



AN INSIDER'S PERSPECTIVE

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More Can Be Done

BACKGROUND

In a past column¹, I shared a wish list of items pertaining to cleaning and peening machines. One of them was the endemic issue of leakage and the resulting unintentional skating rink around your machine combined with the loss of good usable peening or cleaning media. Another undesirable feature is the inability to conduct an audible conversation around a machine due to the high decibel levels. We discussed the common issues faced by Applications Engineers regarding the afterthought that blast machines have been and the lack of space to accommodate them after every small piece of machinery has claimed its space in the layout! I expressed a desire to have “prescriptive maintenance” as part of the machine diagnostics (a feature that some new equipment designs incorporate). Another topic plaguing the end-users in our industry is the difficulty to tangibly measure part coverage. Finally, I pointed out the importance of maintaining a healthy working mix in a foundry blast machine—a concept that is not relevant to peening applications that are strictly reliant on a constant shot size for their operational efficacy.

Following this publication, a few of you met me at various industry events over the past year and offered suggestions that prompted me to continue on with the list, appropriately titled—More can be done!

A LEARNING FORUM

A few years ago, I was introduced to CSEE². The depth of knowledge and information surrounding surface engineering in addition to blast cleaning and peening was highly motivating. This center works with large organizations to solve their fatigue enhancement issues and advance their adoption of shot peening for critical components. This led me to believe that some of the prevalent issues in our industry, including those listed earlier, can be sorted out by a collective assimilation of brain power. In other words, a forum such as <https://www.shotpeener.com/forums> should be widely utilized to discuss common issues faced by many end-users. I remember attending a class by Kevin Young of Progressive Surface where he explained the loss of energy and resulting

lower arc height from peening inside hollow tubes. I am sure this prompted the attendees of his class to think about energy compensation by adjusting process parameters when faced with this situation. Another discussion Kevin led was about a batch of defective Almen strips due to a heat treatment glitch. This helped me avoid a wild goose chase with achieving target arc heights when attempting to dial-in a process. There needs to be more such forums where information exchange can take place unfettered.

These are healthy discussions that do not have to present a competitive challenge or disclosure concerns within the industry. I have often said that most concepts that we deal with regularly, though ingrained in basic physics, are not easy to find elaborated on in textbooks. This prompted me to publish a series titled “Tribal Knowledge”³. After five parts on this subject, I am certain that I have barely scratched the surface, which leads me to my next topic...

MENTORING

Recently, during an opportunity to work with a new recruit in the industry, I was transported to my early years as a trainee engineer where I was handed a machine manual to read for the first two weeks. Those two agonizingly long weeks aged me by about two years in fatigue with little imbibed by way of knowledge! This may not be the best approach to introduce a new recruit to any industry. Our industry needs to have a non-partisan bank of mentors that a new recruit can choose from based on his or her career goals. A fruitful mentor-mentee relationship will not only promote sustained interest for the new entrant but also provide the satisfaction to the mentor as having contributed to the industry's growth. To kick this off, I offer myself as a mentor for anyone that is genuinely interested in knowing the entrails of this industry and getting reasonable access to information that I have integrated over the past three plus decades without the need to pour over maintenance manuals. Though I hardly claim to know everything there is to be known, I do offer the distinct possibility to research a qualified response to most technical problems.

To enhance the quality of our discussion, I sought input from Kaitlin Beach, a Continuous Improvement Engineer at Peening Technologies. Peening Technologies is a peening service provider and equipment manufacturer that specializes

¹ “I wish my machine did this,” *The Shot Peener*, Summer 2022

² CSEE – Center for Surface Engineering and Enhancement, Purdue University, (<https://engineering.purdue.edu/MSE/CSEE>)

³ Tribal Knowledge, Parts 1 through 5, *The Shot Peener*, 2020-2022

in high-end shot peening machines for aerospace and other advanced manufacturing sectors. With a graduate degree in mechanical engineering and experience in the medical device industry prior to her current role, Kaitlin recognizes the importance of understanding specifications and the need for conformance. "For someone starting new, it'll be useful to obtain a high-level overview of all the established shot peening specifications and how they relate to one another," said Kaitlin. It does not end there: Service providers are also faced with individual PRIME specifications that add to the list of variables! Outside of aerospace, MIL-S-13165C⁴, though redundant, continues to be an often referred to specification. More needs to be done to make specifications easily decipherable to anyone that picks up the document for the first time. The language needs to be less open to interpretation and confusion. As part of the SEC committee, I can attest to the efforts of committee members to work toward this goal during every five-year review of the documents.

PARTNERSHIPS: OEM - SUPPLIERS

I came across an insightful article that highlighted the semiconductor crisis⁵ and it offers a timely learning opportunity. Most of us have experienced the impact of supply chain disruptions, whether it be begrudgingly owning a brand-new car minus heated seats, or worse, not being able to take delivery of a car at all for months after you had paid for it! A frustrated aerospace customer recently disclosed that they had to wait for almost 30 months post-order for a shot peening machine to be tested and delivered. The above referenced article cites the example of tech companies that have an established pattern of collaborating with their direct and indirect suppliers. They view procurement vastly different from auto companies who were hardly aware of where the chips in their vehicles came from! On a side note, anyone with some exposure to this industry will have associated stories to relate about doing business with automotive. Let us see how this concept can be made relevant to our industry by adopting some of the big-tech inspired steps listed in this article:

- Establish a bill of material for critical components along with long-term arrangements with suppliers of components such as PLCs, HMIs, pneumatic and flow-control valves, and blast tanks.
- Share potential growth plans and targets with suppliers of critical components (with adequate non-disclosure protection) and make commitments for a two-year horizon.
- Commitment from suppliers to "hold" critical components on consignment exclusively for the OEM.

⁴ "Are you still using MIL-S-13165?", *The Shot Peener*, Summer 2020

⁵ "The semiconductor crisis should change your long-term supply chain strategy", *Harvard Business Review*, May 2022

- Track usage, particularly for consumables such as abrasive and peening media, and report on this data so that a calculated inventory of product can be made available when needed.
- Encourage suppliers to use OEM products as their "launch vehicles" when they introduce innovative technology to replace or enhance existing products.

PARTNERSHIPS: END-USERS - SUPPLIERS

I interviewed select end-users to understand and compile a list of common themes within our industry where suppliers can play a useful role in mutually rewarding partnerships.

1. Fixtures and masking – A large peening service provider in Ontario, Canada processes high volumes of automotive components. High-intensity values often require peening at air pressures such as 80-90 PSI (5 to 6 bar). Overspray and drifting of parting lines between peened and unpeened surfaces are not acceptable. All these present unique challenges for designing fixtures and selecting masking materials that can withstand wear. Though a unique situation for this end-user, such applications promise to be prevalent in many workshops. It presents a rich opportunity for vendor partnership and potential testing ground for new masking/fixturing materials and techniques.
2. Innovation with hybrid machines – Compliance with audit criteria and other prime specifications requires significant effort and has to be repeated for every machine in process. When the application demands the use of wheel and air media propulsion for large surfaces as well as intricate areas, both machines must be certified for the process. Hybrid machine solutions that employ both media propulsion techniques eliminate the need to certify two machines.
3. Fire and explosion protection – This is a subject that needs careful analysis and lots of education. Industry guidelines on handling explosive dust from processing aluminum, magnesium and titanium parts could vary by geography, company standards, and liability insurance requirements. Though a common solution may not be adaptable to all situations, suppliers of dry and wet dust collectors are encouraged to increase their presence within our industry forums and educate end-users on the required safety components, legislation, risks of non-conformance and available solutions.
4. On the topic of dust, its disposal has been a highly debated topic for decades! A Canadian customer in a rural part of the country operates several wheelblast machines that generated a fair amount of dust in the process. Disposing this dust was challenging since local municipalities refused to accept it in their landfill. Consider a wheelblast machine with 8 x 25 HP wheels. With the breakdown of media and pulverization of scale, this machine generates well over 100 pounds of waste

comprising of dust and fines during operation. This calls to action waste disposal companies to find an innovative solution to make this product usable in some form. An airblast machine that peens with two nozzles may not pose a formidable threat in this arena, but the reality is that our blast cleaning industry has invested a high percentage in wheelblast machines.

- Kaitlin Beach from Peening Technologies brought up an aspect of her job that shifts our focus from routine, task-oriented activities. Kaitlin explained, "Because I have experience in a different industry, I know it helps to understand the function of the parts we process or what assemblies they fit within." Why is this important? As shot peeners, we have honed our skills so we can provide productive recommendations on the customer's process and part design that will benefit their end goal if that is known clearly. This speaks to the significance of a healthy end-user-supplier partnership.
- Blast cleaning and shot peening machines are self-consuming. Every sub-assembly and component that comes in contact with the abrasive or peening media is subject to wear. In an airblast machine, it's the blast nozzles and hoses. In a wheelblast machine, it's the wheel parts and cabinet liners. Though wear is inevitable, minimizing or delaying it with sound design practices and planning for wear using preventive maintenance predictors are useful tactics. An aerospace customer recently gave me an example of the former. Tight spaces inside the blast cabinet where blast hoses are forced to change directions should be avoided at all costs by designing a larger size cabinet. Tight hose bends accelerate wear and result in energy loss as the hose degrades. Similarly, there is little benefit in waiting for the nozzle bore to wear to greater than 1/8" its original size before replacing it. If an acceptable and previously established wear life has been reached, replace the critical component without delay.

THE COST-BENEFIT EQUATION

Very often, we are faced with the "refurbish or replace" question for our equipment. This question is often addressed by the logic that if refurbishment costs are over 40% the price of a new machine, choose the latter. More importantly, the irony of this question speaks to the inability of the current state of the equipment in maintaining required tolerances, accuracies and operating efficiencies. With our goal being the protection of capital and operating costs, we are provided tight constraints within which to operate. The only way this can be done is to increase efficiencies within our individual groups of suppliers, OEMs, end-users, and research institutions. ●

Editor's Note: This is Kumar's 75th article for *The Shot Peener* magazine. *The Shot Peener* staff greatly appreciates his contribution to our publication.



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