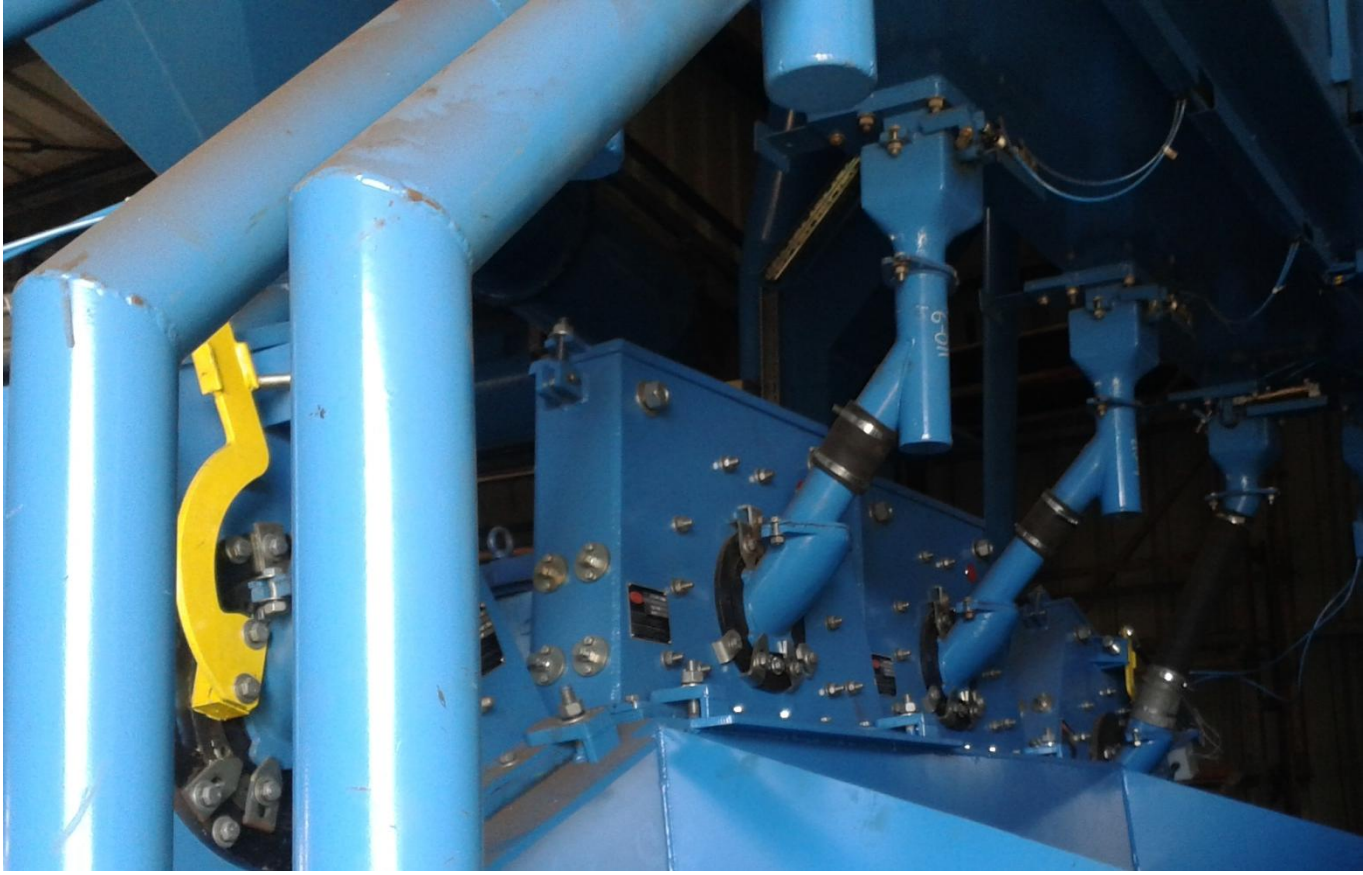
TECHNICAL BROCHURE



Cym Blast Wheel Units

Blast wheel shot blasting is the most economical method among the current cleaning techniques, as well as the one that minimizes environmental impact. The shot blasting principle is based on the use of kinetic energy from the abrasive used when it impacts the surface of the piece, removing impurities. The performance of the equipment depends on the quality, quantity, speed and direction of the shot; these last three factors depend entirely on the correct operation of the blast wheels.

The wheel is the heart of the machine, and has decisive influence on the effectiveness of the work performed, the appearance of the blasted surface, the production costs and thus the profitability of the process.

Operation Principle:

The operation of blast wheels is similar to that of a fan or a centrifuge pump. The wheels throw the abrasive through centrifugal force in a determined direction,speed and amount.

The abrasive enters the wheel through the down comer elbow or feeding bushing, from the storage hopper. The impeller provides an initial acceleration of the shot, pushing it through the opening of the control cage. Then the shot continues toward the vanes or blades. The shot is thrown by the latter, through centrifugal force, until it reaches the pieces to be treated.

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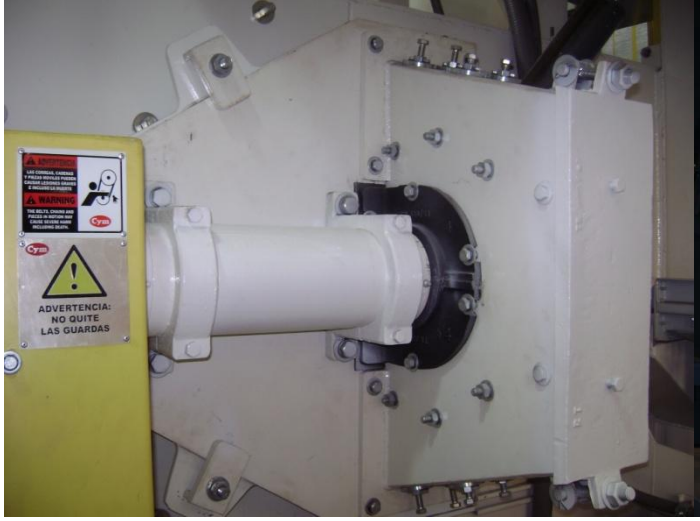
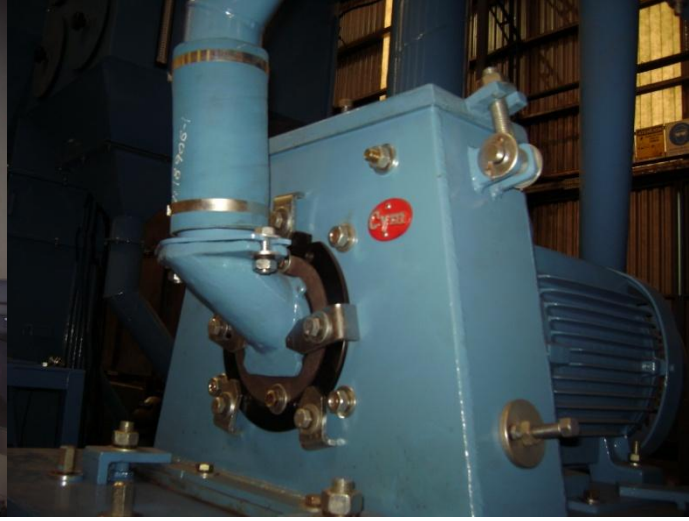




Shot blasting machines can use multiple wheels located in such a way that they allow the abrasive to cover the whole surface of the items to be shot blasted. The number of wheels mounted on a machine is determined by the shape and size if the items to be cleaned. The shot blasting power installed is usually what is required to achieve the desired surface finish in one process at an adequate speed.

It is necessary to perform periodical adjustment to the wheels, which should not exceed 50 service hours. If the wheel is scheduled for intensive service, it is convenient to have a spare complete unit, in order to minimize system downtime

Wheel blast Models

Cym Materiales has a wide range of wheel models available, which can be tailored to each customer's specific needs. The different wheel models are the following:

- Seven Wheel models of 166, 250, 300, 360, 380, 500 y 600 mm diameter
- Wheel operation with a power ranging from 4 HP to 150 HP.
- Shot flows between 40 kgs to 1500 kgs of abrasive per minute.
- Shot velocities ranging from 50 meters/second to more than 110 meters/second
- Three different blade widths: thin, standard and wide
- Control cages with 20°, 30°, 40°, 50° and 60° shot openings
- Two types of wheel operation,
    - Direct coupling of the motor to the wheel
    - Indirect coupling interface between motor and wheel
- Two different models of wheels
    - Monoblock Wheel for models TR 166, TR 250, TR 300 and TR 360
    - Steel wheel with interchangeable blades for models TR 380, TR 500 and TR 600

Model		TR-166	TR -250	TR -300	TR 360	TR-380	TR-500	TR-600
Diámetro de rueda		166	300	300	380	380	500	600
Tipe of Wheel		Monoblock		Monoblock and Interchangable blades.		Interchangable Blades.		
Number Of wheel		4	6	6	6	8	8	12
Blades with(mm)	Thin	-	-	-	-	24	35	-
	Standar	30	66	66	66	59	59	59
	Wide	-	-	-	-	122	122	-
Power (HP)		4 a 7,5	4 a 30	4 a 30	4 a 30	15 a 100	15 a 150	30 a 75

SHOTBLASTING OPERATION

Shot direction

The efficiency of the shot blasting treatment diminishes considerably if the shot pattern is not adequately positioned over the item to be treated. In addition, this flaw creates excessive wear of the machinery parts subject to unnecessary impact.

When propelled by a wheel, the abrasive creates a particular shot pattern establishing an effective zone (hot spot). In some cases this zone can concentrate over 60 % of abrasive thrown by the wheel.

The projection cone is determined by the position of the control cage opening. The location of said cone and its effective zone can be controlled by placing a steel sheet, preferably whose width does not exceed 1 millimeter, supported by a rack to avoid deformation the shot blasting. The rack containing the steel sheet is placed on the spot occupied by the pieces to be treated. After shot blasting it for around 30 seconds it can be determined whether the blasting cone is properly set.

Repeat the operation turning the control cage to the right or left in two or three different positions until the ideal blast pattern is established. Once achieved, secure the control cage firmly to avoid movement during the operation.

Note: The shot cleaning system should guarantee a balanced Operational Mix is maintained during the system operation, which means the distribution of shot quantity by particle size responds to a single curve.

This is of crucial importance in that a variation in the mix also involves a change in the position of the abrasive shot blast pattern projected

Ref 1: Shot blasting with an operational mix with an excess of coarse particles
Ref 2: Shot blasting with a balanced operational mix
Ref 3: Shot blasting with an operational mix with an excess of fine particles

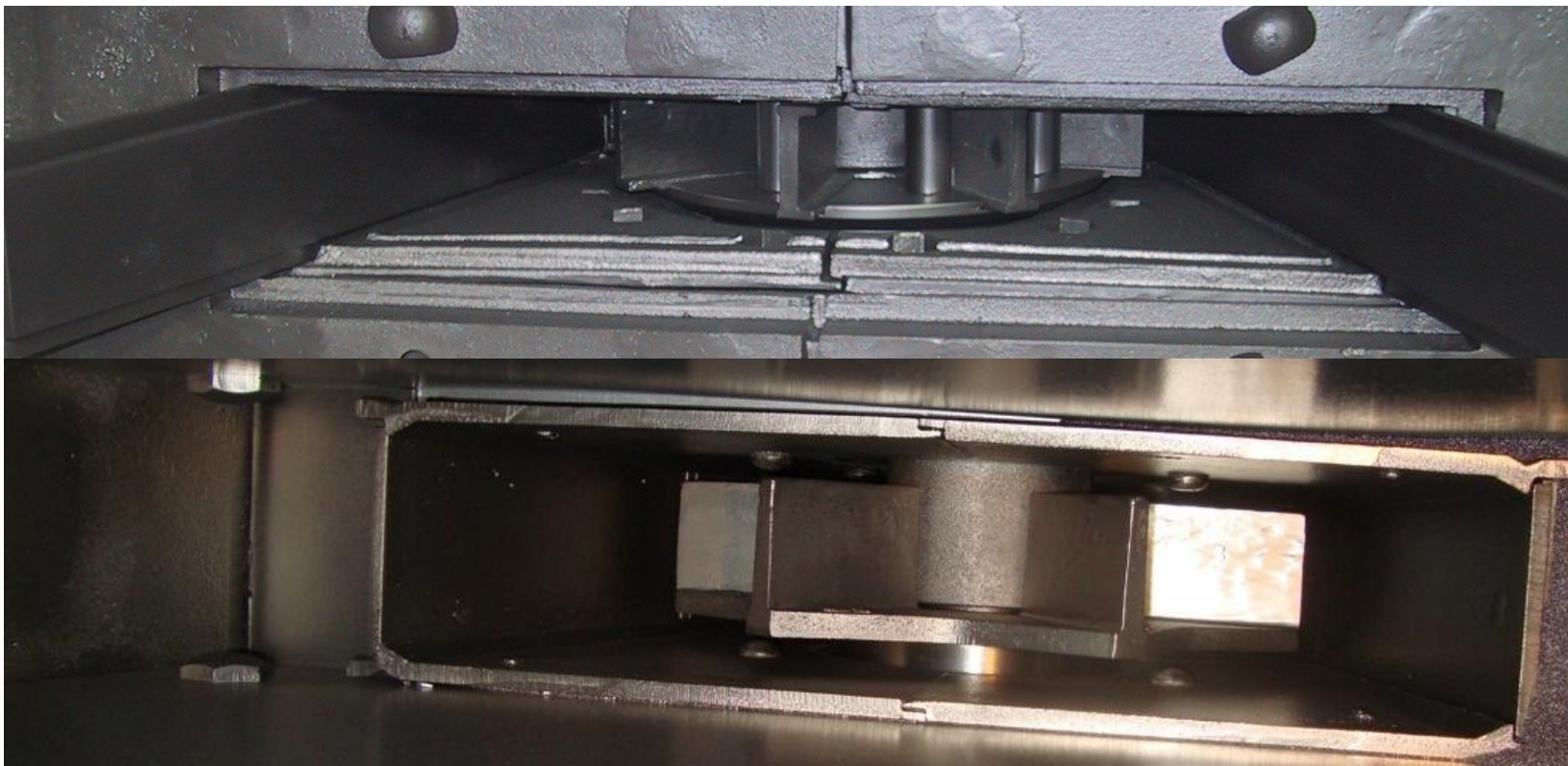
As is well known, a badly regulated abrasive mix, which is not projected directly over the pieces to be treated, radically increases process times, and also speeds up the wear of the areas adjacent to the blast cabin

Wheel blast loading

Shot blasting efficiency can be maintained only if the wheel works with the maximum abrasive flow. The shot amount thrown by a wheel is proportional to the amount electric current driving the blast motors

Therefore, to achieve maximum machine efficiency, the wheel must propel the necessary amount of shot to allow the motor to operate at full power and therefore maximum amperage. That is why the ammeters for each wheel are used - to detect abrasive flow reductions

The example below illustrates the problem this entails: A 15 HP motor connected to 380 Volts of a 350 mm diameter wheel uses 11 amperes without shot and 23 amperes at full load (these rates vary according to the motor). That means that only 12 amperes are used in the form of useful work (throwing shot). If the motor is loaded in such a way that it only uses 20 amperes, the unused capacity of the wheel will be 25%. In other words, the wheel will throw 25% less abrasive than it can throw, which means the shot blasting process will increase in proportion to that flow.



In addition, the three phase induction motors used operate less efficiently at a reduced load, and their power factor is extremely low in these cases. A simple control can be performed to determine the reason for the decrease in the wheel amperage:

1) If the amperage is correct when the flow valve is opened, and decreases after a few seconds, the reasons can be twofold:

- Inadequate amount of shot in the circuit. It is recommended the external shot hopper be filled to it's maximum level.

Flow valve is open excessively, which creates an obstruction at the shot downcomer elbow. The best feeding condition occurs when the abrasive enters the impeller without becoming obstructed at the elbow.

2) If the amperage never reaches its correct value when the flow valve is opened, this can be due to the following reasons:

- An obstruction at the feeding pipe.
- The flow valve is not opened correctly.

IMPORTANT: for the shot blasting process to have a constant quality and to achieve maximum production, it is crucial to maintain maximum, 100%, wheel amperage at all times.

VERIFICATION AND CONTROL OF WHEEL BLAST COMPONENTS

The liners, blades, impeller, elbow, etc. are made of crome/molybdenum alloy, highly resistant to abrasion and wear. Inlet components have a higher service duration than the blades. The level of wear of these elements should be checked each time the blades are replaced.

To verify the condition of the wheel parts, proceed as follows:

• Remove the shot feed spout.
• Use the Allen key to remove the screw that checks the impeller and remove the latter.
• Remove the control cage.
• Remove the centering plate
• Remove the housing cover
• Remove the top liner.
• Remove the blades

Feeding tube and feed spout

Verify that there are no perforations of any kind. We recommend mounting again the feed spout containing the rubber seal ring to avoid shot leaks.

Blades

The vanes should be checked periodically since they are the part of the wheel subject to the greatest wear. Inspection of the blades can be performed from the inside of the machine or by removing the housing cover and top liner.

The blades should be changed when their minimum thickness reaches 4 millimeters. Blade wear is not always even, which results in an imbalance of the wheel. To avoid vibration, the complete blade set must be changed.

Wheel coupling flange

Visual inspection of the flange is recommended each time the blades are changed, if the wear is considerable, the balance should be verified by running the wheel only, without the blades, replacing the coupling flange if necessary.

Wheel

Visual inspection of the wheel and the flange is recommended each time the blades are changed, if the wear is considerable, the balance should be verified by running the wheel only, without the blades. If necessary, remove the flanged wheel and balance dynamically.

Impeller

It should be replaced when the bridges are worn. Working with an excessively worn impeller may diminish performance and may cause wheel vibrations. Once the impeller is mounted again, adjust the Allen screw firmly with a Grower washer.

Control cage

The control cage determines the shot direction through the position of its opening. The opening lip will wear through use. This brings about a change in the shot direction and a premature liner wear. The admissible wear for the control cage is 4 to 6 mm, when it becomes convenient to change it. For mounting, note that the cage has a reference notch located over the lip; position it according to the Hot Spot trial, and firmly adjust the two screws of the frog clamps that support the control cage to avoid its subsequent movement during operation of the machine.

Liners Housing

Remove the housing cover and the top liner to see the inside of the housing. Check for the sides fixing bolts and the bushings proper condition.

Check the condition of the end, front and top liners. The protections should be changed when they are 3 mm. thick in the worn out section, to avoid damage the housing.

It is important that the sockets are tightly locked when the liners are reassembled to prevent the shot from damaging the housing.

Recommendations

- Verify that the assembly of the new parts (impeller, etc.) is not affected by wear.
- When working on the wheel cabinet, remove any shot residues with pressurized air to avoid the potential deformation of the threads in screws and nuts.
- Check that the wheels can be easily hand-rotated.
- Regulate the flow valve opening to ensure that the wheel motor amperage reaches the nominal value (wheel load).
- Regulate the wheel shot blast direction.
- To enhance the useful life of the parts (liners, blades, etc.), maintain shot blasting effectiveness and avoid excessive shot consumption, it is important that the dust separation system and the used shot extraction work correctly. The presence of 1% sand or dust in the used shot diminishes part useful life by 50%.
- Keep the shot operational mix constant to avoid variations in the abrasive blast direction.

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