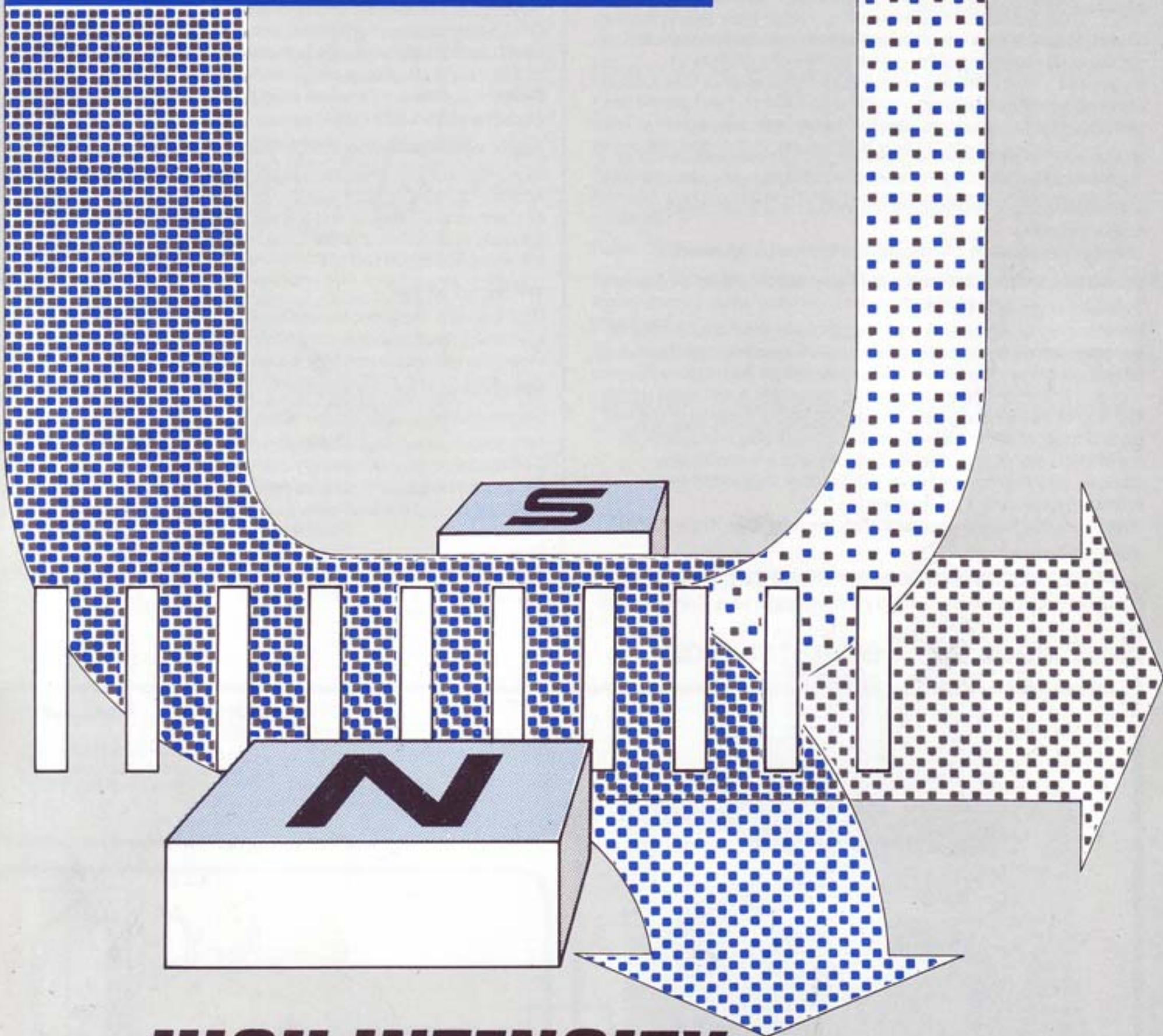




**Master  
Magnets  
Limited**



***HIGH INTENSITY  
HIGH GRADIENT  
WET SEPARATOR***

# A high specification separator with the purchaser in mind

## Introduction

The earliest high intensity wet separator was known as the Forsgren separator, patented about 1897 and illustrated in the 1905 text of the dressing of minerals by Henry Louis. It was not until the 1960's that the full potential of high intensity wet separators was realised, thanks to Mr. Jones of Camborne School of Mines in Cornwall, England. Since then manufacturers have adopted and improved on the original idea.

Master Magnets high intensity wet separators are designed and developed by engineers with over a quarter of a century of experience in this field, and offer a range of separators that embody many sought after features.

'No clogging' 'Easy cleaning' 'Low maintenance'

Master Magnets high intensity wet separators are produced to give 'high intensities' 'high gradients' 'increased residence time'.

In producing these features our engineers have given careful consideration to

'cost per ton treated' 'grades and recoveries achieved'.

## When to use Master Magnets High Intensity Wet Separator

To treat low grade ores.

World supply of high grade ores are gradually depleting, inevitably attention is focussed on low grade ores. To upgrade, ores have to be ground to very fine mesh sizes, occasionally even below 20 microns. It is economical to grind the material in a wet state using Ball Rod or Autogenous mills. Separation of the material in the wet state is most economical without incurring drying costs. Fine dry material causes dust problems. Even if these are secondary reasons, very fine material is very difficult or impossible to be treated magnetically in a dry state.

'Then consider Master Magnets High Intensity Wet Separator'.

## Avoid Pollution

Fine grained material can invariably be treated using flotation. Flotation reagents cause pollution and are expensive. Consider wet

magnetic separation.

## Eliminate tails early

Getting rid of waste material at an early stage of processing is good mineral dressing practice. This is particularly valid when treating low grade ores of iron, chromite, ilmenite etc., that are amenable to magnetic treatment.

## Apply when paramagnetic mineral content is high

One of the most economical separators used in the upgrading of beach sands, when ilmenite is a required mineral with the minimum of other associated minerals such as Rutile, Zircon etc., as in Western Australia, or a waste product as in the Eastern coast of Australia and tin ores in Malaysia.

## Apply when paramagnetic mineral content is low

High intensity wet magnetic separation is applicable when a minute amount of paramagnetic material is to be removed as in purification of glass sands, Feldspar and the like, or when very valuable minerals such as Wolframite, Uranium etc. is to be recovered from hitherto untreatable tailings.

## When not to use

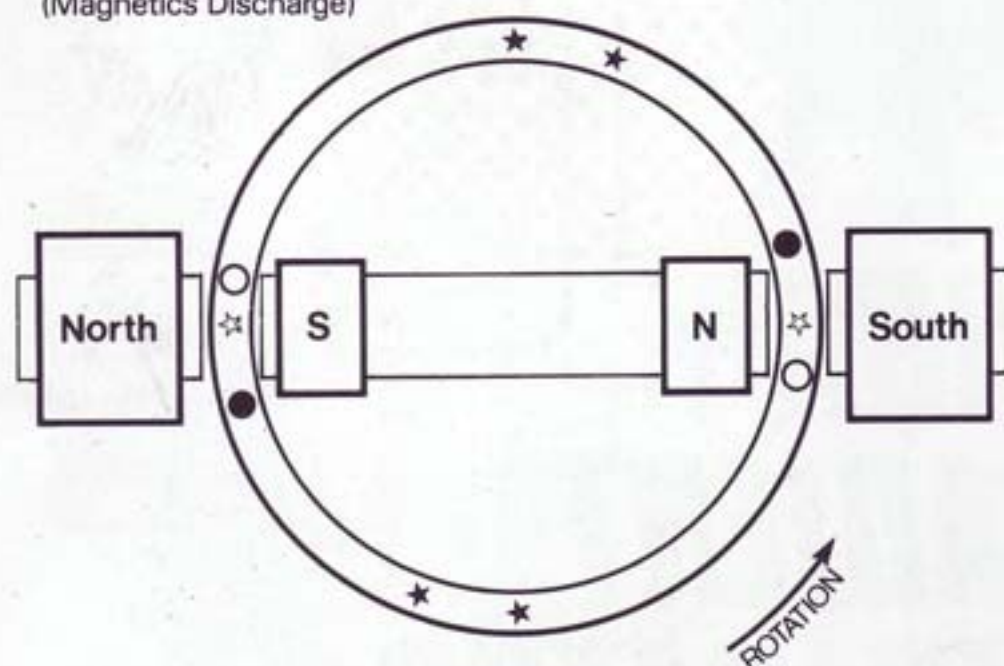
High intensity magnetic separation is not very effective when material is flocculated by the addition of flocculating agents, or when the material is not fully liberated.

## What mineral can be treated?

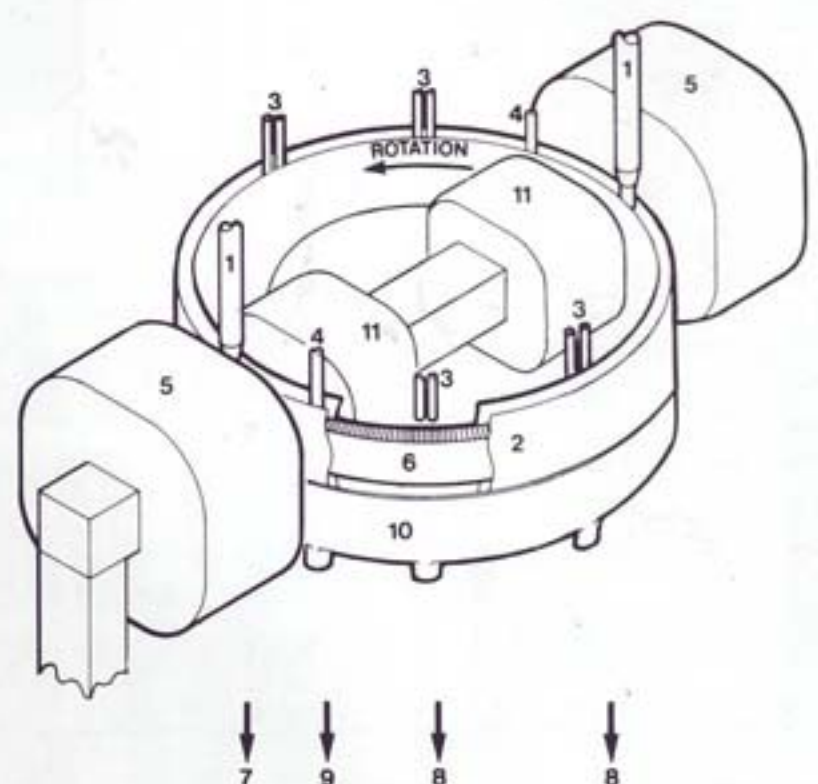
Concentration	Purification
Hematite	Feldspars
Columbite	Quartz
Manganese ores	Nepheline Syenite
Wolframite	Barite
Chromite	Fluorspar
Ilmenite	Phosphate Ore
Tantalite	Clays
	Coals

## How does the Separator work?

- Feed Point
- ☆ Non-Magnetic Discharge
- Low Pressure Wash Point (Middlings Discharge)
- ★ High Pressure Scour Point (Magnetics Discharge)



- KEY
- |                            |                            |
|----------------------------|----------------------------|
| 1. Feed Pipe               | 6. Matrix                  |
| 2. Rotor                   | 7. Non-Magnetics Discharge |
| 3. High Pressure Water Jet | 8. Magnetics Discharge     |
| 4. Low Pressure Water Jet  | 9. Middlings Discharge     |
| 5. Outer Coil              | 10. Trough                 |
|                            | 11. Inner Coil             |



# High Tonnage – Low Middlings – Clean Discharge High Grade – High Recovery

## Design Features

A carousel consisting of 2 annular rings carrying a carefully arranged matrix composed of triangular section magnetic stainless steel bars, rotates between the jaws of a powerful magnet. Each bar whilst in the magnet zone forms into many very powerful magnets producing very high fields, and because of the proximity to each other, very high gradients. The matrix is so arranged that the feed pulp has to pass through a multitude of powerful magnets. The feed pulp is fed through feed nozzles in the magnet region. As the feed pulp passes through the matrix, magnetic particles are attracted and held to the matrix, whilst the non-magnetic particles pass through to be collected. While the magnetic material is still in the separation zone, it is given a light wash with low pressure water jets which remove any trapped non-magnetic material and/or material that is very feebly magnetic. These can be collected as a middling product. The magnetic material is carried by the matrix to a point where the magnet no longer has any influence, to be washed off by powerful high pressure jets.

Master Magnets unique design permits even the most stubborn highly magnetic material such as abraided iron and magnetite to be washed off with ease, presenting a clean matrix to the next feed zone.

## Scalp or not to scalp

The magnetic intensity at the high pressure jet zone (scour zone) is very low. Nevertheless, customers are advised to keep highly magnetic material to a minimum; about 1%, in order not to take up valuable space where feebly magnetic material can be captured. Highly magnetic material is captured before feebly magnetics. In cases where highly magnetic material exceeds 1%, a pre-scalping operation with low intensity separators is recommended.

## Other Design Features

**Matrix.** Standard Master Magnets matrix assembly is constructed from triangular section wedge wire bars made from magnetic stainless steel. They are arranged at an incline or horizontally with regular spacing between bars. The matrix arrangement can be sectionalised for easy removal, either for cleaning or replacement.

Master Magnets offer machines with other matrix materials, grooved plates, steel balls, etc. These machines are specially designed depending on laboratory tests.

**Magnet Coils.** Are totally sealed to prevent ingress of moisture.

**Feed Boxes.** Feed distribution boxes are constructed from stainless steel or high quality composite material, incorporating trash screens to prevent inadvertent ingress of oversize material.

**Collection troughs.** Are constructed from high quality composite material, and are adjustable to obtain correct split of separated products.

**Pipes.** Stainless steel feed and wash pipes are easily repositioned.

**Carousel Rotational Speed.** Separator is provided with a variable speed geared motor permitting very fine adjustment to obtain the maximum benefit.

**Surfaces.** Non corrosive and wear resistant surfaces where material comes into contact. Rigid construction.

**Control Panel.** All Master Magnets mineral separators are supplied complete with control panel using up to date circuitry.

## TESLA

FEED ZONE	1	1.2
	2	
WASH ZONE	3	0.55
	4	0.09
SCOUR ZONE	5	0.015
	6	0.001

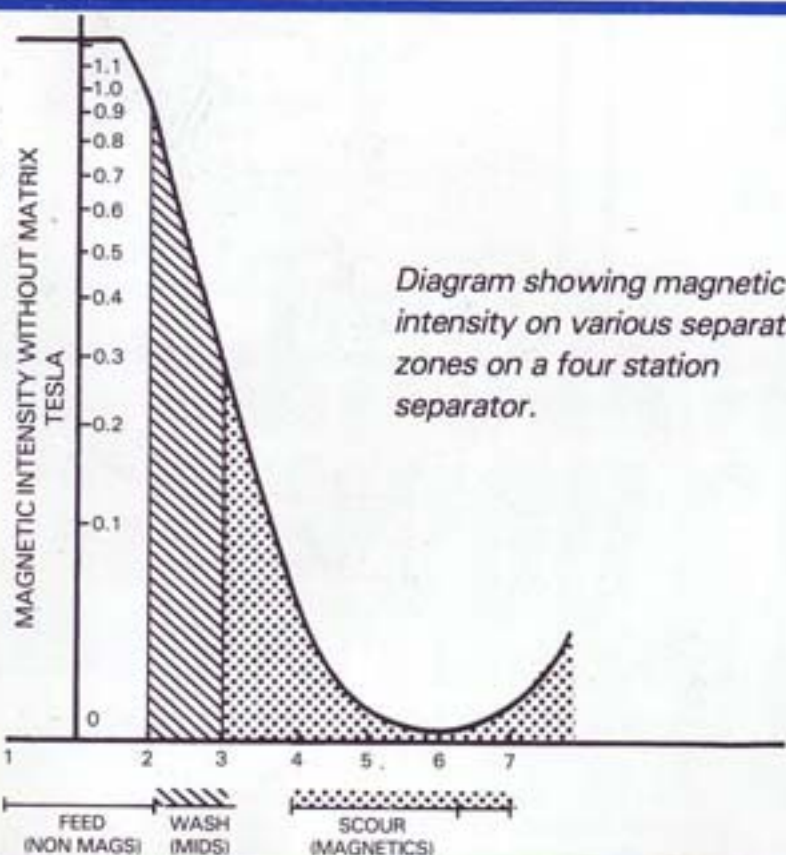
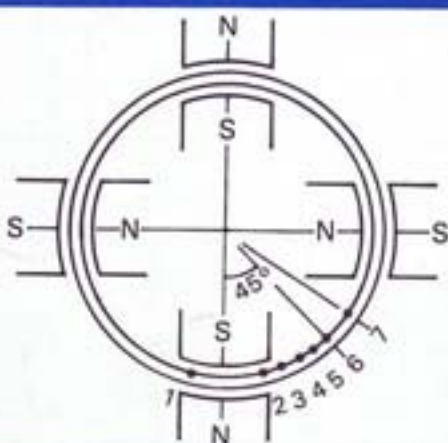
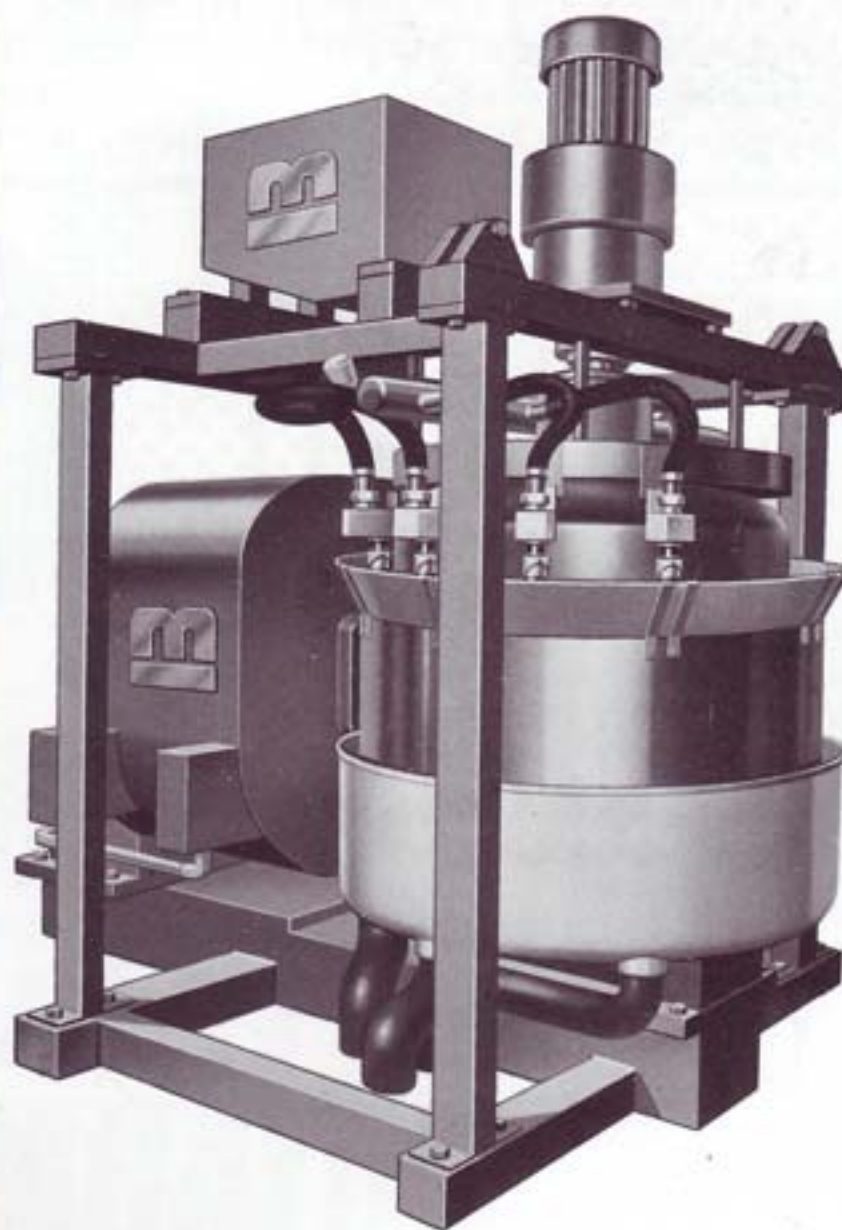


Diagram showing magnetic intensity on various separation zones on a four station separator.



A single station separator.

### What tonnage can be treated?

Master Magnets build a range of separators with one, two, four or eight separating zones, which are capable of treating from 5 to 160 tonnes of material per hour depending on the magnetic intensity required to treat a particular material. Consult Master Magnets engineers for the right choice.

### What particle size can be treated?

With the right choice of matrix and magnetic intensity it is possible to treat material from approximately 3mm down to a few microns. Master Magnets will advise after examining a sample.

### How much water is needed?

This is dependent on the magnetic intensity and the tonnage to be treated. Water requirements for Master Magnets separators are much lower than many other separators of the same type. Master Magnets will advise.

### Physical size of separator

Request Master Magnets to provide you with dimensional drawings. In addition to the larger industrial size separator Master Magnets offer both a pilot and a laboratory type carousel separator, incorporating all the desirable features and capable of treating from a few kilograms to one tonne an hour, either on a continuous or intermittent basis.

A laboratory high intensity wet test magnet is also available with various matrix options to conduct preliminary trials. Machine is capable of treating up to 500 grammes of material on a batch basis.

### Sample testing service

Take advantage of our sample testing service. Our engineers will make the right choice and offer performance figures. Our fully equipped laboratory provides a comprehensive test service, not only in wet separation but in other aspects of magnetic and electrostatic separation.

Request our Form No. ST.1 for sample testing service.

### Mineral Division

Our Mineral Division is under the control of Mr. Ivan S. Ratnam who has over a quarter of a century of experience in this field. He is known world wide as a specialist in mineral separation and in the use of electrostatic separators. He has specialist experience in high intensity wet separation, and his work on special matrix arrangements forms the basis of the highly improved performance of our separators, which can be supplied as single, double, 4-station and 8-station units. The 8-station separator has a capacity of up to 160 tons per hour.

We also work in close co-operation with the minerals engineering division of Birmingham University, whose assistance and facilities are invaluable when treating certain substances. When required, the results of tests can be assayed which provides the complete service.



Cliff Walker Geoff Worley Ivan Ratnam Steve Ralley

*A typical meeting to discuss a particular application using the long experience of some of Master Magnets senior personnel.*

## The Complete Range of Mineral Separation Equipment

Mastermag engineers have a fund of knowledge and experience across the whole range of industrial magnetic applications, particularly relating to mineral separation. Below are three products from our range.

*Electro magnetic high gradient and high intensity unit specifically designed to separate fine weakly magnetic particles from a slurry.*

*High Intensity Induced Double Roll Separator type B.*

*Typical Mastermag Wet Drum Separator for reclaiming magnetics from a slurry.*

*Other products include overband separators, suspension magnets, magnetic drums and pulleys, lifting magnets and magnetic conveyors.*

### MASTER MAGNETS LTD

Incorporating Integrated Recycling Systems Ltd

Burnt Meadow Road, North Moons Moat,  
Redditch, Worcestershire B98 9PA

Tel: +44 (0)1527 65858 Fax: +44 (0)1527 65868

Email: [info@mastermagnets.co.uk](mailto:info@mastermagnets.co.uk)

Website: [www.mastermagnets.co.uk](http://www.mastermagnets.co.uk)



MASTERY IN MAGNETS

**Master  
Magnets  
Limited**

*As improvements are introduced we reserve the right to supply products which differ slightly from those described.*