GritSablare®
Sustainable Solutions for Blasting & Cleaning

Modern Technologies & Innovation with Custom-Made Blasting Wheels

GritSablare • (+4) 0722.279.481 • office@gritsablare.ro • www.gritsablare.ro

Phone: +4 0722 279 481
+4 0725 984 004
Email: comercialgritsablare@gmail.com
Web: www.gritsablare.ro

GritSablare: About Us

GritSablare is a Romanian leader in blasting field and provides a complete solution for any type of blasting application: ecological and non-toxic blasting media, professional blasting equipment for small and also large blasting applications, blasting protective equipment, and also air compressors for blasting applications.

We are actively involved in finding new competitive solutions with our partners, to provide the latest technologies in air compressors for our clients, at an optimal price-quality ratio, but also with the guarantee of a fast response in case of equipment failure, for units of equipment purchased from our company.

Since our establishment, we pursued the leadership position in blasting and cleaning solutions, so our clients could find the best solutions and technical expertise for every blasting requirement. We have so many ideas, so much will, that is impossible not to succeed!

Introduction to Airless Blasting

INTRODUCTION

Machines for airless blasting come in a wide variety of styles and perform many applications in different ways. Ranging from tumbling in a barrel or traveling on a conveyor to spinning on a hanger or rotating on a table. Though different in many ways, they all propel the abrasive without air.

The airless blast wheel is the "heart" of these abrasive blast systems.

The centrifugal "airless" wheel has an internal impeller and vane design which "throws" the abrasive at the parts.

The blast wheel acts much like a pump. The blast wheel impeller and vanes are revolving at approx. 3600 RPM and propels the abrasive from 250 to 300 feet per second.

A number of wheel designs have been developed over the years with current models providing the best combination of features for smooth abrasive flow, a tightly focused blast pattern, and controlled impact energy.

AIRLESS BLASTING INSTALLATIONS

- Endless Belt Airless Blast Machine
- Table Type Airless Blast Machine
- Spinner Hanger Airless Blast Machine
- Barrel Type Airless Blast Machine
- Conveyor Type Airless Blast Machine

Airless Blasting Systems: Blast Wheels

BLAST WHEEL

Most modern blast wheels today are of the centre fed, centrifugal design, usually incorporating 8 vanes. This type of wheel is sometimes referred to as a “slider” type, as the abrasive slides down the face and off the tip of the vane. This distinguishes it from the older style “batter” type wheel, so called because the action of the wheel is similar to a bat hitting a ball.

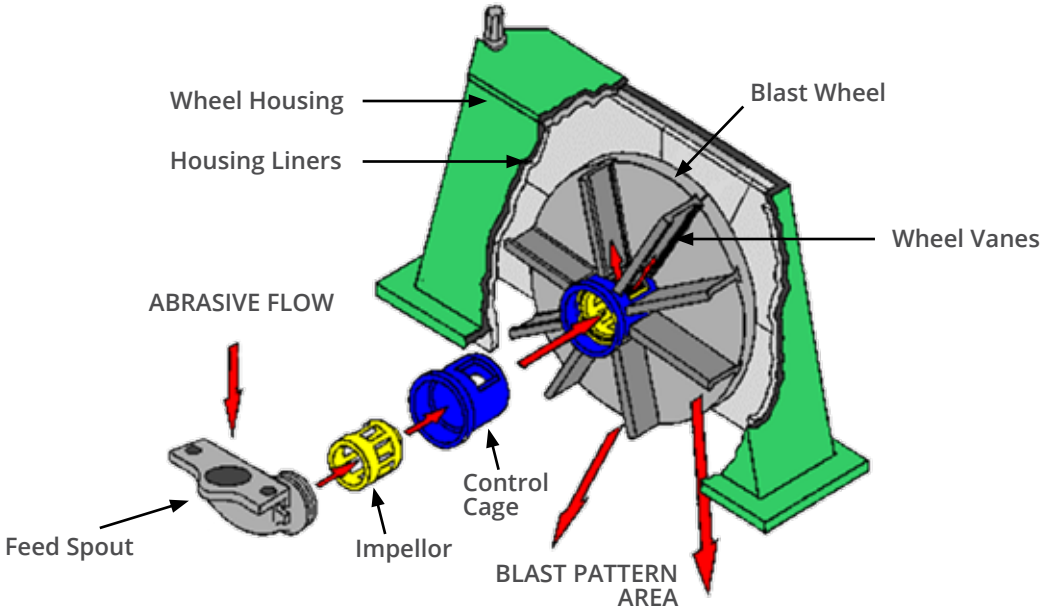


Fig. 1: Blast Wheel: exploded view

- A slider type, center fed blast wheel has the abrasive fed into the centrally located impeller. The impeller has small slots which pick up the abrasive and give it velocity and centrifugal force.
- The abrasive collects around the periphery of the impeller, because of a case which encloses the impeller except for one rectangular opening.
- When the small vane sweeps past the opening, the slug of abrasive that has been collected on the slot moves out through the opening.
- It is then picked up by the blast wheel propelling vane and accelerated at the final discharge velocity.

NOTE: The final velocity is determined primarily by the wheel RPM, wheel diameter and vane configuration.

BLAST WHEEL IMPELLER

- When in good condition, each impeller vane "leads" each wheel vane by approx. 6mm.
- This timing is achieved by locating pins or lugs which engage with the wheel runner head or centering plate.
- This lead serves to deliver the abrasive onto the front face of the of the blast wheel vanes, rather than on the bottom or inner end.

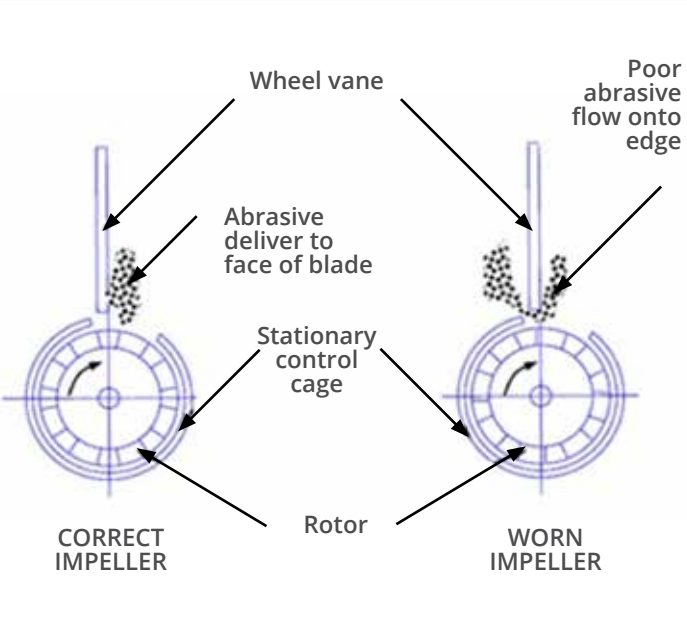


Fig. 2: Impeller

- When this lead is lost by impeller wear, some of the abrasive strikes the end of the vanes or goes behind them, causing abnormal wear to the vanes as well as disruption of the blast pattern.

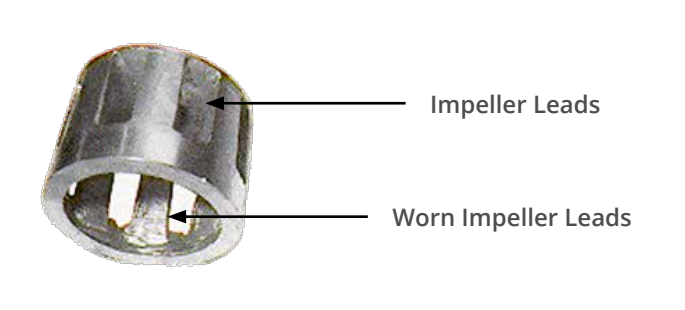


Fig. 3: Impeller Leads

BLAST WHEEL SIZES

- Blast wheels are available in many different diameters, some as small as 250 mm, and up to 530 mm for large 75 kW wheels.
- The vane width will also vary with the blast wheel diameter, ranging from as little as 25 mm wide, up to 150 mm wide.
- Generally, a smaller diameter blast wheel will have a wider blast pattern than the larger diameter wheels, and assuming they are operated at the same speed, a larger wheel will impart a higher abrasive velocity than a smaller wheel.
- For example, a 13” wheel operating at 3000 rpm will achieve a velocity of 210 feet per second, while a 15” wheel at 3000 rpm will achieve a velocity of 250 feet per second.

BLAST WHEEL VANES

- Most blast wheel vanes are of the straight type, however the “Curve Vane” is, as the name suggests, a curved vane. This curve further accelerates the abrasive as it slides down the vane face, thus increasing the abrasive velocity as it leaves the wheel.
- Taking the previous example, a 13” Curve Vane wheel will have an abrasive velocity of 250 feet per second, instead of the straight vanes 210 feet per second.
- The main advantage of Curve Vane system is that it allows lower rotational speed of the wheel while still maintaining the abrasive velocity, and lower wheel speeds give reduced noise levels.
- Assuming the application does not require a higher velocity, the 13” Curve Vane can operate at only 2550 rpm and still achieve 210 feet per second velocities.

BLAST WHEEL DRIVES

- There are 2 ways to drive a blast wheel, direct drive or belt drive. Direct drive refers to mounting the blast wheel directly to the motor shaft, while belt drive uses a vee belt drive to power the blast wheel, via a spindle bearing arrangement.
- Direct drive systems are cheaper than belt drives, as there is no requirement for a spindle assembly or belts and pulleys, however they are limited in operation to the rotational speed of the motors, ie: 2 pole speed (2990 rpm) and 4 pole speed (1440 rpm) in Australia.

Fig. 4: Direct drive

Fig. 5: Belt drive

THE BLAST PATTERN

- Unless the abrasive being thrown directly strikes the parts, it cannot clean properly. Blasting efficiency is therefore greatly affected by the percentage of abrasive thrown onto the work, which is primarily determined by the position of the impeller case.
- The impeller case, or control cage, is a sleeve which fits around the impeller.
- The impeller is cast with blade slots that resemble those in the wheels itself, although much smaller in size. The impeller is attached to the same drive shaft that powers the wheel. It receives the abrasive from the feed spout and propels it towards the vanes of the blast wheel.
- The abrasive fed to the vanes is controlled by the size and shape of the control cage opening.

"HOT SPOT"

- **The concentrated area of abrasive is usually referred to as the "hot spot",** because a stationary target plate located directly in the blast stream for 30 seconds or longer will actually become hot in the area where the impact of abrasive is most heavily concentrated.
- **The abrasive "hot spot" is adjusted by rotating the control cage,** either clockwise or counter clockwise, which alters the point at which the abrasive from the impeller enters the wheel. This then changes the point at which the abrasive leaves the blast wheel, thus moving the blast pattern.

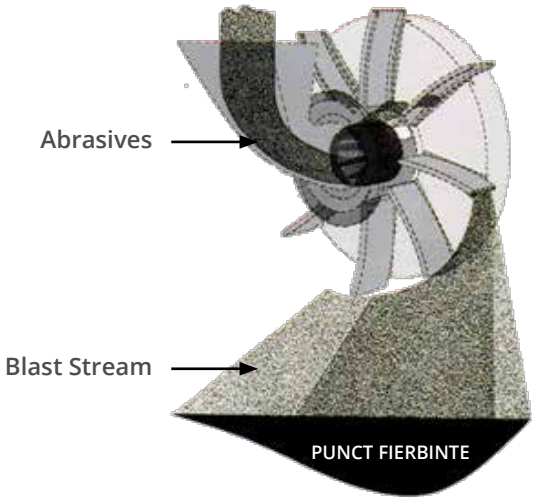


Fig. 6: "Hot spot"

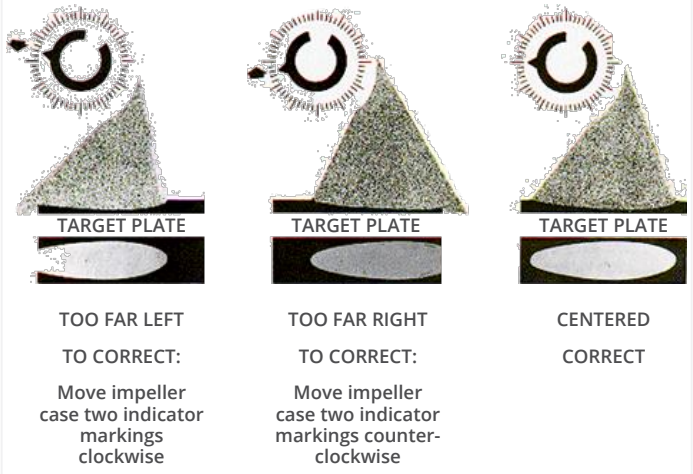


Fig. 7: "Hot spot" adjusting

WORN WHEEL PARTS

1. Wear on any or one of the wheel feed components, that is the impeller, control cage or wheel vanes, will cause movement of the blast "hot spot".
2. Wear on the control cage (opening increasing) will tend to move the hot spot towards the tail stream.
3. Worn or pitted vanes will also tend to move the hot spot towards the tail stream.
4. Use of grit instead of shot will tend to move the hot spot towards the tail stream.
5. Increasing the wheel speed will to move the hot spot towards the head stream.
6. Decreasing the wheel speed will tend to move the hot spot towards the tail stream.

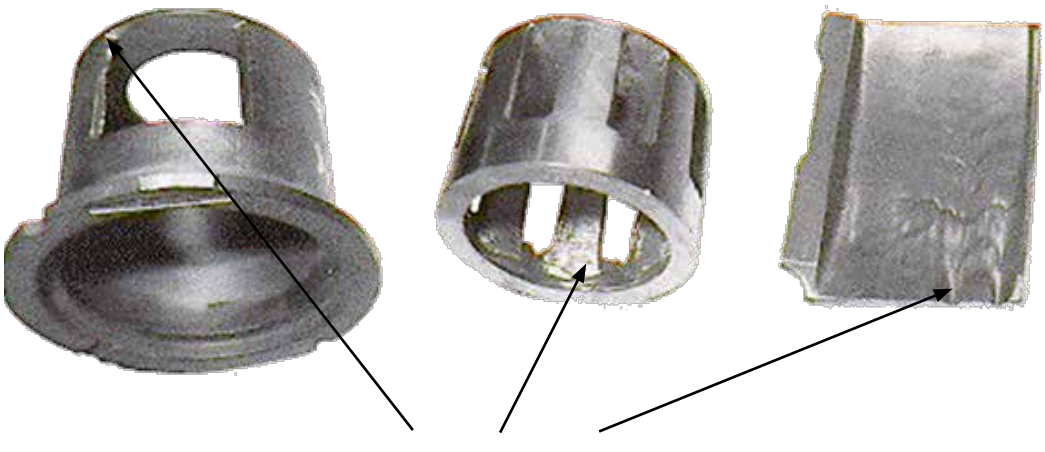


Fig. 8: Worn Wheel Parts

CASE STUDIES:

NOTE 1: ABRASIVES BEING PROPELLED

As a general rule of thumb, any blast wheel will throw at the product around 1600 lbs. of abrasive per horsepower per hour, or 1000 kg per kilowatt per hour (1hp = 0.75 kW).

For example:

- A 10 hp wheel will throw 16,000 lbs of abrasive per hour
- A 7.5 kW wheel will throw 7,500 kg of abrasive per hour

The volume of abrasive thrown is directly proportional to the cleaning rate of the machine.

NOTE 2: CLEANING RATES

The actual cleaning rate of any blast machine must be calculated taking into account the product type, product surface condition, throughput and surface finish achieved.

From condition A or B steel, the following usually applies:

- To achieve Class 2 finish » 1.5 ft^2 / CP / min
- To achieve Class 2.5 finish » 1.25 ft^2 / CP / min
- To achieve Class 3 finish » 1 ft^2 / CP / min

As an example, to clean steel plate 5 ft wide to Class 2.5 at the rate of 3 linear feet per minute would be calculated as below:

5 ft wide x 3 ft x 2 (both sides of plate) = 30 square ft per minute

Therefore:

30/1.25 = 24 hp required

CLEANING RATES - EXPLANATIONS:

- The calculation so far assumes that the blasting efficiency is at 100%. That is all of the abrasive thrown will hit the product where we want it. This is obviously not possible, as most of the abrasive is concentrated in the blast “hot spot”, and the head and tail of the pattern will often not strike the product at all.
- Blast efficiency must be calculated for each individual application. In the instance of a flat plate, the blast efficiency will generally be good, in the region of up to 80 to 85%. For some applications, such as fabricated or rolled sections, the efficiencies can be as low as 40%, depending on the size of the product.
- Using the above example, 24 hp is required at 100% efficiency, but by the time the actual efficiency is taken into account, the actual total hp required will be 24/0.8 = 30 hp.

THE SPEEDLOCK BLAST WHEEL

The SPEEDLOCK Bi-directional blast wheel is one of our blast wheels. We provide other blast wheels types, which are suitable for particular blasting applications.

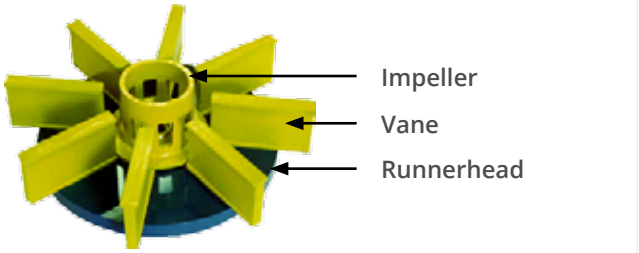


Fig. 9: SPEEDLOCK Blast Wheel

- The vane locking systems uses an “O” ring located in a groove around the centre of the wheel face. As the vanes are slid into the vane slot, the end of the tongue on the vane pushes up against the “O” ring. Once released, the “O” ring forces the vane back towards the outer edge of the wheel which engages the opposite end of the tongue in the vane locking horns.

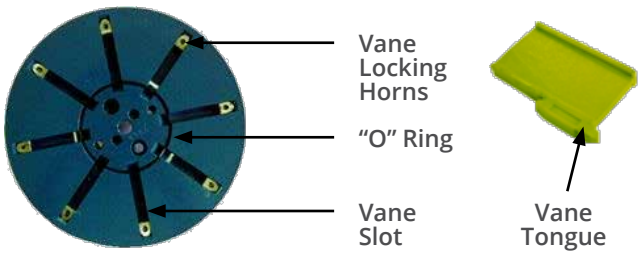


Fig. 10: Vane Locking System

- The bi-direction wheel is available in either 13” (330 mm) diameter configuration, or can be supplied with extended vanes, which increase the effective wheel throwing diameter to 15” (380 mm).
- When compared to double cheek blast wheels, the SPEEDLOCK wheel offers significant weight savings, and this can be used as a selling feature, because the reduced mass will absorb less power. The power saved can then be used to throw more abrasive at the product, thus increasing the efficiency of the system.
- The blast wheel is fitted to the motor shaft by way of a reverse taper lock arrangement, with the screws protected by the impeller during operation. Such a simple design makes the removal of the wheel reasonably straight forward.

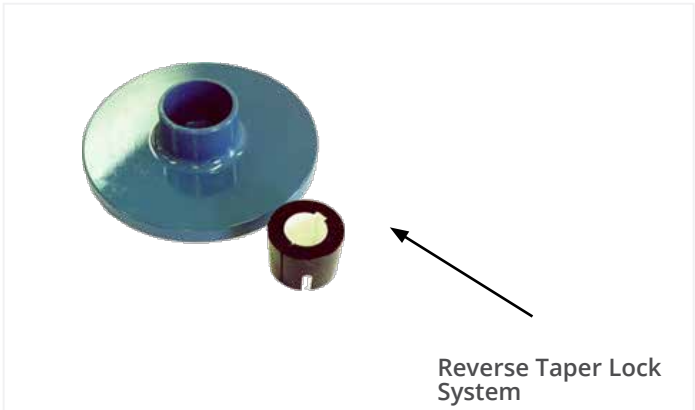


Fig. 11: Reverse Taper Lock System

Fig. 12: SPEEDLOCK - Exploded view

THE R370F BLAST WHEEL

R370F direct drive blast wheels are high efficiency direct drive units mounted on a heavy duty 20mm thick base plate with a cast iron frame TEFC flange mounted motor.

The maintenance design allows for many parts to be replaced without the need to remove the wheel hood. The cast wheel parts are hardened to HRC 60+ and all rotating parts are dynamically balanced. The blast wheel motor is protected from the abrasive by a Triple Seal System.

PRODUCT FEATURES:

- Available in a multitude of sizes and configurations to meet with all shot blasting machine requirements.
- Wheel Blades (Cast): Shell Molded 18-20% Chrome Iron Alloy with 1.5% Moly, hardened to HRC 60+.
- Wheel Blades (Machined): Alloy, precision machined and hardened to HRC 60+.
- Hood Liners: Cast 18-20% Chrome Iron Alloy hardened to HRC 60+.
- Blast Wheel: Machined Alloy hardened to HRC 60+ and dynamically balanced.
- Dispenser Housing: Shell Molded 18-20% Chrome Iron Alloy with 1.5% Moly hardened to HRC 60+.
- Dispenser: Shell Molded 18-20% Chrome Iron Alloy with 1.5% Moly hardened to HRC 60+.
- Feed Chute: Chilled Cast Iron.

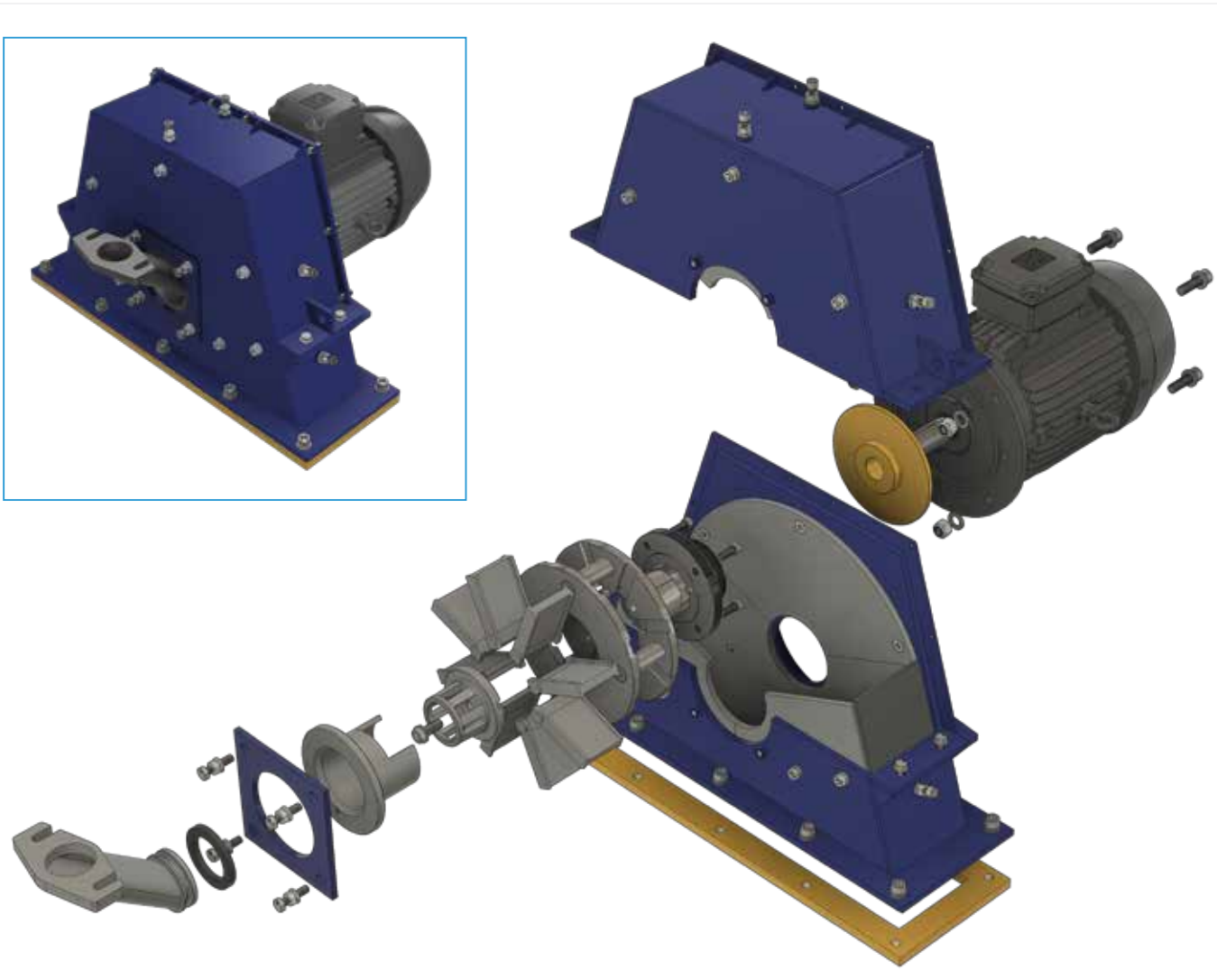


Fig. 13: R370F - Exploded view

THE BVM 366 BLAST WHEEL

High efficiency monowheel turbines model BVM 366 are suitable for all shotblasting plants to increase the yield of the treatment.

- Runner head diameter is 360 mm and is obtained by a singular disk where the components are assembled in easy way.
- The main feature is a large number six (6) big blades fixed to the disk by means of a quick joint.
- The shot spread speed is calculated in 82 m/min with RPM 3.000 route/minute.
- Steel made turbine body finished on CNC machines with all internal wear protection plates made of NI-HARD alloy of easy replacement to warranty a longer protection and duration of the components.
- Central feeding system with bushing to control the blasting spread direction with easy adjustable device.
- Direct-coupling electric motors with the runner head and settable by electronic inverter to regulate shot speed and shot flow.

MAIN COMPONENTS:

- Monowheel built in special steel 18NcD5.
- Nr. 6 big blades with quick joint built in two version: Ni-Hard (CH7) or in alternative Hard Steel K100.
- Centrifugal force by special cage in two version: Ni-Hard (CH7) or in alternative Hard Steel K100.
- Distributor settable shot direction in two version: Ni-Hard (CH7) or in alternative Hard Steel K100.
- Motor power from kW 7,5 up to kW 60.
- Speed and shot regulation by electronic inverter (option).

MOTOR POWER AND SHOT FLOW CAPACITY:

- kW 7,5 – kg/min 140
- kW 11 – kg/min 180
- kW 15 – kg/min 240
- kW 18,5 – kg/min 280
- kW 22 – kg/min 320

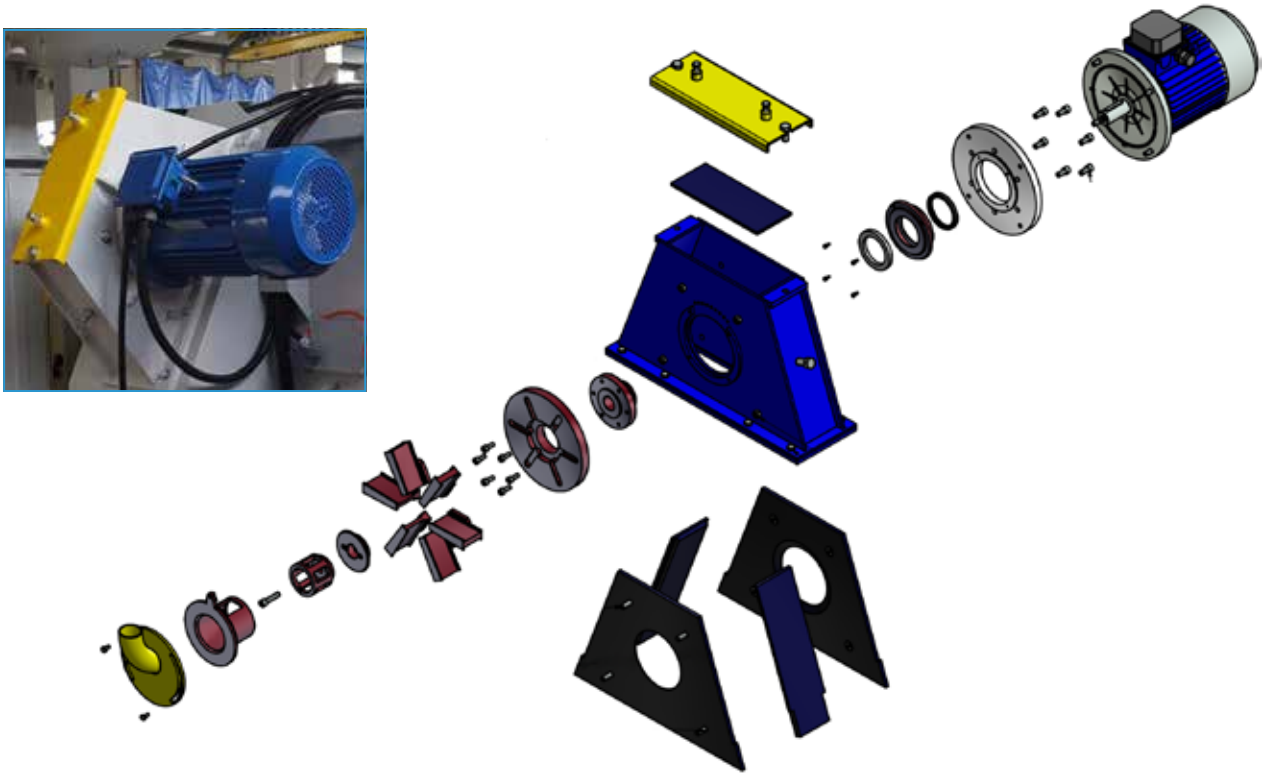


Fig. 14: BVM 366 - Exploded view

Airless Blast System Overview

MAIN COMPONENTS

Although the configuration will vary somewhat from machine to machine, all wheel blast systems are comprised of a number of main components with a key role for the blast wheel proper functioning.

1. The airless blast wheel, which throws the abrasive against the work to be cleaned in a controlled pattern.
2. The cabinet which confines the abrasive.
3. Some form of material handling system which presents the work to be processed to the blast wheel or wheels.
4. The abrasive recycling system, which cleans, conditions and returns the abrasive to a hopper for reuse through the wheel.
5. A dust collector and ducting system for ventilating the cabinet and operating the airwash separator.
6. Abrasives of a proper type, size and mix for the application.

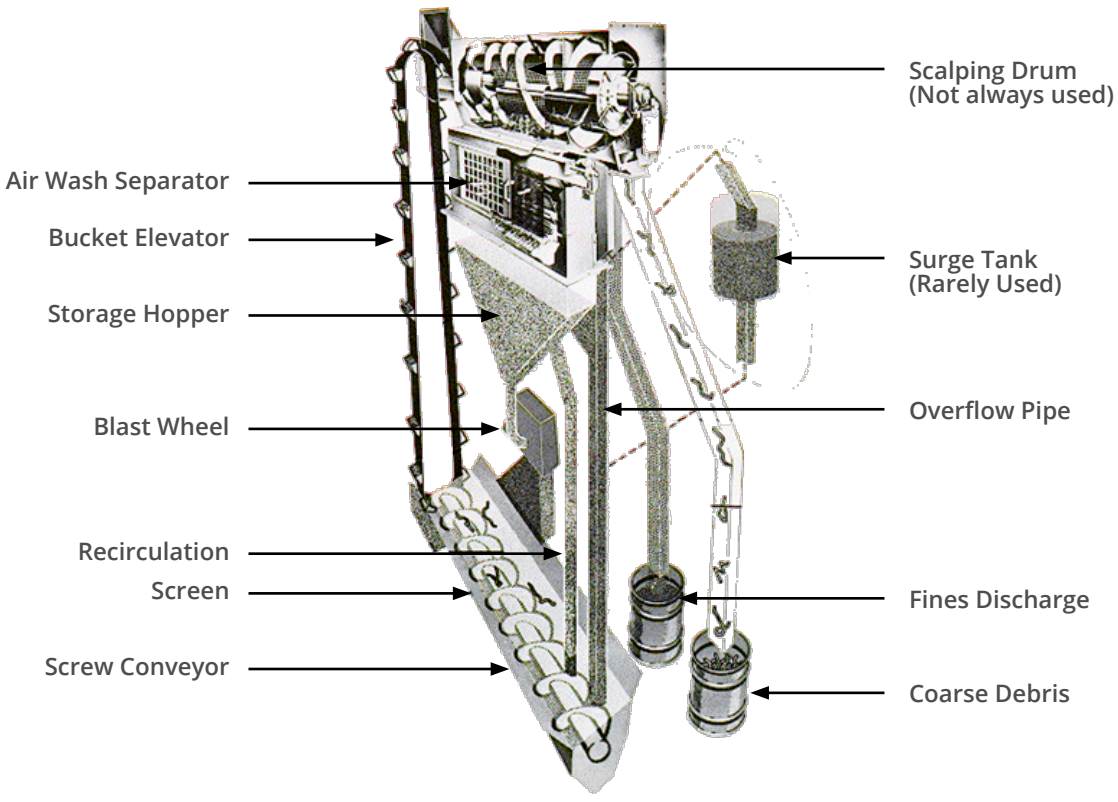


Fig. 15: Main components of an airless blast system

AIRLESS BLAST SYSTEM FUNCTIONING

In the simplest terms, the system works as follows:

1. Metered abrasive flows by gravity from an overhead storage hopper, through a feed spout and into a rotating impeller.
2. The impeller directs the abrasive through an opening in the control cage and onto the rotating vanes of the blast wheel.
3. The blast wheel throws the abrasive by centrifugal force against the work to be processed.
4. After striking the work, the abrasive falls into a recovery hopper along with contaminants such as sand, scale etc. which has been removed from the work being cleaned.
5. The abrasive handling system lifts the contaminated abrasive up to the airwash separator above the machine.
6. The airwash separator removes the contaminants and any abrasive particles that have become too small to be useful.
7. Cleaned abrasive is now returned to the storage hopper for re-use, completing the cycle.

CLEANING ABRASIVES – THE AIRWASH

- All wheel blast machines feature some type of airwash separator, and these are designed to remove sand, scale dust and broken down abrasive from the good re-usable abrasive. To ensure the rate and uniformity of the desired finish, the size of the abrasive particles and the contaminant levels must be carefully controlled.
- Even a small amount of contaminant, such as sand or scale, will reduce the wear life of the wheel components.
- The simplest separator in the range is the single lip separator. This is a cost effective, simple separator, however it does the work reasonably well when compared to some opposition systems.

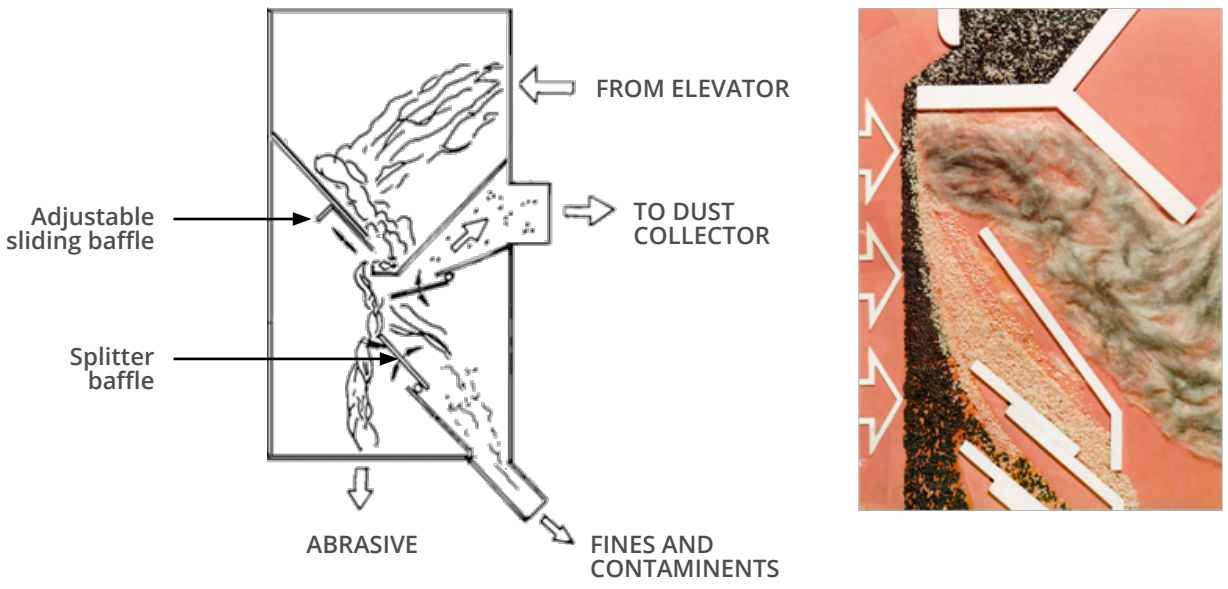


Fig. 16: The Airwash

BLAST CABINET WEAR PLATING

- The blast cabinet on an airless blast system serves 2 basic functions. Firstly, to encapsulate the flying abrasive, and secondly to mount the blast wheels in the required blast pattern.
- The most common type of cabinet construction is 6 mm mild steel plate, as it is both inexpensive and easy to work. The main drawback with using mild steel is that it will generally require the entire inner surface of the blast chamber to be lined with a wear resistant material, which is usually removable for replacement.
- In some instances, if the blast stream allows, wear plating will only be used in areas that are subjected to primary or secondary blast. This plating will be either 500 Brinell hardened steel plate, or if the area is small enough, cast Ni- Hard liners.

WORK HANDLING SYSTEMS

- All blasting machines will require some form of work handling system to both convey the product into and out of the machine, and to position it in the blast stream.
- The actual blasting of the product is usually a straight forward exercise, and the work handling is the area of the system which pose the greatest difficulties.
- Systems where there is only one product to be handled are the simplest, but more often then not, we are faced with designing a common system which can handle a wide range of differing products.

WORK HANDLING SYSTEMS TYPES

1. Table Machines
2. Satellite Tables
3. Endless Belt
4. Fixed Barrels
5. Overhead Conveyors
6. Roller Conveyors
7. Skew Type Rollers
8. Rubber Belt Conveyors

1) TABLE MACHINES

- Table machines can features a swinging table arrangement mounted on the door of the machine, while other arrangements of tables are a fixed table located inside a cabinet fitted with wide opening clamshell doors. This system is commonly used in foundries for blasting large castings one at a time and are also useful for de-scaling complicated steel fabrications.

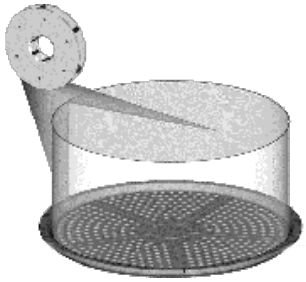


Fig. 17: Table Machines

2) SATELLITE TABLES

The Satellite table features a set of smaller tables mounted on a larger main table, with the smaller tables rotating in a satellite motion around the main table. This system system provides excellent blast coverage on each satellite table, and is useful for peening and semi-automated applications.

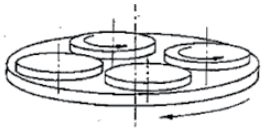


Fig. 18: Satellite Tables

3) ENDLESS BELT

- Endless Belt systems are extremely versatile, making them suitable for a very wide range of applications, particularly foundries, die casters and any product which can be tumbled easily.
- They are also suited to automated systems, as the product can be easily discharged, simply by reversing the belt rotation.

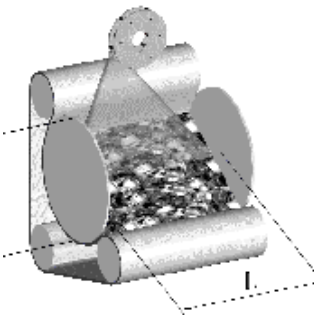


Fig. 19: Endless Belt

4) FIXED BARRELS

- The plain barrel machine, while having the advantage of being less expensive to manufacture, is not as versatile, and does not lend itself to automation.
- It is also not as suitable for cleaning single large components, which create a lot of impact as they tumble in the barrel.

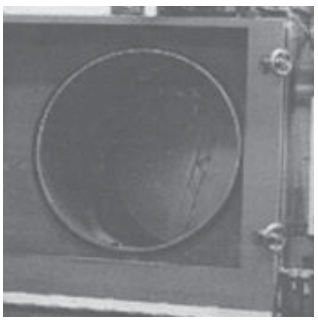


Fig. 20: Fixed Barrels

5) OVERHEAD CONVEYORS

- There is a multitude of differing types of overhead conveyor systems available today, ranging from continuous type, power and free type, and indexing type.
- The type of conveyor selected will depend on the product size, through put and finish requirements.
- Overhead conveyor systems are versatile, in that they can be fitted with rotating fixtures, which allow the product to be rotated in the blast stream, which provides extremely good blast coverage.
- Power and free conveyors are the most useful of all the overhead conveyors, but are also the most expensive.

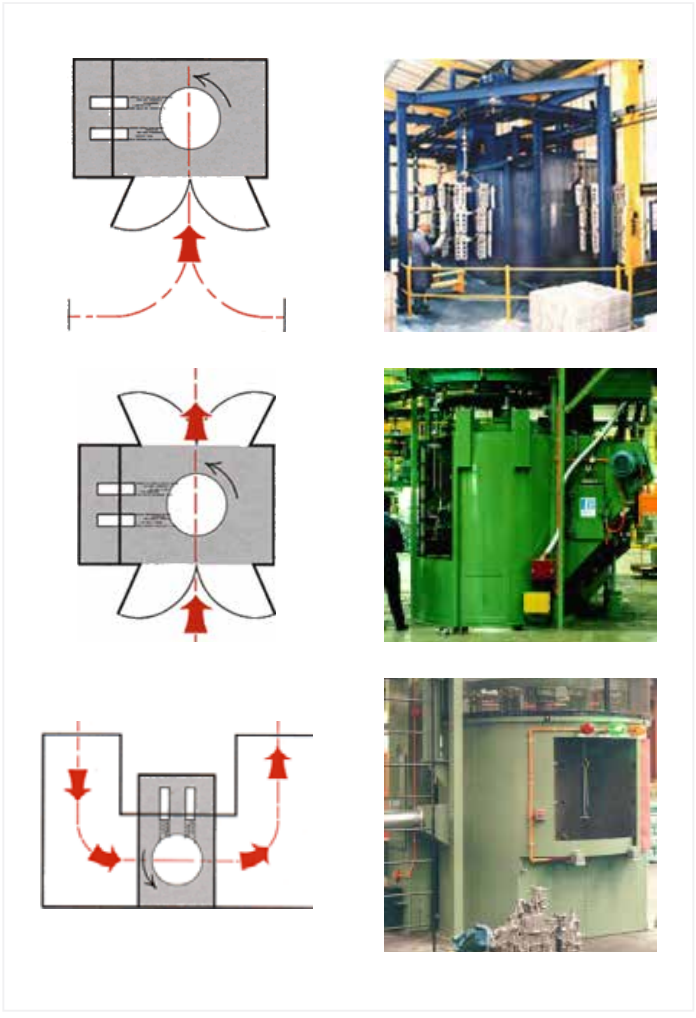
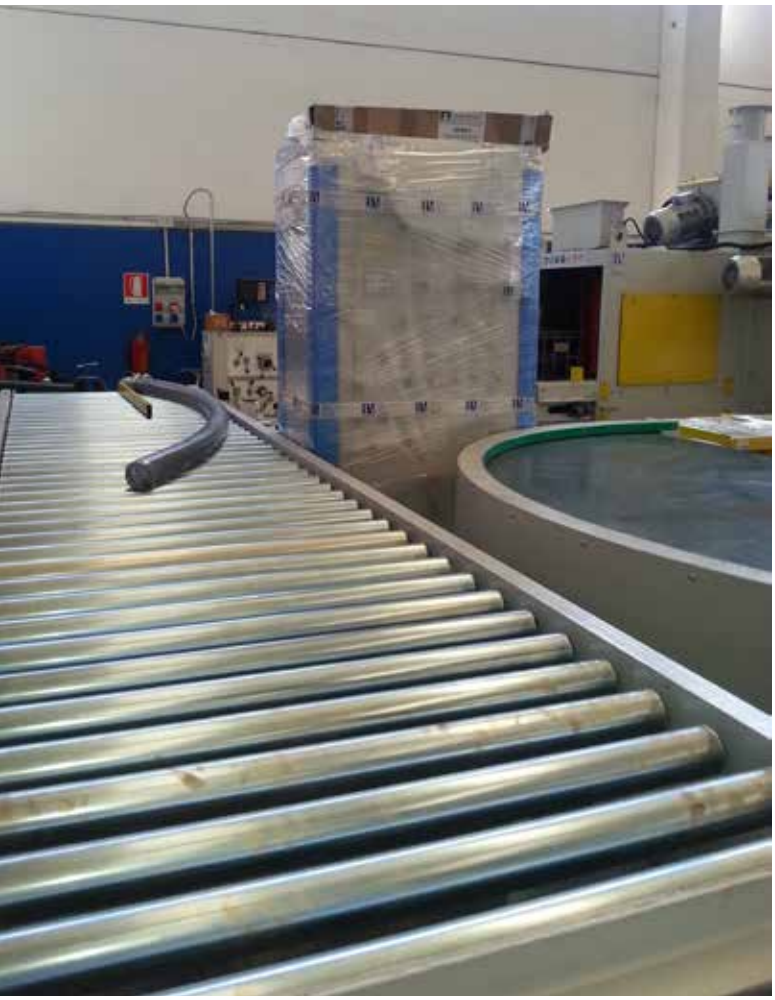


Fig. 21: Overhead Conveyors



6) ROLLER CONVEYORS

- Roller conveyors are ideally suited to plate and section de-scaling applications, as they provide good support and control of the product.
- These systems can be easily fitted with variable speed controllers which allow for differing finishes to be achieved.

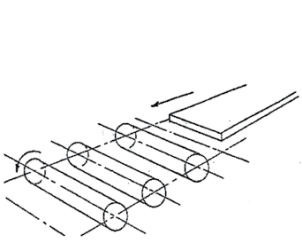


Fig. 22: Roller Conveyors

7) SKEW TYPE ROLLERS

- Skew Type rollers are best suited to pipe and bar cleaners, as they both rotate the product and convey it through the machine in the one movement.
- These systems can also be fitted with variable speed drives, and are also used for gas bottle cleaning applications.

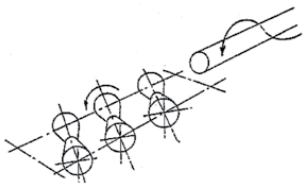


Fig. 23: Skew Type Rollers

8) RUBBER BELT CONVEYORS

- The plain rubber belt conveyor is a simple system which is suited to blasting one side of a product at a time, such as automotive wheels.
- It has the capacity to process a very wide range of product shapes and sizes, but is limited in it's blast coverage.

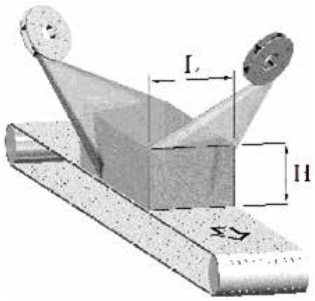


Fig. 24: Rubber Belt Conveyors

GritSablare®
Sustainable Solutions for Blasting & Cleaning

Table of Contents: