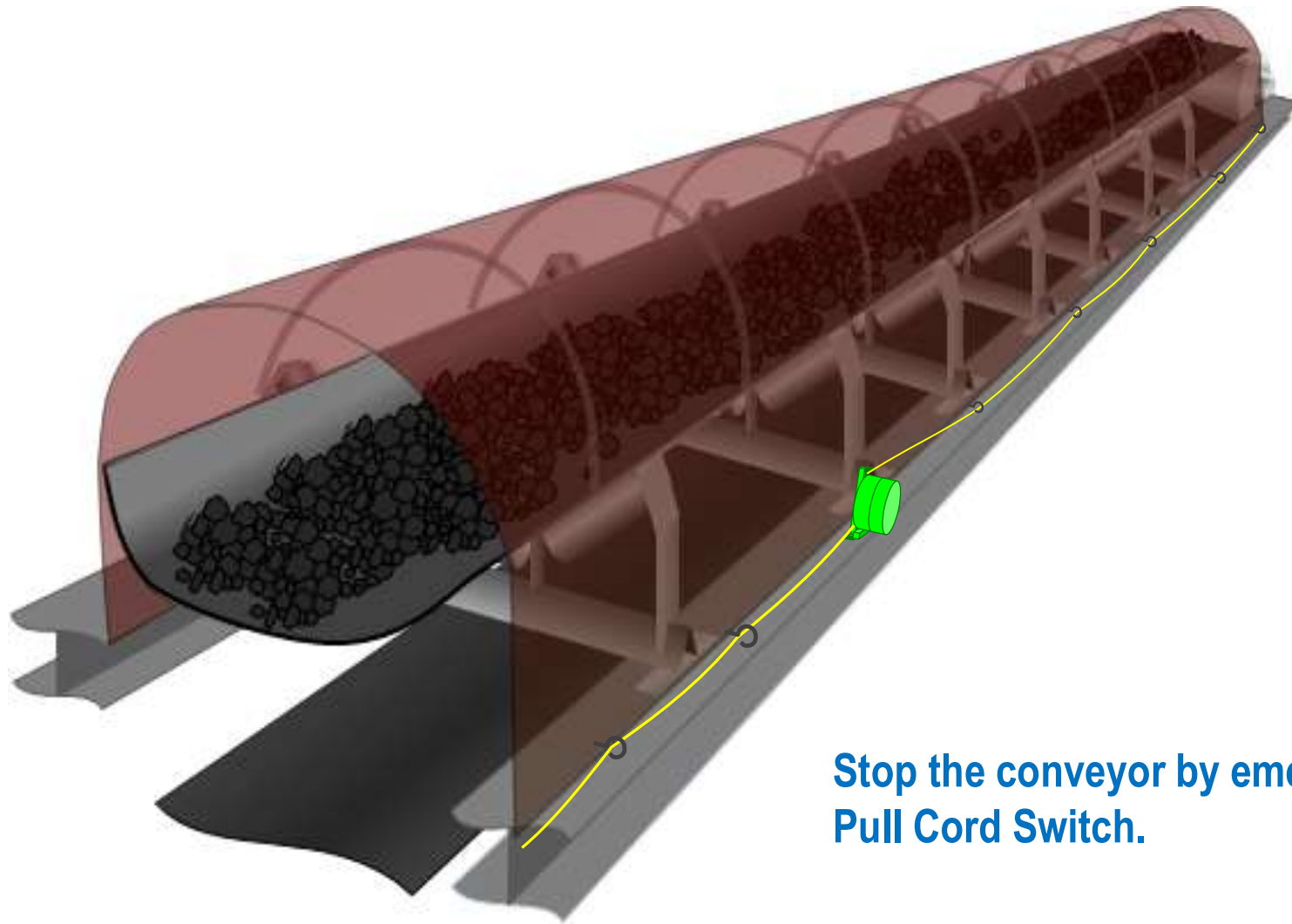


**Human caught in machine**



**Serious human injury**  
**Production loss**

## Countermeasures (for being caught in machine)

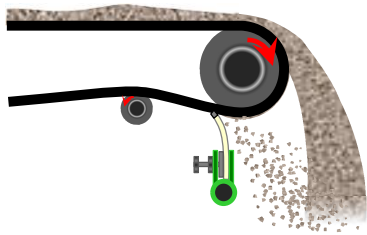


Stop the conveyor by emergency  
Pull Cord Switch.

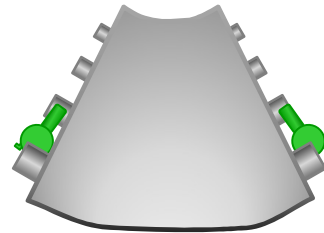


# Countermeasures for those troubles

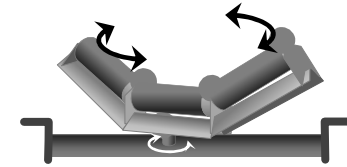
Remove build-up material



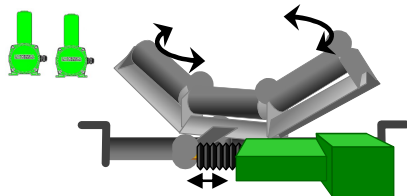
Detect belt sway and stop conveyor



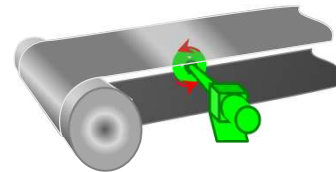
Self-aligning mechanical carrier



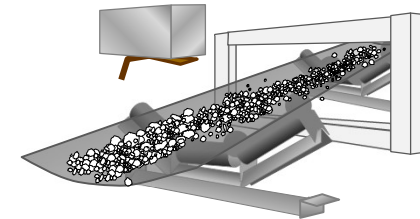
Motor-operated Adjusting Carrier



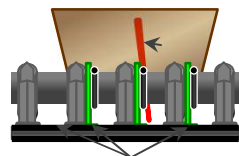
Detect slip and stop conveyor



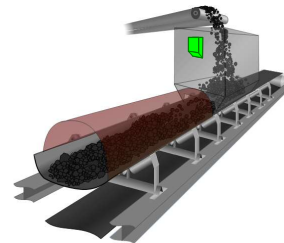
Detect metal and remove it



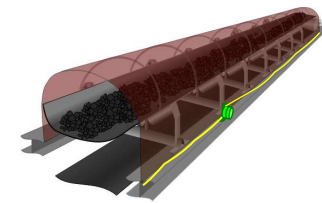
Immediately detect stuck obstacle and stop conveyor



Detect blocked situation



Emergency stop Pull Cord Switch





**Thank you  
for your attention.**

**We will answer to your  
questions after next  
session presented by  
Mr. Mamoru Omura.**

# Matsushima Measure Tech

## *Conveyor Safety & Automation Devices*



# Matsushima Measure Tech

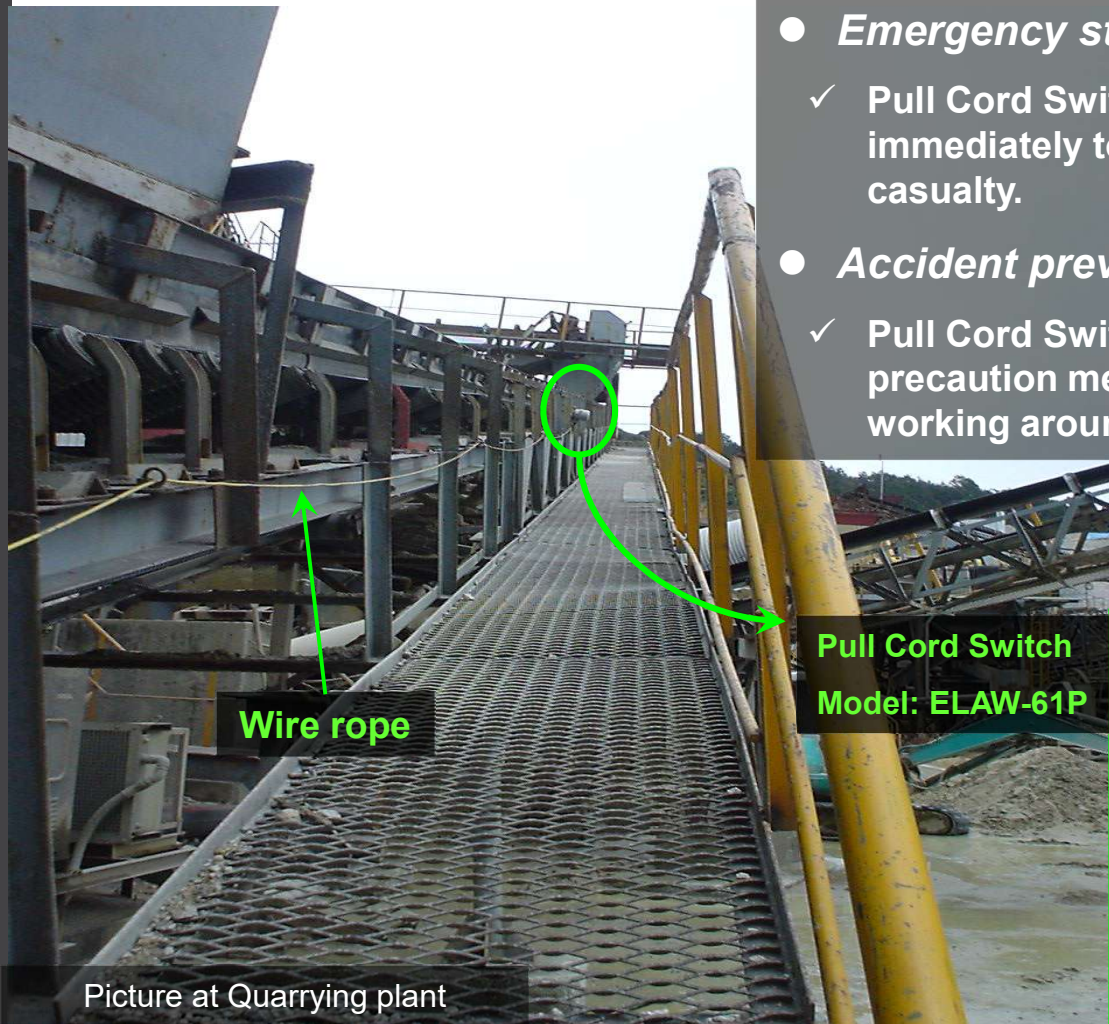
## *Conveyor Protection Switches*

1. *Advanced simple* safety switch
  - Pull Cord Switch
  - Belt Sway Switch
  - Speed Switch
2. *Matsushima unique* protection device
  - Motor-Operated Adjusting Carrier
  - Belt Tear Detector
  - Belt Cleaner

# Pull Cord Switch

## Emergency stop at accident

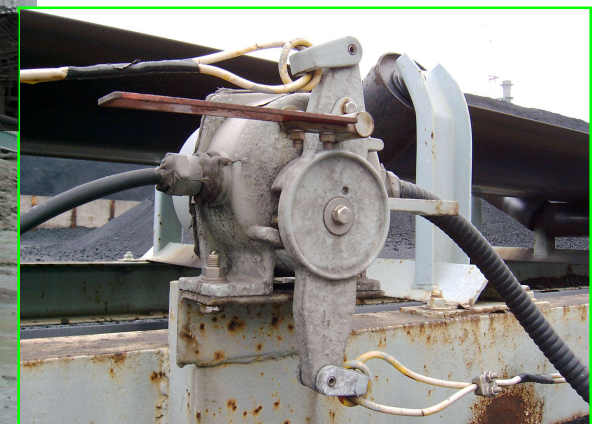
- *Emergency stop at conveyor accident*
  - ✓ Pull Cord Switch stops the conveyor immediately to minimize the accident or casualty.
- *Accident prevention at conveyor*
  - ✓ Pull Cord Switch can be applied for precaution method as the interlock during working around conveyors.



Wire rope

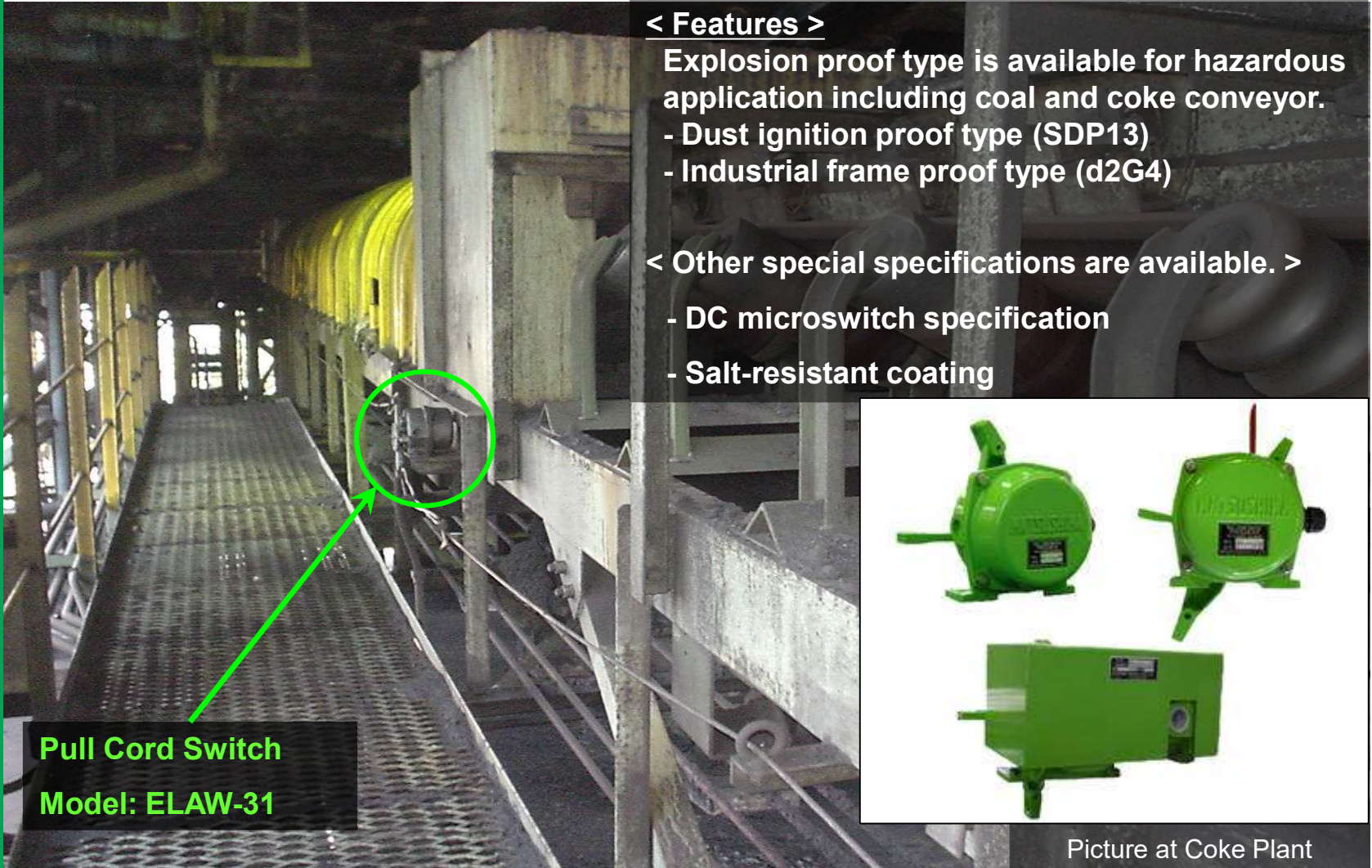
Picture at Quarrying plant

Pull Cord Switch  
Model: ELAW-61P



# Pull Cord Switch

## Emergency stop at accident



**Pull Cord Switch**  
**Model: ELAW-31**

**< Features >**

Explosion proof type is available for hazardous application including coal and coke conveyor.

- Dust ignition proof type (SDP13)
- Industrial frame proof type (d2G4)

**< Other special specifications are available. >**

- DC microswitch specification
- Salt-resistant coating



Picture at Coke Plant

# PULLSTOP

(Emergency switch complied with ISO standard)



## < Features >

- Wire (rope) break is detected and output to maintain safety.
- In addition to pulling a rope, a push button is available for detecting activation.
- Since total 100m (50m each side) is covered, less item quantity is necessary for each conveyor.

# Belt Sway Switch

## (Belt misalignment detection)

Belt Sway Switch

Model: ELAP-20



Picture at Coke conveyor

When conveyor belt is swayed...?

1. The materials on the conveyor fall down.  
→ material loss and cleaning work
2. The edge (side) of the conveyor belt wears with facilities.  
→ Reduces the belt life-span.

### < Features >

- It is equipped with two micro-switches for two step detection (alarm signal and conveyor stop signal).
- It is composed of robust housing made by aluminum die-cast.



Belt Sway Switch

Model: ELAP-20



# Belt Sway Switch

## (Belt misalignment detection)

< Other special specifications are available. >

- ✓ DC microswitch specification
- ✓ Salt-resistant coating
- ✓ SUS material for touch pulley
- ✓ Special operating angle  
(Standard) 20 deg. for alarm  
35 deg. for conveyor stop



- Dust Ignition proof type  
(SDP13)

- Industrial frame  
proof type (d2G4)

Explosion proof type is available for hazardous application including coal and coke conveyor.



Picture at Limestone conveyor

# Speed Relay (magnetic type) / Belt slip detection

When conveyor belt is slipped.....



The friction between belt and driving pulley may cause a fire accident.



Speed Relay detects these belt slips, and output the signal to stop conveyor, which can prevent the fire accident.

## < Features >

Because power supply is not required, the wiring installation cost can be reduced, and it can work even in case of power outage.

- Long continuous operation without maintenance
- Highly durable because of simple mechanism

## < Other applications >

- Speed monitoring for cranes or crushers
- Over-speed detection is also applicable (e.g., elevator)



Pictures at Coke plant

## < Various types of Speed Relay >

- Low-speed type
- Touch roller type
- Dust-ignition proof type
- Industrial frame proof type



# Speed Switch / Belt slip detection

When conveyor belt is slipped... ?

↓  
The friction between belt and driving pulley may cause a fire accident.

↓  
Speed Switch detects these belt slips, and output the signal to stop conveyor, which can prevent the fire accident.



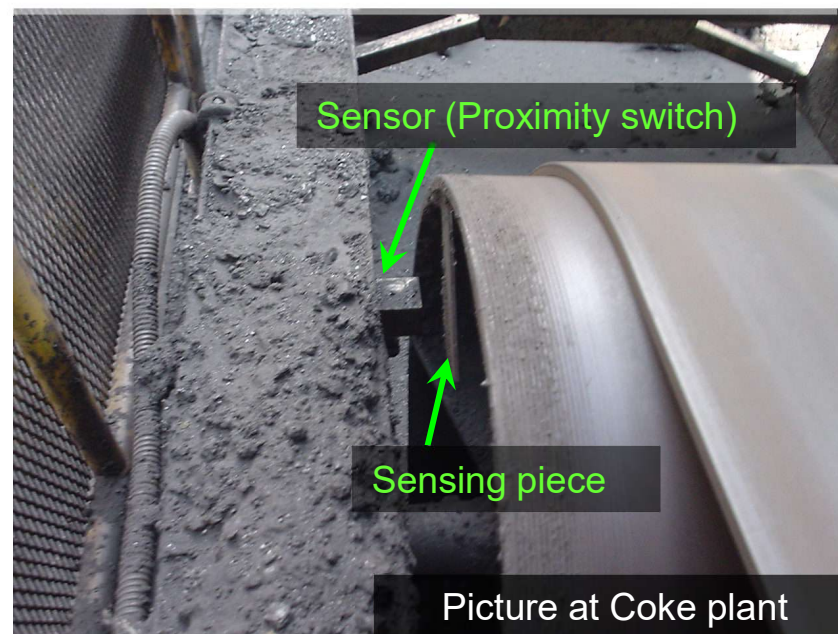
< Various types of Speed Switch >

- Separated proximity switch type (ESPB-051)
- Transducer in-panel mounting type (ASTC-051)
- Touch roller type
- Intrinsic safety type

< Features >

- Non-contact sensor (proximity switch) → Connection construction with rotating facility is not required.
- Actuating speed can be set up at a local site.
- Wide range of power supply is applicable.

(DC24V, AC20~240V, 50/60Hz)



# Matsushima Measure Tech

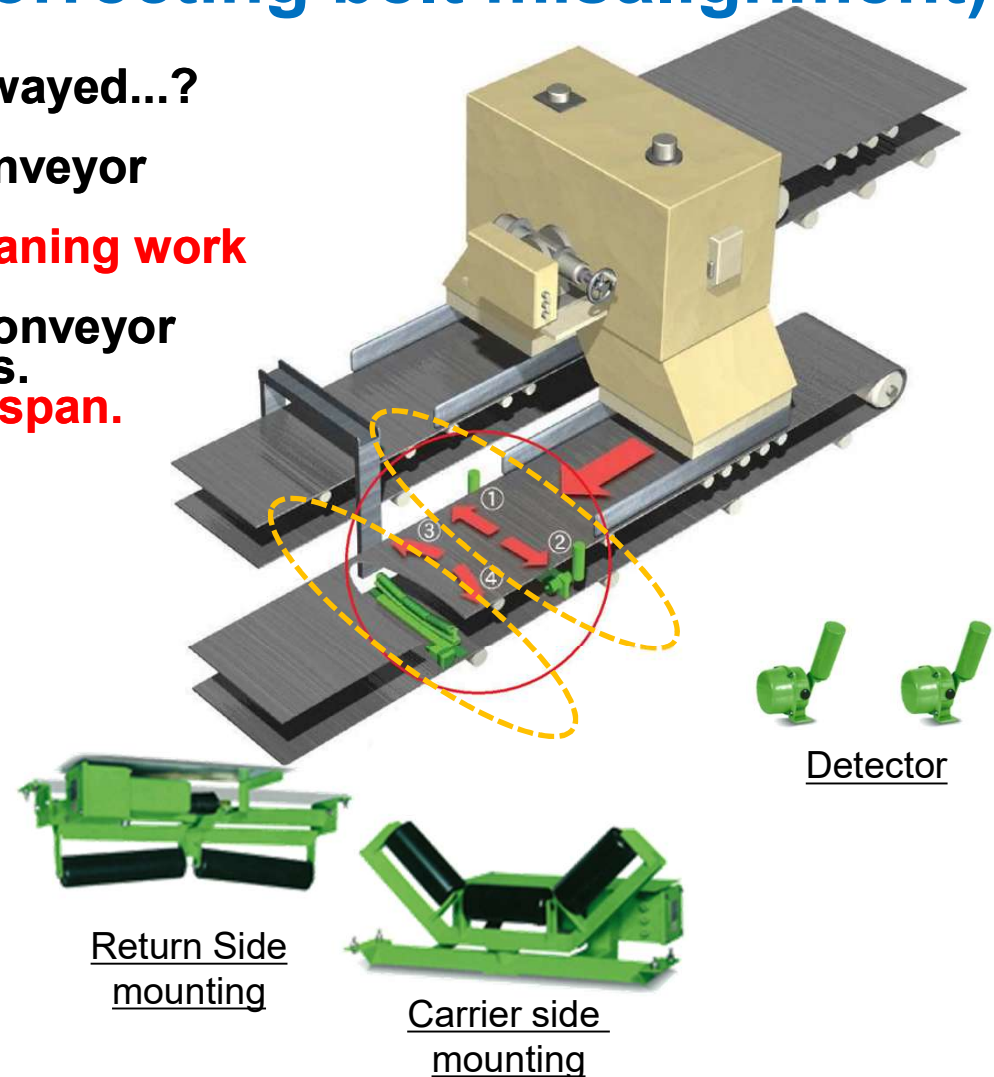
## *Conveyor Protection Switches*

1. *Advanced simple* safety switch
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  - Speed Switch
2. *Matsushima unique* protection device
  - Motor-Operated Adjusting Carrier
  - Belt Tear Detector
  - Belt Cleaner

# Motor-Operated Adjusting Carrier (Detecting and correcting belt misalignment)

When conveyor belt is swayed...?

1. The materials on the conveyor are fallen down.  
→ **material loss and cleaning work**
2. The edge (side) of the conveyor belt wears with facilities.  
→ **Reduces the belt life-span.**



# Belt Tear Detector (Longitudinal belt rip protection)

Once **a foreign material** gets stuck into the conveyor.....

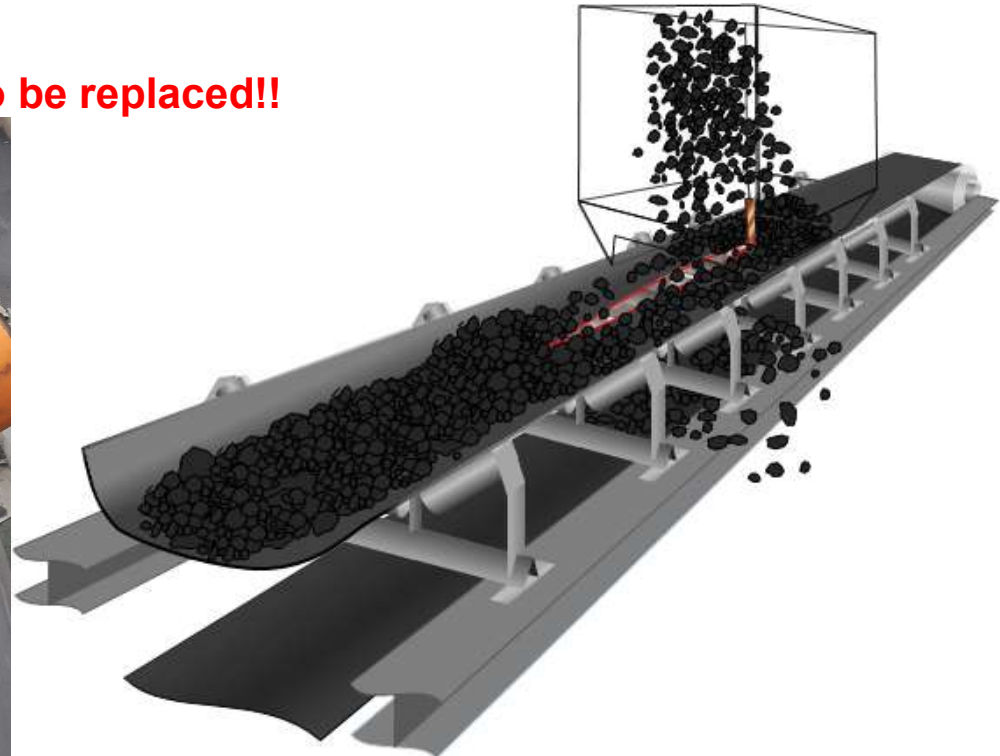


The conveyor continues to move,  
the rip expands and materials are fallen out.

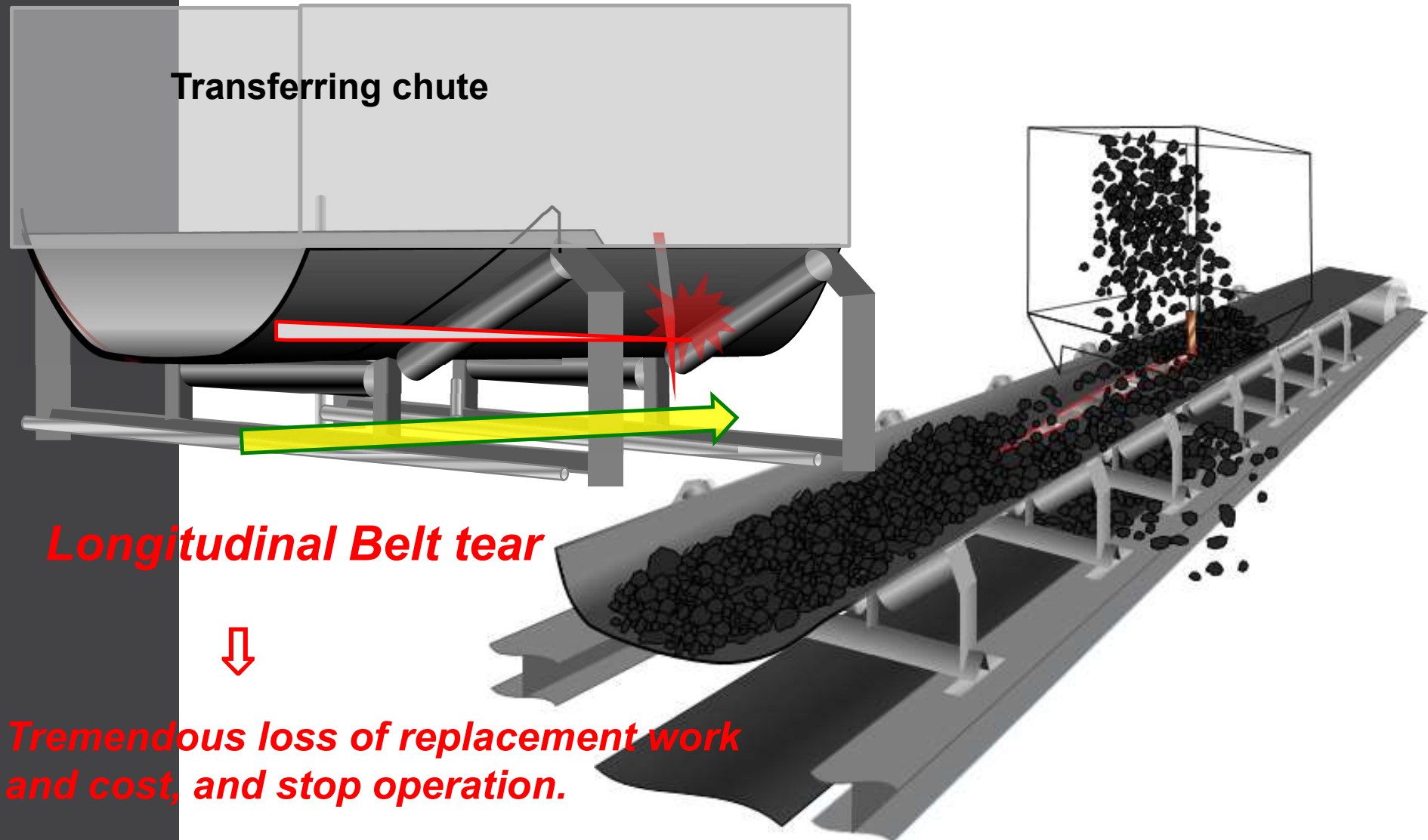


**Eventually,**  
**A whole set of the belt needs to be replaced!!**

Transferring chute



# Belt Tear Detector

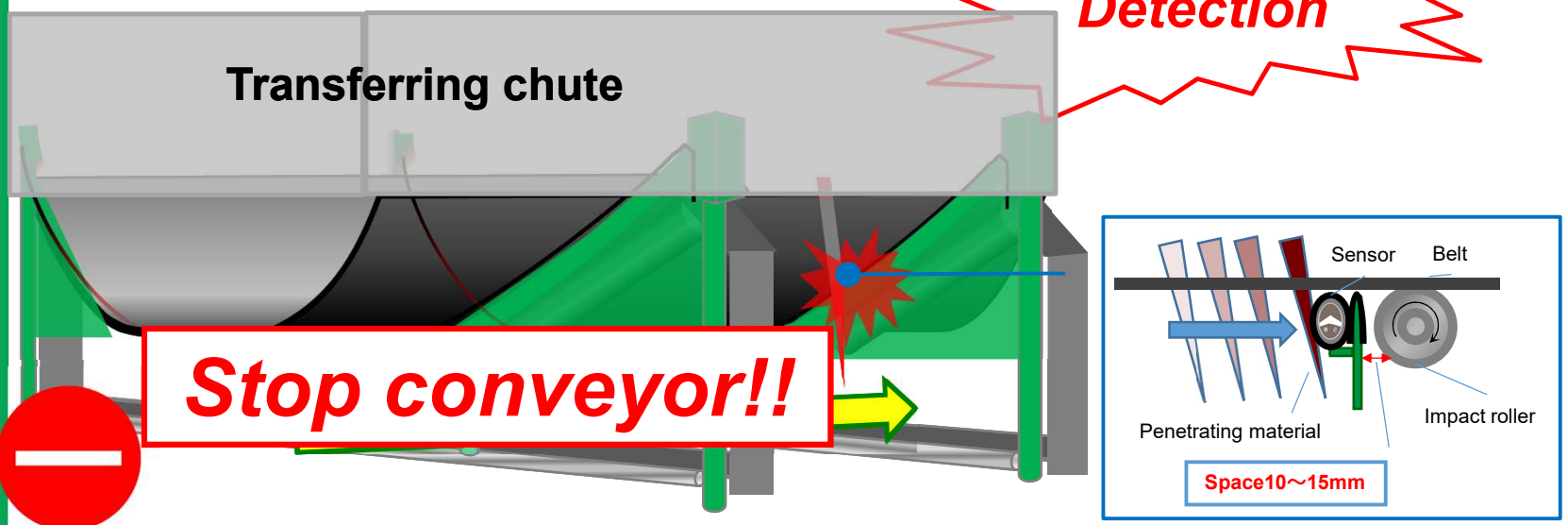


***Longitudinal Belt tear***



***Tremendous loss of replacement work and cost, and stop operation.***

# Belt Tear Detector



If any material penetrates belt,

↓

It pushes the sensor before contacting the impact roller. Our detector finds it, and makes a detection signals.

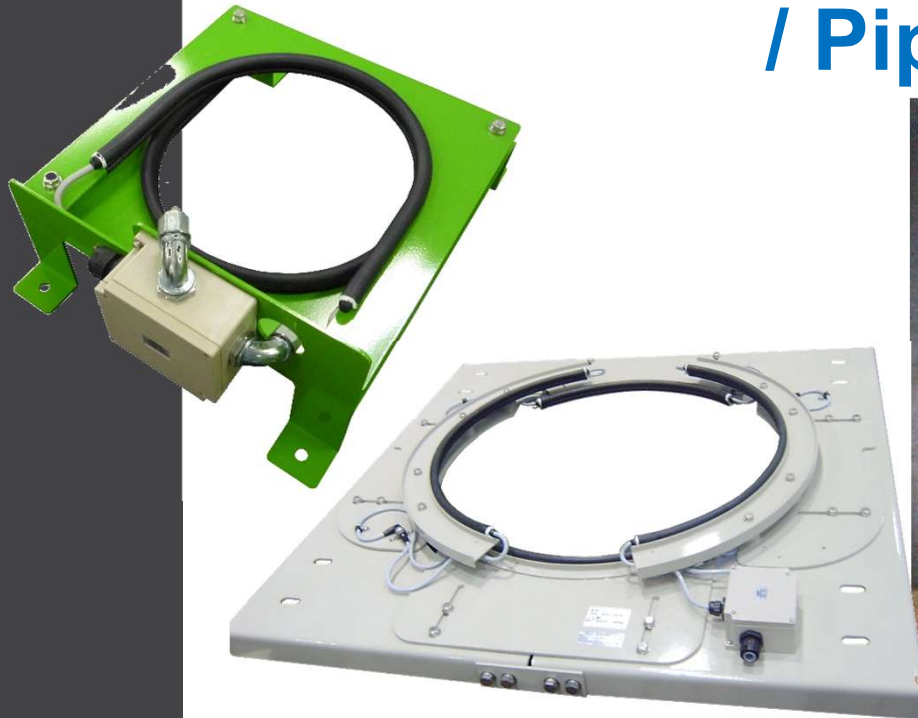
↓

**Stop the motor of the conveyor!!**



# Belt Tear Detector

## / Pipe conveyor model



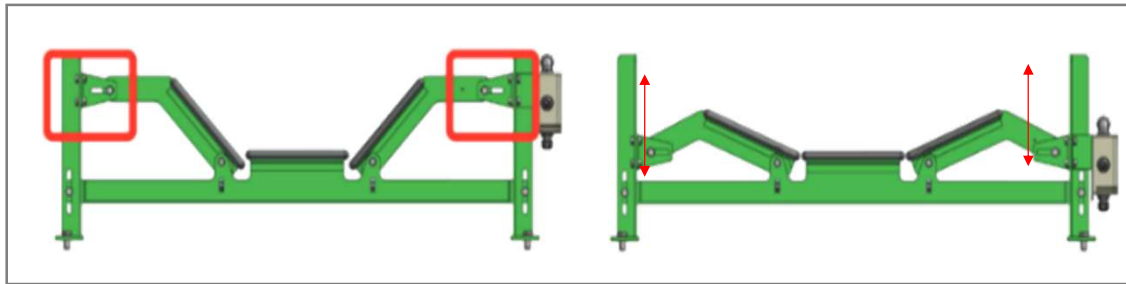
### < Features >

- The sensitive sensor (touch switch) is applied, same as Belt Tear Detector for belt conveyor.
- It is applicable in heavy environment
- It can be designed and manufactured in accordance with each conveyor dimension.

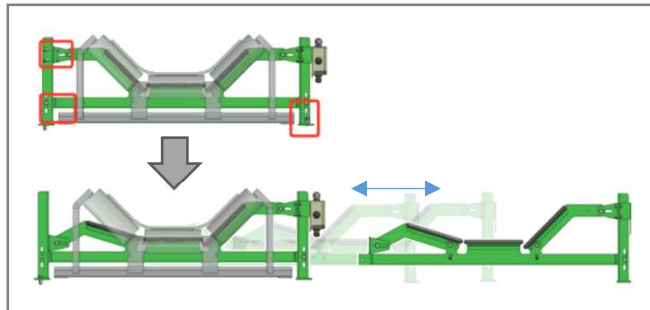
# *Latest type* Belt Tear Detector

## < *Latest type features* >

1. The trough angle can be adjusted at the site.

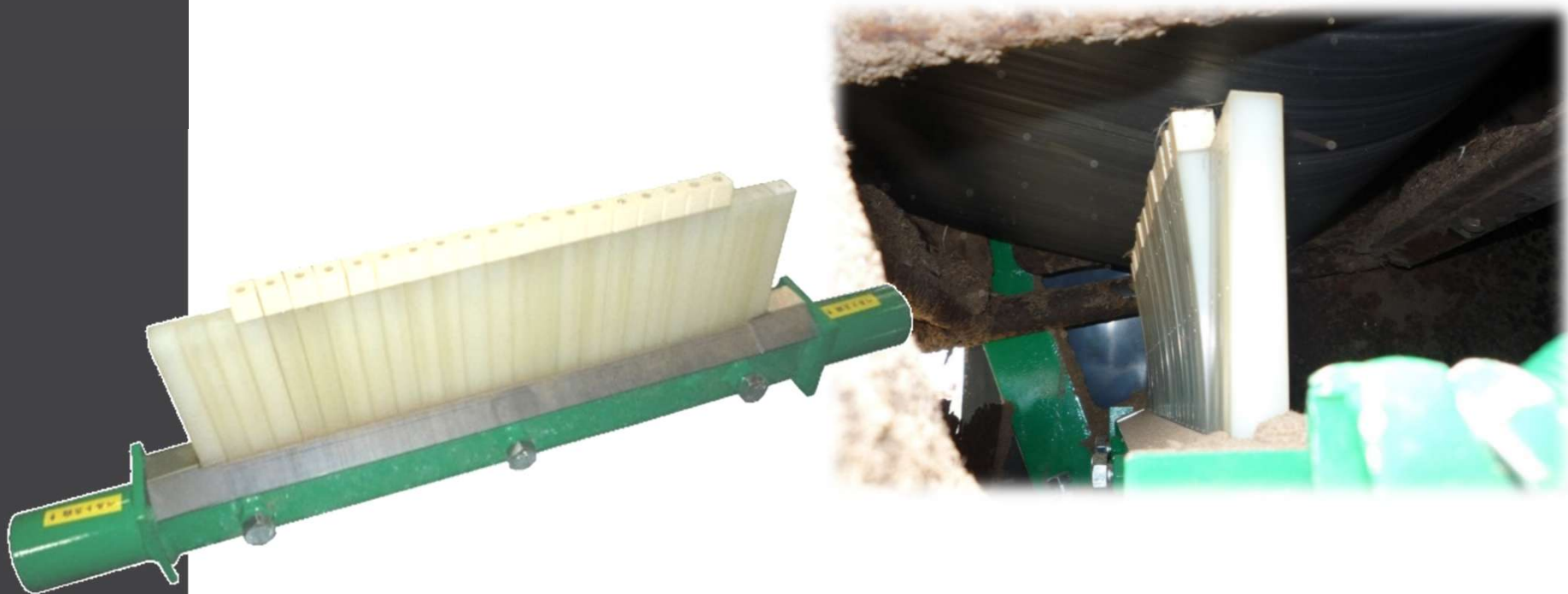


2. *Remove and Installation are easy.*



# Belt Cleaner

## / Cleaning device for conveyor belt



### < Features >

- The scraping part divided into 15mm width follow the conveyor movement without getting caught in the protrusion by belt repair.
- Because the elastic urethane bar is applied for the scraping part, conveyor movement or vibration does not influence scraping work be Belt cleaner.

*Matsushima Measure Tech Co., Ltd.*

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Osaka sales office

【 International office 】

Seoul liaison office (Korea)

【 Affiliated company 】

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**Twitter:** <https://twitter.com/MatsushimaMTech>

*The performance and  
quality of Matsushima  
Switch is **the world top  
class!!***



***2 years warranty period!!***

**Matsushima**  
Matsushima Measure Tech