Modern Shot Blast Solutions for the Automobile Industry

Rosler Metal Finishing USA

New concepts for adapting manufacturing processes to a changing market environment

Two of the most important issues currently facing the automotive industry are:

- Reduction of vehicle weight for better gas mileage
- Shortening the times required to bring new vehicles to the market

The automobile companies are meeting theses challenges with a combination of new materials, new manufacturing processes and new vehicle designs. This article describes a few examples of innovative shot blast applications helping automotive manufacturers in reaching the above goals.

There is a constant conflict in car design between the customer's desire for increased safety and comfort on the one hand and safety and environmental regulations on the other hand. In this context the design and manufacture of lightweight vehicles plays an essential role in automotive engineering. Increasing raw material cost, shortage of resources, emission guidelines and recycling requirements are just a few topics that are forcing the industry to make the design and manufacture of light vehicles an essential part of their product strategy.

Since the 1980's, aluminum, with its low specific weight of 166 lbs/cubic ft (2.7 kg/liter), has been the most popular material for light car components, including car bodies. New developments by, for example the steel manufacturer Thyssen-Krupp, with high-strength multi-phase steel have led to light weight steel car bodies in 2004.

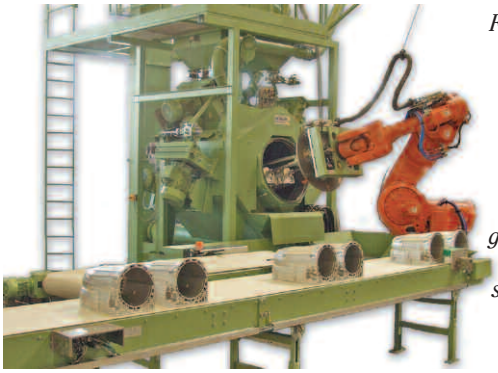
In recent years, many important engine components like crank cases, cylinder heads and sumps are produced as cast magnesium alloys. With a specific weight of 107 lbs/cubic ft (1.74 kg/liter) the use of magnesium can result in weight savings of up to 25% when compared with aluminum. These changing material specifications require flexible manufacturing systems and the introduction of completely new processing methods.

High-Performance Surface Finishing for Magnesium Bell Housings

A car manufacturer located in Southern Germany that had previously outsourced the shot blasting of transmission bell housings brought this process back in-house after a move from aluminum die castings to magnesium die castings. This move was made largely because of the need to speed up the production process while at the same time ensuring the highest possible levels of process stability.

This customer commissioned Rosler to design a highly efficient processing system for the deburring and surface finishing of the outer and inner surfaces of transmission bell housings. The Roboblaster RROB 800/1200-6 developed by Rosler met all of the customer's requirements for increased cost effectiveness and quality.

To achieve the tight cycle time of 26 seconds per work piece, the robot was equipped with a special gripping tool.



Fully automatic blast system for deburring and surface finishing of transmission bell housings. The double gripper can pick up two parts simultaneously.

The double gripper allows the robot to safely pick up and process two work pieces at a time. The bell housings are carefully moved into the blast chamber and rotate while being blasted. The patented cuff/seal system on the gripper ensures that the blasting chamber is immediately sealed off.

In the chamber, the bell housings undergo concentrated shot blasting for 20 seconds using six high-performance "Hurricane H40" blast wheels. Two of the wheels are mounted on the back wall of the booth in order to ensure that the interior of the housings is effectively shot blasted. During the parts loading/unloading step, pneumatically activated lids cover the blast wheel openings to protect against leakage of shot.

Surface Hardening of Stabilizer Bars

As already pointed out, reduction of vehicle weight is a key issue in modern car design. A lightweight construction is usually a combination of modern and innovative materials, design features and special manufacturing methods. In the case of stabilizer bars, a material change requires careful analysis of all safety implications and high stress loads this component is subjected to. A market leader in the production of chassis components utilizes shot peening to improve the structural strength and fatigue life of stabilizers made from manganese steel. Improved residual stress values allow a weight reduction and extend the product life span.

Stabilizers are a familiar component of racing cars, where they are used just like suspension units to make individual adjustments to the chassis. The stabilizers reduce body roll that occurs in hard cornering or under extreme changes of load. The result is more precise steering, a reduced tendency to dive in fast corners and improved traction.

The steel tubes, which are around 4 feet long and have an external diameter of 1 – 1.5" and a wall thickness of approximately 0.12 - 0.2", undergo a fully automatic peening process with a Rosler tube shot blasting machine (RDR 100) in a three-shift operation. Rosler has adapted the continuous flow system specifically to meet the customer's processing requirements. The line speed is around 10 feet per minute, which corresponds to a cycle time of 28 seconds for each stabilizer.

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This blasting machine is used to shot peen stabilizer bars made of manganese steel.

To ensure even and all-round blast coverage, Rosler utilizes a skew roller parts transport system which rotates the parts and moves them forward at the same time. A high-performance 30 HP H-42 Hurricane blast wheel is used to shot peen the bars.

After peening, the bars pass through a blow-off unit, where any residual abrasive is removed from the outer surface. An abrasive removal unit is used to clear the inside of the bars of any remaining shot, before they are passed on to a robot.

The machine is equipped with two dust collectors that ensure that the level of dust released into the air is kept low enough to return the clean air back into the building.

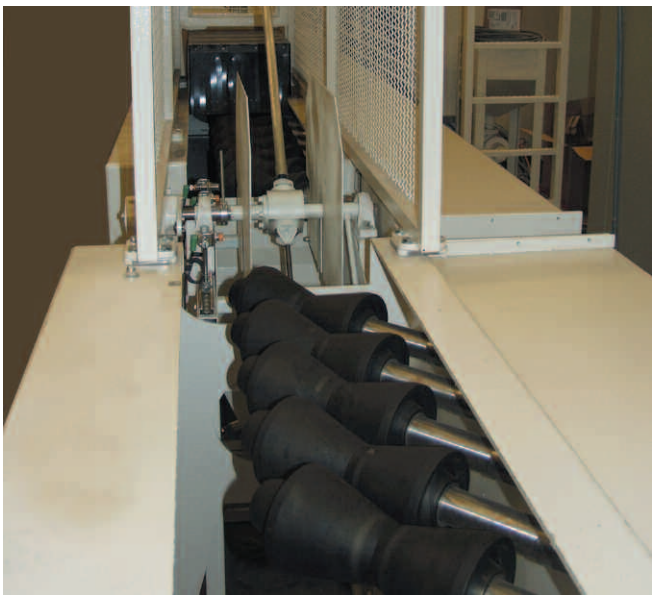
In order to keep noise levels at 83 DBA or below, the blast wheel has also been fitted with a soundproof hood.

Efficient Sand Removal

Aluminum is the undisputed leader of the lightweight materials used in the automotive industry. Aluminum components are generally produced as die- or sand-castings.

Sand castings must undergo a thorough sand removal as well as a general surface finishing. In order to automate the process of removing residual sand from a wide range of aluminum parts, and at the same time to ensure the best process stability, a well-known producer of sand cast aluminum components uses a continuous flow wire mesh belt machine (RDGE 800-4) from Rosler. This high-performance machine equipped with four "Hurricane" blast wheels removes not only residual sand from the parts but produces an all-round matte finish.

This particular automotive parts supplier needed a more cost-effective blasting system for this special task. As a result of the wide variety of parts being processed, too much manual labor was involved in loading and unloading the existing overhead rail machine and removing the residual abrasive.

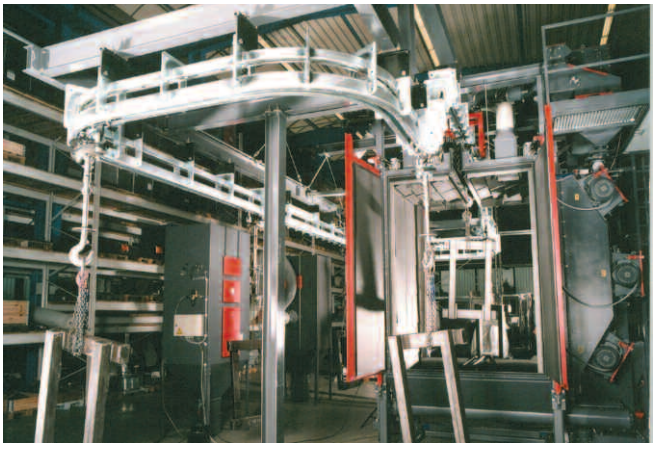


This skew roller conveyor moves the parts forward and rotates them at the same time.

The new continuous flow wire mesh belt machine is designed to optimize the sand removal process. In order to remove all traces of sand, the RDGE machine is equipped with an "intelligent" separation system in the form of a continuous flow rotating drum, which is designed similar to a tumble belt machine. This unique system not only tumbles the parts but also moves them forward at a constant speed. The tumbling mill consists of a large number of polyurethane rods which prevent part nicking and damage during the tumbling process.

Overhead Monorail Machine with Level Adjustment

A cast aluminum component manufacturer no longer uses a horizontal continuous flow system for shot blasting large parts. Instead, a continuous flow overhead rail system with level adjustment, seven hooks and up to 15 parts per hook is used to deburr and surface finish a variety of parts. The RHBD 15/20 T overhead rail machine was designed by Rosler for high-performance, continuous processing of sensitive or very large work pieces. It utilizes 3 blast wheels for intensive and fast blast cleaning. The machine can be integrated into an automatic production line and, because of the level adjustment mechanism, can easily be loaded and unloaded either manually or by robot. ●



Because of the height adjustment of the monorail transport system, this continuous overhead monorail blast system can be easily loaded, either manually or by robot.