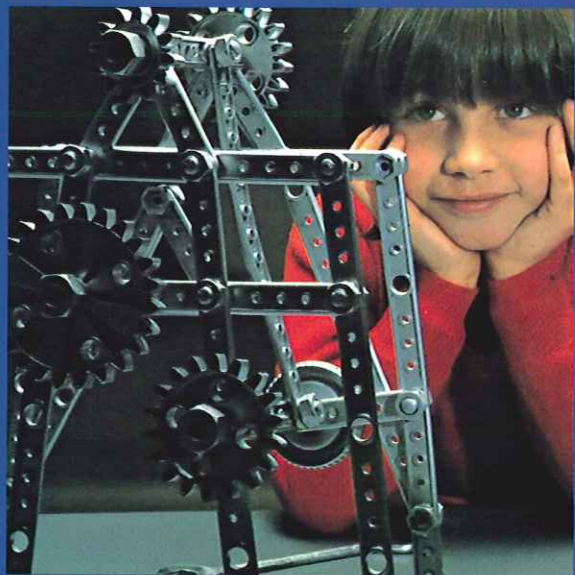


**COMSPAIN**



**INDUSTRIAL EQUIPMENTS**

# **Crushers**

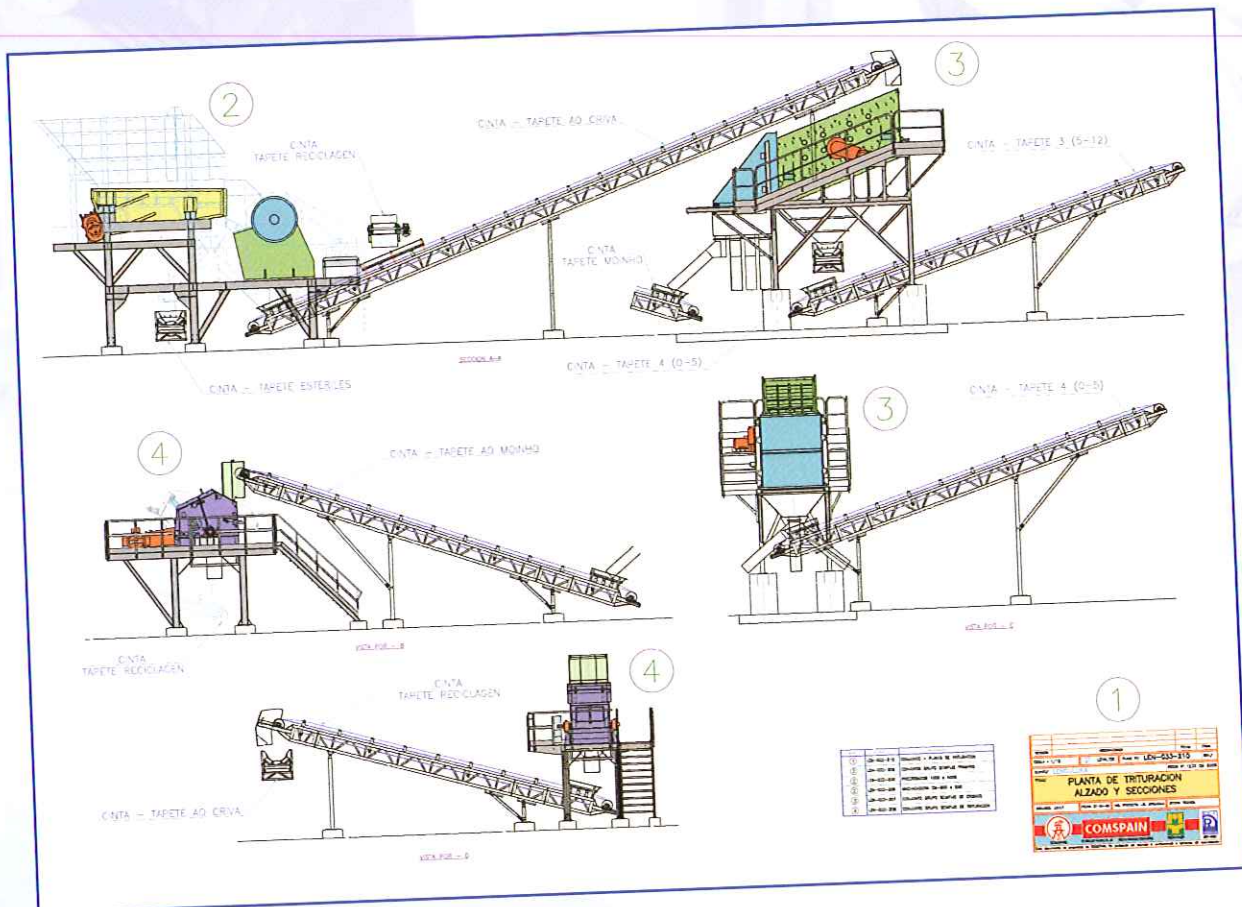
# COMSPAIN: EXPERTS IN DESIGN, MANUFACTURING AND MAINTENANCE OF CRUSHERS

**(Hammer Crusher, Chain Crusher, Cylinder Crusher, Lump Crusher, Pendular Mill, Grinding Trommel, Jaw Crusher, Pug Mill, Attrition Washer Drum, Impact Crusher, Squirrel Cage Mill...)**

Crushers are machines used in the industry and in everyday life for many centuries; since the industrial development of the XIX century, they have been technified and different models have been created, suitable for each type of problem (primary grinding in quarry, secondary grinding, tertiary grinding... until achieving crusher types such as the pendular mills, which can obtain granulometries of less than 100  $\mu$ ).

They are generally made up of a sturdy body, inside of which moves a rotary organ, provided or not of accessory elements, such as hammers or chains.

An exception to this are the jaw crushers, which are alternate motion machines.

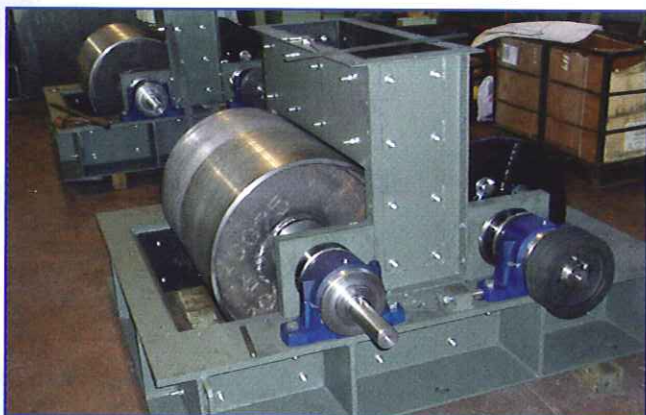


Crushers are usually fitted with the relevant support frames, and they can be manufactured according to the types shown on our catalogue or custom made, following customer's requirements.

Comspain has not only developed crushers for mining and quarries, but we are in fact specialized in grinding granulated fertilizers.

## CRUSHING

COMSPAIN crushing equipment is built to process a variety of rocks and minerals, with production capacities up to 2,000 T/H and with feeding granulometry from 0 to 1,800 mm. The crushing equipment is useful in grinding to size material for de-lumped fertilisers and other chemical products.



*Hammer Mill*  
*Toyo Thai- THAILAND*



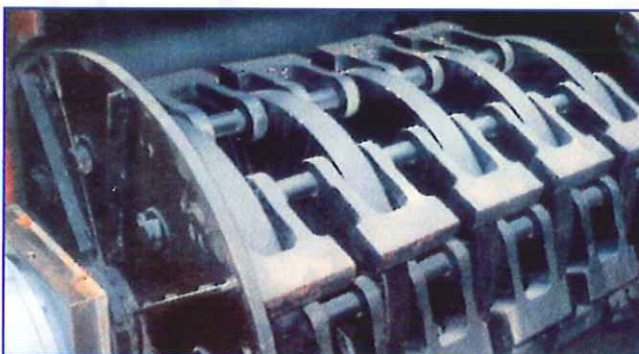
*Double Rotor Hammer Crusher*  
*Petrokimia Gresik – INDONESIA*



*Cylinder Mill*  
*General Fertilizer-SYRIA*

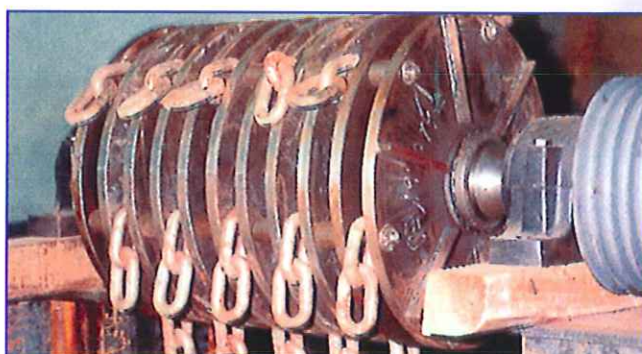


*Double Rotor Chain Crusher*  
*Fertial ^ ALGERIA*



*Hammer Crusher*  
*Ercros Cartagena – SPAIN*

- Hammer Crushers.
- Chain Crushers.
- Cylinder Crusher.
- Lump Crushers.
- Pendular Mills.
- Jaw Crushers.
- Impact Crushers.
- Squirrel cage Mills.
- Other types.



*Chain Mill*  
*Toros-TURKEY*

## **HAMMER CRUSHER, CHAIN CRUSHER, CYLINDER CRUSHER, LUMP CRUSHER, PENDULAR MILL, GRINDING TROMMEL, JAW CRUSHER, PUG MILL, ATTRITION WASHER DRUM, IMPACT CRUSHER, SQUIRREL CAGE MILL**

Computer calculations and simulations, essays and tests, design calculations, including production, power, rollers, shafts, bearings and housing.

### **SPECIAL TECHNOLOGIES:**

- Hammer Crusher, with a smooth cylinder with automatic cleaning, either manual or pneumatic.
- Chain crusher of single or double roller, fitted with chains, with hammers, or mixed (chains+hammers).
- Cylinder crusher, provided with mobile separation system for the granulometry regulation and with safety systems with automatic separation for the passage of foreign bodies. Option: toothed cylinders or grooved cylinders.
- Lump Crusher, type hook & comb, specific for the disintegration of fertilizers. Both the mobile blades and the static blades can be removed one by one, in case of wear or breakdown. With torque limiter.
- Pendular Mill, with machined pendulums and ring. Including static or dynamic separators, blowing fan, air heater, cooling fan, bag filter and exhaust fan.
- Grinding Trommel- it allows sorting and grinding at the same time, by means of elevating / breaking shovels.
- Jaw Crusher, with simple or double shaft.
- Pug Mill with lowerable slope frame for the definition of the residence time. This equipment includes, if necessary, internals for the incorporation of additives.
- Attrition washer drum– it decreases the size of the pulp grains by attrition, while washing at the same time.
- Impact crusher – with regulating hydraulic group.
- Squirrel cage mill – with external breaking paddles.

## EXPERIENCE AND CAPACITY

COMSPAIN reaches productions of up to 700 T/H in primary grinding, with equipment (jaw crushers) which can have a weight higher than 200 T and an inlet mouth of 2000 x 1600 mm.

In the rest types of crushers, our capacities and weights are the following:

TYPE OF CRUSHER	MAX. PRODUCTION (T/H)	MAX. WEIGHT (T)
Hammer Crusher	40	9
Chain / Hammer Crusher of simple rotor	45-75	4
Chain / Hammer Crusher of double rotor	60-90	5,3
Cylinder Crusher	15	9
Lump Crusher	40-60	4,2
Pug Mill	200-250	10
Pendular Mill	48	85
Attrition Washer Drum	1000	58
Grinding Trommel	1000-1500	70

### MATERIALS:

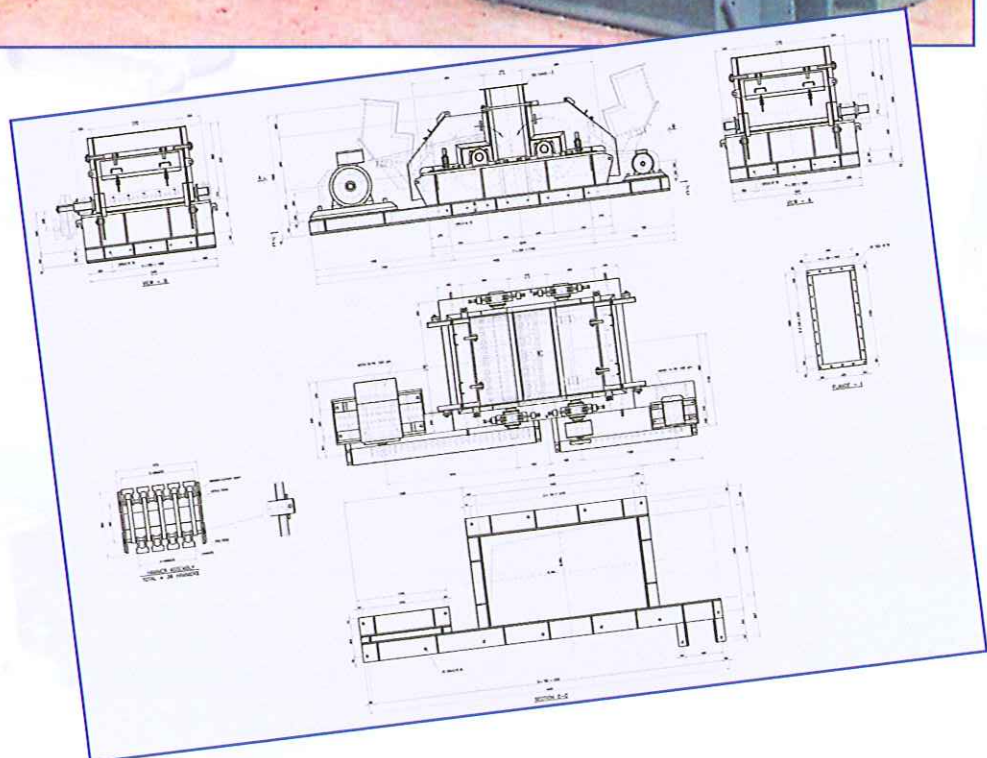
- Carbon steel, stainless steel, refractory steel, high resistance steel, etc.
- Automatic lubrication if necessary.



## HAMMER CRUSHER

TYPE	HM 80/60	HM 100/80	HM 120/100
Ø HAMMER ROTOR (mm)	800	1000	1200
ROTOR LENGTH (mm)	600	800	1000
SCRAPING	Mechanical	Pneumatic	Pneumatic
HAMMER POWER (kW)	30	55	75
SMOOTH CYLINDER POWER (kW)	5,5	7,5	11
WEIGHT (kG)	4000	6500	9000
PRODUCTION (T/H) *	10	25	40
ROTATION SPEED (RPM)	1.000	900	800

\* Productions given are an estimate, as they depend on the type of product or on the product characteristics.



This crusher is designed for grinding dry and semi-dry materials, and it is used in the fertilizer field as crusher for raw materials and also as oversize mill.

It is essentially formed by two rotors rotating in opposite directions, one of hammers and the other smooth. The smooth rotor acts as anvil and works at less speed than the hammer rotor, by means of an intermediate reducer of hollow shaft located in the shaft prolongation.

It is formed by a steel body built with big thickness plates, and with several electrowelded nerves, forming a very sturdy unit. It is fixed to a structure.

The two rotors are mounted on roller bearing supports on this structure.

A couple of these supports are fixed, while the other couple are mobile, in order to separate or to bring close the breaking element and thus to regulate the product size at the outlet.

Both rotors are mounted on oversized shafts.

The hammer rotor is formed by several disks mounted on the shaft and which support the hammers.

The smooth rotor is a metallic drum shrunk on the shaft and which rotates at slow speed. It has a scrapers system for its cleaning.

The above assembly is closed under a casing formed by two articulated hoods with hinges. On the casing there are inspection doors to enable the control and regulation of wearing. There is a feeding duct with a flange and a dust suction intake. The inside is coated with rubber.

For the 80/60 Crusher, our supply includes a mechanical scraper built in hard plate ( $90 \text{ Kg/mm}^2$ ), which cleans the smooth cylinder, allowing the exit of the stuck material through the crusher exit. It is adjustable by means of screws and slant holes.

The remaining sizes include an automatic scraping system, pneumatically driven, with a set of exchangeable “widia” scrapers.

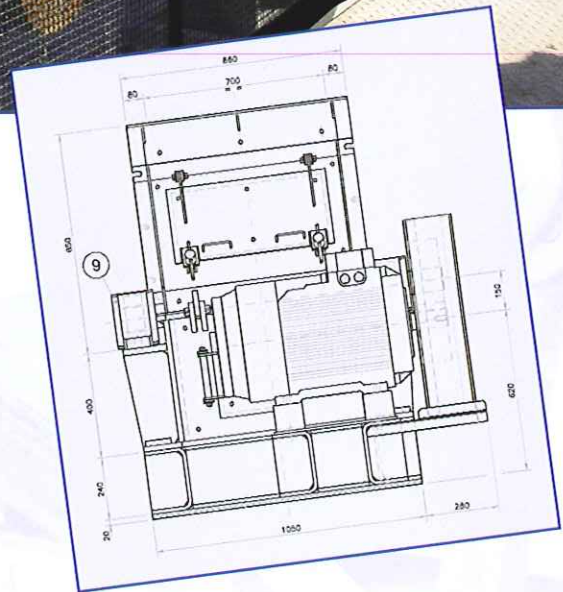
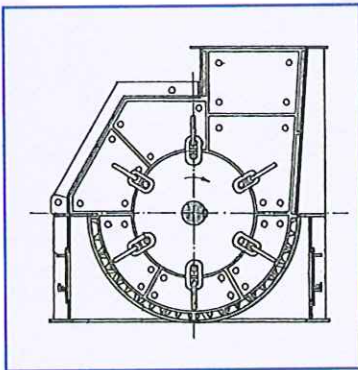
The hammer rotor is driven by means of an electrical motor, and the smooth rotor by means of a motor gear reducer.



## CHAIN CRUSHER



Single Rotor



TYPE	DM-1	DM-2	DM-3	DM-4
Rotor speed rpm	1200	1000	800	700
Motor power kW	11	15	30	75
Average production T/H*	4 - 10	12 - 16	18 - 40	14 - 75
Approx. weight Kg	850	1300	1800	3750
Length mm	700	960	1300	1500
Width mm	500	700	1050	1300
Height mm	600	1100	1250	1400

\* Productions given are an estimate, as they depend on the type of product or on the product characteristics.

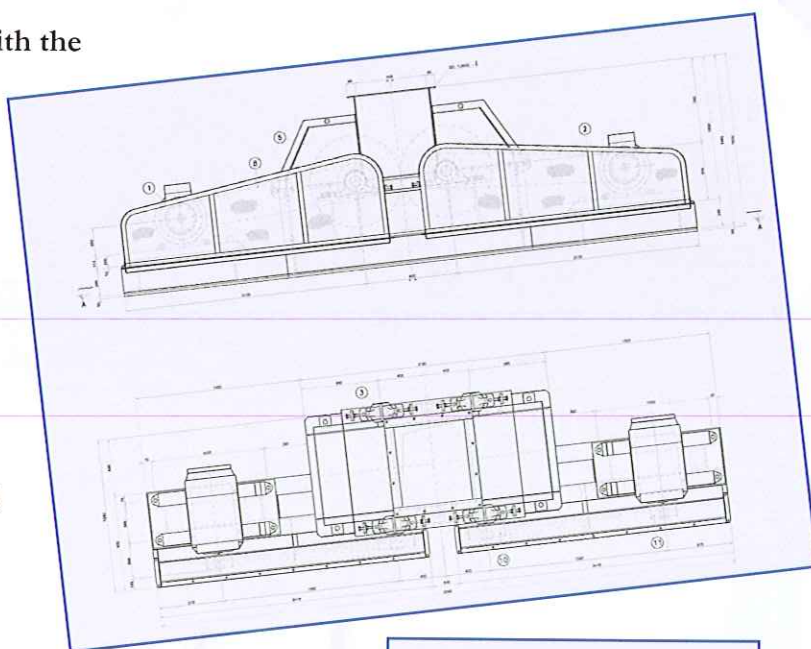
This kind of equipment has been specially designed to break the materials which are stored in silos or rooms, after their manufacturing process. They are essentially made of a chain rotor or a hammer rotor, rotating at medium speed, and in the product forward sense.

They are treated successfully in the disintegration of super phosphates, ammonium nitrate, ammonium salts, and in the various complex fertilizer formulas.

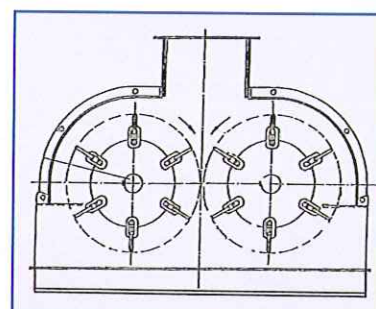
The whole assembly rests on a metallic chassis, with a mobile gate on top, which can be opened, in order to be able to get inside and carry out maintenance operations easily.

**The DM /DB series crushers are built with the following characteristics:**

- Steel frame, electric welded construction, with mobile gate to access inside
- Crushing chamber with a high capacity.
- Internally coated with removable manganese steel plates.
- Rotor made of steel disks which house hammers or chains by means of transverse shafts.
- Driving shaft in treated forged steel.
- Supports with double rotule bearings, fitted with tightening system and regulation by screw.
- Driving parts, including:
  - o Driving pulley.
  - o V Belts.
  - o Safety carter.
  - o Support chassis for motor.
  - o Exit bars.



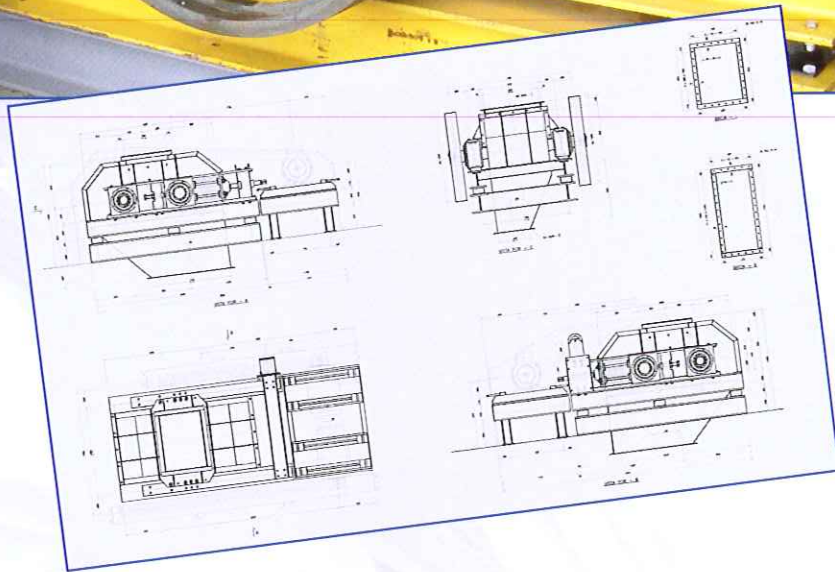
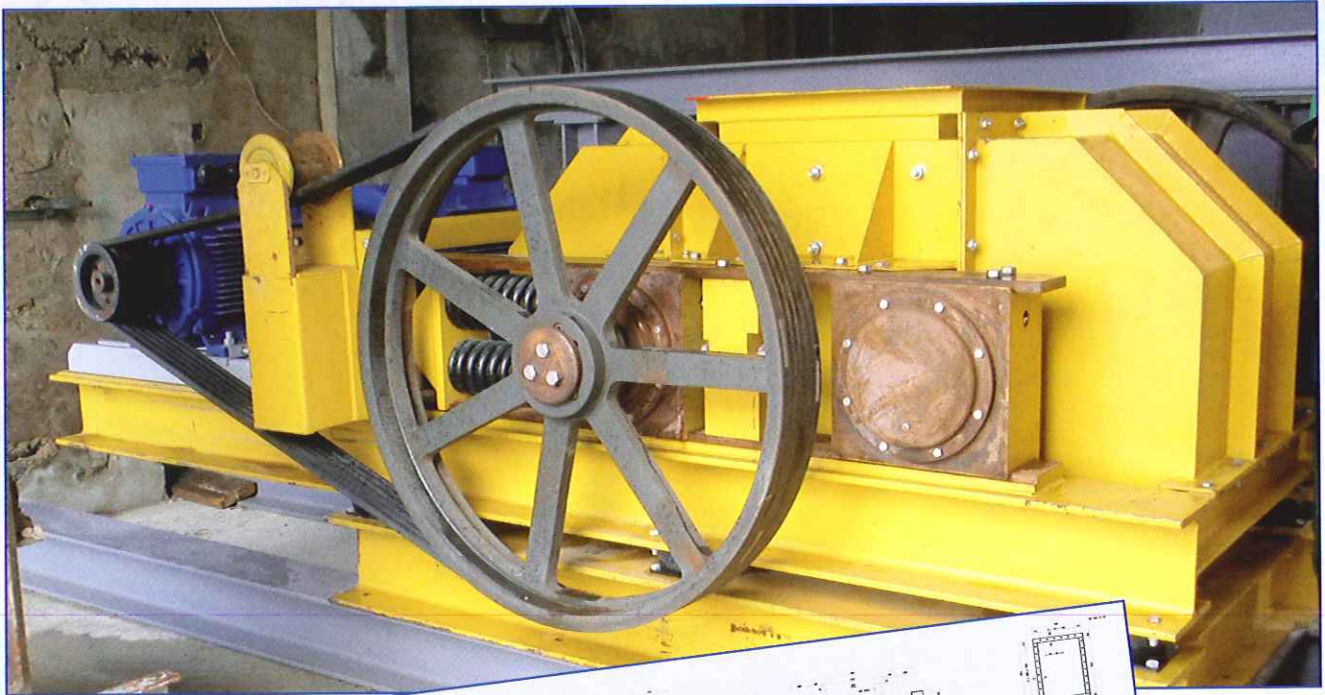
*Double Rotor*



TYPE	DB-1	DB-2	DB-3	DB-4
Rotors speed rpm	1500	1150	850	750
Motor power kW	22	30	55	90
Average production T/H *	10 - 20	20 - 40	40 - 60	60 - 90
Approx. weight Kg	1850	2200	3500	5300
Length mm	1100	1550	2000	2450
Width mm	700	1100	1500	1700
Height mm	800	1050	1350	1550

\* Productions given are an estimate, as they depend on the type of product or on the product characteristics.

## CYLINDER CRUSHER



TYPE	600 x 600	800 x 800	900 x 900
Ø CYLINDER (mm)	600	800	900
LENGTH CYLINDER (mm)	600	800	900
LENGTH (mm)	2800	2900	3500
HEIGHT (mm)	900	1000	1200
WIDTH (mm)	1500	1800	2200
POWER (kW)	2 X 22	2 x 30	2 x 45
WEIGHT (Kg)	4500	7000	9000
PRODUCTION (T/H) *	5	8	15

\* Productions given are an estimate, as they depend on the type of product or on the product characteristics, and mainly on the exit granulometry. They have been established considering a separation between cylinders of 2 mm.

Crusher made up of two cylinders, with one sliding shaft and one fixed shaft, each of them driven by a separate motor.

The regulation of the exit granulometry is obtained acting on the regulation screws which set the separation between both cylinders.

The sliding shaft assembly separates by the springs compression, to allow the passage of the unbreakable items.

### Comprising:

- One lower chassis in one piece formed by thick laminated sections, to ensure the rigidity of the assembly. This lower chassis is the one fixed to the ground.
- One upper chassis, resting on the lower chassis, by means of elastic supports to absorb vibrations. This section has horizontal supports on top, which are used for the sliding of the plummer blocks of one of the two cylinder rotors.

The other cylinder rotor has a fixed position.

- One feeding duct joint to the chassis and fitted with an upper flange, on which the material inlet duct (supplied by others) could be screwed.

This duct is fitted with an anti-abrasion rubber-coating, by means of screwed plates.

The rest of the body consists of two hoods covering the cylinders.

- Two cylinder rotors, formed by the cylinders and by two conical discs on both ends, centered by the tension caused by several straps.
- The cylinder-shaft assembly is secured by shrunk elements, with the capacity to transmit significant torques.
- Two driving systems formed by:
  - o Electric motor
  - o Grooved pulley of a large diameter
  - o Belts

The driving of the mobile cylinder is also fitted with an automatic tightening device, which prevents the belts on this side from detaching, when the sliding roller moves closer to the fixed one.

**OPTION: We also manufacture TOOTHED CYLINDER MILLS or GROOVED CYLINDER MILLS LUMP CRUSHER.**

## LUMP CRUSHER

TYPE *	70 x 1250	1000 x 1500
Rotor speed rpm	590	490
Motor power kW	37	55
Average production T/H **	20 - 40	40 - 60
Approx. weight Kg	3200	4200
Length mm	1946	2154
Width mm	2230	2230
Height mm	960	1140

\* Mouth dimensions.

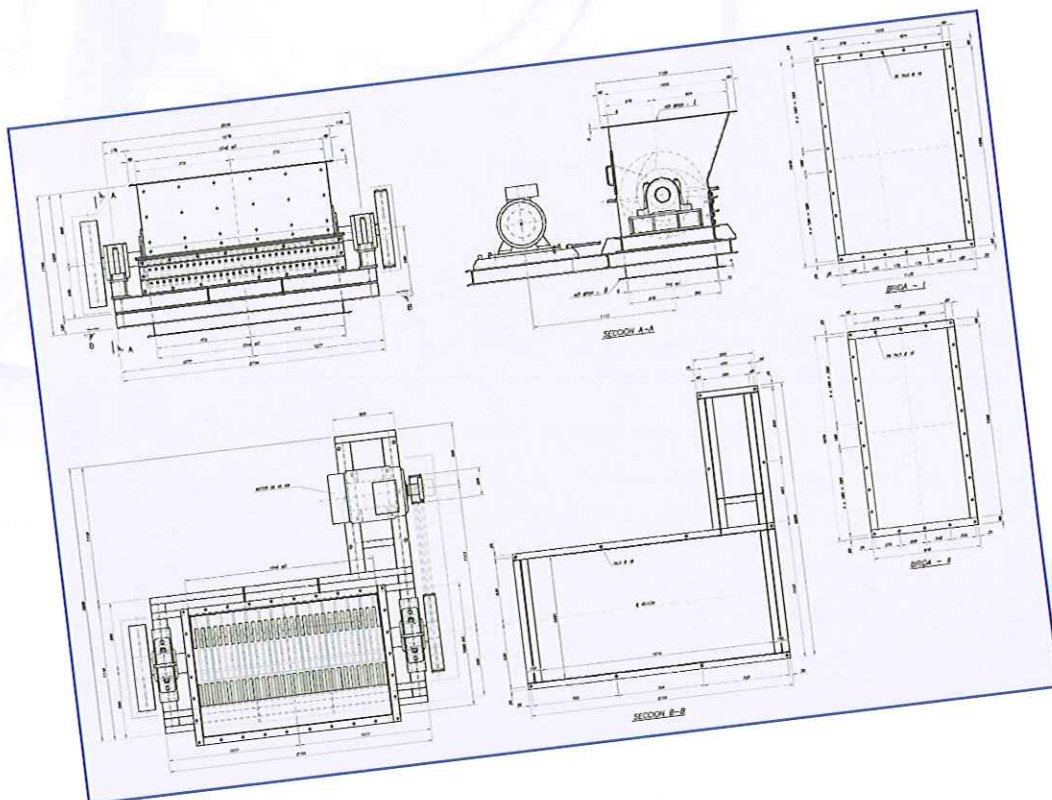
\*\* Productions given are an estimate, as they depend on the type of product or on the product characteristics.



This type of lump crusher is used generally to separate the oversize in fertilizers, which is formed during the drying process, and for this reason it is usually placed at the outlet of the drying drums.

**Our supply includes:**

- One body made in steel plate, containing the breaking device and supported on a sturdy frame. This frame also supports the shaft which drives the breaking blades.
- One shaft which drives all breaking blades, keeping the distance between them by means of intermediate pieces. This shaft is driven by means of V-belts by an electric motor.
- Breaking blades built in steel plate with a hard metal reinforce to increase hardness. There are 25 or 29 blades, depending on the type, which are fixed to the shaft by means of a pin and tightening nuts. An important advantage of Comspain's design for this lump crusher is the possibility to replace the blades one by one, or the whole set (as desired), both the breaking blades and the static blades.
- Combs: The complement to the separation system is a series of 26 steel parts, screwed to the internal part of the body (counterblades), so that blades move between each other.
- Cleaning Comb: Another cleaning comb is included.
- Safety Devices: Included.



## PENDULAR MILL

TYPE	1000 MP	3000 MP	5000 MP	8000 MP	12000 MP	16000 MP	30000 MP
N° of rollers	2	3	3	3	3	3	3
Power Installed for mill (kW)	15	30	40	75	110	160	300
Power installed For fan Open circuit (kW)	18.5	37	75	110	160	200	400
Power installed For fan Closed Circuit (kw)	15	30	45	75	110	160	300
Hourly production * 160 μ (Kg)	1-1600	3-5000	5-8000	8-13000	12-19000	16-25000	30-48000
Hourly Production * 80 μ (Kg)	550	1800	3000	5000	7200	9500	18750
Hourly Production * 40 μ (Kg)	300	1000	1600	2700	4000	5300	10000

\* Productions given are an estimate, as they depend on the type of product or on the product characteristics. They have been established with a material with bulk density 1.3 T/m<sup>3</sup> (limestone or phosphate) and with moisture < 1%.



This mill consists basically of a housing with two bodies- chamber and casing- very sturdy and built in cast steel.

The casing houses the horizontal and vertical shafts, of large diameter, built in treated steel, with their relevant bearings, supports, nuts, etc. The casing also houses the treated conical gears in nickel-chrome-molybdenum steel, which act as connection and reduction between the above-mentioned shafts.

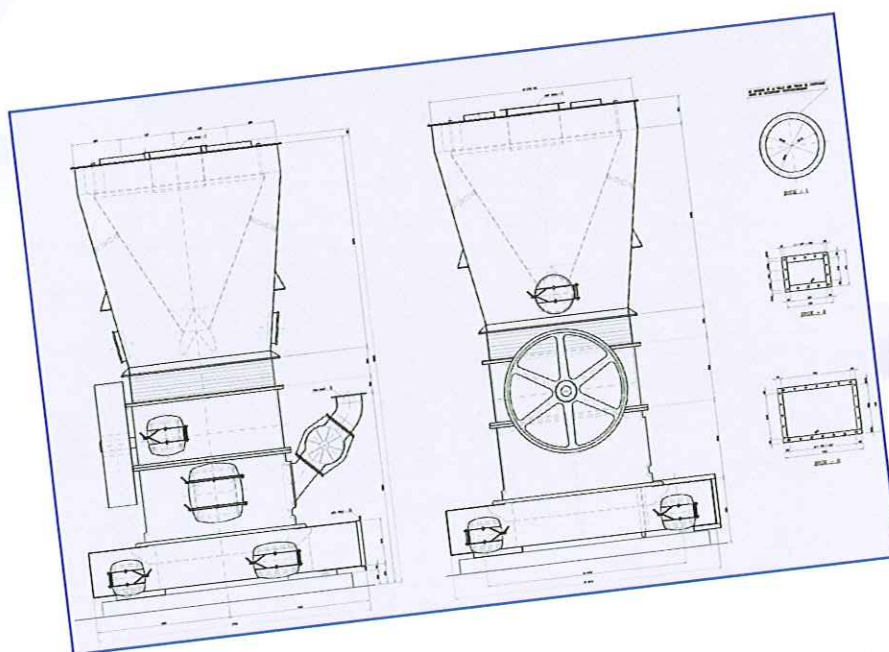
The chamber houses the three pendulums which hang from the vertical shaft by means of the cast steel star.

The mill basis is made of cast iron, acting as support for the whole system, as well as also as location for the riding ring or working surface, made of manganese steel.

When the system turns, the manganese steel rollers of the pendulums, due to centrifugal force, are pressed against the riding ring, causing the grinding effect. The grids in the meantime lift the material up to the roller height.

### THE MILL ALSO INCLUDES:

- An alveolar feeder, adhered to the grinding chamber, with its relevant gearmotor, pulleys and driving belts. Built with cast housing and alveoli.
- An electronic controller, for the regular feeding of the product into the mill by means of starting the feeder.
- Driving pulleys of the mill.
- Pendulums fan.
- Dripping automatic greasing system.
- Fan.
- Air heating equipment.
- Bag filter.
- Blades to direct the air, fixed to the base.
- Double Cone Separator - Pneumatic and adjustable, located on the mill. Able to obtain an adjustable range of fineness, around the guaranteed value. Fitted with a system of adjustable gates, to be operated externally.

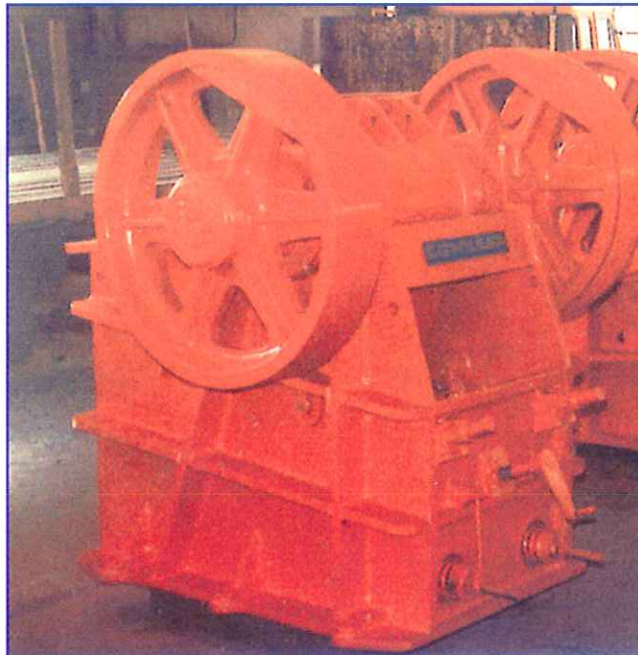


## JAW CRUSHER

Type*	200 x 100	300 x 150	400 x 200	600 x 300	600 x 400	800 x 600	1000 x 750	1200 x 900	1500 x 1200
Max. Opening outlet in mm	40	50	65	90	100	150	200	250	300
Hourly production ** at max. Opening in Tm	3	6	12	35	45	100	200	300	450
Eccentric shaft speed rpm	400	400	370	325	325	275	250	250	225
Motor power kW	3	7,5	15	22	30	55	75	110	160
Grooved Wheel pulley kW	3-A-75	4-B-500	6-B-640	5-C-920	6-C-920	8-C-1200	8-D-1600	10-D-1600	13-D-2200
Motor pulley at 1500 rpm	3-A-100	4-B-100	6-B-160	5-C-200	6-C-200	8-C-200	8-D-270	10-D-270	13-D-330
Machine weight in Kg	400	850	1500	4000	4900	13500	24000	39000	70000
Length	650	815	1065	1550	1775	2300	2960	3200	4000
Width	666	930	1116	1500	1620	2120	2720	3230	4050
Height	613	835	1070	1490	1730	2300	2890	3265	4375

\* Mouth dimensions.

\*\* Productions given are an estimate, as they depend on the type of product or on the product characteristics.





## “PUG MILL” SCREW GRANULATOR



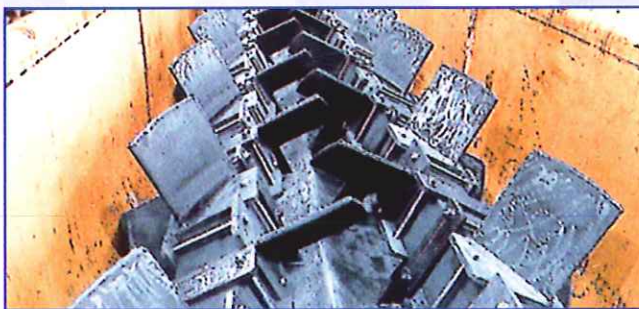
**COMSPAIN** engineers its experience resulting in high-quality technology that translates into products like our Double Screw Granulator and Mixers for Pug Mill manufacturing. We guarantee mixing efficiency and minimal degradation of product. Our pug mill screw granulator is amply designed for smelting urea and steam work, sulphuric acid and ammonia conditions.

The smelting urea entrance has steam jackets to help prevent obstructions.

The easy removable paddles are manufactured from special steels and are protected with a covering of hard-coat sealant.

The injection tubes are made from stainless steel or Alloy 20.

Special spray nozzles.



### “PUG MILL”

Capacity: up to 150 T/H.

Power: up to 132 kW.



### SCREW GRANULATOR

Capacity: up to 400 T/H.

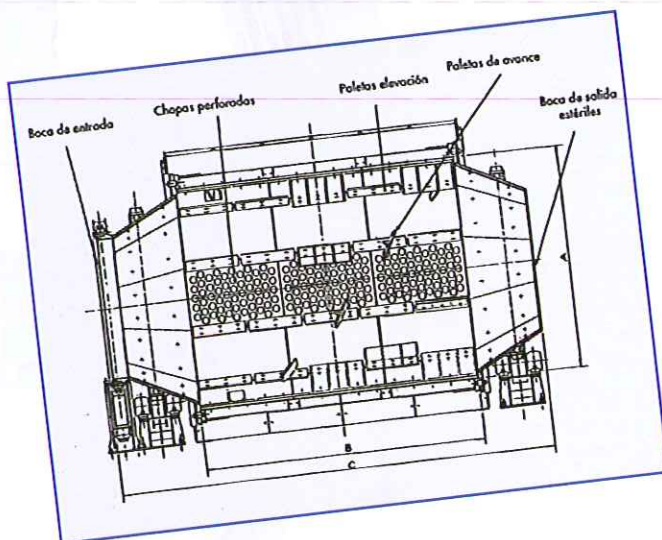
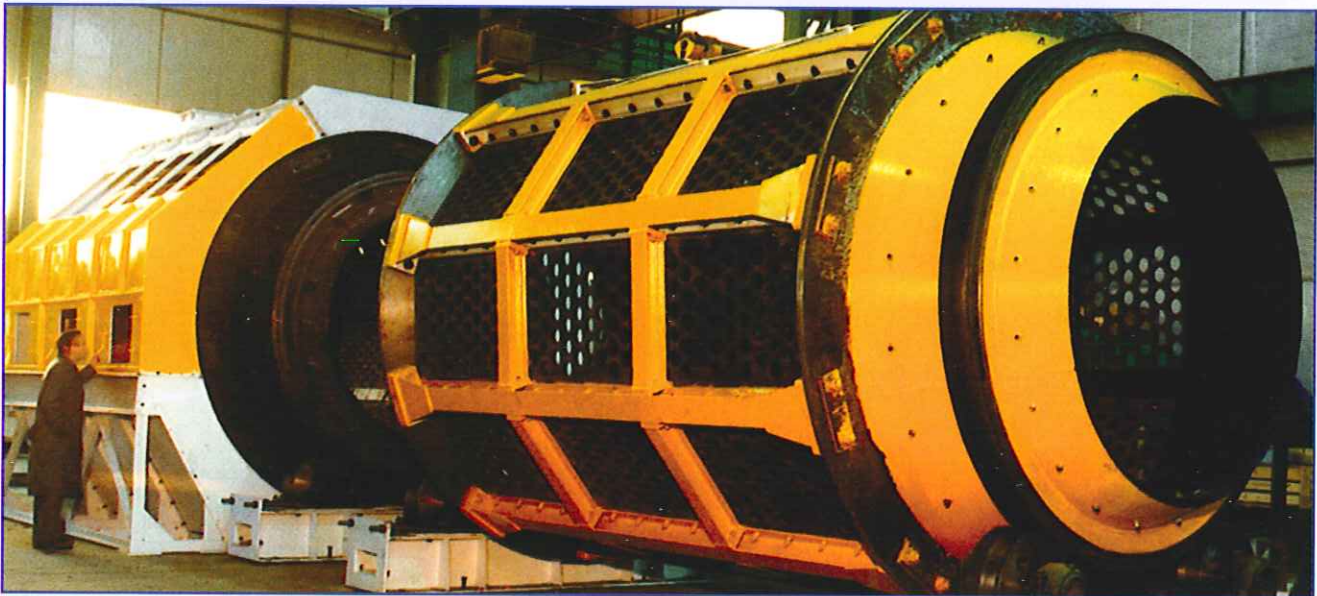
Power: up to 300 kW

Variable speed: Frequency variator

### PUG MILL, DATA SHEET

TYPE	Size mm W x L x H	Slope	Power kW	Capacity T/H
PM 120	1200 x 2500 x 1000	2/10	22	20/40
PM 130	1300 x 3200 x 1100	2/10	30	40/70
PM 140	1400 x 3750 x 1200	2/8	45	70/100
PM 145	1450 x 4000 x 1250	2/8	75	100/150
PM 150	1500 x 4500 x 1300	3/6	110	150/200
PM 155	1550 x 4700 x 1350	3/6	132	200/250
PM 160	1600 x 4900 x 1400	3/6	200	250/300
PM 165	1650 x 5100 x 1450	3/6	300	300/350

## GRINDING TROMMELS



### PURPOSE

The separating-revolving screen performs autogeneous crushing, separation and screening of tailings and exceptionally hard materials. This equipment can perform either homogeneization upstream from the process, or screening-separation all the process long.

### APPLICATION

- Sand and gravel screening
- Coarse coal
- Environmental:
  - o Fresh household waste.
  - o Compost screening.

Type	TTS 28 x 37	TTS 28 x 49	TTS 35 x 49	TTS 35 x 61	TTS 35 x 74	
Cilinder insider(A) diameter	2800	2800	3500	3500	3500	
Cilinder useful length (B)	3700	4930	4930	6160	7400	
Overall length (C)	6000	7250	7850	9100	10300	
Peso total Kg	28000	38000	56000	62000	70000	
Cross Weight	27-37	30-50	33-56	40-60	60-75	
Hourly Production	0/30 mm tm/h	80-150	120-210	150-300	200-400	300-600
	0/150 mm tm/h	125-250	300-450	400-650	650-1100	1000-1500

## ATTRITION WASHER DRUM



### DESIGN

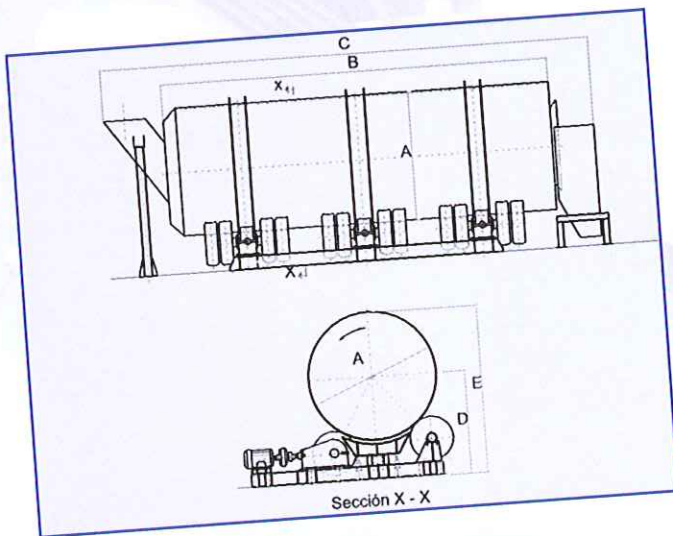
The cylinder is made of laminated steel plate, designed to withstand loads and abrasion, the removable inner lining is made of steel or reinforced rubber.

The shell comprises a set of raising and move forward blades allowing cascade stirring and pulp forming.

Supporting and driving are ensured by a set of driven supporting mechanisms which are independent, either equipped with standard tyres, or roller mounting with chain drive.

### SOME ADVANTAGES:

- Performance without vibration and noises, due to the assembly on tyres.
- Reduced maintenance cost and long life, due to the assembly on tyres.



Type (0)	Power (kW)	Weight empty (kg)	Weight Loaded (kg)	Max particle size (mm)	Consumption water (m³/h)	Capacity (T/H)		Dimensions				
						4 min.	1,5 min.	A	B	C	D	E
CM 06.02	1.1 (1)	900	1100	60	10	2	5	600	2000	3200	600	800
CM 11.03	4.0 (1)	2000	2700	110	50	10	25	1100	3000	4200	1000	1400
CM 14.04	11.0 (2)	5000	6900	150	100	20	50	1400	4000	5300	1300	1800
CM 16.04	15.0 (2)	7100	9600	170	150	30	75	1600	4000	5300	1500	2100
CM 18.05	22.0 (2)	8900	12700	190	200	40	100	1800	5000	6400	1600	2400
CM 20.06	33.0 (3)	12400	18200	210	300	60	160	2000	6000	7400	1800	2600
CM 22.07	44.0 (3)	18000	26100	230	450	80	220	2200	7000	7400	2000	2900
CM 25.08	74.0 (4)	23600	35800	260	650	120	330	2500	8000	9500	2250	3400
CM 29.09	111.0 (6)	35200	61800	300	1000	190	500	2900	9000	10500	2600	3900
CM 33.10	180.0 (6)	46000	73100	350	1500	270	720	3300	10000	11500	2970	4400
CM 37.11	240.0 (8)	57800	94700	390	2000	375	1000	3700	11000	12500	3330	4900

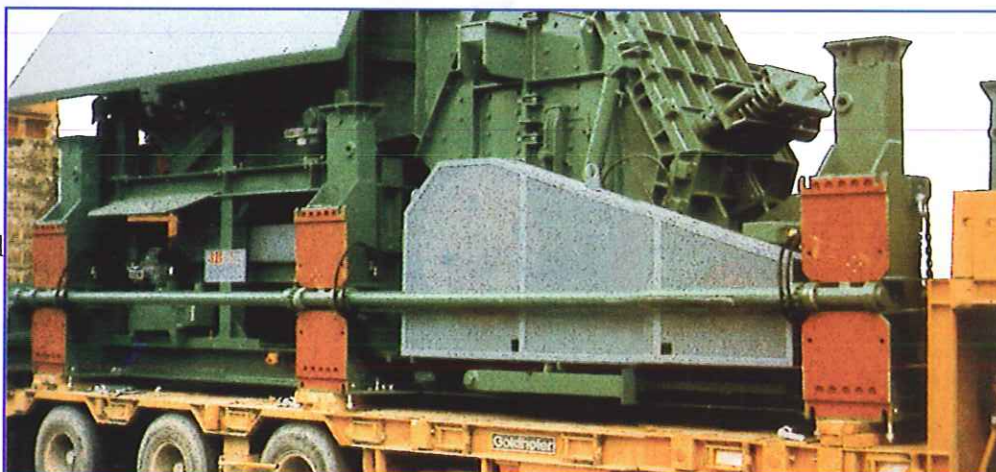
## MOBILE GROUPS



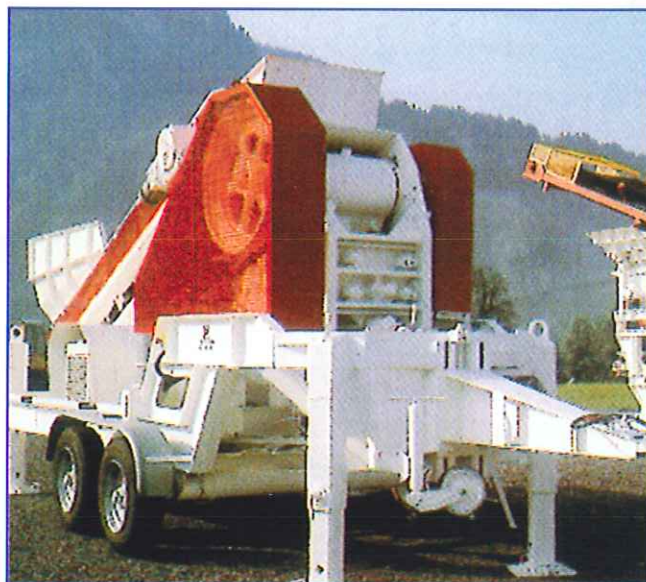
A typical mobile group is composed of a series of belt conveyors that feed classified products to a receiving hopper. In sequence, this machinery connects to a jaw crusher and a pre-screening device. If separation and diversion of rejection-type materials is required, additional belt conveyors can be deployed.

The portability of a mobile group makes it useful in situations that require adaptation to changes in the location of the work. The ever changing front of a mine's advance and the progression of road and motorway construction are excellent examples of mobile group application.

A new application utilising mobile groups is found in solid-waste managing systems. They are particularly effective in transporting, reducing and sorting solid materials in an ecological friendly way, as concerns for environmental and economic efficiency become important to the design, construction and operation of these facilities.



The Groups can be "Mobile", over caterpillar or rubber wheels, or "Semi-Mobile", which are sometimes adapted to the homologated dimensions of a container. The latter can be transported by special trucks which make this kind of work.



DIESEL OR ELECTRICAL MOTORS		
Mobile Minigroup	600 x 400	40 T/H
Container Group	800 x 400	80 T/H
Mobile suppourting group	1000 x 750	175 T/H
Group over skid	1200 x 900	350 T/H



# COMSPAIN XXI, S.A.

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