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Best Practice

# Boosting Air-Blasting Efficiencies

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Because blasting productivity depends on numerous variables, including media size and type, operating pressure, nozzle-to-part distance, impact angles, etc., the right approach sometimes escapes formulation. Consequently, many leading producers of blasting equipment employ test labs to fine-tune solutions for enhancing blasting efficiencies.

Air blasting performs a multitude of maintenance and manufacturing tasks ranging from peening to cleaning, with a host in between. Due in large part to blasting's versatility, the equipment it relies upon can be found throughout the industry in facilities both large and small. Add the fact that blasting is a mature technology, often playing a supporting rather than central role, and it's not surprising to find many old blasting machines on plant floors around the world. The problem with many of these relics is that they were built in an era when costs for energy and disposal had a smaller impact on production budgets. As a result, much of this equipment does not compete well in a global economy faced with increasingly expensive energy and dwindling disposal capacity.

## Minimizing Trash

"Efficiencies" is plural in this article's title to highlight the fact that costs associated with operating any type of air-blasting system fall into two dominant categories: 1) blast media (i.e., the abrasive or shot propelled at work surfaces) and 2) compressed air, the energy-consuming propellant.

Although diverse, blast media fall into two general groups: discardable and recyclable. While discardable abrasives such as coal slag are indeed inexpensive to purchase, they typically breakdown during a single pass whereas a more durable medium, such as steel grit, stands up to repeated use. When properly recycled, steel grit delivers about 20 times the work of a single-pass abrasive, thus reducing costs for purchasing, handling and disposing of blast media **(see Figure 1)**. Within the realm of recyclable media, users can select from many materials, such as plastics for gentle action and metals for fast work, in shapes and sizes suitable for almost any application.

How much can be saved by moving up to recyclable media depends on choosing the

Figure 1

**Sample Savings from Recycling Media**
**(Based on 5,000 lbs of media use per day)**

| | SLAG (100% breakdown) | STEEL GRIT (5% breakdown) | DAILY SAVINGS |
|---|---|---|---|
| Media Cost (cost/lb X 5,000 lbs X breakdown rate) | $0.20/lb x 100% | $0.50 x 5% | $875.00 |
| Clean up Cost (man hours X $25 per hour) | $25 X 4 hrs | $25 X 0.2 hrs | 95.00 |
| Disposal (Based on $1.00 per 1,000 lbs) | $7.00/cycle | $1.75/cycle | 4.25 |
| Extra Electrical for automated recycling (440V, 11.9A) | 0 | $5.40/cycle | -5.40 |
| TOTAL DAILY SAVINGS | | | $968.85 |

Figures courtesy of Empire Abrasive Equipment Company.

## HAND SANITIZER

**JNJ Industries**' (Franklin, MA) SafetySmart™ Hand Sanitizers kill germs on contact and provide persistent antibacterial protection that will continue to provide protection for up to four hours after a single application. SafetySmart is a specially formulated skin antiseptic that contains a broad spectrum of anti-microbial activity that forms a protective film on healthy skin. It can be applied to any area of intact skin, and is available as both a lotion and as a saturated wipe.

Unlike many consumer products that use alcohol to kill germs, SafetySmart uses Benzalkonium Chloride as the active ingredient, an anti-microbial compound that has been used in the medical industry for more than 60 years. This product not only sanitizes the hands but also creates a virtual barrier against germs and contamination, while moisturizing and conditioning skin at the same time. This hand-nourishing emollient lotion is alcohol and fragrance free, non flammable, non toxic and has none of the drawbacks associated with alcohol based gels and liquids. Since it is long lasting, it also helps to prevent cross contamination in the workplace.

SafetySmart has been proven in clinical and laboratory tests to be extremely effective in killing 99.99 percent of bacteria and germs that workers encounter every day in a variety of industries. SafetySmart will hold up even after multiple hand washings and complies fully with FDA requirements.

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**Figure 2**
Pneumatic blasting and recycling package offers an economical alternative to a complete blast room. The system recycles and cleans abrasives with a cyclonic reclaimer attached to a filtration system that returns clean air to the work place, adding the benefit of lower HVAC costs.

**Figure 3**
The blast cabinet shown borrows oscillating nozzles and a powered turntable from the automation shelf to expedite the cleaning of wheels. Programmable controls facilitate quick adjustment of part and nozzle movement.

best size and type of shot or abrasive for the job and on the capabilities of the blasting system. Today's production machines normally include devices to remove dust and fines from the working medium before returning it to the blast cycle. This reclamation step is important because a clean medium works faster than one contaminated with undersized particles. If degraded material is allowed to build up in the media supply, the rate at which work is performed declines even though compressed-air consumption does not. Without recycling equipment that removes dust and fines, users face a costly compromise. They can either waste time and energy by pushing the media mix past its prime or waste media by discarding a mix containing perfectly good abrasives or shot. Either way, money is squandered; in some cases, quality suffers.

Most modern blast cabinets and rooms used in production settings include reclamation devices that solve this problem. Blasting equipment that puts the accent on media reclamation is also available. Designed for users who are unable to justify the cost of a complete blast room, these packages consist of blasting, reclamation and dust-collection hardware around which users can fashion their own enclosure **(see Figure 2)**.

### Optimizing Energy Use

Two types of blast systems are used in air-fed machines: suction and pressure. Suction systems are normally less expensive and have fewer moving parts. In addition, they simplify continuous operation and the use of multiple blast guns. Pressure systems, on

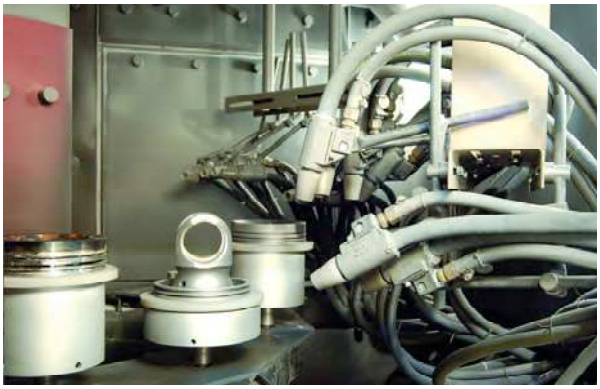

**Figure 4**
Full-scale automation coordinates the movements of 16 blast guns, oscillating vertically and horizontally, with spinning work stations on a rotating platform to clean pistons in a single pass. The eight guns oscillating vertically hit the sides and skirts. The guns sweeping horizontally clean tops and interiors. Programmable controls simplify changeovers between pistons of different sizes.



the other hand, offer a major edge in terms of energy efficiency. Under certain circumstances, pressure systems have been shown to perform three or four times as much work as suction systems using the same amount of compressed air. They also provide more precise control of media flow at both high and low operating pressures. For tough jobs like cleaning recessed areas or removing tight mill scale, pressure is the only practical choice. Moreover, pressure is usually the more economical choice in a manual blast cabinet used more than a few hours a week when labor and energy costs are considered.

A pressure system alone, however, does not guarantee efficient energy use. As mentioned before, using degraded media or the wrong choice of media wastes energy. The same can be said about unskilled blasting in which an operator over works much of a part to ensure its entire surface has been adequately covered. If a blast cycle is 20 percent longer than necessary, then 20 percent of the labor, energy and media going into the process is being wasted. It's worth noting that over-blasting represents the norm rather than the exception in manually controlled machines for a couple of reasons. In a cleaning operation, for example, an inadequately cleaned part will be rejected while an overly clean part will go unnoticed. Furthermore, seeing a work piece clearly amid the airborne dust and media within a blast cabinet is not always easy, so operators tend to err on the side of too much rather than not enough.

## Advantages of Automation

Because automation is more precise and repeatable than human control, its impact on blasting continues to grow. Today, many specialized jobs are expedited by equipping blast cabinets with powered accessories **(see Figure 3, page 51)**. By adding off-the-shelf options such as nozzle oscillators, rotating turntables and timers, users can process parts consistently and automatically in cycles. Though relatively simple and inexpensive, these types of additions normally pay for themselves quickly by minimizing the waste of time, energy and media associated with over-blasting.

At the same time, cheaper and increasingly sophisticated controls are making fully automated blast systems more affordable by enabling one machine to process different parts **(see Figure 4)**. These machines store instructions for nozzle movement, blast pressure, blast duration, part movement and other variables related to the processing of a specific work piece. Once stored, the recipe for blasting a part can be recalled and put into action with a few touches on a keypad.

Empire's test laboratory, centered at headquarters with the company's engineering and production teams, uses the empirical approach to find the right mix of media and machinery. Test blasting services are available without charge for industrial customers.

## The Right Solution

Because blasting productivity depends on numerous variables, including media size and type, operating pressure, nozzle-to-part distance and impact angles to list a few, the right solutions sometimes escape formulation. Consequently, many leading producers of blasting equipment operate test laboratories to help customers find the optimum mix of media and machinery. This lab work can pay big dividends—particularly in repetitive processes involving parts in large numbers—sometimes by uncovering counterintuitive approaches but more often by fine-tuning solutions for enhancing blasting efficiencies. **pcm**

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