



PROGRESS - INTEGRITY

TURBO™

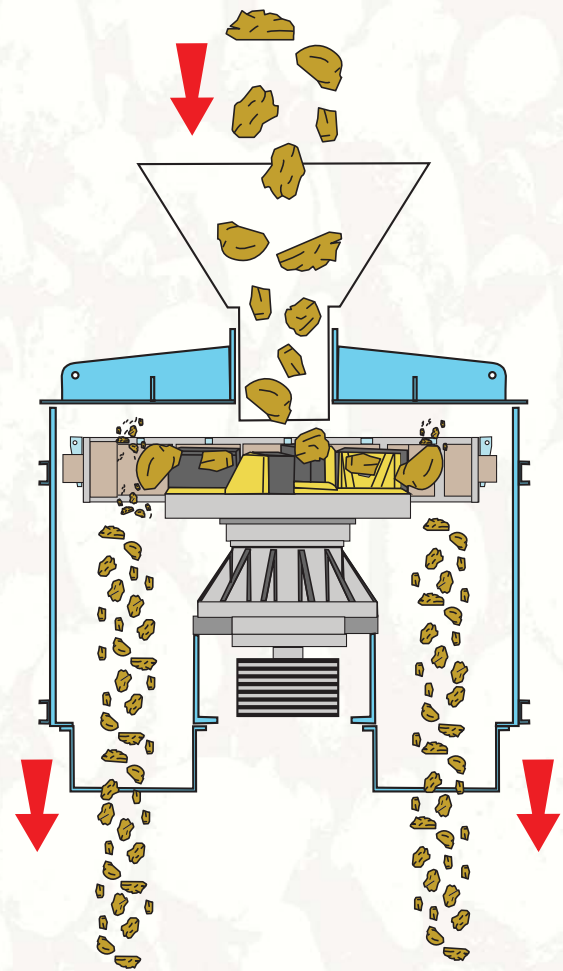
**VERTICAL SHAFT IMPACT
CRUSHERS**

Principles of Operation

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

VSI Benefits

- High throughput capacity;
- Energy Costs;
- Cubical shaped product;
- Reduces "slabby" or slivered material in product;
- Meets constantly changing state DOT specifications;
- Consistently produces product in a tight gradation range;
- High Product Yield;
- Produces intermediates and fines;
- Simple maintenance;
- Low wear cost per ton;



The Science Behind VSI Crushing

The Science in Vertical Shaft Impact (VSI) crushing is based on the fundamental principle of conservation of energy, which requires that the total mechanical energy of a system remains unchanged if it is subjected only to forces which depend on position or configuration.

In order to provide the most energy efficient crusher on the market, CEMCO considers the complexity of three dimensional collision forces and investigates the projectile of the material by taking into account five major physical components:

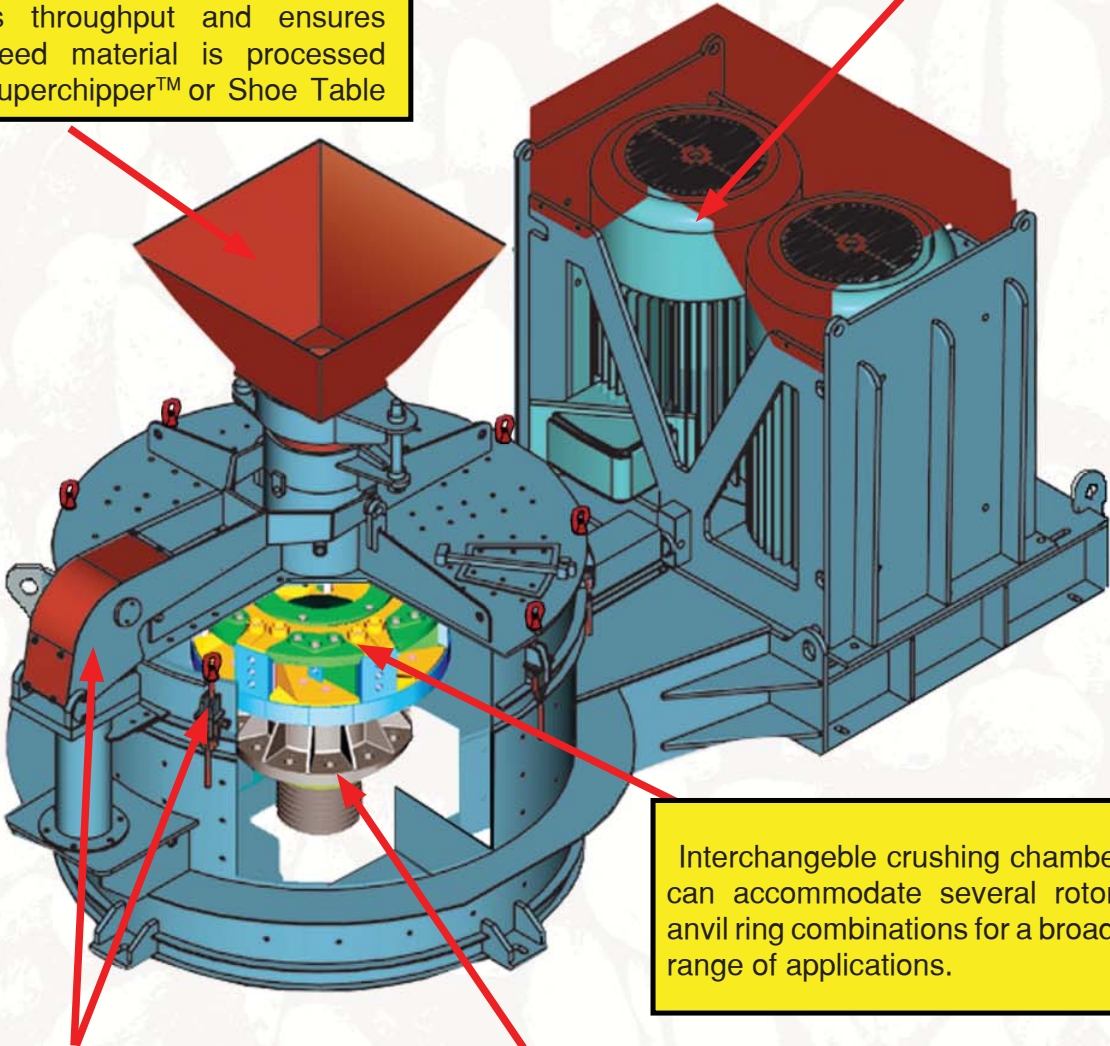
1. Free fall of a body with variable mass and geometrical configuration;
2. Conversion of energy and momentum;
3. Internal and external ballistic properties including the projectile's initial velocity and impact force over time.
4. Conversion of the physical properties of solid bodies into a fluid model and replacing the classical Newton's physics with Bernoulli's dynamic-kinematics of fluids.
5. Friction

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. By using advanced next generation computer applications, CEMCO is able to convert the mathematical model into CAD programs such as Solidworks and Matlab

CEMCO Turbo™ VSI Crusher Standard Features

Wear Resistant adjustable feed tube maximizes throughput and ensures that all feed material is processed through Superchipper™ or Shoe Table

V-Twin™ motor design eliminates cyclic vibration and correctly loads pedestal bearings for more power and longer pedestal life.



Interchangeable crushing chambers can accommodate several rotor / anvil ring combinations for a broader range of applications.

Hydraulic lid lifter and camlock system provide quick internal access making routine inspection and maintenance easy, reducing downtime

CEMCO's upper and lower double row spherical bearing pedestal system has the longest operational life of any VSI crusher. It is lubricated with a customizable filtered oil system.

Customize Your Crusher

CEMCO has been designing and manufacturing crushing solutions since 1962. Our company has hundreds of crusher installations in 21 countries around the world. We understand that not all crushing applications are the same. Therefore, we offer a large variety of options to customize each crusher to produce the customer's specific product gradation. CEMCO Turbo™ VSI crushers are proven in extreme environmental conditions and can be equipped to process wet, dry or sticky material in extreme heat or cold. CEMCO offers self contained diesel powered portable units for remote installations or dust control systems for not so remote locations.

Optional Packages

- Trailer or Skid Mounted Units
- Custom Stands
- Custom Conveyors
- Dust Control Systems
- Internal Wet Kits for Sticky Material
- Oil Coolers and Oil Heaters
- Variable Frequency Drives
- Generators and Diesel Motors
- Automation Software



TURBO™ 80 Portable Unit

MAXIMIZER Automation Program

CEMCO's *MAXIMIZER* program is the future of crusher automation. This software does not just start and stop the crusher like other systems, it can monitor and adjust many variables of material processing. Operators can switch the desired product and tons per hour produced by the crusher at the touch of a button. The *MAXIMIZER* program allows for routine crusher maintenance to be easily logged, tracked and scheduled.

MAXIMIZER allows the user to:

- Monitor Crusher Input/Output
- Adjusts Motor and Pedestal Speeds
- Change Desired Product Quickly
- Monitor Real-Time Production Statistics
- Monitor Fault Status & Alarm History
- Monitor Critical Lubrication System
- Schedule and Track Maintenance
- Monitor and Track Life of Wear Parts
- Monitor Vibration and Temperature
- View and Adjust Crusher Output TPH

Conveyor	Tons per Hour	% of Infeed	Run Status	Enable
Infeed	00000	N/A	Stopped	●
Discharge	N/A	N/A	Stopped	●
Product 1	00000	000	N/A	●
Product 2	00000	000	N/A	●
Product 3	00000	000	N/A	●
Fines	00000	000	N/A	●
Recycle	00000	000	N/A	●

"MAXIMIZE YOUR PRODUCTION!"



Model T-35 (Single Drive Only)

Weight	5,500 lbs
Feed Size	Rotor: 1", Shoe Table: 1" - 1.5"
HorsePower	75 - 125
Superchipper™ Diameter	18 inches
Shoe Table Diameter	18 inches
Max Feed Tonnage	5 - 50 TPH



Model T-54 (Single Drive Only)

Weight	11,000 lbs
Feed Size	Rotor: 1"-1.5", Shoe Table: 2"
HorsePower	150 - 250
Superchipper™ Diameter	27 inches
Shoe Table Diameter	27, 32 inches
Max Feed Tonnage	30 - 125 TPH



Model T-70 (Single Drive Only)

Weight	15,500 lbs
Feed Size	Rotor: 2", Shoe Table: 3"
HorsePower	200 - 300
Superchipper™ Diameter	32 inches
Shoe Table Diameter	32 inches
Max Feed Tonnage	50 - 175 TPH



Model T-80 (Single & V-Twin™ Drives)

Weight	25,200 lbs (v-twin)
Feed Size	Rotor: 2"-2.5", Shoe Table: 4"
HorsePower	200 - 400 Single, 300 - 600 Dual
Superchipper™ Diameter	35 inches
Shoe Table Diameter	35 inches
Max Feed Tonnage	100 - 275 TPH



Model T-96 (Single & V-Twin™ Drives)

Weight	37,900 lbs (v-twin)
Feed Size	Rotor: 3", Shoe Table: 5"
HorsePower	200 - 400 Single, 500 - 800 Dual
Superchipper™ Diameter	39 inches
Shoe Table Diameter	38 inches
Max Feed Tonnage	600 TPH



Model T-128 (V-Twin™ Drives Only)

Weight	41,800 lbs
Feed Size	Rotor: 3", Shoe Table: 6"
HorsePower	600 - 900 Dual
Superchipper™ Diameter	N/A
Shoe Table Diameter	41 inches
Max Feed Tonnage	500 - 1000 TPH



Model T-160 (V-Twin™ Drives Only)

Weight	56,400 lbs
Feed Size	Shoe Table: 7"
HorsePower	800 - 1000 Dual
Superchipper™ Diameter	N/A
Shoe Table Diameter	48 inches
Max Feed Tonnage	600 - 1500 TPH

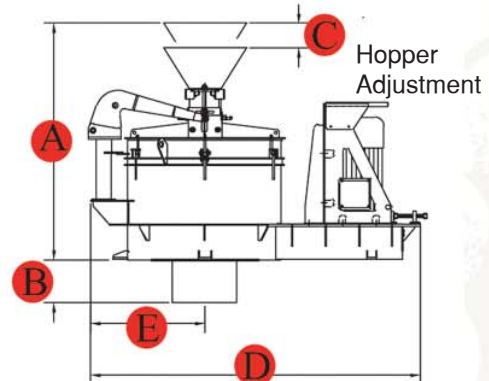
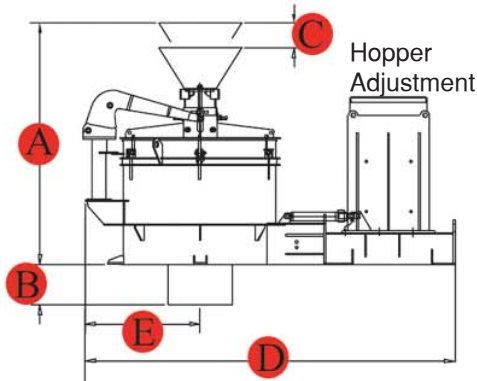
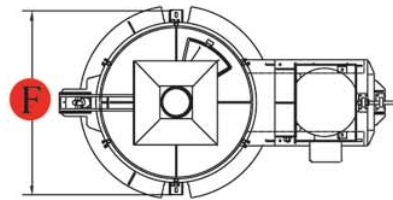
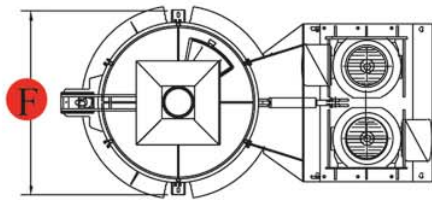


Model T-175 (V-Twin™ Drives Only)

Weight	72,800 lbs
Feed Size	Shoe Table: 7"
HorsePower	800 - 1000 Dual
Superchipper™ Diameter	N/A
Shoe Table Diameter	48 inches
Max Feed Tonnage	600 - 1500 TPH

Overall Crusher Dimensions and Weights

TURBO MODEL		A	B	C	D	E	F	WEIGHT	
35 SINGLE	in	80.00	10.00	12.00	97.25	31.31	49.50	lb	5,500
	cm	203	25	30	247	80	126	kg	2,495
54 SINGLE	in	96.25	18.00	12.00	131.00	48.00	76.00	lb	11,080
	cm	245	46	30	333	122	191	kg	4,990
70 SINGLE	in	98.25	19.25	12.00	138.00	49.50	79.25	lb	15,500
	cm	250	49	30	351	126	201	kg	7,031
80 SINGLE	in	108.63	19.25	12.00	139.38	51.00	82.38	lb	19,350
	cm	276	49	30	354	130	209	kg	8,777
80 V-TWIN	in	108.63	19.25	12.00	164.75	51.00	82.38	lb	25,200
	cm	276	49	30	418	130	209	kg	11,431
96 SINGLE	in	121.00	19.25	12.00	165.50	57.25	9.00	lb	27,800
	cm	307	49	30	420	145	234	kg	12,610
96 V-TWIN	in	121.00	19.25	12.00	188.80	57.25	92.00	lb	37,900
	cm	307	49	30	478	145	234	kg	17,171
128 V-TWIN	in	113.00	28.88	12.00	205.50	74.50	101.00	lb	41,800
	cm	287.02	73.36	30	521.97	189.23	256.54	kg	18,960
160 V-TWIN	in	104.75	19.81	N/A	232.75	75.44	132	lb	56,400
	cm	266	50	N/A	591	191	335	kg	25,583
175 V-TWIN	in	104.75	19.25	N/A	249.00	86.00	146.50	lb	72,800
	cm	266	49	N/A	632	218	372	kg	33,022



V-Twin™ Model

Single Model

The contents of this document do not constitute a warranty, either expressed or implied

TURBO MODEL	HORSEPOWER	DIAMETER (in)		ANVIL RING QUANTITY	CAPACITY (TPH)
		SUPERCHIPPER	SHOE TABLE		
35	75-125	18	18	16	5 to 50
54	150-250	27	27,32	16,17,18	30 to 125
70	200-300	32	32	18,19,20	50 to 175
80	200-400	35	35	19,20,21	100 to 275
80 V-TWIN	300-600	35	35	19,20,21	200 to 400
96	200-400	39	38	16,17,18	150 to 400
96 V-TWIN	500-800	39	38	16,17,18	250 to 500
128 V-TWIN	600-900	N/A	41	20	500 to 1000
160/175 V-TWIN	800-1000	N/A	48	23, 26	600 to 1500

Possible Internal Configuration Options

Shoe Table / Rockshelf



- Friable, low abrasion material
- Low reduction rate / High recirculating load
- Low percentage of "fracture face" material

Superchipper™ / Rockshelf



- Good for shaping abrasive material
- Good for light crushing

Shoe Table / Anvil Ring

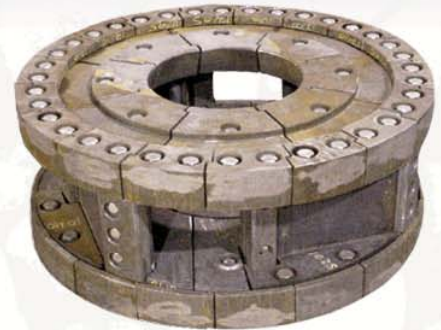


- Medium range friable material
- Medium to low abrasion material
- Low to Medium recirculating load
- Good reduction rate / Good for "chips" and sand

Superchipper™ / Anvil Ring



- Low recirculating load
- High reduction rate / High "fractured face" ratio
- Use with high abrasion, low friability material
- Excellent for producing sands and fines



Shoe Table Data

Diameter (Inches - #shoes)	Feed Size (Max inches)	Capacity (TPH)	Crusher Models
18 - 4,5	1 1/2	5 - 50	T-35
27 - 3,4,5	2	30 - 125	T-54
32 - 3,4,5	3	50 - 175	T-70
35 - 3,4,5,6	4	100 - 400	T-80
38 - 3,4,5	5	150 - 500	T-96
41 - 4	6	500 - 1000	T-128
48 - 3,4,5	7	600 - 1500	T-160, T-175

Superchipper™ Rotor Data

Diameter (Inches - #ports)	Feed Size (Max inches)	Capacity (TPH)	Crusher Models
18 - 4	1	5 - 50	T-35
27 - 4	1 1/2	30 - 125	T-54
32 - 4	2	50 - 175	T-70
35 - 4,5	2 1/2	100 - 400	T-80
39 - 3,4,6	3	150 - 500	T-96

Based on cubical feed

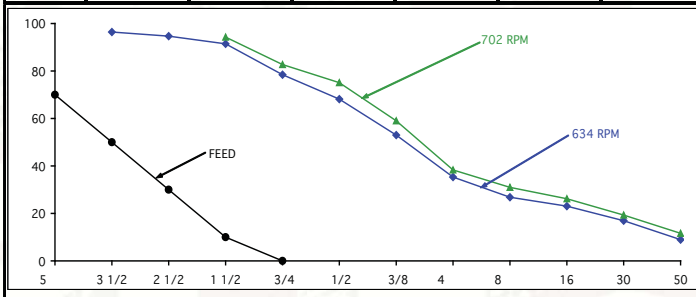
Send Us A Sample

We do not test on laboratory-size crushers for simulated results. At CEMCO, we test on a full-size crusher for real results. Contact a CEMCO sales representative, dealer or our main office to send us a sample of your material. After testing the material we can recommend the most suitable VSI configuration based on your data. Your company representatives are encouraged to visit CEMCO, participate in the testing and tour our manufacturing facility. Visit our web site www.cemcoturbo.com for more information.

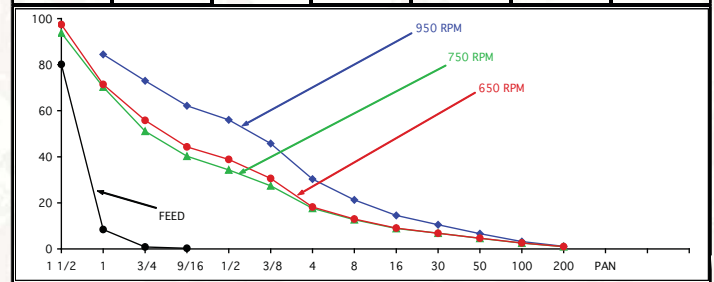


Typical Single Pass Gradations

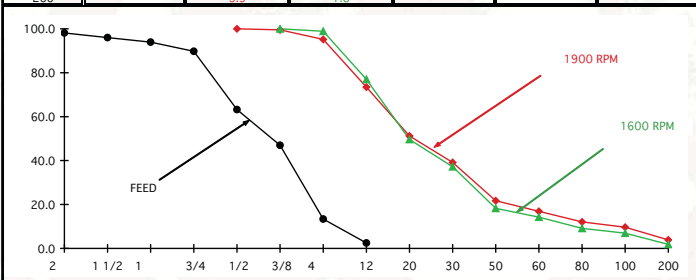
CEMCO INC.						
DATE	CUSTOMER	INQUIRY	MATERIAL	TURBO	CONFIGURATION	
11/7/2003			River Rock	T 160	# OF ANVILS: 23	
MECHANICAL ANALYSIS					ROTOR SIZE: 48-3	
SIEVE SIZE	FEED	634 RPM	702 RPM			
5	70.0					
3 1/2	50.0	96.4				
2 1/2	30.0	94.7				
1 1/2	10.0	91.5	94.3			
3/4	0.0	78.5	82.7			
1/2		68.1	75.1			
3/8		53.0	59.0			
4		35.3	38.3			
8		26.8	31.0			
16		23.0	26.2			
30		17.0	19.3			
50		9.0	11.6			
100						
PAN						



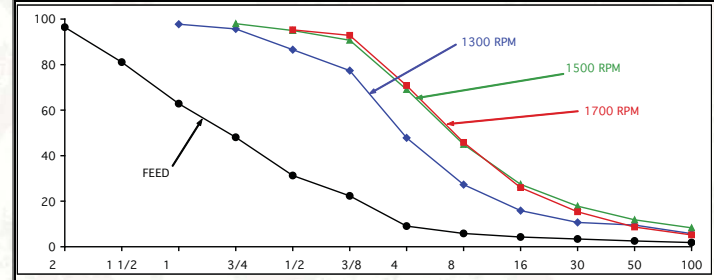
CEMCO INC.						
DATE	CUSTOMER	INQUIRY	MATERIAL	TURBO	CONFIGURATION	
5/15/2002	CEMCO		GRANITE	T 80	# OF ANVILS: 21	
MECHANICAL ANALYSIS					ROTOR 35" 4 PORT	
SIEVE SIZE	FEED	950 RPM	750 RPM	650 RPM		
1 1/2			93.76	97.43		
1	80.12	84.45	70.27	71.43		
3/4	8.44	72.99	51.07	55.80		
9/16	0.83	62.18	40.25	44.31		
1/2	0.28	56.01	34.31	38.84		
3/8		45.76	27.39	30.58		
4		30.32	17.64	18.19		
8		21.28	12.67	12.95		
16		14.55	8.87	9.04		
30		10.47	6.82	6.81		
50		6.62	4.58	4.69		
100		3.20	2.53	2.57		
200		1.10	0.97	1.00		
PAN						



CEMCO INC.						
DATE	CUSTOMER	INQUIRY	MATERIAL	TURBO	CONFIGURATION	
7/27/1999	CEMCO		GLASS	54	# OF ANVILS: 18	
MECHANICAL ANALYSIS					ROTOR SIZE: 27" 4P	
SIEVE SIZE	FEED SIZE	1900 RPM 25 TPH BAG HOUSE	1600 RPM 25 TPH BAG HOUSE			
2	98.1					
1 1/2	96.0					
1	93.9					
3/4	89.8					
1/2	63.2	100.0				
3/8	47.0	99.5	100.0			
4	13.4	95.2	98.9			
12	2.5	73.4	72.0			
20		51.2	49.6			
30		39.1	37.2			
50		21.7	18.2			
60		16.9	14.2			
80		12.1	9.1			
100		9.7	6.9			
200		3.9	1.8			



CEMCO INC.						
DATE	CUSTOMER	INQUIRY	MATERIAL	TURBO	CONFIGURATION	
7/12/2006	CEMCO		LIMESTONE	T80	# OF ANVILS: 21	
MECHANICAL ANALYSIS					ROTOR SIZE: SCK-35 4	
SIEVE SIZE	FEED	1300 RPM	1500 RPM	1700 RPM		
2	96.4					
1 1/2	81.1					
1	62.8	97.8				
3/4	48.1	95.7	98.0			
1/2	31.3	86.5	95.0	95.3		
3/8	22.3	77.4	90.7	92.8		
4	9.1	47.9	69.1	70.8		
8	5.8	27.3	45.0	45.8		
16	4.3	15.9	27.4	26.0		
30	3.4	10.7	17.8	15.3		
50	2.6	9.5	11.8	8.7		
100	1.8	5.8	8.3	5.2		
200	1.3	3.9	6.0	3.0		
PAN						



Benefits of VSI Crushing

- Cubical shaped product reduces "slabby" or slivered material in product.
- Meet constantly changing state DOT specifications.
- Consistently produces product in a tight gradation range.
- Produce intermediates and fines.
- Simple maintenance.
- High throughput capacity
- Low wear cost per ton

The CEMCO Advantage

- Numerous equipment combinations offer more options to meet customer needs.
- Expedient service to customers and dealer network by qualified factory personnel.
- Excellent OEM product support on crusher parts.
- Castings are stocked at CEMCO, dealers and at foundries for quick delivery.
- CEMCO will test crush material on a full-sized crusher at our test facility.
- CEMCO will make personalized adjustments to our products to meet crushing needs.
- CEMCO meets and exceeds customer expectations when applying Turbo crushers.

At CEMCO, our goal is to provide you with the best quality, in-house, manufacturing methods including CNC machining, robotic welding, aggressive quality control and extensive post sale support. Wear parts, designed and sold by CEMCO, adhere to CEMCO's strict quality specifications. Through continuously funded wear resistance research and development, we are constantly striving to reduce our customers operating costs. CEMCO takes pride in providing quality customer service and will always go the extra mile to help customers solve problems.



Turbo™ 175 Installation Crushing Dolomite / Limestone at 1400 TPH 24 Hours a Day / 7 Days a Week.



Two Turbo™ 160's installed in a Power Plant Crushing Gob Coal For Fluidized Bed Combustion. This Power Plant Burns 1000 TPH 24 Hours a Day / 7 Days a Week.

The Largest VSI Installation in the World, 16 Dual-Motor Turbo™ 96's Crushing Gold Ore at the 3rd Largest Gold Mine on Earth. This Plant Processes 1.1 Million Tons per Month.





PROGRESS - INTEGRITY

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