International Combustion (India) Limited

OMNI VERTICAL SHAFT IMPACTOR - VSI

Excellence in production of manufactured sand



Description

The Omni Vertical Shaft Impactors (VSI) are designed for **crushing and shaping** of diversified materials such as: quarry material, minerals, and industrial products, to produce high quality products of high value. The cubical product is obtained by the impact technology called **"Rock on Rock"**, with possibility of change of quantity of fines by variation of rotor speed, this is possible by changing the diameter of pulleys or more practical by introducing of variable speed invertors on the motor drives.

Principles of Operation

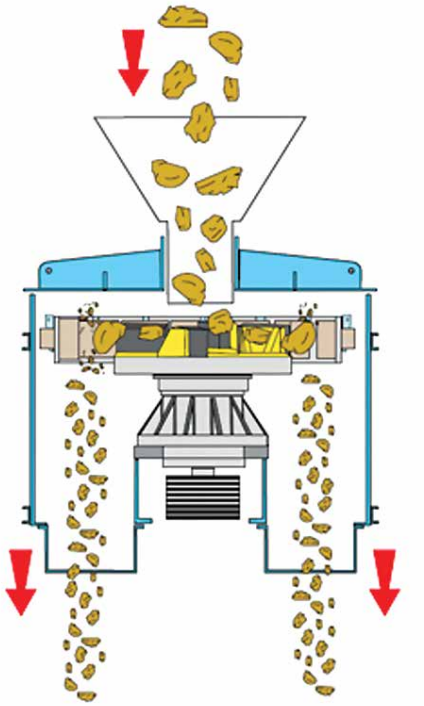
Feed material drops through the feed tube onto the impeller table or enclosed rotor, which throws the material against stationary anvils made up of composite alloys, due to centrifugal force.

When the rock impacts the anvils at a 90° angle, it shatters along natural stress lines, creating a uniform, cubical product. This method of crushing is simple and economical to operate.

OMNI CS
OMNI CRUSHING & SCREENING LTDA.

VSI Benefits

- Ideal for M & P sand production
- High throughput capacity
- Optimal energy cost
- Cubical shaped product
- Reduces “flaky” or slivered material in product
- Meets coarse & fine grades as per IS 383 : 2016
- High product yield, low wastage
- Consistently produces all gradations as per standard
- Simple & fast maintenance
- Low wear cost per ton



The Technology Behind VSI Crushing

In order to provide the most energy efficient crusher and shaper on the market, ICIL considers the complexity of three dimensional collision forces on the material:

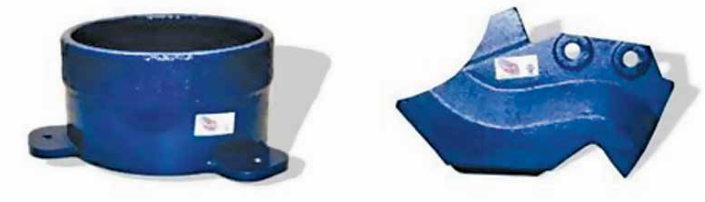
1. Free fall of material with variable mass and geometrical configuration.
2. Conversion of energy and momentum.
3. Internal and external ballistic properties including the projectile’s initial velocity and impact force over time.
4. Conversion of electrical energy to kinetic energy by means of centrifugal force.
5. Friction of the material under centrifugal action during transfer of material within crushing chamber.

The five major physical components of the VSI are employed into a three dimensional real time mathematical model representing functional logic relationships. A mathematical model is then utilized to observe the collision process and forces to reveal solutions for a better final product, higher energy efficiency and a lower wear cost.

- Material bed in the intake chute.
- Air transfer area.
- Material bed in the crushing chamber.
- Chamber discharge area.
- Material bed on spider arms and hub.
- Machine discharge area.



The reduction is obtained by transfer of kinetic energy which occurs in the rotor where the crushed material shall be accelerated. The material leaves the rotor through lateral ports. It leaves the rotor with high speed and impacts the side surface of crusher wall, suffering impact reduction, while being hit by more high-speed material coming from the rotor. In other words, the material is reduced by impact on the side walls of the crusher and impact with other particles coming from the rotor. The described crushing action is a turbulence of interacting particles with various types of reduction actions such as milling, impact and shear. After the described crushing action, the crushed material falls by gravity through the inferior discharge opening.



Advantages of OMNI VSI

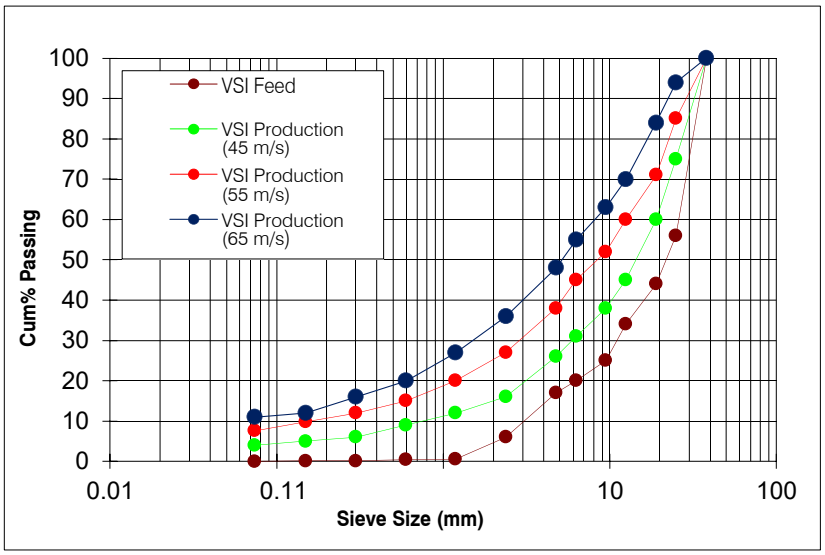
- The product is almost 100% cubical. This guarantees reduction of cement content in the concrete made with VSI product. The same reduction occurs with asphalt consumption in asphalt concrete.
- Can vary product distribution by changing of rotor speed and rotor type.
- **Can manufacture excellent crushed sand. Produces bigger quantity of fines in crushing plant. Has high ratio of reduction.**
- Hydraulic opening of top cover permits easy access and quick exchange of any wear part. Parts disassembly is top serviced.
- Range of sizes is fit for any application.
- Proven product with several hundreds of installation all over the world.
- **Rotors of 4 and 5 port design,** up to 40% more efficient in comparison to the traditional 3 port rotors. Extra heavy construction is adequate to suit even most difficult crushing application.
- Totally balanced, permits the installation on light structures with no need of sophisticated foundations.
- Mounted on rubber snubbers and isolated from the drive motors, guarantees a long life for the motors.
- Vibration protection switch provides for safety against accidental tip breakage or other event that creates vibration, may damage the cartridge bearings.
- With recommended fed, it does not generate atmospheric dust.
- Assembly of tungsten tips and central distribution plate are of “drop in” type easy and quick to replace.



Technical Specification

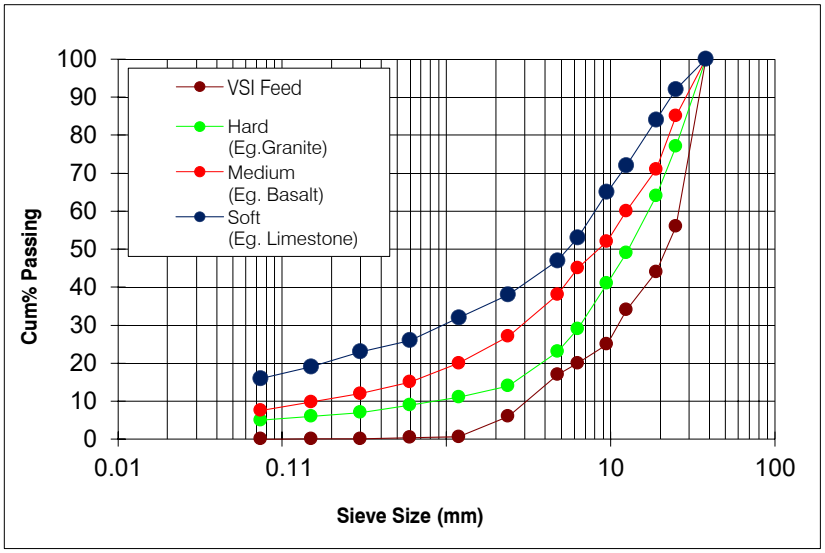
Model	Weight (kg)	Drive Power	Rotor Model	Maximum Feed Size	Capacity (TPH)
OMNI VSI 200	7,000	1 X 150 kW	25" (635 mm) - 4 Ports	32 mm	130-180
OMNI VSI 250	8,000	1 X 187.5 kW	25" (635 mm) - 4 Ports	32 mm	140-190
OMNI VSI 300	14,000	1 X 225 kW 2 X 112.5 kW	32" (800 mm) - 4 Ports	45 mm	150-200
OMNI VSI 350	15,000	1 X 250 kW	32" (800 mm) - 4 Ports	45 mm	180-230
OMNI VSI 400	16,500	1 X 300 kW 2 X 150 kW	32" (800 mm) - 4 Ports	50 mm	215-265
OMNI VSI 500	20,500	1 X 375 kW 2 X 187.5 kW	37" (940 mm) - 5 Ports	50 mm	280-320
OMNI VSI 600	22,500	2 X 200 kW	37" (940 mm) - 5 Ports	50 mm	340-390
OMNI VSI 800	27,500	2 X 300 kW	37" (940 mm) - 5 Ports	50 mm	455-505

- Capacity table in ton/h measured as machine feed, in closed circuit. The capacities shown in this table are to rock appropriately sized feed and bulk density of 1.6 ton/m^3 and values are approximate and can change in accordance with composition of the feed material.



Sieve (Inch)	Size (mm)	Cumulative % Passing			
		VSI Feed	"VSI Production (45 m/s)"	"VSI Production (55 m/s)"	"VSI Production (65 m/s)"
2"	51				
1 1/2"	38	100.0	100.0	100.0	100.0
1"	25	56.0	75.0	85.0	94.0
3/4"	19	44.0	60.0	71.0	84.0
1/2"	12.5	34.0	45.0	60.0	70.0
3/8"	9.5	25.0	38.0	52.0	63.0
1/4"	6.3	20.0	31.0	45.0	55.0
4#	4.76	17.0	26.0	38.0	48.0
8#	2.38	6.0	16.0	27.0	36.0
16#	1.19	0.6	12.0	20.0	27.0
30#	0.6	0.4	9.0	15.0	20.0
50#	0.3	0.1	6.0	12.0	16.0
100#	0.15	0.1	5.0	9.8	12.0
200#	0.074	0.0	4.0	7.6	11.0

Theoretical product curves for same feed with different peripheral rotor speed.



Sieve (Inch)	Size (mm)	Cumulative % Passing			
		VSI Feed	"Hard (Eg. Granite)"	"Medium (Eg. Basalt)"	"Soft (Eg. Limestone)"
2"	51				
1 1/2"	38	100.0	100.0	100.0	100.0
1"	25	56.0	77.0	85.0	92.0
3/4"	19	44.0	64.0	71.0	84.0
1/2"	12.5	34.0	49.0	60.0	72.0
3/8"	9.5	25.0	41.0	52.0	65.0
1/4"	6.3	20.0	29.0	45.0	53.0
4#	4.76	17.0	23.0	38.0	47.0
8#	2.38	6.0	14.0	27.0	38.0
16#	1.19	0.6	11.0	20.0	32.0
30#	0.6	0.4	9.0	15.0	26.0
50#	0.3	0.1	7.0	12.0	23.0
100#	0.15	0.1	6.0	9.8	19.0
200#	0.074	0.0	5.0	7.6	16.0

Theoretical product curves for different rocks with same feed & same peripheral rotor speed (55 m/s).

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