



Modern Incline Winder Systems

BR Castley

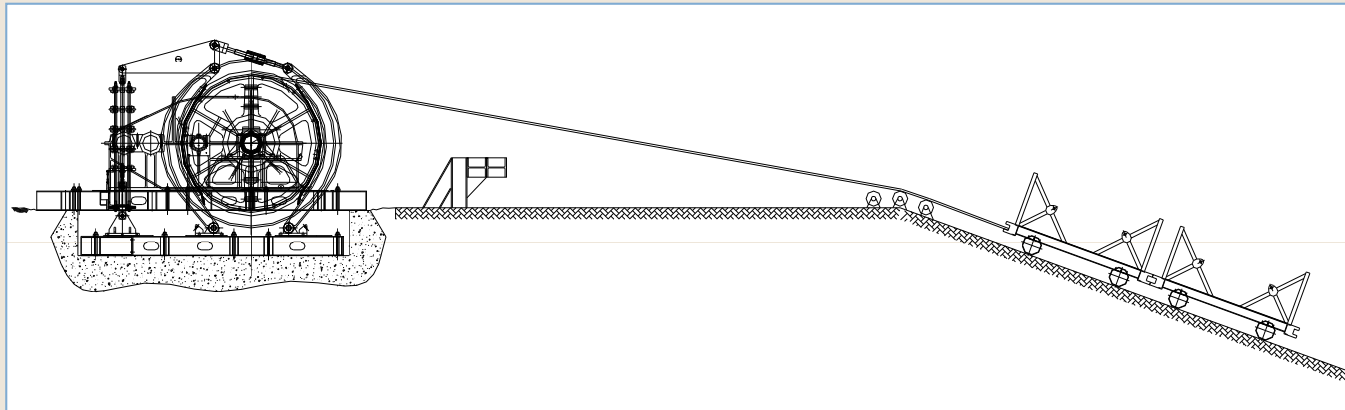


OVERVIEW

- Typical material / ore declines
- Typical weaknesses
- Incline friction winder principle
- Rope handling / management
- Typical loading systems
- Control philosophies

MATERIAL DECLINES

- Small winch or winder (250kW or less)
- Cars run on rails in decline
- Between 10° and 30° to the horizontal
- Slow winding speed operation



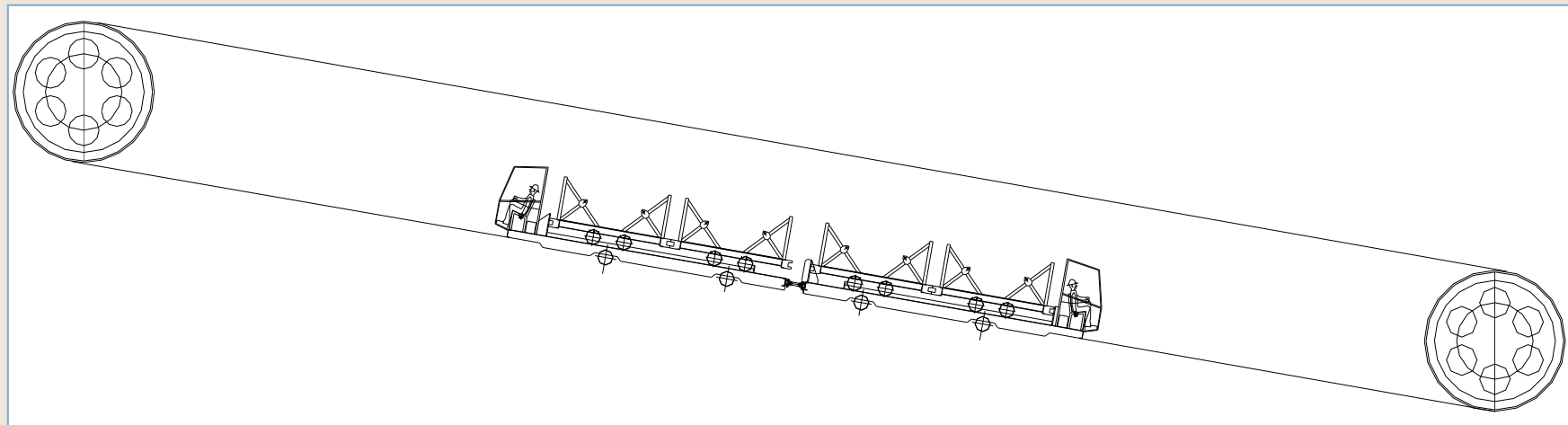


WEAKNESSES

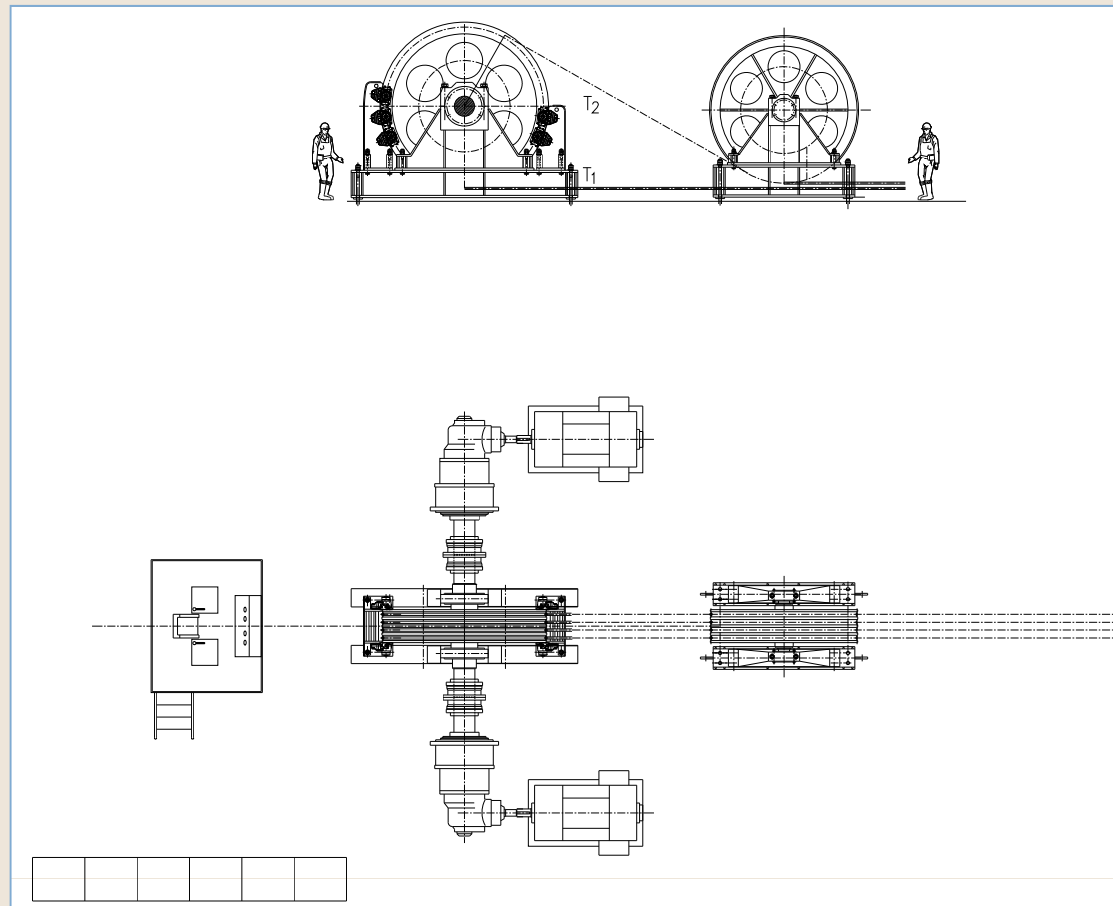
- Failure of rope – Corrosion
- Failure of rope – Mechanical Damage
- Failure of rope attachment
- Derailments from poor track work
- Derailments from damaged wheels and axles
- Cars pushed over brow – too much slack rope
- Slack – then broken rope after ascending trip-out

FRICTION WINDER PRINCIPLE

- Spliced rope or ends attached to conveyance (Head & Tail ropes)
- Single or balanced winding systems
- Single or multiple winding ropes
- Can be used on any inclination angle shaft



FRICTION WINDER PRINCIPLE

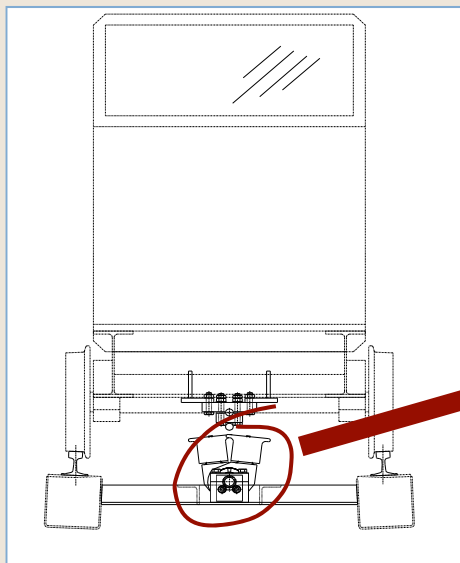


FRICTION WINDER PRINCIPLE

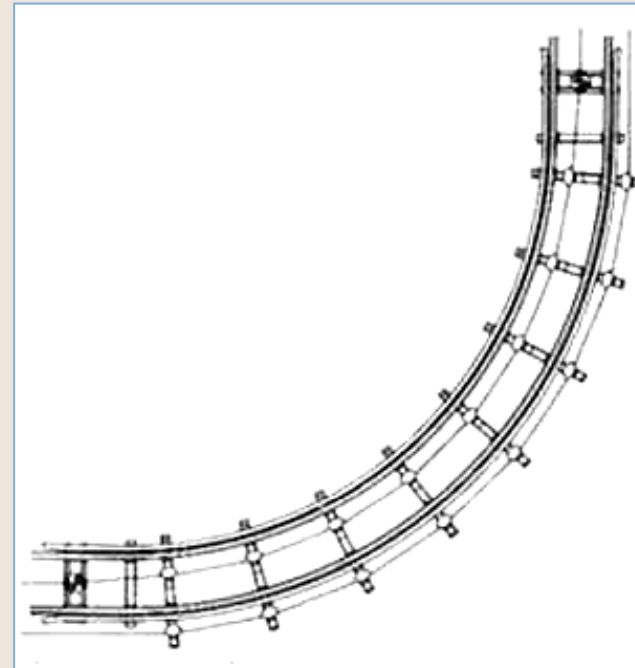
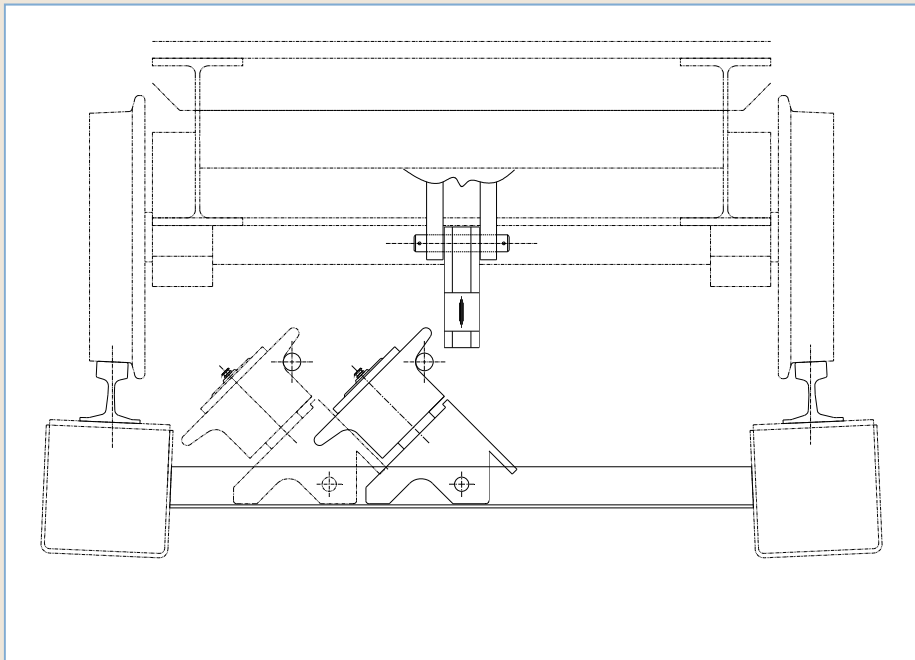


ROPE HANDLING

- Can negotiate horizontal and vertical curves
- No slack rope

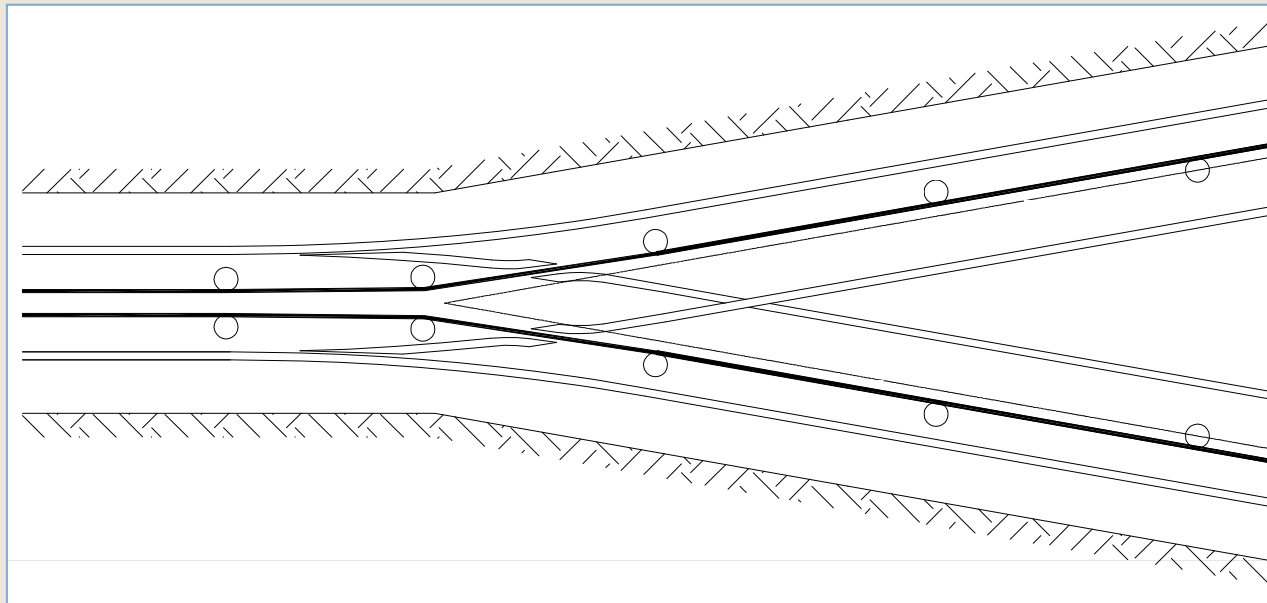
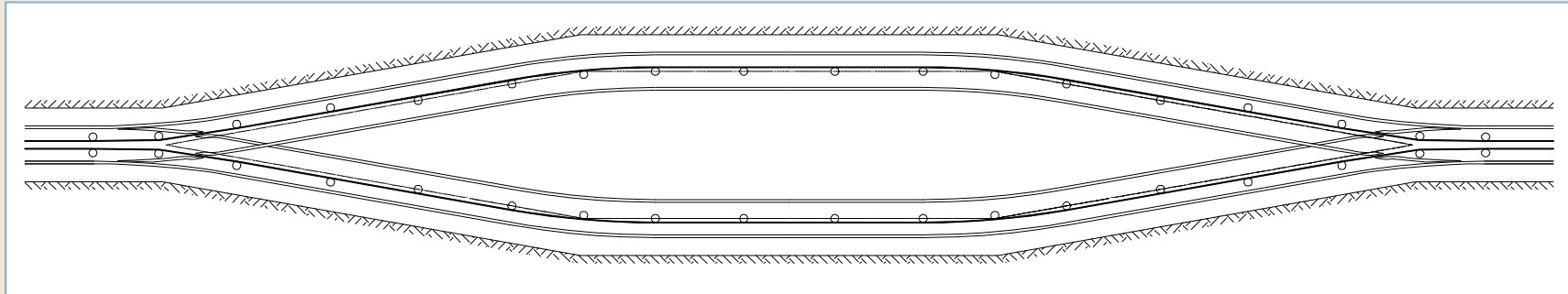


ROPE HANDLING



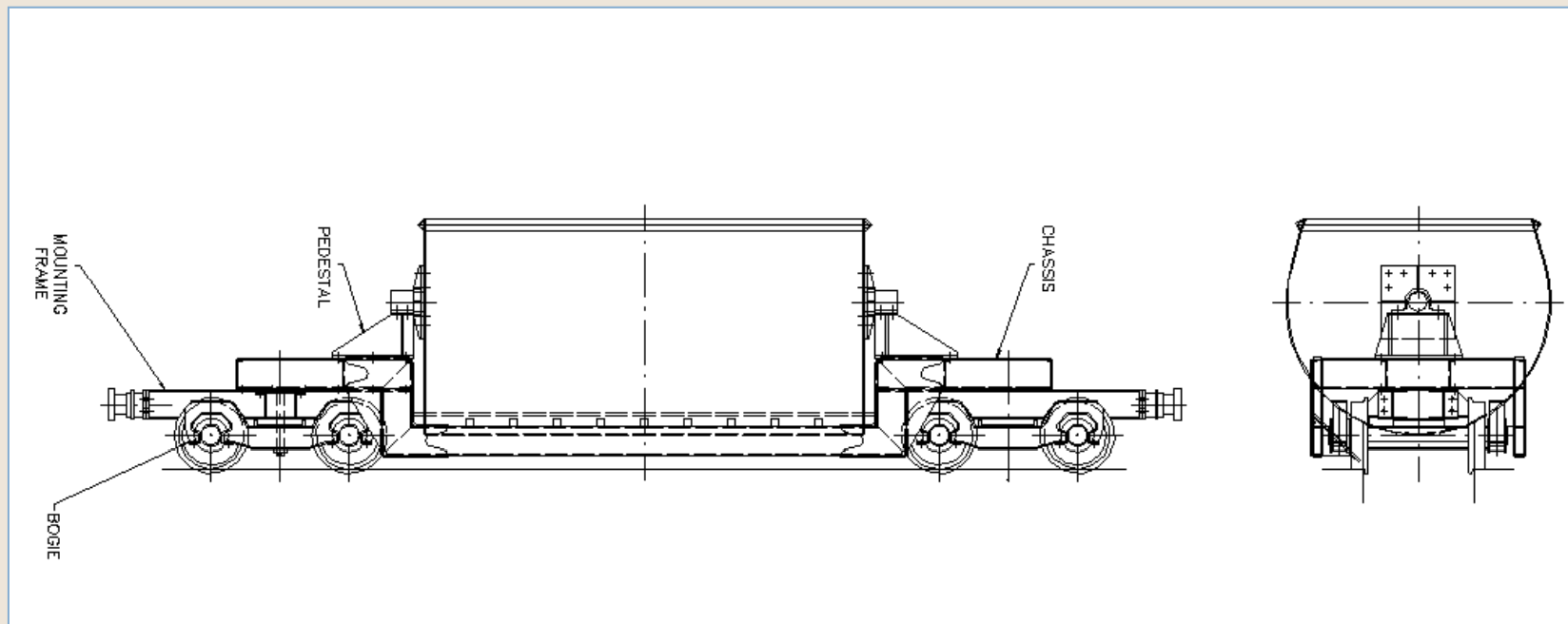
- View showing bollards in horizontal curve

BALANCED WINDING



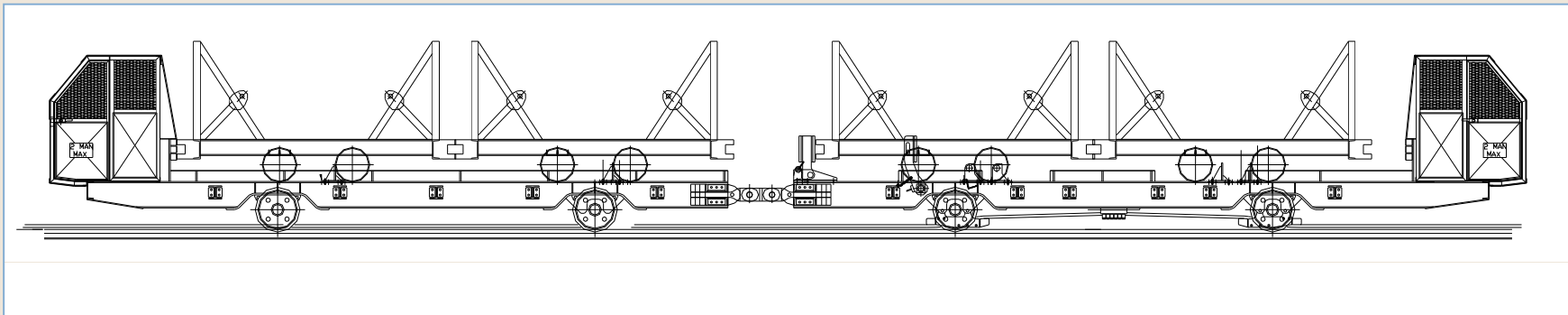
ROCK HOISTING SYSTEM

- Uses spill-free hopper design
- Used for 3MW, 250 000tpm systems

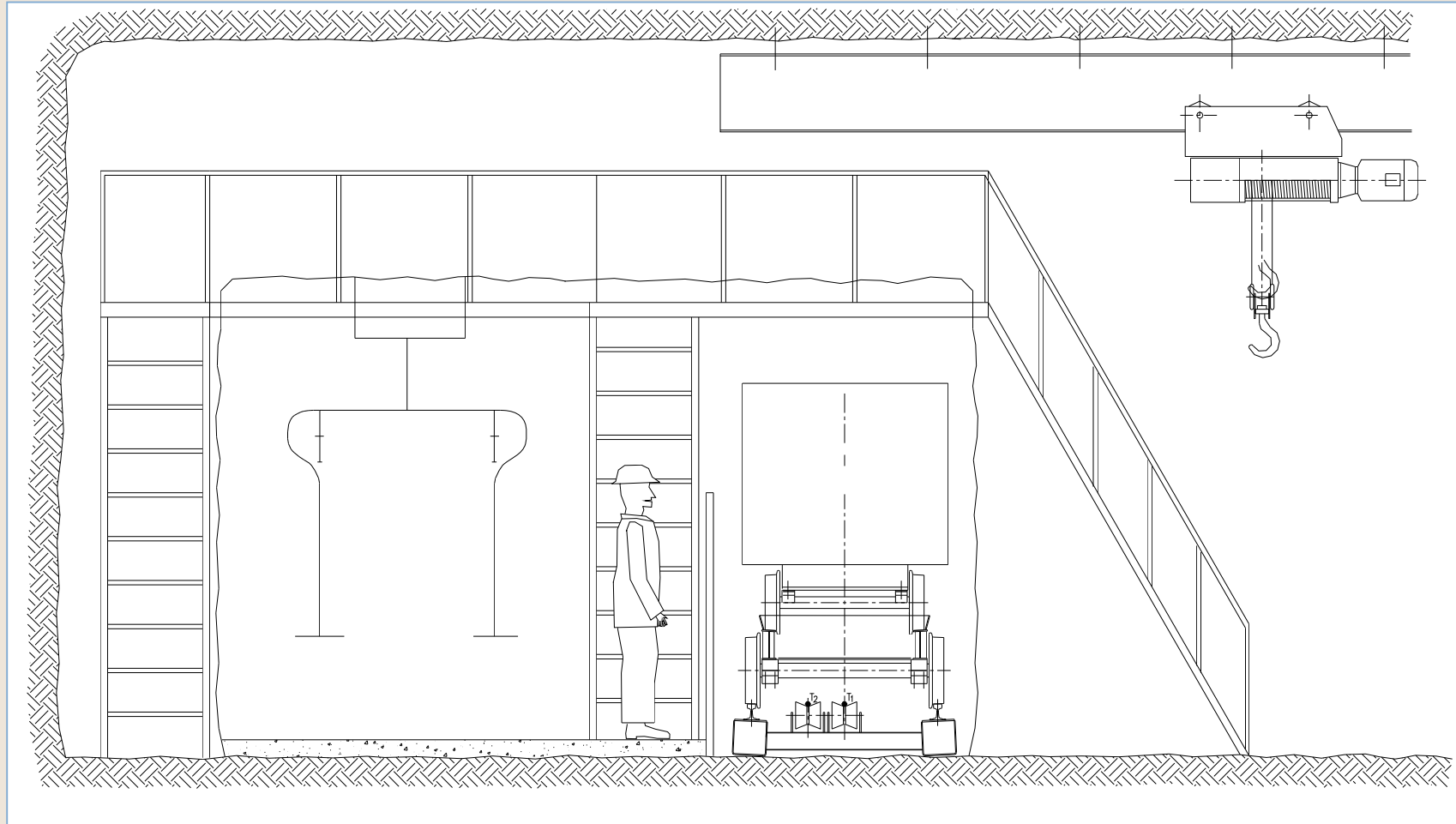


MATERIAL HANDLING CONVEYANCES

- GONDOLA



MATERIAL HANDLING CONVEYANCES

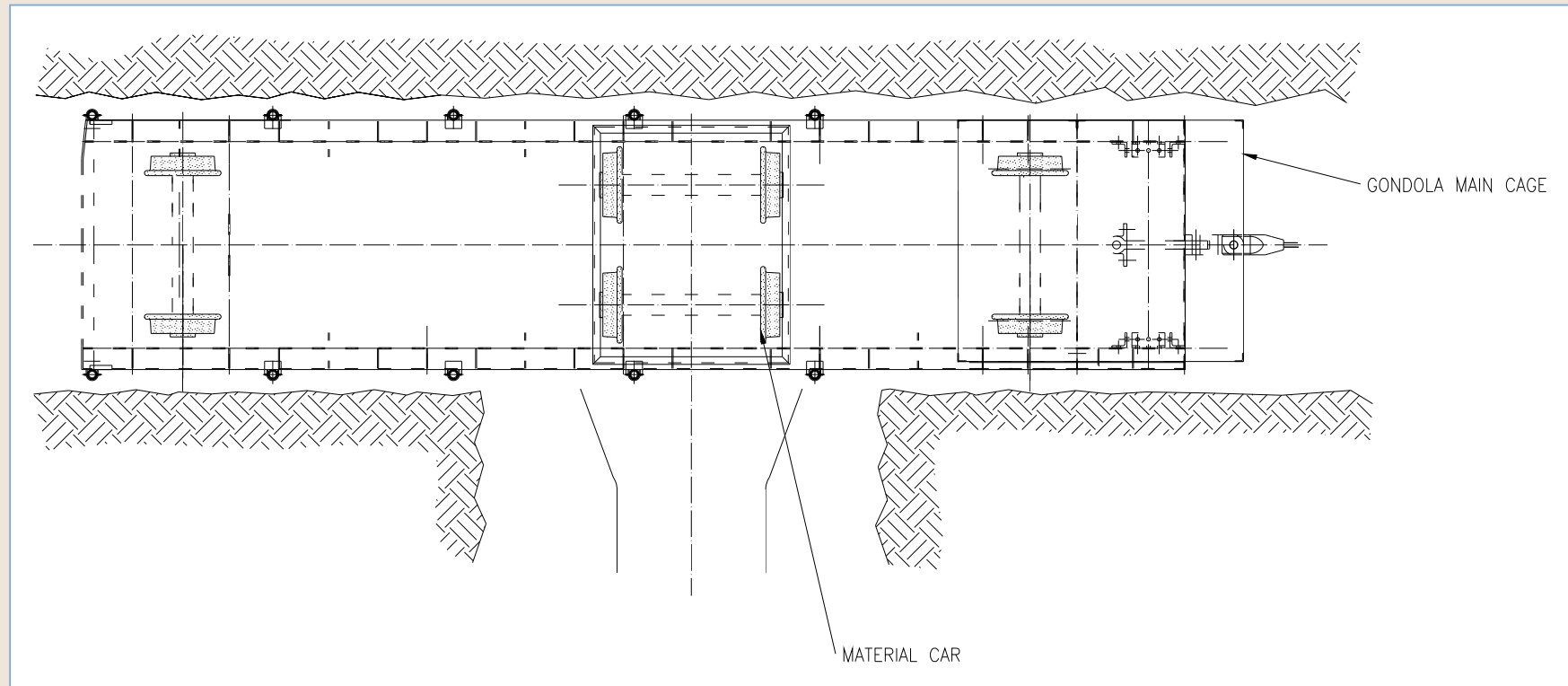


MATERIAL HANDLING CONVEYANCES



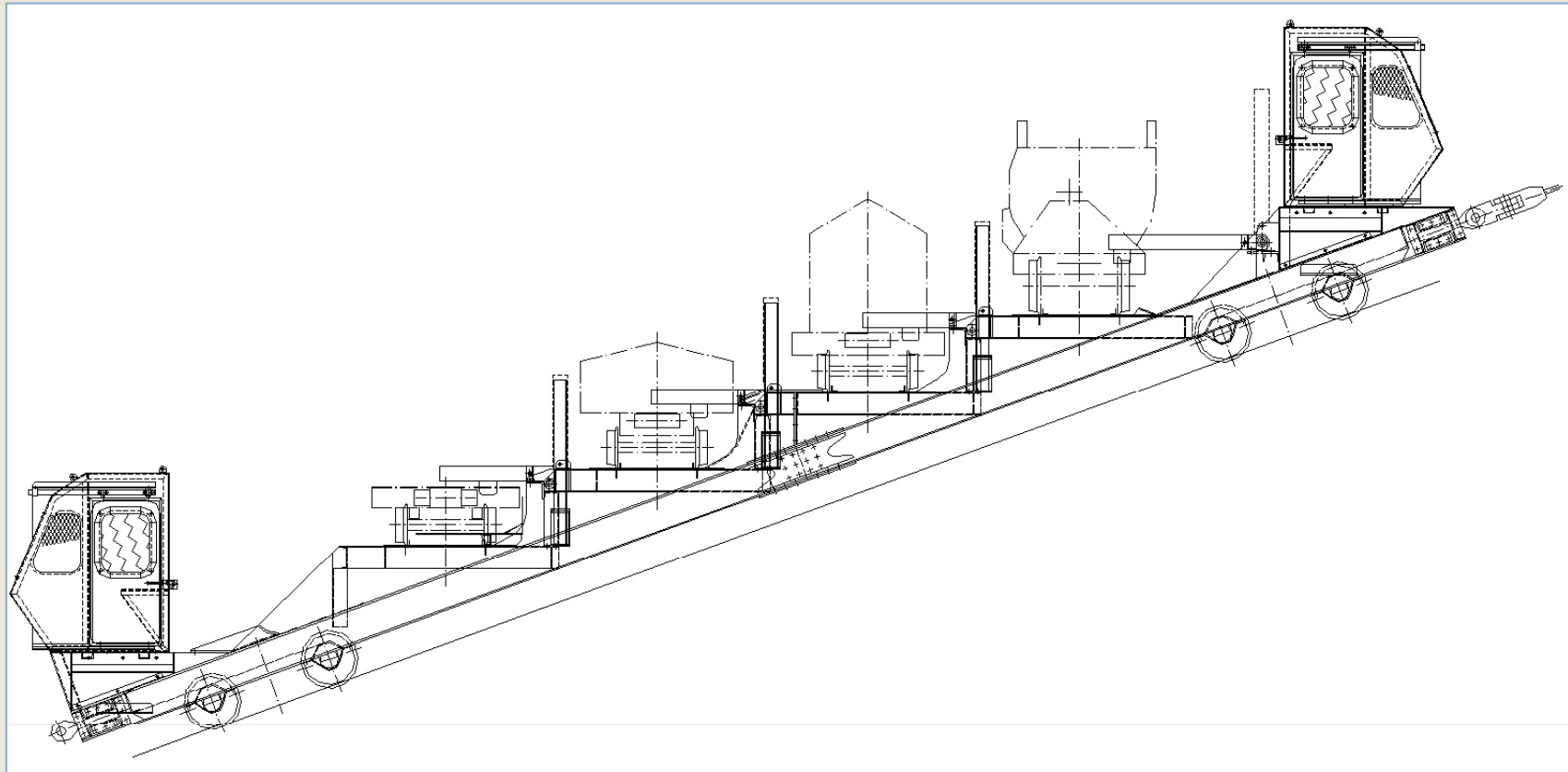
MATERIAL HANDLING CONVEYANCES

- Loading at right angles to shaft

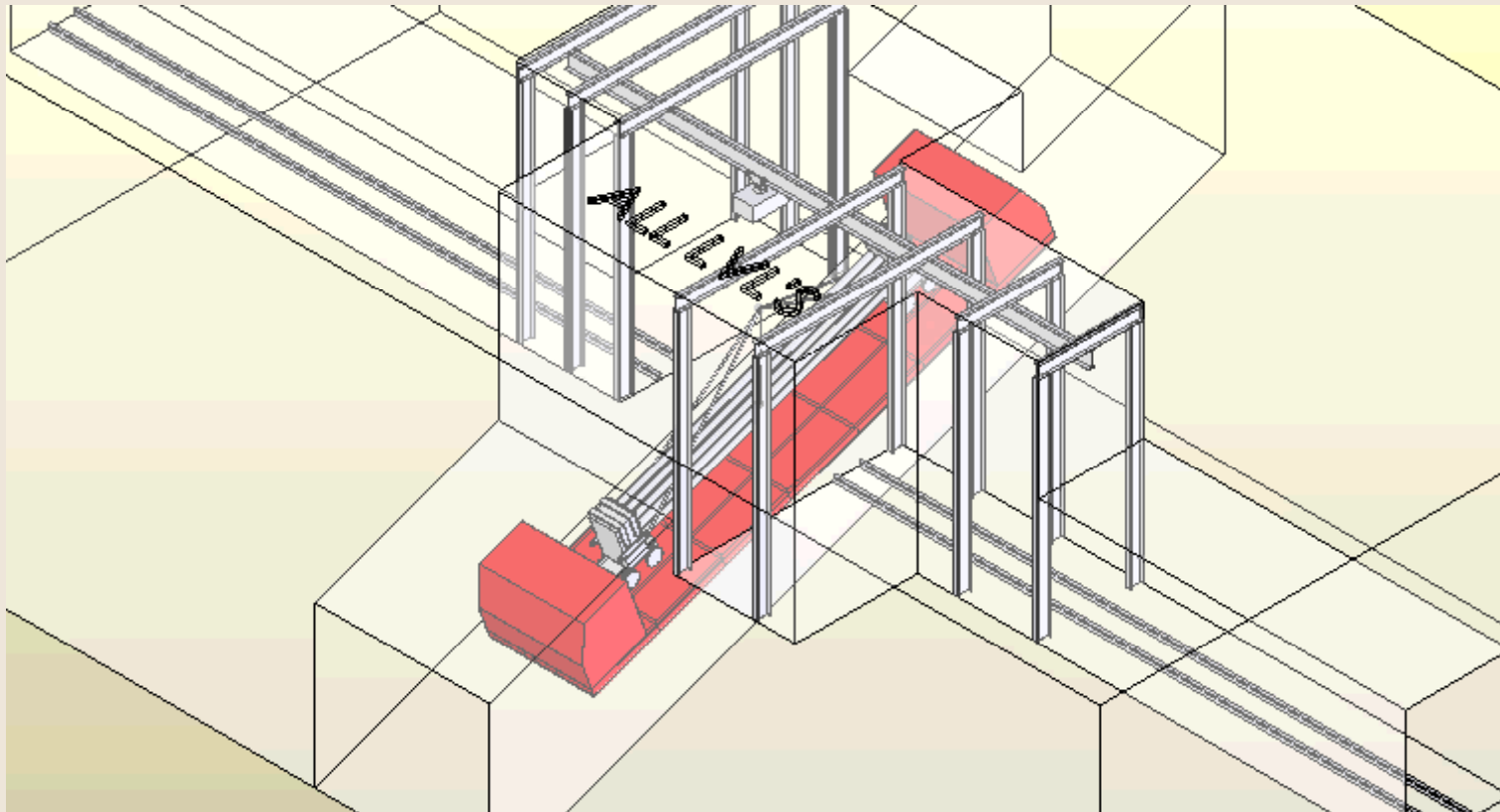


MATERIAL HANDLING CONVEYANCES

- Either single or dual purpose conveyance attached to rope

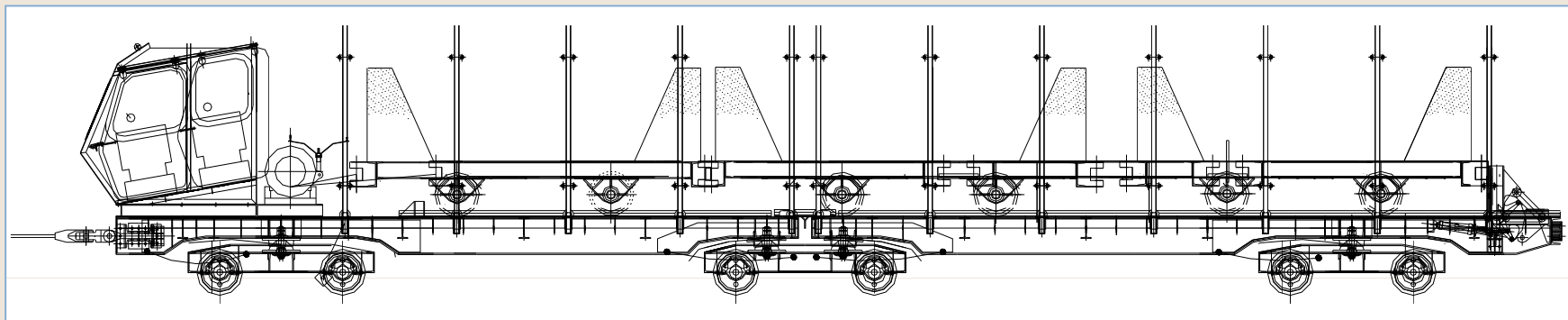
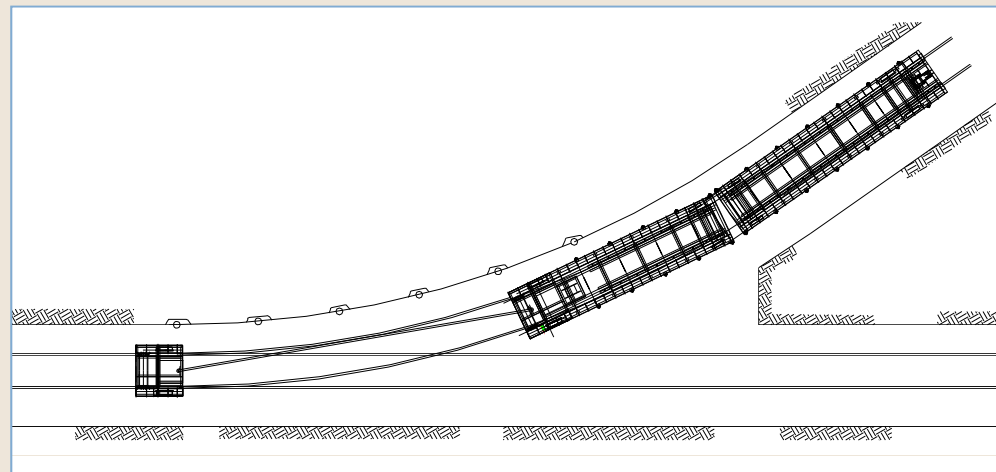


MATERIAL HANDLING CONVEYANCES



MATERIAL HANDLING CONVEYANCES

- Tangential station



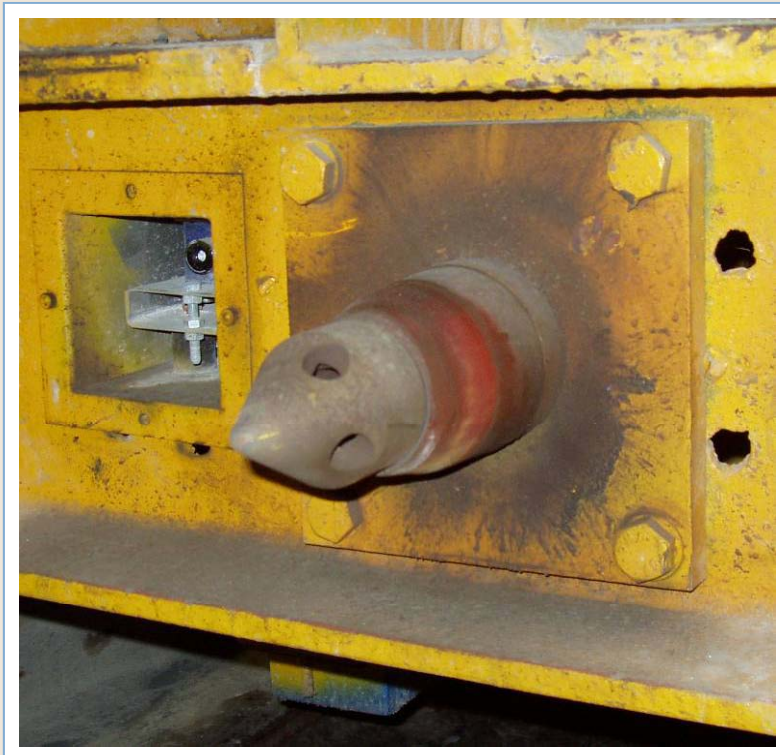
MATERIAL HANDLING CONVEYANCES

- Gondola for roll-on roll-off end loading



AIR COUPLING & CAMERA

- Automated air coupling and camera system





ADVANTAGES / SAFETY

- Material cars loaded onto the “Gondola”
- “Gondola” permanently attached to rope
- Possibility of slack rope is eliminated
- Only required to maintain “Gondola”
- Operators travel with “Gondola” and cars
- Operator has direct and full control



ELECTRICAL OVERVIEW

- Hardwired safety circuit
- PLC based software safety circuit
- AC or DC drive
- MMI based information system
- Can have remote SCADA
- Control net to reduce shaft wiring
- Dedicated fail safe leeky feeder

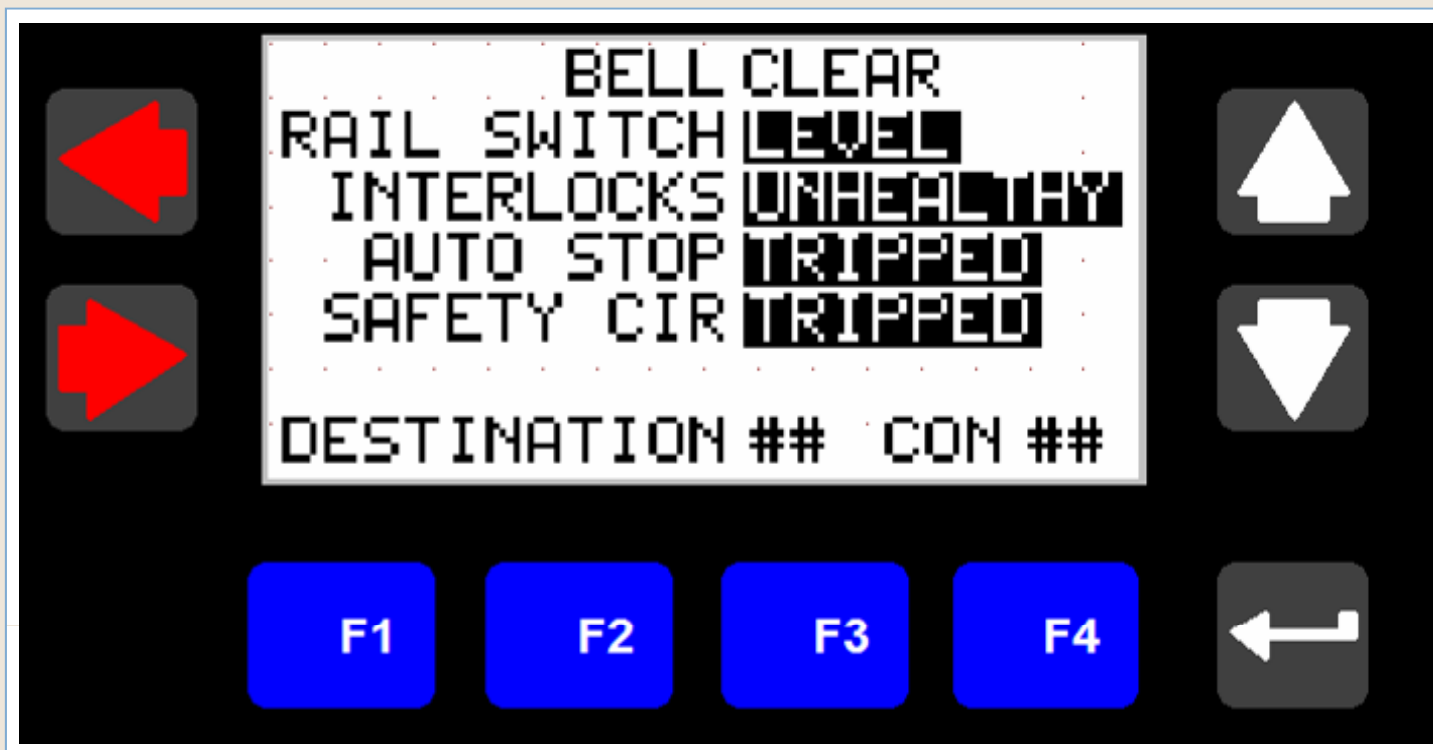
MODES OF OPERATION

- Fully automatic control



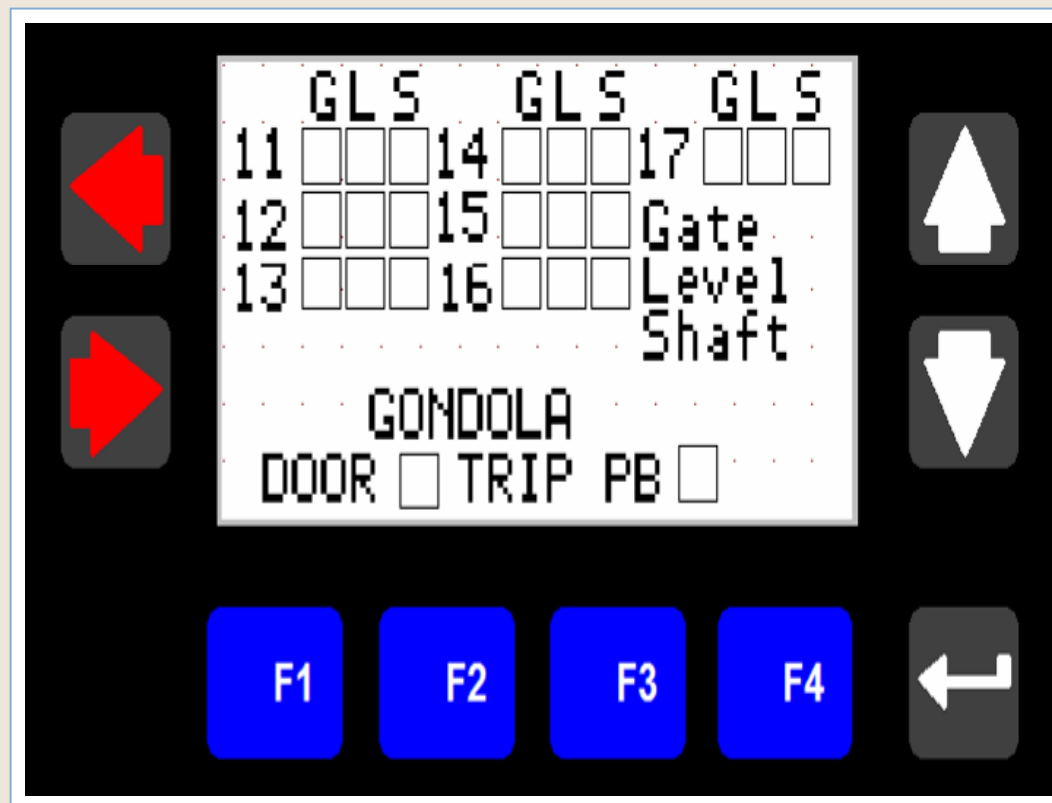
MODES OF OPERATION

- CCU MMI



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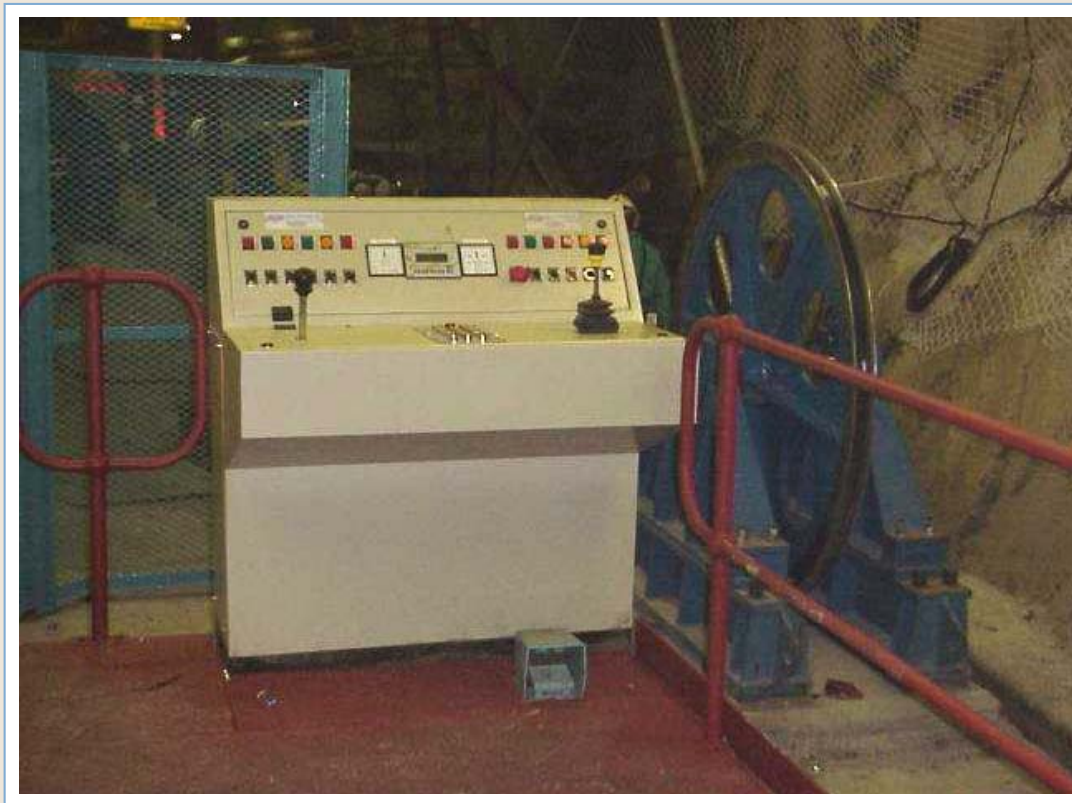
MODES OF OPERATION

- Semi-automatic
(point to point control)



MODES OF OPERATION

- Manual operation



SHAFTSIDE STATIONS



MMI

The screenshot displays a graphical user interface for a winder system. At the top left is the DRA logo, consisting of a stylized mountain peak and the letters 'DRA' in a large, bold, blue font. Below the logo, the text 'WINDER SYSTEM ENGINEERS' is displayed in a smaller, blue, sans-serif font. The main title of the interface is 'Hossy Shaft Sub Incline Winder', centered in a large, bold, black font. To the right of the title is a vertical menu with a blue background and white text, listing the following options: 'S/C IND', 'TRIP HISTORY', 'CURRENT TRIPS', 'CURRENT INFO', 'RESET CRT', and 'MIMICS'. At the bottom left, a digital clock shows '10:44:34 AM 2006/04/04'. At the bottom right, there are three navigation buttons: an upward-pointing triangle, a downward-pointing triangle, and a left-pointing arrow.

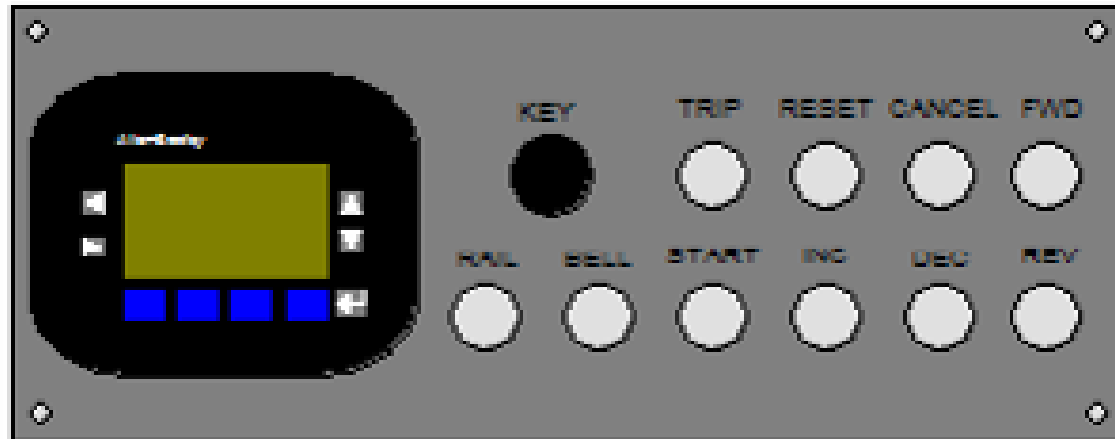
TRIP HISTORY

Alarm time	Message
2006/06/12 09:54:53 AM	ABCDE FGHIK LMNOPQ RSTUV W*

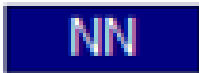


RETURN



CAB SIGNALS



 PRESSED  RELEASED

	DESTINATION	
	CAB DOOR	

The image displays a Man-Machine Interface (MMI) for a system labeled "12 LEVEL". The interface is contained within a white rectangular frame on a light beige background. At the top center, a teal box contains the text "12 LEVEL". Below this, on the left side, are two status indicators: a red circle and a teal circle, both within a teal rectangular box. Underneath these are two stacked teal boxes. The first is labeled "CALL BELL" and contains a blue-bordered box with the text "SSSSSSSSSS". The second is labeled "GATE" and also contains a blue-bordered box with the text "SSSSSSSSSS". At the bottom of the interface are five blue navigation buttons labeled "HOME", "PREV", "NEXT", "TRIPS", and "HELP". To the right of the text elements is a schematic diagram of a ladder with two vertical teal rails and several horizontal black rungs. A black diagonal bar is positioned across the top rungs, and a yellow square is located on the right rail near the bottom.

FALSE BANK TEST

FALSE BANK TOP

FALSE BANK BOTTOM

TRIP SPEED

STOPPED POSITION

RETURN

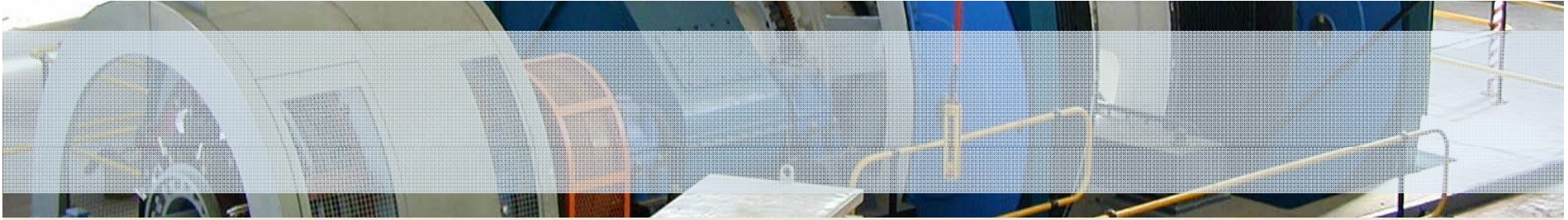
SSSSSSSSSSSSSSSS

SELECT



SUMMARY

- Small to large winding applications
- “Gondola” designed to suit loading arrangement
- Automated (1 man operation)
- Improved safety
- Negotiates vertical and horizontal curves
- Can be used where conveyors and trackless vehicles cannot



THANK YOU