



Shot Blast Costs Revisited

“We’re gonna cut your shot-blasting costs”

This is an attractive sales pitch from media suppliers and equipment manufacturers. It raises the interest of industrial customers who struggle to keep afloat in the tremendously competitive pressure of the global economy. The purpose of this article is to analyze the sales pitch from a realistic and practical point of view.

We will first clarify what a cost-cutting offer means and we will list the costs associated with a blasting process. We will review the impact of the individual costs on total blasting costs, compare the cost-cutting potential of abrasives compared to equipment and then reach a pragmatic conclusion.

What Does “Cutting Costs” Mean?

The objective of any supplier engaged in “shot-blasting cost cutting” is to justify its offer, maintain or penetrate the account, or defend its price level.

A supplier’s cost-reduction method begins with the gathering of current expenses, defining and implementing an improvement plan, documenting costs again, and providing the method and the materials to operate at this optimum. The following items are generally tracked:

- Abrasives consumption (price x volume),
- Energy (wheel or compressed air and dust extraction),
- Direct labour,
- Wear parts,
- Maintenance (labour),
- Waste disposal,
- Poor quality, and
- Depreciation of the equipment

This list is typical of an accounting-based approach, but does it reflect how a production department works? Does it take into account the costs that change the most from changes in the blasting parameters?

Not All Costs Are Proportional

Abrasives consumption is clearly a direct cost factor because the number of cycles and transmitted energy of a media affects consumption. It is generally estimated that abrasives represent roughly 30% of the total blasting costs.

Energy is also proportional with the blasting duration, varying between 20% and 25% of the cost.

The cost of **Direct labour** isn’t as easy to compute. In the vast majority of finishing departments and shot-blasting plants, labour is a fixed cost. Shortening blasting time by a few seconds will never cut labour time as the machine operators are not waiting in front of the machines until the cycle is done.

Unless the whole production process is overhauled, changes in shot-blasting parameters are unlikely to cut labour costs.

Wear parts represents 15 to 25% of the costs, but their consumption is a subject of debate. If the separator of the shot-blasting machine is properly set, the consumption should be reasonable. Checking the separator, tuning its settings and keeping it properly adjusted is a basic maintenance objective. But this is independent from variations in media. Furthermore, in reality it is difficult to indisputably relate wear part consumption to the choice of abrasives. Faster cleaning means higher energy transmission and/or abrasiveness. In the cases of low-hardness grit versus shot, or high-carbon versus low-carbon shot, slightly faster cleaning is compensated indeed by slightly less abrasion. The combined variation is negligible and this parameter should be dropped in a serious comparison.

Most cost-cutting proposals say they will reduce **Maintenance (labour)**. The reasoning is that less wear parts consumption means less maintenance work, which is untrue. I suggest that additional maintenance effort is necessary to cut costs. The checking and tuning up of the machine parameters more frequently is needed to keep a shot-blasting operation at peak performance.

Waste disposal. Contaminants, dust, and discharged particles must be properly disposed of. Dust and discharged particles (separated magnetically from contaminants) should be recycled and can be sold. Properly tuning up the machine and separating recyclable material from contaminants does improve costs. But this is the task of maintenance and does not depend on X or Y abrasive supply.

Poor quality. Blasting a batch for the second time is a nightmare for any production manager. This is one of the reasons why a vast majority of operations shot-blast too long. Variations are in the nature of all industrial processes, including abrasives production. While staying within specifications, one batch of media may over-perform, and another one may be less effective. As a consequence, the blasting time is set to accommodate the poorer performing batches.

It’s easy for a task force, assigned by an abrasives supplier, to shorten the blasting duration to its minimum while ensuring all parameters are tightly preserved. But when the task force leaves, maintaining such optimized and ideal industrial conditions is not realistic. Operating on the very limits of the capability of a process is risky and may sooner or later generate poor quality product.

The **depreciation of the equipment** is annualized and unless the productivity of the production line or the machine

increases tremendously, the variation between abrasives is unlikely to make a real difference.

What Are the Benefits of a Cost-Cutting Project?

Make no mistake, cutting costs is mandatory in the global economy and a cost-killing exercise is healthy and should take place on a regular basis.

The first benefit is the “Hawthorne Effect.” This is where a minor change (including the mere observation and measurement) triggers an improvement. The second advantage is that reviewing cost components, tracking bad work practices, benchmarking, updating standards and setting goals can only have a positive effect.

What Questions Should Be Asked?

- Is the calculation of the cost improvement solidly documented and in line with the reality of the operation?
- Is the achieved improvement sustainable, in particular the blasting time, after the supplier’s task force goes away?
- What is the counterpart—the compensation or reward—for this cutting costs assistance?

The Impact of Abrasives

It’s accepted that costs go down when productivity goes up. Shorter operating time, less consumption and energy usage, higher processing speed and less fixed costs per part cut costs. Period.

How can abrasive X perform better than abrasive Y in an industrial shot-blasting operation? (X and Y belonging to the same quality league.)

The life and transmitted energy of abrasives of the same quality show little variation in industrial operation. Comparisons, made with a testing machine, are a useful lab benchmark but do not reflect the real blasting machine operation with generally higher projection speed, rebounds, and, at the end of the day, an unknown number of cycles. In other words, after all parameters have been tuned up and optimized, the differences between X or Y abrasives is unlikely to significantly reduce the cost of blasting.

Let’s Take An Example:

The price of abrasives X is 10% higher than abrasives Y, but abrasives X shows a better efficiency (life and energy transmission) in the machine by 10%.

- A 10% higher price of abrasives, which is 30% of the total blasting cost, means 3% higher total blasting cost ($10\% \times 30\%$).
- A 10% higher effectiveness of the abrasives will make the consumption drop by 10%. This higher effectiveness reduces by 10% the abrasives consumption which is 30% of the total cost, means 3% lower total blasting cost ($10\% \times 30\%$).

As stated before, Energy is proportional to blasting duration, varying between 20% and 25% of the cost. The energy is then tilting the total blasting cost in favor of abrasive X: shorter blasting means less energy consumption, which is perfectly proportional. As Energy = 20% of the total blasting cost, the 10% reduction of the blasting time means a gain of 2% in the TOTAL blasting cost ($20\% \times 10\% = 2\%$ of the total

blasting cost). We expect that the spare parts consumption will not vary, nor the direct labour and the depreciation.

In this example, the cost advantage is a meager 2%. If the abrasives are the same price, the total blasting cost advantage would be 5% (2% for energy and 3% for faster blasting, hence less consumption).

Now if we take a step back and look with common sense at the reality of the shot-blasting operation, it is unlikely that two abrasives of the same quality league would show such difference inside the blasting machine. The 10% difference observed and measured by a lab technician and conveyed by a salesman does not mean this happens inside the machine. In the real life of sustained industrial operations, abrasives of the same quality typically do not show variation of consumption and efficiency combined over 5%.

What is the difference between two abrasives of the same quality league and at the same price, with one cleaning faster by 5%? Answer: 5% of energy costs and of consumption = $5\% \times (20\% + 30\%) = 2.5\%$ of the total blasting costs. In other words, such difference in industrial performance can justify a price gap of 8.3% in pricing (2.5% divided by 30%).

So, unless the quality levels show huge differences, the room to lower the total blasting costs between abrasives of the same quality league ranges around 2% or 3%. This potential cost advantage makes room for a higher price between 5% and 10% per ton to break even. This cost-killing exercise is indeed healthy but its outcome remains modest in properly run operations.

Having said that, the value of the technical advice, the constructive customer-supplier relationship and a sufficient supply of media at all times are valuable components in the commercial offer and deserve a price difference reward and should legitimately drive the choice of a supplier.

What Can Shot-Blasting Machines Achieve?

It is clear that the speed of blasting is a key factor of productivity and has a direct impact on cutting costs (less fixed and variable costs per part). This is precisely what the new machines achieve: higher output and enhanced productivity along with more control, especially in maintaining and recycling the operating mix. The new generation of turbines cut maintenance costs even more because of the fast and secure changing of their blades.

The rule of thumb is that replacing a 10-year old machine will decrease your abrasives consumption by 20%, a 15-year old machine by 30%, etc. At the same time, your productivity will surge, depending on your operation. Replacing an old machine with a new machine is a sure path to cutting your blasting costs by 10% or more, which will pay for your investment.

Conclusion

A shot-blasting cost-cutting process is a healthy and profitable exercise. Any help from a supplier or an outside specialist should be welcomed and compensated. It is unlikely that two abrasives of the same quality league will make much difference in your shot-blasting costs. Investing in new shot-blasting machines, which are more productive and efficient, is the sure recipe to reduce your costs. ●