MAGNETIC SEPERATOR

Brought to You by

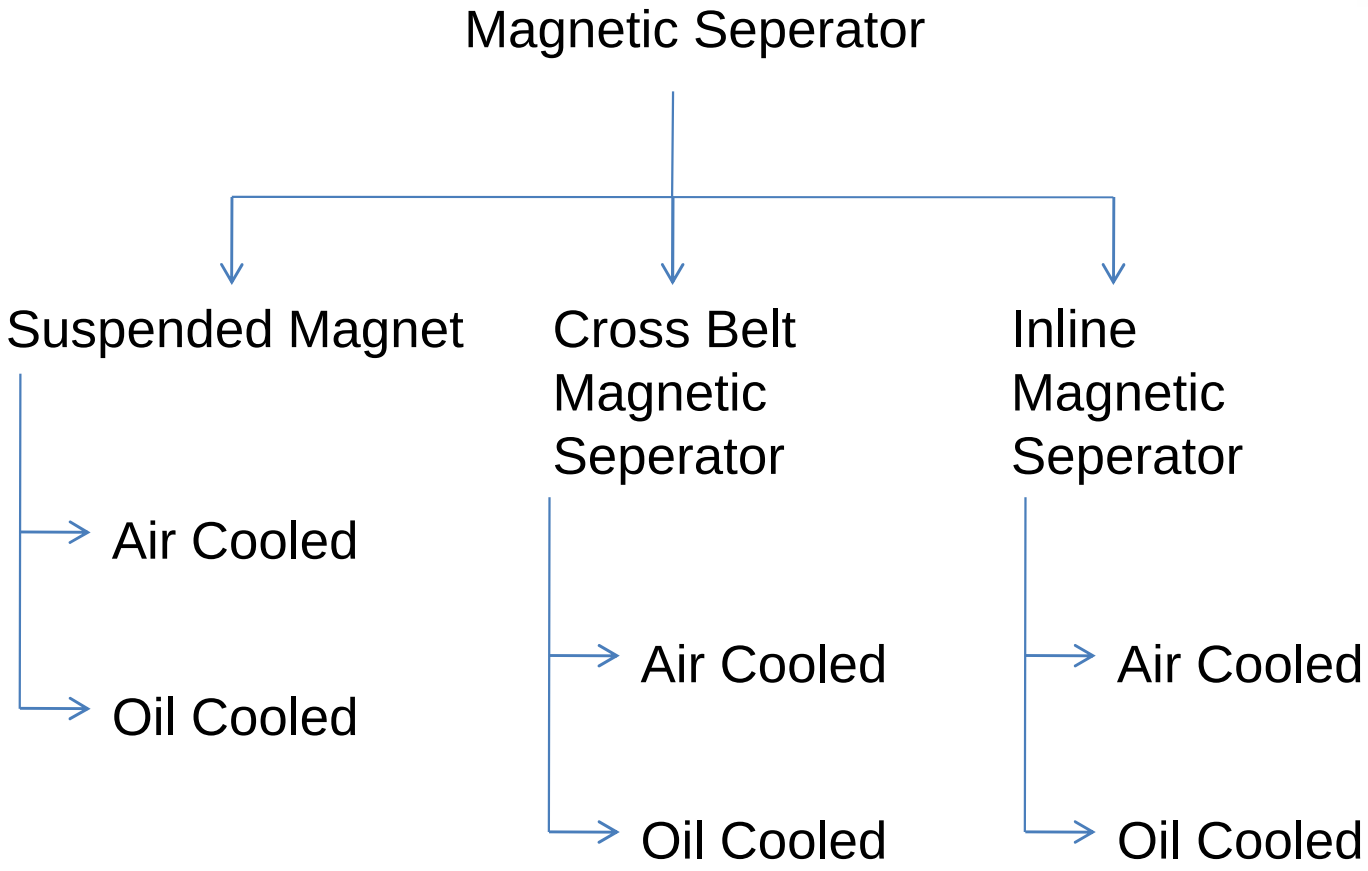
ELECTRO ZAVOD (INDIA) PVT. LTD

Purpose for Magnetic Separator

- To remove tramp iron materials for protection of expensive equipment in the downstream process
- For purification of conveyed material.
- For reclaiming and salvaging valuable ferrous scraps.

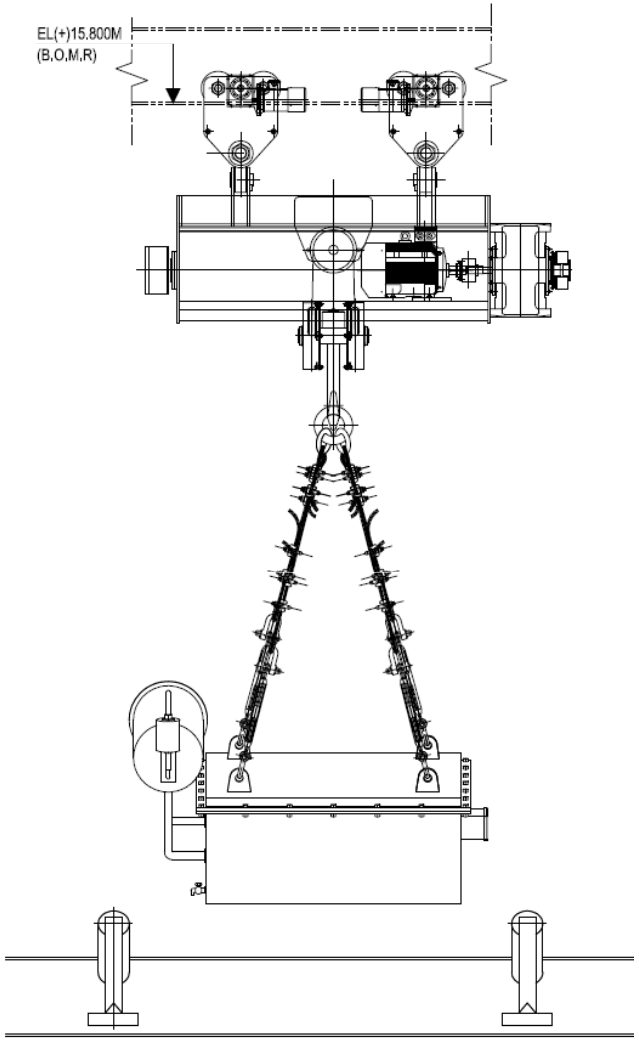
Common applications are - removal of tramp iron from foundry sand, sized coal, stone, glass cullet, fertilizers, crumb rubber, slag, gypsum, ores and similar material. Applications also include the removal of tramp iron to protect crushers, shredders and similar expensive & vital processing equipment

Types of Magnetic Separators



Suspended Magnet

1. The energising coils of the Magnetic Separators produce deep and strong magnetic field, which penetrates through the material burden below the magnet.
2. The tramp iron parts get magnetized and are attracted upwards, towards the magnet face.
3. In case of Suspension Magnet, the magnet is suspended over the material being conveyed and ferrous material is attracted and held against the magnet face until the magnet is de-energised.
4. The magnet is normally suspended from a travelling trolley so that it can be moved clear of the conveyor before de-energisation and discharge take place.

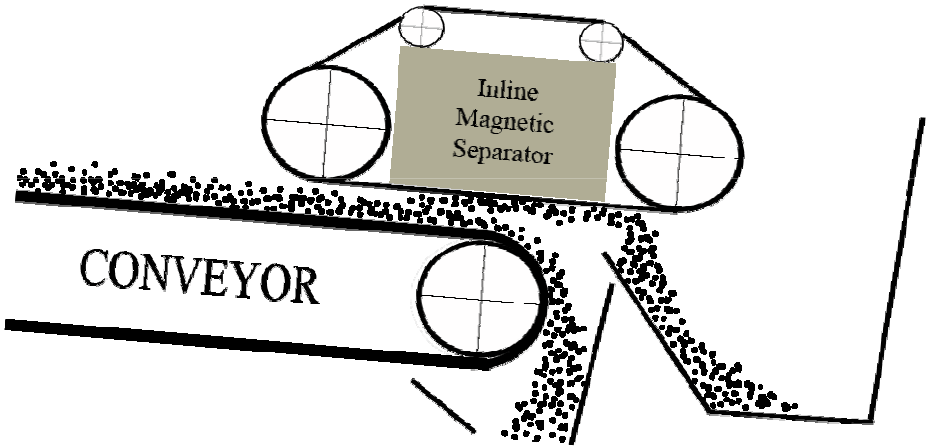


Suspended Magnet
At NTPC, Badarpur, New Delhi

Inline Magnetic Separator

IN LINE models are suspended along the main conveyor belt. The separator is mounted at an angle as shown for better performance. The belt of the separator travels in the same direction as the main process conveyor with a speed which is equal or greater than the main burden speed. The tramp is discharged away from the conveyor belt in the direction of travel.

These operate most efficiently when they are placed at an angle over the conveyor head or over the discharge point of a vibratory feeder. In such cases, the magnets can remove more tramp from deeper burdens even at higher conveyor speeds since the burden loosens up and fans out. In cases where the magnet cannot be installed at an angle over the discharge point, it may be suspended parallel to and above the conveyor belt.



Inline Magnetic Separator
For TATA Steel Limited, CHP, Jamshedpur.

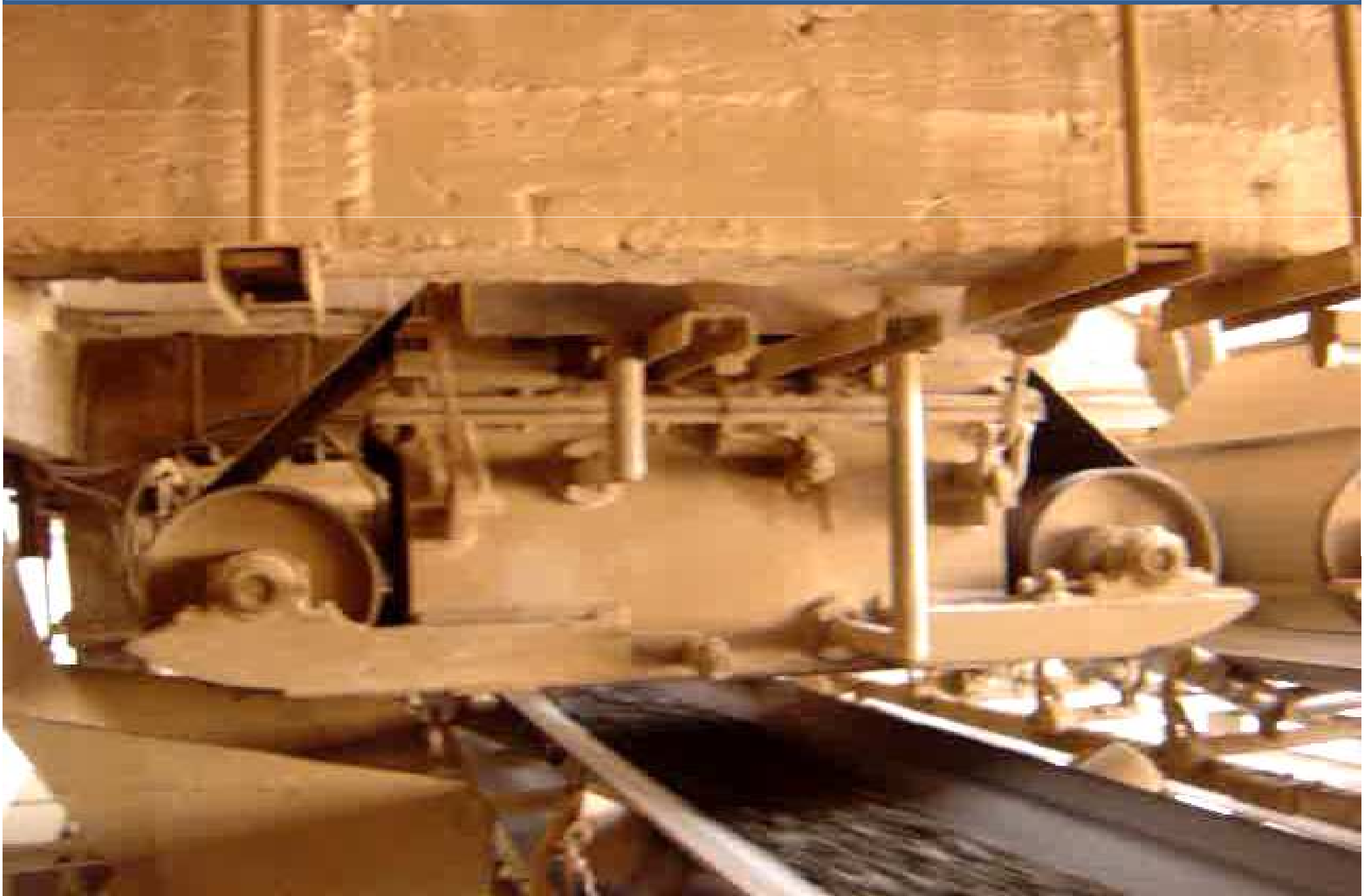
Magnetic Separator
For Neyveli Lignite Corporation Ltd, Neyveli

Magnetic Separator
For Neyveli Lignite Corporation Ltd, Neyveli

Cross Belt Magnetic Separator

1. CBMS models are suspended along the main conveyor belt.
2. The belt of the separator travels in the perpendicular direction as the main process conveyor with a speed which is greater than the main burden speed.
3. In such cases, the magnets can remove tramp from deeper burdens even at higher conveyor speeds.
4. CBMS is preferred over ILMS only when the magnetic separator cannot be installed at discharge end.

Cross Belt Magnetic Separator
At Century Cement, Raipur



Boosting Magnet

- Here Magnetic Separator is electrically interlocked with Metal Detector.
- In default condition magnet runs at a low voltage, Metal Detector sensitivity is so selected that it will not detect smaller particles, while Magnetic Separator separates small particles of metal from conveyor.
- As Metal Detector detects larger particles, the magnet is boosted to high voltage which makes it capable to lift and separate heavier metal particles.

What will be the Parameters for Selection of A Magnet

- Conveyor details, such as belt width in mm, belt speed in Mtr/Sec., angle of troughing, inclination of conveyor, capacity of conveyor, material of conveyor belt, type of feed (continuous or batch).
- Details of conveyed material such as description, flow characteristics, maximum size, density, burden depth.
- Details of iron parts to be separated such as description, size (min. and max.), weight (min. and max.) and shape of different iron particles.
- Operating condition viz. duty of operation, atmospheric condition.
- Available electrical supply.

How To Chose A Magnetic Separator

Selection of the proper magnetic separator for any application requires very careful evaluation of all operating conditions and separation objectives. The magnetic field configuration of any magnetic separator, regardless of type, should profile the conveyor belt for maximum tramp removal. To help proper selection, to enable us to recommend the most efficient and economical magnet.

POINTS TO REMEMBER:

1. Magnetic Flux (H) = Number of turns (n) x Current (I)
2. Power Generated in form of Heat $P = I^2 \times R$
3. Ohms Law $V = I \times R$
4. $R = \rho \times L / A$
5. Magnet Power = Work Done W_D + Loss W_L

For Example

In-order to lift 50Kgs of a tramp iron piece, a magnet requires minimum 1000Gauss at 400mm Operating Height at Hot Steady Condition. In order to achieve 1000Gauss, the magnetic field / Flux (H) shall be 1,00,000.

Magnet #1		**Magnet#2**
	Current at Hot Steady Cond.	
I = 50Amp		I = 100Amp
	H = N x I	
N = 2000		N = 1000
(Wt of conductor required more)		(Wt of Condt. Required less)
Say, Resistance R = 4Ω		R = 2Ω
	Therefore, V = R x I	
V = 4 x 50 = 200VDC		V = 2 x 100 = 200VDC
	Power $P = I^2 \times R$	
P = 50 x 50 x 4 = 10,000W		P = 100 x 100 x 2 = 20,000W
	Current Density for conductor size: 10 x 5mm	
D = 50 / (10x5) = 1.0		D = 100 / (10x5) = 2.0
W_D >> W_L, Temp Rise Low		W_L >> W_D , Temp Rise High

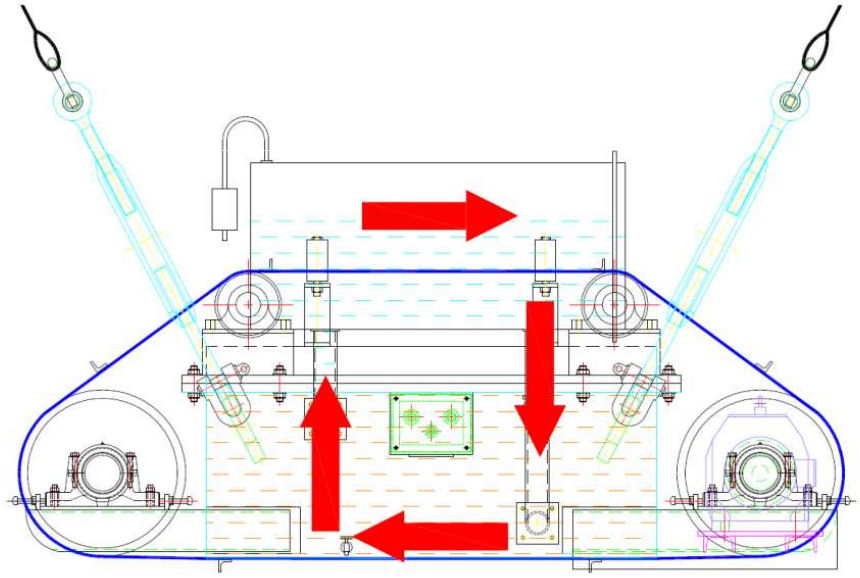
Oil Cooled Magnetic Separator

Comparing the Magnet#1 & Magnet#2

1. Magnetic Strength Depends on the number of turns, the more number of turns the magnetic flux is stronger.
2. Current in coil shall be so selected, it should meet the optimum current density, so that the rise of temperature is controlled, else the power is wasted in generating HEAT and magnetic field is not produced.
3. Magnetic Field or Flux also depends on the Cross Section of Core, and Core material. Core is the path where magnetic filed flows through it. It works like a conductor, the higher the cross section the less resistance and rate of low of flux is higher. Core material plays a part in flux resistance, softer the core metal lesser the resistance.
4. Similarly, the top plates and side plate of the magnet tank, contributed in fulfilling the circuit / path for the magnetic field to flow.
5. The cooling factor increases the life of magnet and the performance. It helps in achieving the maximum gauss needed for proper magnet strength. Heat generation in magnet effects the gauss strength.

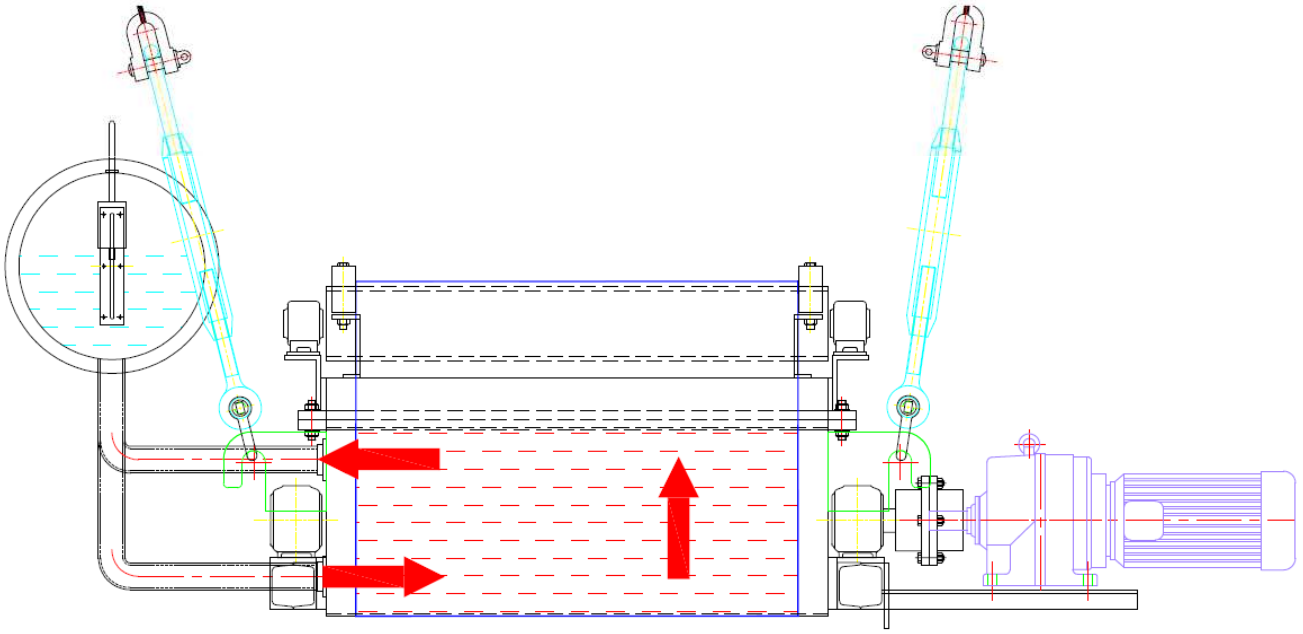
Oil Cooled Magnetic Separator

1. Oil cooled helps to keep the temperature of the magnet coil lower than the air cooled system.
2. In a magnet, when voltage is applied to the coil terminal, a current (Ohms Law I=V/R) flowing through the coil generates a magnetic field and hence magnetic flux. This induced magnetic field/flux is directly proportional to the coil current and number of turns of the coil (H= n x I, where H is magnetic field, n is number of turns of coil and I is current in coil). The total heat generated depends on the magnet power rating, $P=I^2r$. Hence when the current rating is increased the generated heat is directly proportional to the square of current. In order to increase the flux density H, it is easier to increase the current rating. If we increase the current rating, heat generation will increase abnormally. To control heat generation we try to design a magnet with optimum current rating by increasing the number of turns as well as cross section of the conductor. Magnet with low power rating / current rating is much costlier than the magnet with higher power rating. In long run magnet with lower current rating will be much effective due to the lower heat loss.



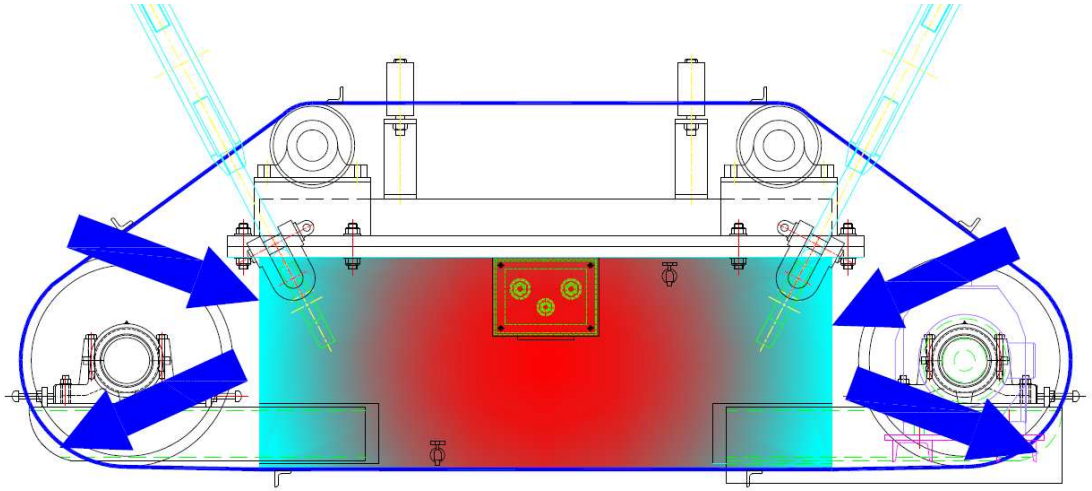
Oil Cooled Magnetic Separator

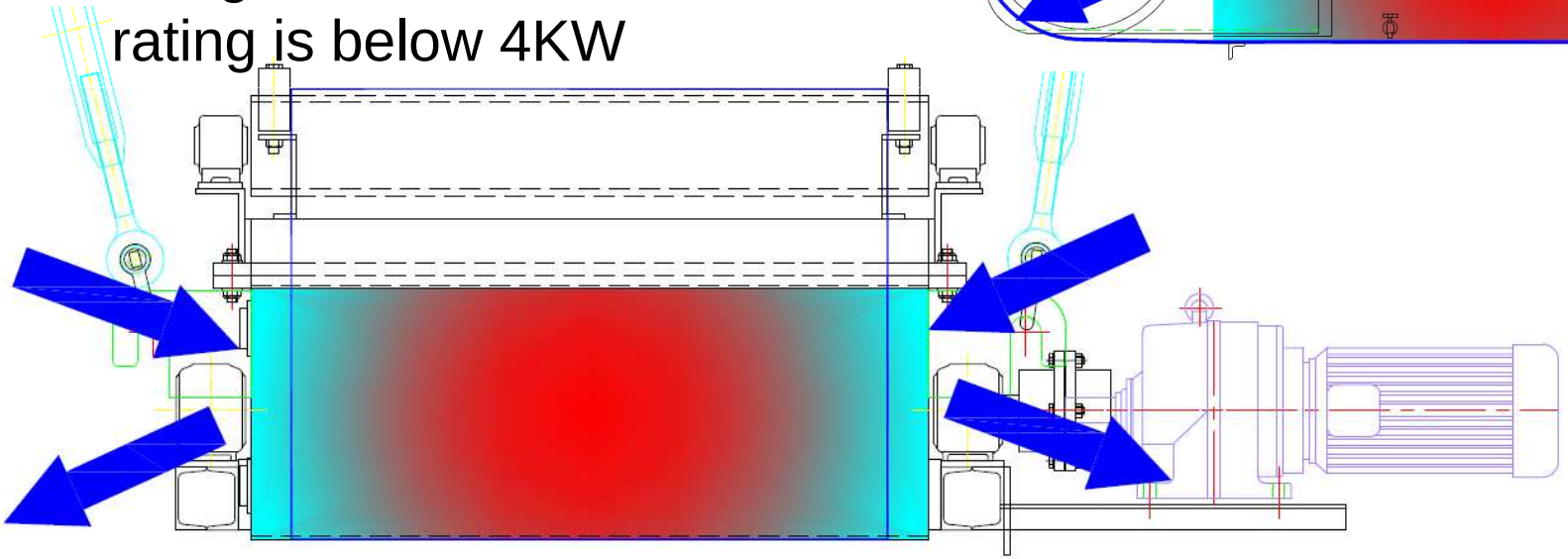
3. The heat generated is cooled down effectively with help of transformer oil using a conservator tank. Similar type of principal used in transformer only radiators are not used rather the convectional current produced in the magnet body and conservator tank helps to cool down the magnet. Like wise the abnormal rise of temperature is controlled. We can achieve maximum temperature rise of 90^{o}C over an ambient temperature of 50^{o}C.
4. The absolute temperature of the coil is 140^{o}C which is below the flash point. This is very important to save the insulation which can withstand a maximum temperature of 180^{o}C continuous.



Air Cooled Magnetic Separator

- Air cooling system is not sufficient to cool down the temperature of magnet coil.
- Only the surface gets cooled but the core of the coil remains hot.
- Air cooled magnet can be designed where the Power rating is below 4KW



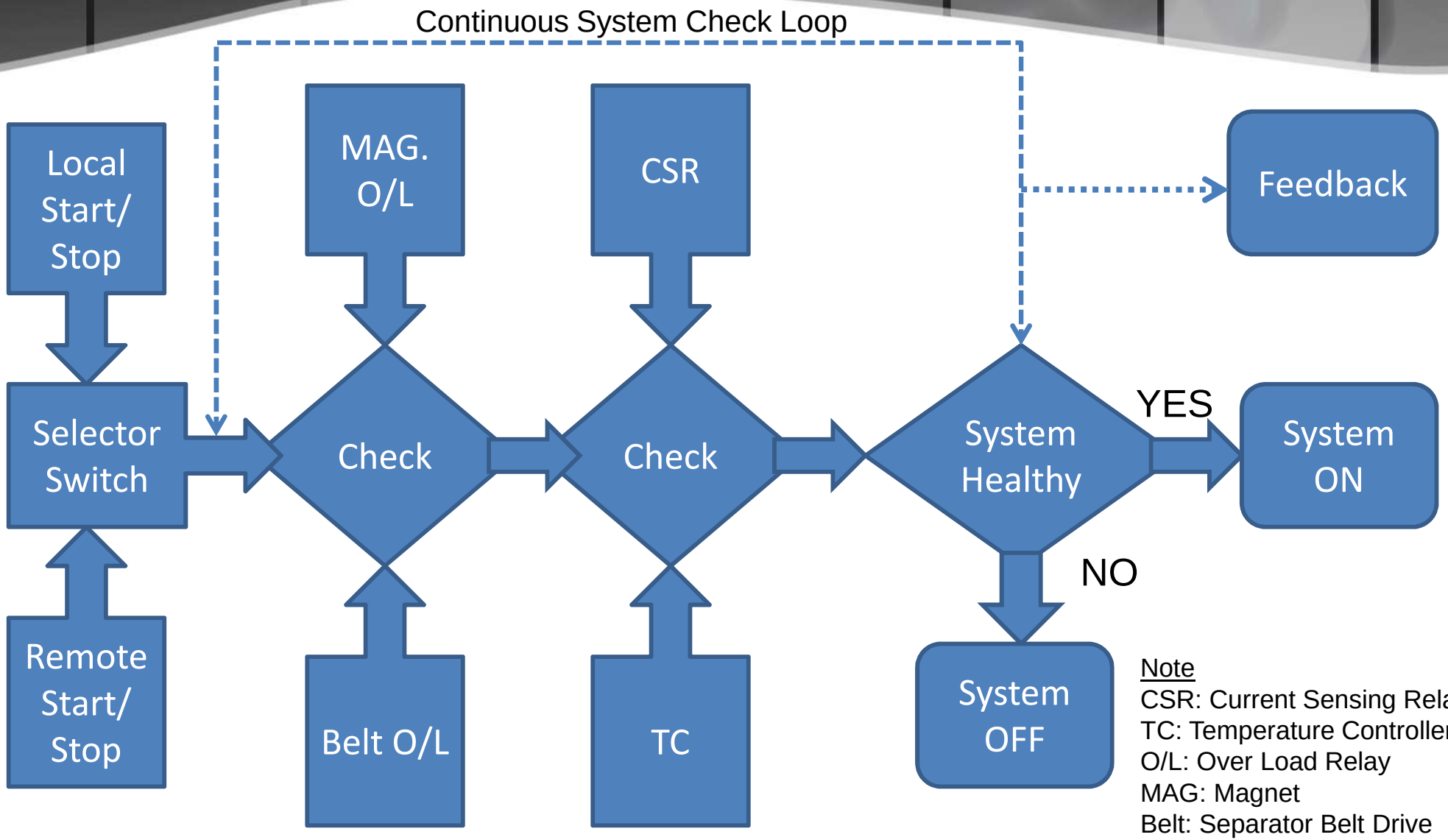


Easy to Use Control Panel

- Simplified Control Panel for operating Magnetic Separator.
- Providing feedback for every operation and fault i.e. Magnet ON, Magnet OFF, Belt ON, Belt OFF, Oil Temperature High Indication cum digital display of temperature, Excitation Fault Trip Indication, Digital display of DC current of Magnet, Belt Speed Low Indication, over load trip and etc.
- Feedbacks for the following are also provided to Client PLC or DCS system for system analysis through separated terminal box with potential free contacts.
- Magnetic Separator can be operated locally as well as through remote, i.e. Client PLC or DCS.

CBMS Control Panel for Vicat Sagar

Operation and Control



Note
CSR: Current Sensing Relay
TC: Temperature Controller
O/L: Over Load Relay
MAG: Magnet
Belt: Separator Belt Drive

Our Other Products

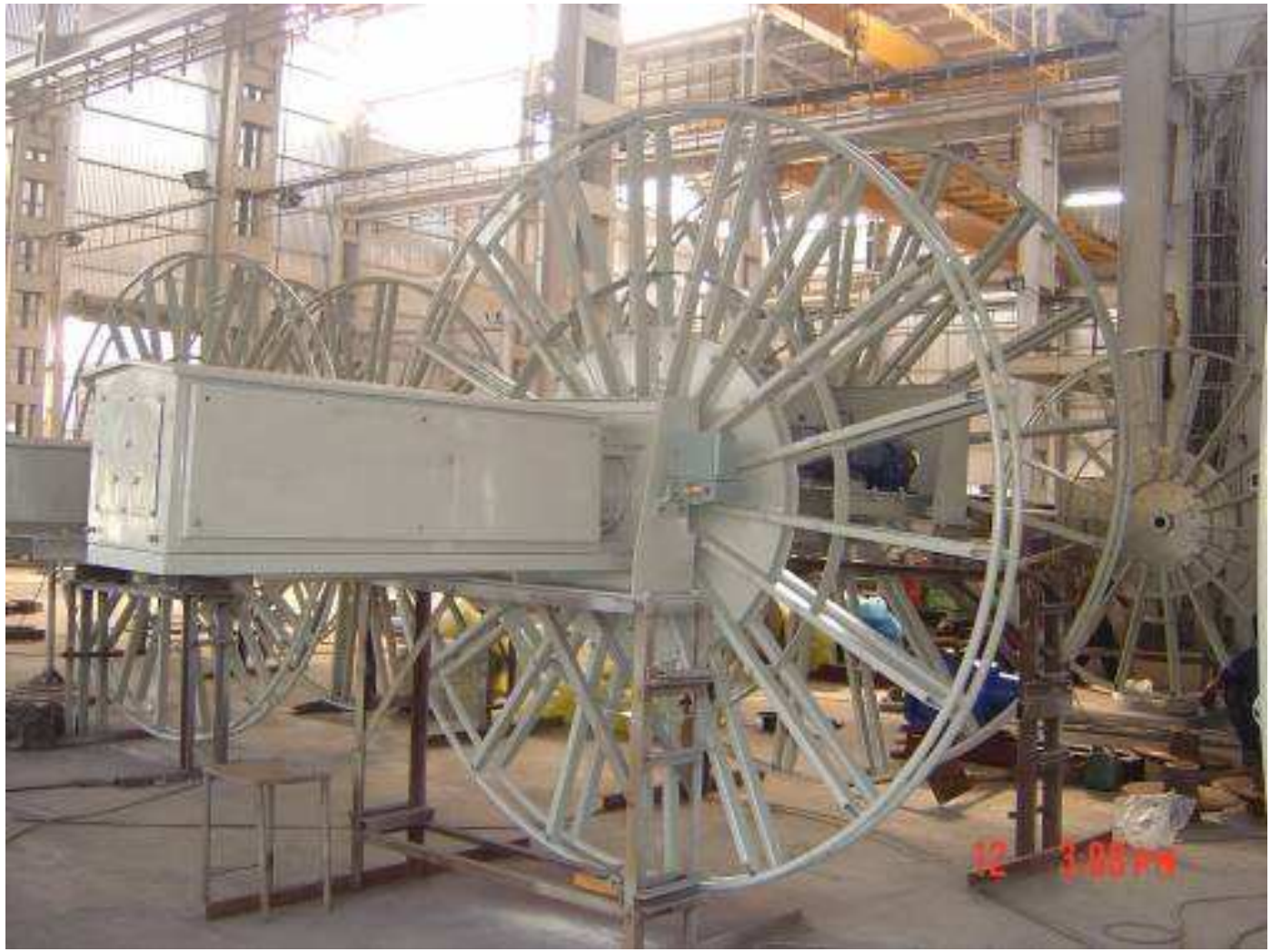
Vibrating Screen & Feeders

Our Other Products

Vibrating Screen & Feeders

Our Other Products

Cable Reeling Drum



Our Other Products

Cable Reeling Drum

Our Other Products

Metal Detector

Ourselves

We are an Engineering Company, founded in 1973 and a leader in the Bulk Material Handling equipment industry. Our factory is manned by trained technical personnel and is constantly upgraded with equipment and systems to ensure high product quality and consistent standards of excellence.

Our Major Clients

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