



WEAR

Minerals

ENDURON®
Vibrating screens

Enduron® dewatering and sizing screens showcase a combination of innovative and proven screen technology

Weir Minerals has been a global leader in the design, manufacture, installation and servicing of equipment and solutions for the mining, sand and aggregates industries for almost a century.

Enduron® vibrating screens are quality machines providing exceptional screen process performance for our customers in a wide range of applications. Enduron® linear motion horizontal screens offer a screening solution with a low headroom requirement and less pegging of screen media when compared with circular or elliptical motion screens. Using linear motion screens results in a lower installed cost, as well as the ability to better control the travel rate across the screen, resulting in improved screen efficiency.

Custom design

The Enduron® screen range can be tailored to suit the unique needs of your specific application. Our expertise is spread across a wide variety of industries ranging from sand washing, classification, minerals and coal processing plants, to

tailings dewatering applications. With thousands of satisfied customers around the globe, our engineers at Weir Minerals and support teams are confident that they can create a custom solution to ensure all your project's objectives are met.

Integral part of our process equipment range

Enduron® dewatering, horizontal and multislope screens form an integral part of process plants operating across many industries around the globe.

Global support

Weir Minerals has a wide network of global professionals able to assist at every stage. Whether it is at the initial design stage, during commissioning, or after installation, you can be confident that a Weir Minerals expert is able to assist. We are also able to provide on-site and off-site maintenance training. We stock replacement parts in our numerous locations around the globe, and have field service crews readily available to help.

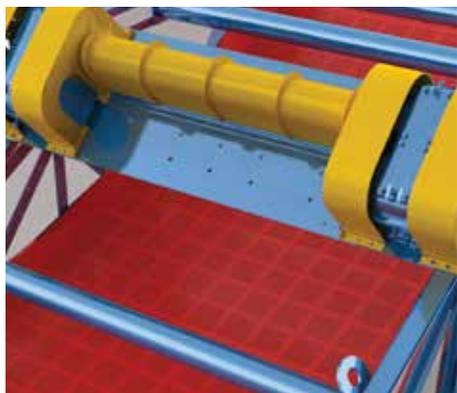
With screens ranging from light duty sizing and dewatering through to heavy duty multislope screens, Enduron® vibrating screens can accommodate most minerals processing applications

Enduron® linear motion vibrating screens offer extremely robust design and construction. With the benefits of high efficiency, high capacity, low headroom and reduced operating and maintenance costs, these screens are ideally suited for heavy duty applications in the sand and minerals processing industries.

Features

Experience indicates that a G-force range of 3 - 7 is required to achieve good stratification, which is important for classification and dewatering. Enduron® screens typically operate at a g-force range of 4.5 - 5 thanks to our range of high G-force exciters and vibrating motors.

A unique feature of the Enduron® vibrating screen is the method of corrosion protection. Epoxy resin is applied to the mating faces before fastening to prevent ingress of liquid and solid materials during operation, and to mitigate the risk of stress corrosion cracking. Side plates are lined with Linatex® premium rubber for abrasion and corrosion protection.



Typical screen applications

- Classification (sizing): material is separated based on size
- Dewatering: removal of process water from the ore
- Heavy media recovery (drain and rinse): Medium recovery for reuse in the process (e.g. ferro silicon or magnetite)
- Scalping: removing coarse material during primary and secondary crushing
- Trash removal: screening of grit, wood and oversize material
- Grading: preparing of products with size ranges.
- Desliming: removal of -500 µm material

Application guide overview

Application	Dewatering screens	Multislope screens	Horizontal screens
Dewatering of mineral concentrates	•		
Tailings dewatering	•		
Sand dewatering	•		
Coal fines recovery	•		
Replacement of rake classifiers and sand screw equipment	•		
Primary sizing		•	•
Secondary sizing		•	•
Stockpile sizing		•	•
Mill discharge		•	•
Soda ash processing		•	
Potash processing		•	
Uranium processing		•	
Feed preparation			•
Drain and rinse	•		•
De-sliming	•		•
Pre-wetting			•
Trash removal			•
Salt crystal processing			•

Enduron® screen range

At Weir Minerals, we offer a wide range of vibrating screens. These screens meet the needs of modern high capacity production plants in terms of plant availability, space and energy savings.

Enduron® dewatering screens

These screens incorporate a sloping back deck section, fitted with slotted aperture panels. Slurry is fed uniformly along the top of this back section, which acts as a vibrating drainage panel. The main deck slopes upward at 3°- 5° and is fitted with slotted apertures.

Enduron® single and double deck multislope screens

The development of the multislope screen concept is a major innovation in screening technology, essentially because of its exceptionally high throughput per unit screening area. Multislope screens are a high capacity, high velocity machines with low bed depth resulting in greater efficiencies and throughput by allowing quicker stratification of the material bed.

Enduron® single and double deck horizontal screens

Ranging from 0.3m (1') to over 4m (13' 1/8") wide, and up to 10m (32' 7/8") in length, these single or double deck screens are popular in a variety of applications, including coal sizing and DMS drain and rinse applications. Excitation is via twin out-of-balance exciters, and screens may be fitted with modular rubber/polyurethane or woven/wedge wire media.

Exciters

Vibrating motion for a screen is provided by means of out-of-balance motors or geared exciters. Enduron® vibrating screens use high g-force geared exciters for machines 2.4m (7' 7/8") and wider to provide the vibrating motion required.

The major part of the exciter drive is the housing, which is a cast metal enclosure that serves as an oil bath. Gears mounted on bearings, reside in the oil bath. The gears are driven via an electric motor attached to a through shaft.

Eccentric weights, which provide the vibratory motion, are mounted onto both ends of the shaft and the excitation force can be varied by means of lead weights.

Screen technology resides in the design of the exciter and Enduron® screens are fitted with exciters specifically designed to provide the g-forces necessary to enable proper material stratification and screening.

Enduron® vibrating screen exciters are designed to enable our screens to cope with the high capacity demands of modern plants. Our exciter range is constantly under review with the latest manufacturing technology being considered to produce efficient and cost effective designs. We custom-make our exciters to exact specifications under strict tolerance and quality guidelines.



Screen motion, provided by linear exciters



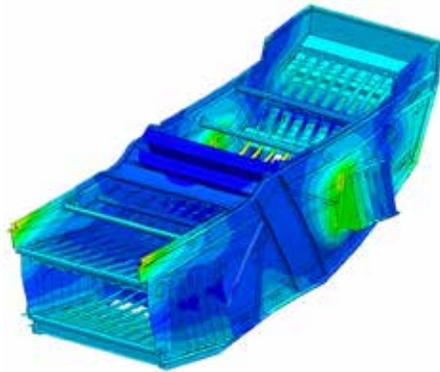
Enduron® horizontal 'low profile' screen

Advanced computer aided design - an integral part of Enduron® vibrating screen development

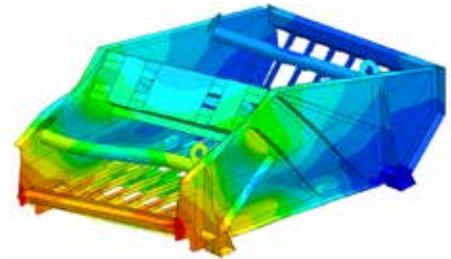
Finite Element Analysis

While screen design has evolved and improved from many years of operational experience and industry know-how, at Weir Minerals we have taken these improvements a step further. In 1992 we introduced the Finite Element Analysis (FEA) method of design to our development methodology.

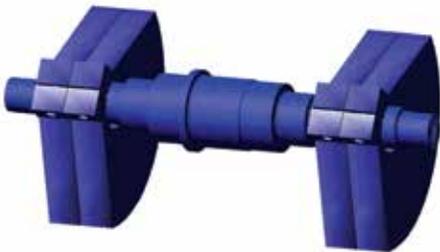
Our FEA capabilities have assisted in optimising the mass and strength of the screens, assisting in providing lower cost solutions in terms of capital, as well as operational costs.



Enduron® horizontal screen FEA output example



Enduron® VD screen FEA output example



Computer simulated exciter counter mass



Enduron® vibrating screen sub-frame

Sub-frames

Sub-frames (isolation frames) are used to reduce the vibrating force transmitted to the support structure. Enduron® vibrating screen sub-frames are able to reduce the vibration force transmitted by approximately 75-80 percent.

Under certain circumstances, it is possible to engineer the sub-frame to reduce the transmitted force by as much as 95 per cent. Sub-frames are highly recommended for larger screens, namely those 2.4m (8") and wider, or 6m (19' 11/16") and longer in length.

Enduron® multislope screen



Enduron® multislope screens

The Enduron® multislope screen is capable of achieving exceptional throughput per screening area. The screen is a high capacity, low bed depth, high velocity machine and may include any number of deck slopes from two to as many as seven, varying from 45° through to horizontal on the last slope.

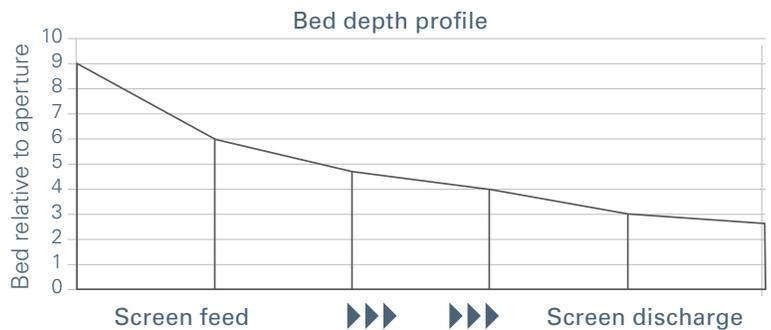
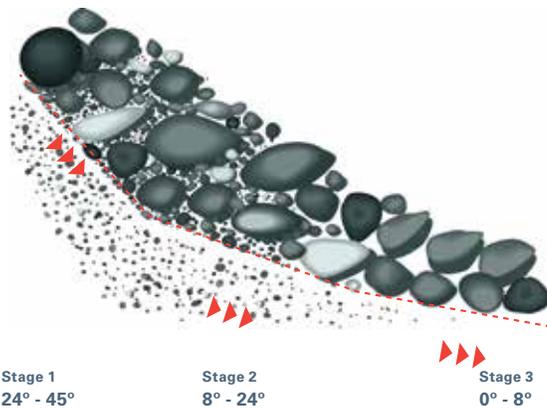
The various slopes may also incorporate deck media with different apertures to meet the particular process requirements. The screens are commonly designed to fit modular polyurethane deck panels. However, woven wire or punched plates may also be used, depending on requirements.

Enduron® multislope screens are also available in a double deck arrangement which reduces the number of equivalent horizontal single deck units installed. Enduron® multislope screens vary in size from as small as 1.8m (6") wide to over 4.3m (14") wide and are able to handle screen feeds with a higher proportion of fine materials than other screen designs.

Benefits

- Excellent sizing efficiency due to rapid stratification of material.
- High specific capacity per unit area resulting in reduced screen (unit) size.

Principle of multislope screening



Stage 1: High velocity

The feed section (highly inclined) of a multislope screen causes high velocity material flow which serves to quickly remove fine material.

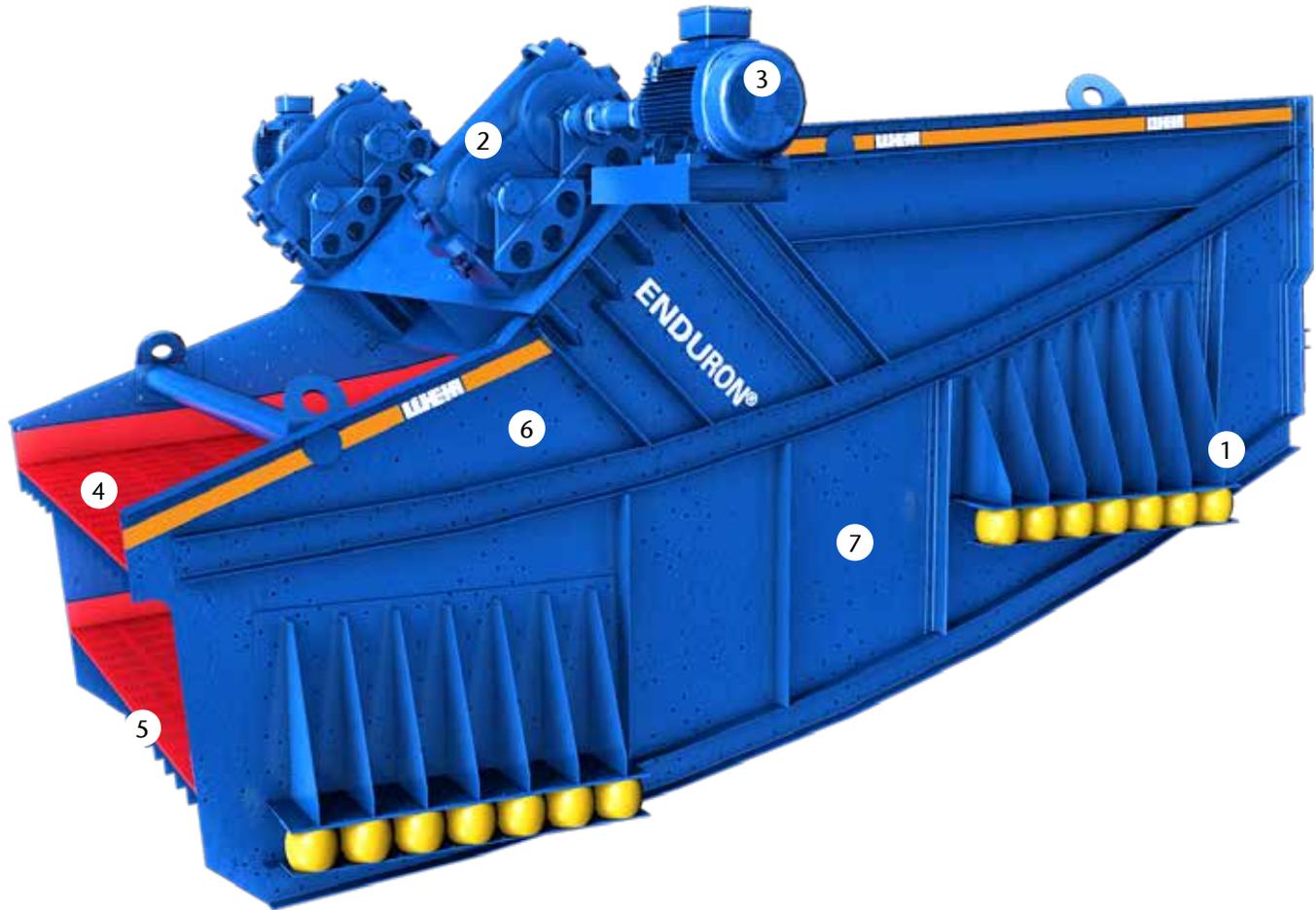
Stage 2: Medium velocity

Midway along a multislope screen, the resultant thinner bed stratifies quickly. The remaining fine material (below the cut point) is screened out more effectively than would be possible on a slower, thicker bed.

Stage 3: Low velocity discharge

The lower screen slope (see diagram) slows the material down. More efficient screening of near size material occurs here.

The advantage is quicker stratification due to the high velocity that the multislope screen shape imparts.



1. Suspension

Suspension is either by means of steel coil springs or moulded rubber buffers. Buffers have higher dynamic loads but are more suited to wet applications. The number and types of buffers or springs is determined by the mass of the screen.

2. Vibrating mechanism

Screens are vibrated in linear motion using geared exciters with contra-rotating out-of-balance masses. Different sizes of exciter units or multiples thereof are used for the various models of screens depending on the screen mass. The advantage of the geared exciter is the continuous splash oil lubrication, which ensures long life. Exciters are driven externally using cardan shafts via v-belt and pulleys, for optimal performance. Line of action varies from 40° through to 65°, the most common being 45° or 50°.

3. Drive

Drive transmission is through cardan shaft, pulleys and v-belts allowing simple adjustment of screen operating frequency.

4. Screen deck

Most often the deck support structure is designed for the use of easily removable modular polyurethane or Linatex® rubber screen media. Other types of screen media may be used, including woven wire and punched plate.

5. Deck support stringers and beams

The use of stringers and beams as a deck support system not only gives longer life due to comprehensive rubber protection but also allows for the renewal of only those members that require replacement.

6. Surface protection

High quality preparation and corrosion protection systems result in improved screen life.

7. Construction

The screen frame features bolted construction by means of high tensile or threaded fasteners. Minimal welding is used, but only in low stress areas. All joints incorporate an epoxy adhesive between the mating faces to eliminate the ingress of moisture thus preventing deterioration of the joint through corrosion. The epoxy also assists in strengthening the joint.

Enduron® VD dewatering screen

Enduron® dewatering screens

Enduron® dewatering screens (previously branded as Linatex® screens) have been operating successfully in a wide range of industries worldwide for more than 40 years.

Design features

Vibration on Enduron® dewatering screens is produced by vibrating motors which can be run at different speeds depending on the application. Alternatively, geared exciters with an external drive motor can be fitted to the larger screens. Easy adjustment of the amplitude of vibration, deck inclination, as well as the discharge weir plate is a feature incorporated to suit the process requirements.

A high solids recovery is achieved when the screen underflow is kept in closed circuit with a hydrocyclone and the only solid losses occurring would be the very fine material exiting in the cyclone overflow.



Quality control through ISO 9001:2010 certifications.

Linatex® FusionCast™ polyurethanes

Weir Minerals is pleased to announce the development of a range of new high performance polyurethane screen media materials. Linatex® FusionCast™ polyurethane is a revolutionary material designed to maximise service life through superior abrasion resistance. Field trials conducted have confirmed wear life advantages of 50% or more when compared to injection moulded PU. Additionally, FusionCast™ polyurethane screens can be supplied in a wide range of openings for separations as coarse as 25 millimetre.

Enduron® VD dewatering screen

The Enduron® VD dewatering screen range represents an innovation in dewatering screening equipment and has been designed to ensure that maximum efficiency and lowest cost of ownership is achieved. Using the latest screen design technology and Finite Element Analysis, the range has been engineered to meet the most rigorous demands of the mining and minerals processing industries.

The Enduron® VD dewatering screen range has an innovative 45° feed section. This feed profile increases the screening area and the dewatering capacities, using high feed end velocities to aid in the dewatering process. The main deck of the screen slopes upwards to maximise solids retention and dewater the cake bed.

The Enduron® VD dewatering screen is a light weight dewatering screen. Well suited for applications in the sand and aggregates, and mining and minerals processing industries, the screen's lower capital and operating cost is a result of its light weight design.

Applications

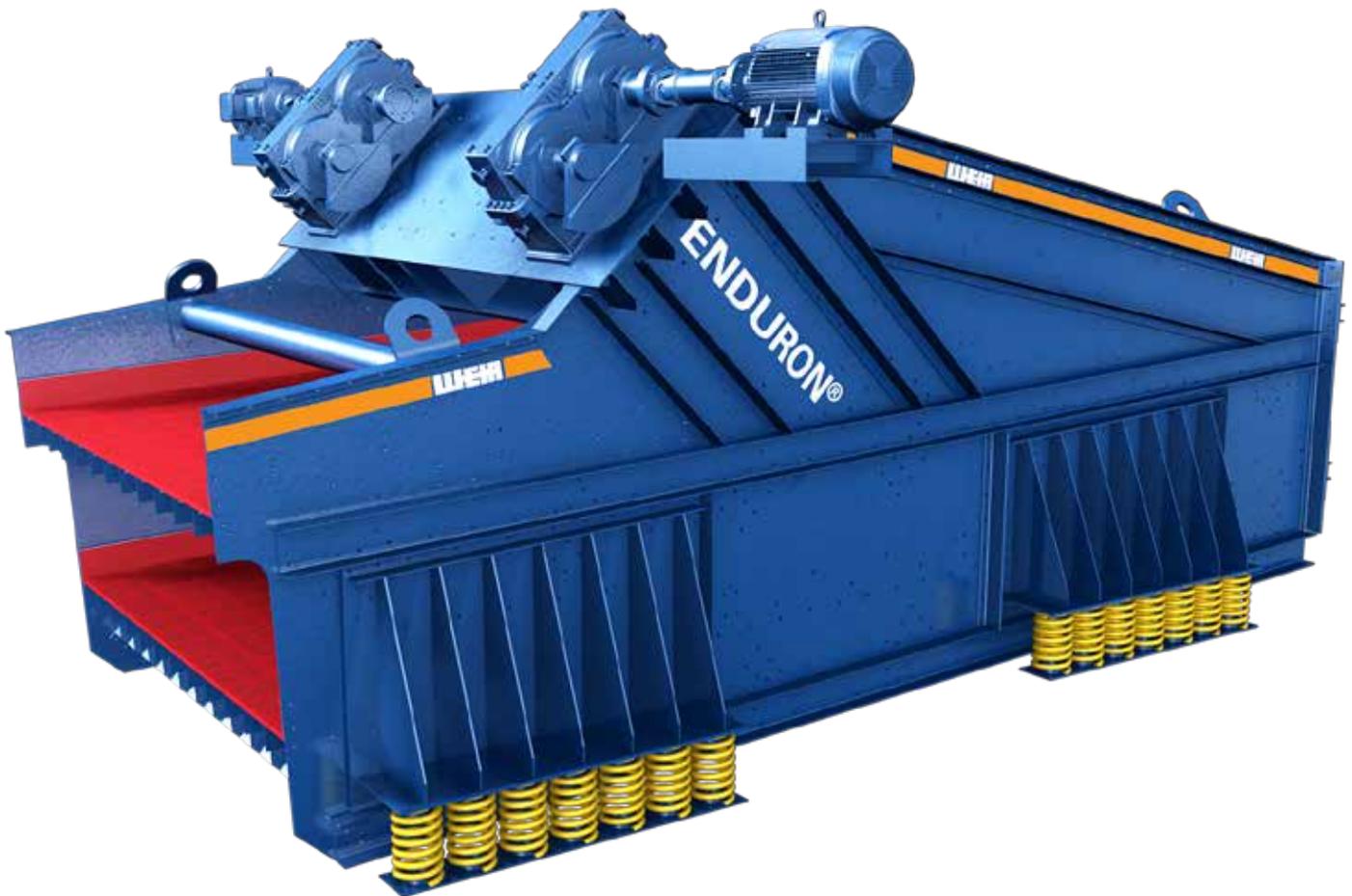
While primarily applied to dewatering with retained fines, the Enduron® VD dewatering screen range is capable of being used in a wide range of other applications including:

- Replacement of rake classifiers, rotary sand dewatering and sand screw equipment in dewatering applications
- Removal of tramp material - for example wood chips from gold ore pulp (CIP)
- Removal of oversize from pulp of beach sand cutting at 1mm
- Dewatering activated carbon in CIP circuits
- Dewatering of sand and aggregate
- Tailings dewatering
- Removal of fines from activated carbon (CIP)
- Dewatering - 0.5mm fine coal



1. The fabricated main exciter bridge, the vital component in the transmission of the vibration from the vibrator motor to screen, is stress relieved. The surfaces mating with the screen side plates and the motors are machined to exacting tolerances to provide a precise fit for long trouble free life.
2. Epoxy adhesive is used between all mating surfaces of the screen frame, eliminating corrosion and uniformly distributing stresses in these areas.
3. The side plates of the machine are fitted with easily replaceable (bolt in) Linatex® premium rubber wear liners, affording protection to the structure of the machine and ensuring long service life.
4. The screen can be fitted with snap-in modular screen deck panels providing long life, easy handling and maintenance with the ability to replace small areas of localised wear.
5. Moulded rubber buffers are used on all four support points to isolate live frame vibrating loads. These provide longer life and less maintenance than coil springs in wet applications.
6. Standard surface protection is provided to ensure a high degree of corrosion resistance. This comprises abrasive blasting followed by two coats of vinyl etch primer and two coats of finishing epoxy polyamide paint.
7. The steel screen frame is predominantly of bolted construction, avoiding the stresses created by welding.
8. Both the linear motion low noise vibrating motors and the robust geared exciter have been designed specifically to ensure long life with minimum maintenance requirements.

Enduron® horizontal screen



Horizontal screens

Having been manufactured since the 1970's, Enduron® horizontal screens have proven extremely successful in highly demanding and competitive mining industries throughout the world.

The large screen concept has met the needs of modern high capacity production plants by reducing the number of machines installed or production modules required. The introduction of our screens has led to improved plant availability, space savings, energy savings and greatly improved materials handling.

Benefits:

- Low maintenance.
- Proven reliability.
- Robust construction for improved product life.
- Elimination of stress concentrations as a result of the use of Finite Element Analysis (FEA).

Enduron® horizontal single deck - specifications

Width (m)	Length (m)	Length (m)	Length (m)	Motor driven	Exciter driven
0.6	1.2	1.8	x	✓	x
0.9	1.8	2.4	3.0	✓	x
1.2	2.4	3.7	4.8	✓	x
1.5	3.0	3.6	4.8	x	x
1.8	3.6	4.8	5.4	x	✓
2.1	4.9	5.4	x	x	✓
2.4	4.8	5.4	x	x	✓
2.7	6.4	x	x	x	✓
3.1	6.4	7.0	x	x	✓
3.7	7.3	x	9.7	x	✓
4.3	8.5	x	x	x	✓

Enduron® horizontal double deck - specifications

Width (m)	Length (m)	Length (m)	Motor driven	Exciter driven
1.2	4.8	x	x	✓
1.5	3.6	x	x	✓
1.8	4.8	x	x	✓
2.4	4.8	6.7	x	✓
3.0	6.7	x	x	✓
3.7	7.3	8.5	x	✓
4.3	7.3	8.5	x	✓

Enduron® dewatering - specifications

Type	Width (m)	Length (m)	Length (m)	Motor driven	Exciter driven
VD6	0.6	2.1	x	✓	x
VD9	0.9	2.4	x	✓	x
VD12	1.2	3.0	3.6	✓	x
VD15	1.5	3.9	x	✓	x
VD18	1.8	3.6	x	✓	x
VD21	2.1	4.8	x	✓	✓
VD24	2.4	3.9	4.8	x	✓
VD30	3.0	x	6.7	x	✓

Enduron® multislope single deck - specifications

Width (m)	Length (m)	Length (m)	Length (m)	Motor driven	Exciter driven
2.1	5.8	x	x	x	✓
2.4	6.7	7.3	x	x	✓
2.7	6.7	7.3	8.2	x	✓
3.1	8.5	8.8	9.8	x	✓
3.7	7.3	8.2	9.8	x	✓
4.3	6.1	7.3	8.5	x	✓

Enduron® multislope double deck - specifications

Width (m)	Length (m)	Length (m)	Length (m)	Length (m)	Motor driven	Exciter driven
2.1	5.7	x	x	x	x	✓
2.4	6.7	7.3	x	x	x	✓
2.7	6.7	7.3	x	x	x	✓
3.1	6.7	7.3	8.5	9.8	x	✓
3.7	6.1	7.3	8.8	9.8	x	✓
4.3	x	7.3	8.5	9.7	x	✓



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