

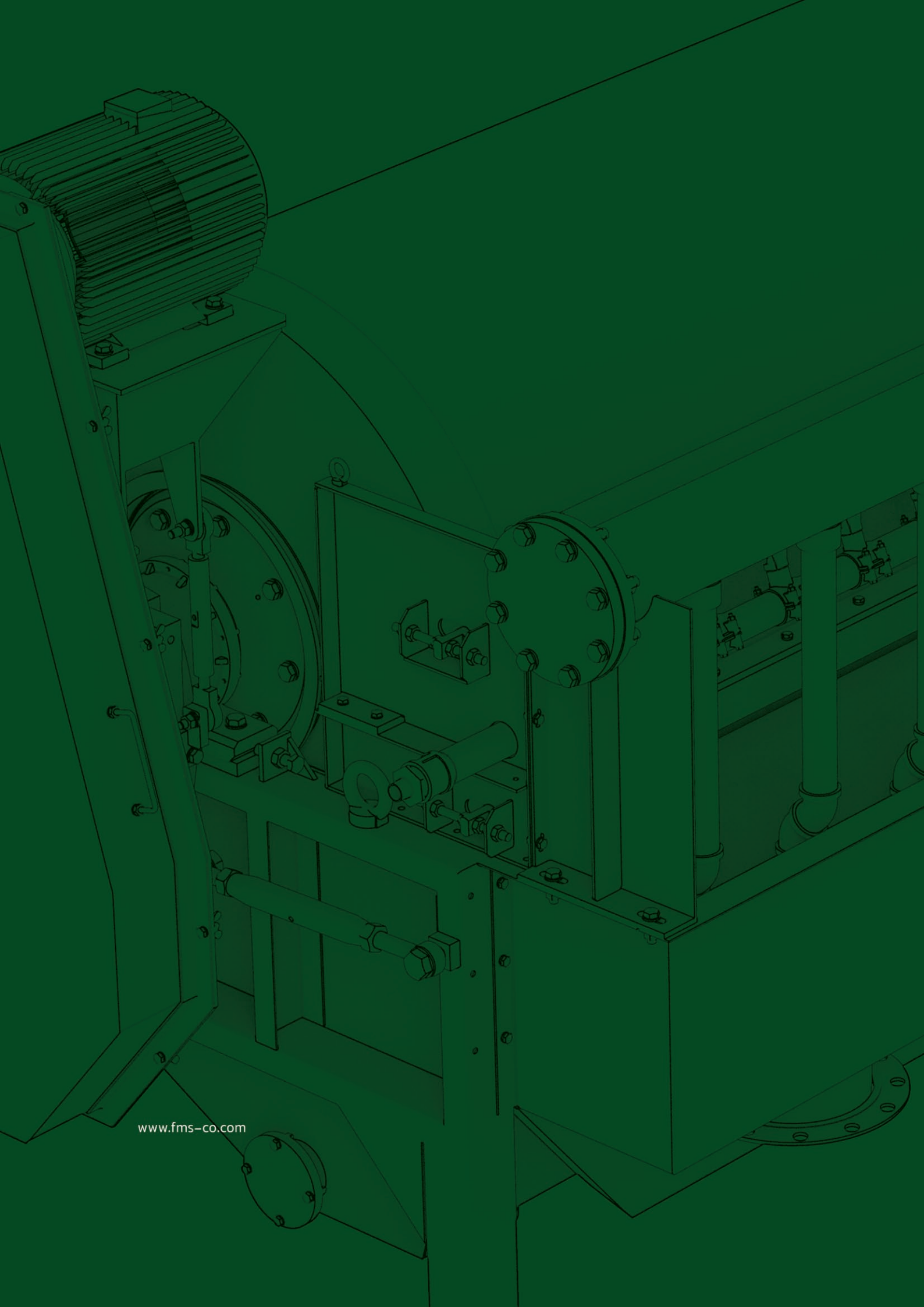
# DRUM SEPARATOR

Gain more out of magnetic separation



Fakoor Meghnatis Spadana Co.

[www.fms-co.com](http://www.fms-co.com)





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# GENERAL DESCRIPTION

FMS produced more than 1000 of magnetic drum separators (in over 100 plants and process above 50 million tons concentrate yearly) both wet and dry types. All the magnetic drum separators have been developed and optimized in accordance with plant builders and operators requirements in a closed three lateral cooperation between FMS, EPC contractor and Iron ore mining industry.

This closed cooperation led to deep knowledge of conjunction of processing, mechanical and magnetic parameters. In result FMS magnetic drum separators shown much higher separation recovery and efficiency in comparison with world leaders.



# SEPARATORS DESIGN AND SIZES

Magnetic drum separators are designed in accordance to standard dimensions in order to meet different processing requirements.

## Wet Magnetic Drum Separator

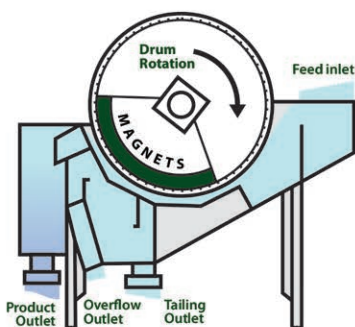
Wet magnetic drum separators are used for cobbing, roughing, cleaning and dewatering. To best meet the requirement of each stage three tank configurations from concurrent, counter-current and counter-rotation could be selected.

### Wet Separators General Dimensions

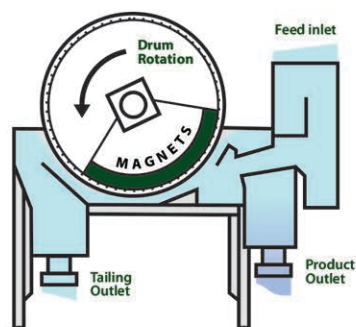
Diameter (mm)	Length (mm)	Rotational Speed (RPM)	Tank configuration
1200	600 – 3600	19 - 23	All three types



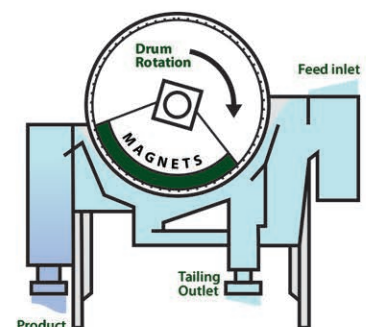
Concurrent and counter current tank configurations could be selected for one or multi stages separation while the counter rotation tank normally is being used for one stage separation.



Concurrent (Dense Media)



Counter Rotation



Countercurrent

## Dry Magnetic Drum Separator

Dry magnetic separators have two main types, housing and belt configurations.

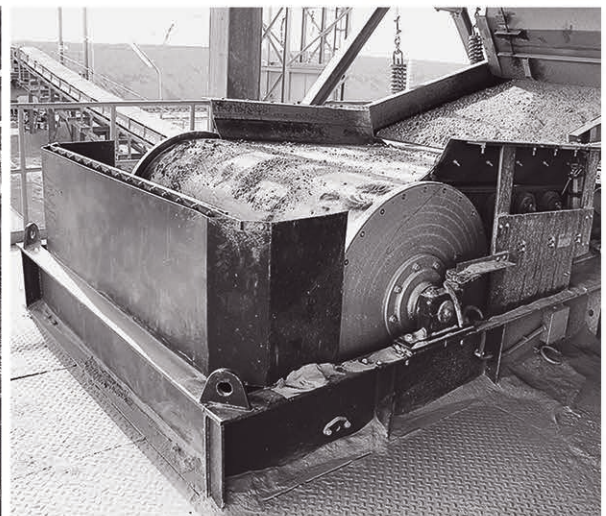
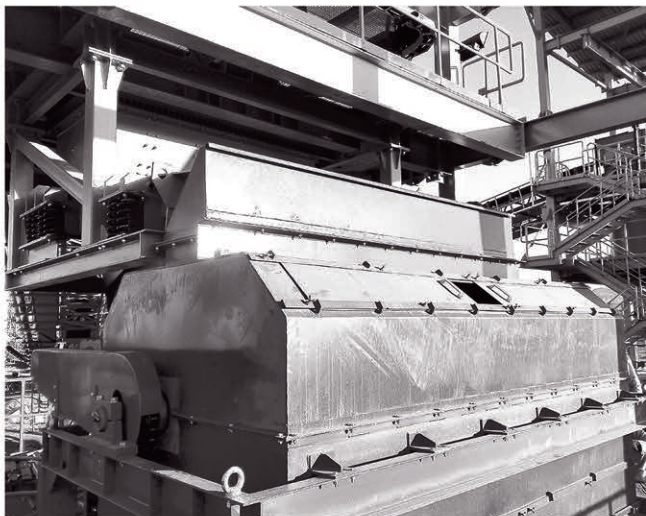
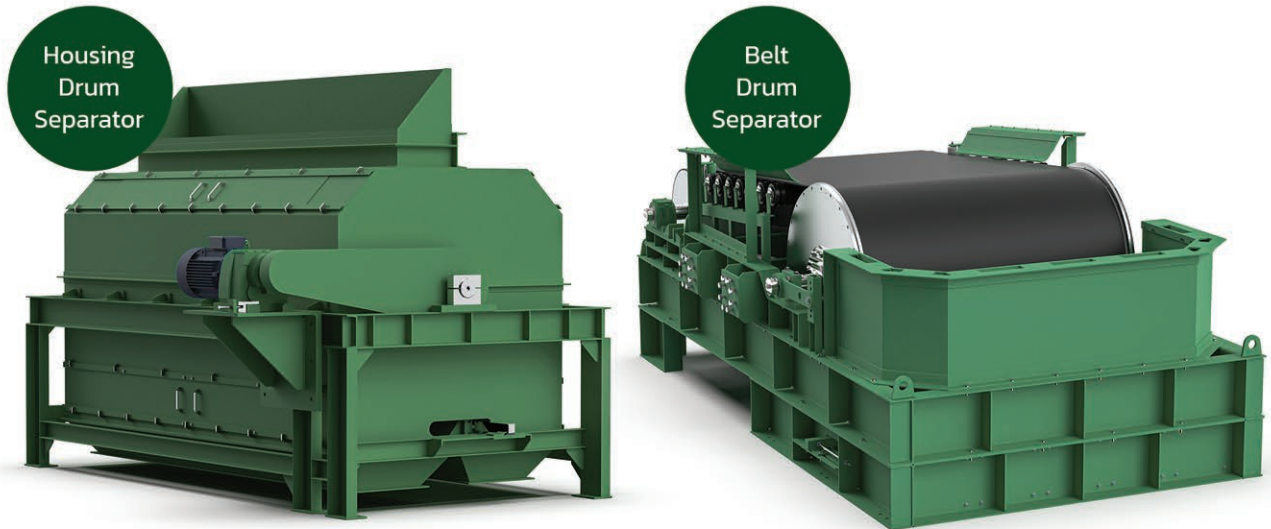
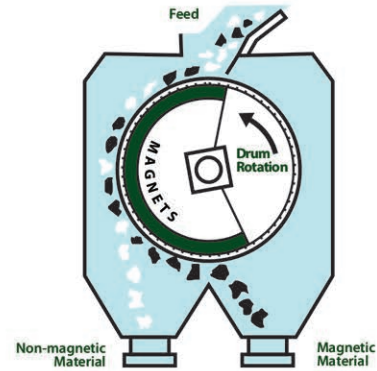


Table of Dry Sperator

Diameter (mm)	Length (mm)	Rotational Speed (RPM)	Type
900	600 – 2400	30 - 80	Housing
900	900 - 1800	40	Belt
1200	600 - 3600	20 - 60	Housing
1200	900 - 1800	40	Belt



## SPECIAL SEPARATORS

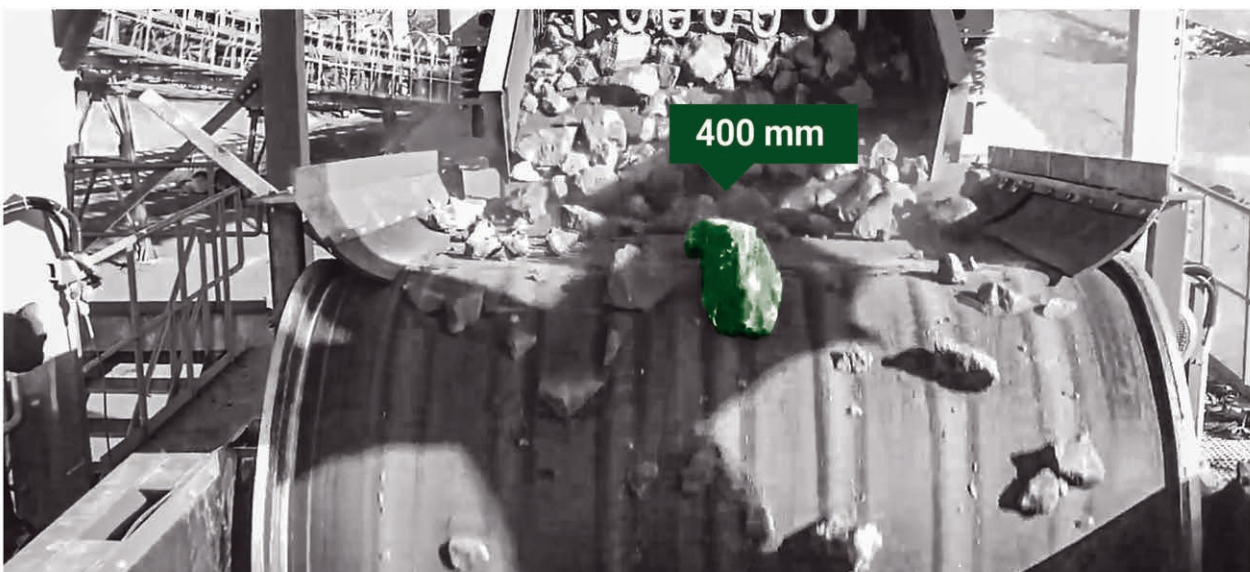
There are many applications which standard separators cannot fulfil their objectives, there are vast experiences in design and manufacturing special separators.

### High Speed dry Medium intensity Magnetic separator

In application of processing of iron ores with medium intensities for fine particles (less than 5 mm) it is required to have relatively higher rotational speeds. The maximum speed of dry medium intensity magnetic separators are limited by stainless steel shells, for these sort of applications composite shells wear-protected by ceramic tiles could be the optimum option.

### Dry separator for coarse feed particles

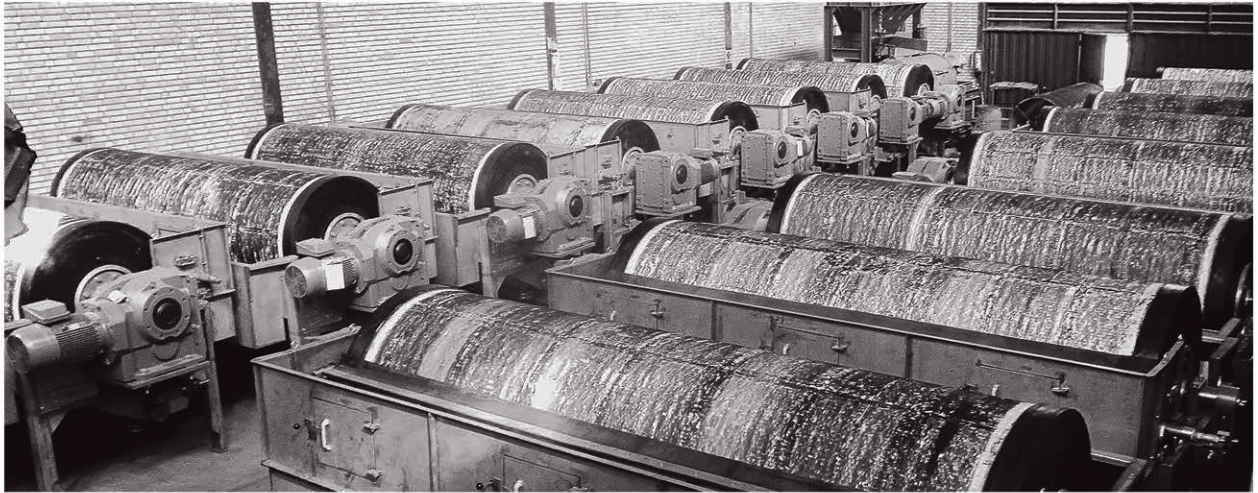
For mines far distance from beneficiation plant with relatively low grade Iron ores, the transportation costs would be the turning point on plant economical performance. One separator based solution is to have the primary crushing and separation at mine-site, and transport the upgraded ore to the processing plant. These special separators with medium magnetic intensity are capable of handling particle sizes up to 400 mm and capacity up to 700 tons per hour which dramatically reduces transportation costs by eliminating gangues from feed.



## Dry separator for fine feed particles

As a solution for reduction of water, power and consumable material consumption in an iron ore beneficiation plant, dry cobbing with minimum applicable particle size ( $k_{80} \approx 1 \text{ mm}$ ) could be considered. An efficient magnetic separation is the key to make this process successful.

A special separator has been developed to process very fine particles produced by HPGR or other dry mills. In this special separator there would be virtual polarity which could be changed up to 3000 times per minute to have better cleaning effect on final product.



# MAGNETIC DESIGN

## Separation theory

Separation of iron minerals with magnetic drum separators is based on variation of magnetic susceptibility of mineral particles from tailings. It is a complicated process to reach to the best separation efficiency by balancing the implied forces on each particle during separation process includes, magnetic, gravity, drag, centrifugal and etc.

Magnetic forces applied on a particle are related with following formula:

$$F_{\text{mag}} \approx B \cdot \frac{\partial B}{\partial x} \cdot \lambda \cdot d^3$$

Which:

B = magnetic intensity

$\frac{\partial B}{\partial x}$  = magnetic gradient

$\lambda$  = particle magnetic susceptibility

d = particle diameter

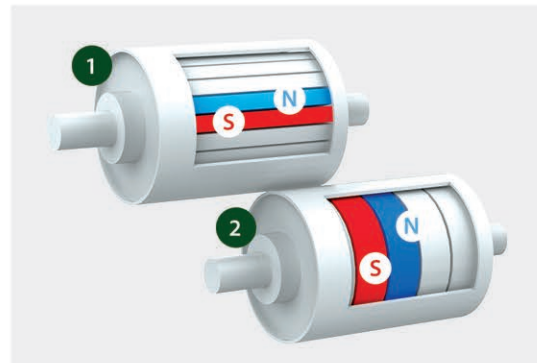
The magnetic intensity is measured on drum surface and is the most important magnetic parameter for selection of suitable magnetic drum separator for each application. In FMS standard magnetic drum separators it could be vary from 500 up to 5000 Gausses (for dry magnetic belt drum separators the maximum field intensity is limited to 3500 Gausses). Magnetic gradient also is another important affecting parameter which need to be maximized when handling fine particles to withstand reduction of magnetic attraction forces due to the decreasing of particles diameter.



## Magnetic arrangement

Axial arrangement of magnetic assembly is dominated design with higher product quality, but radial arrangement also could be consider when the recovery in the main concern or in cases which much bigger particle sizes need to be handle specially for dry applications.

Optimizing of all the magnetic parameters for each application in conjunction with selection of right mechanical specifications of each separator is the key advantage of FMS separators which result in higher recovery rates, better product quality with reduction of fix investment.



## FEATURES

### Wear protection

Body and tank of both wet and dry magnetic separators are protected by a wear resistant layer made of anti-wear natural rubber, ceramic tiles or 304 stainless steel.

### Drive system

Drive system divided into two models. First design, drive system consists of a gear box with a direct-coupled electric motor. The advantages of this method are the reduction of maintenance requirement, higher efficiency and lower noise.

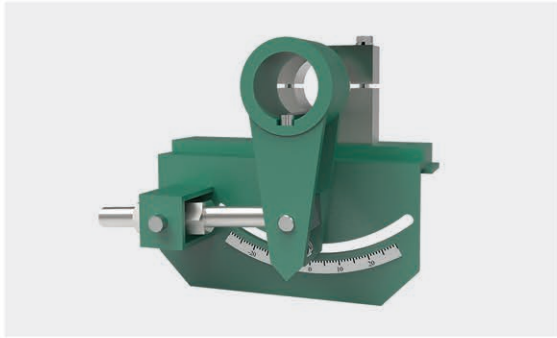
The second model is a set of a shaft-mounted gear box with V-belt and fully enclosed drive guard. The advantage of this system is the possibility of changing the drum speed to gain the best possible product quality (speed changes can be done by changing the pulleys). V-belt system also acts as a shock-absorber system in fluctuation of load especially in equipment start up.



### Feeding system

Even distribution of feeding slurry is one of the main parameters for optimal performance of wet magnetic drum separators, the feeding system is not included in separators delivery.





### Magnetic yoke and drum position adjustment

To achieve better processing performance the magnetic yoke angle and drum position could be adjusted in horizontal and vertical directions.

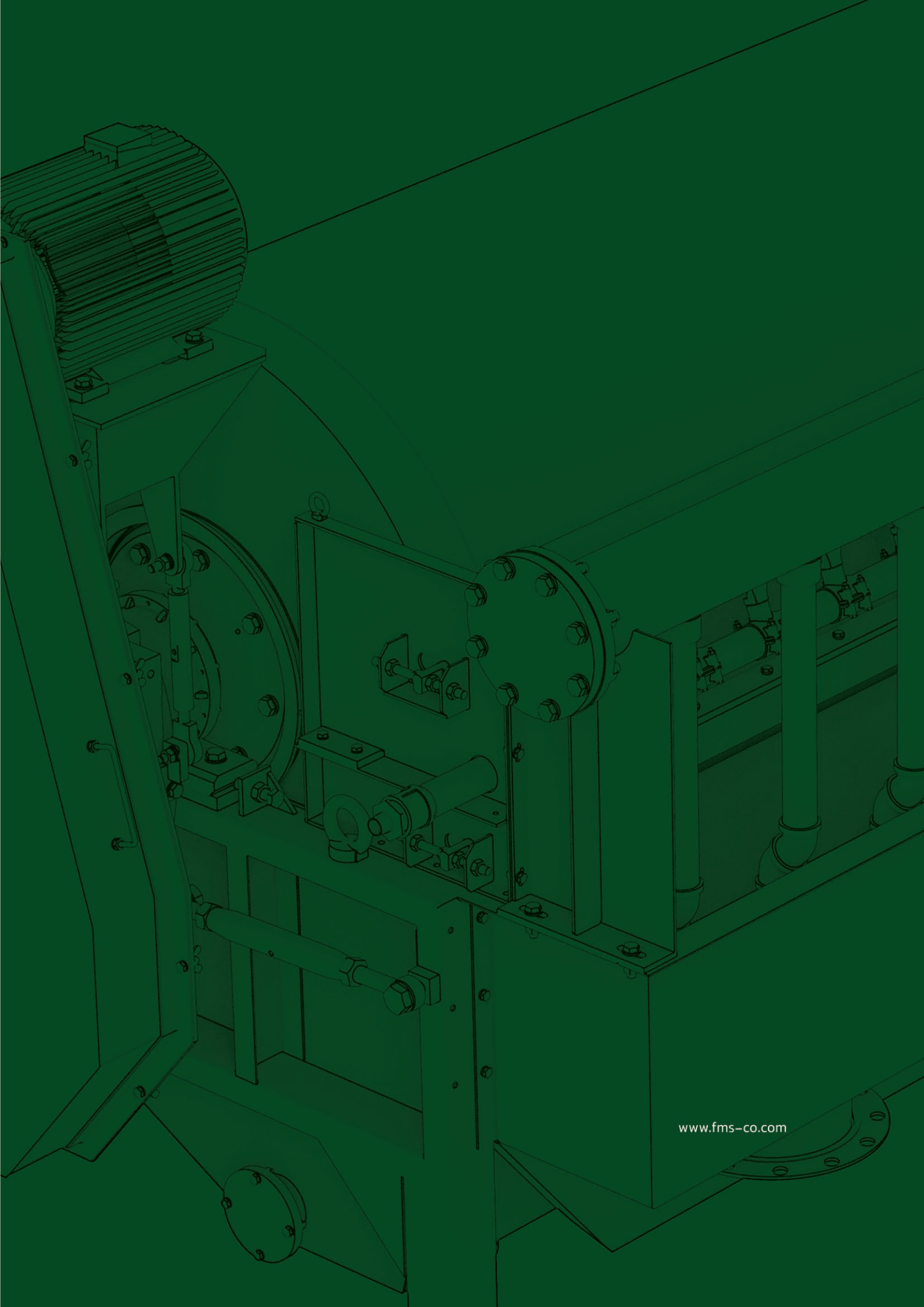
## PROCESSING LAB

The processing lab plays a key role in development of new separators and provide technological solutions for different applications on different raw materials.

FMS lab has following divisions:

- Mineralogical laboratory
- Mineral processing laboratory
- De-watering & thickening test center
- High pressure grinding roll test center
- Chemical laboratory
- Mineral processing pilot plant
- Metallurgical laboratory and pilot plant
- Plant process support unit







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