

What I Have Learned from the Shot Peening Workshops

TO QUOTE SOCRATES, the Greek philosopher, “I cannot teach anybody anything, I can only make them think.” Similarly, education and training can be credited as having achieved their main goal if they bring about this effect in students. In an industry like ours, where background theory gets scant mention even in a Production Engineering book, it's not uncommon to witness informal learning opportunities more often than structured courses. Fresh out of school in the mid-90s, as an Engineer with the subsidiary of a large surface preparation company, most of my practical education was through discussions with design draftsmen within the company.

Similarly, the “Subject Matter Experts” (SMEs) that we have come to know within the shot peening and blast cleaning industry have contributed tremendously through informal engagements to proliferate knowledge within this field. As the EI Shot Peening workshop meets for its 25th annual session in the United States, I look forward to gaining more information from these SMEs that could not have been obtained through a formal college program.

Training Patterns in Our Industry

Though every company has its own unique training schedule, the incidences of such programs are generally as follows: (a) specific product training prior to a sale, with an effort to present a potential solution (application centric), (b) factory training during equipment testing at the manufacturer's location and (c) start-up training at site after equipment installation. Empire, for example, has a distributor-focused sales model that places critical emphasis on providing regular training (once or twice a year) on the technology and basic concepts of cleaning and peening in addition to their unique product attributes. Such a program presents a relatively informal yet structured set-up designed for participants to seek basic information without the fear of being ridiculed. As an industry veteran framed it, “the only stupid question is the one that you don't ask!”

The EI Shot Peening workshops, at least in North America, are exactly that—a relatively informal setting with a structured and intensive dose of information. Information at these workshops is not just restricted to peening, but also includes related auxiliary and sub-systems.

Training also takes a customized approach where a particular user of (typically) peening equipment might request training on their equipment at site, relating to their specific application. This is more prominent when the audience size is large and the process is confidential. Such an approach allows for barrier-free transfer of information with the trainer.

As an instructor, I've noticed a higher degree of audience participation in North American workshops. However, with increasing prominence of training overseas, particularly in non-English speaking China, a lot more questions are now raised during and after a class. My Chinese trainer colleagues inform me that the questions are not always to seek basic information. They are also not about technological advances in specific makes of equipment since most training sessions are expected to be commercial-free! Questions revolve around understanding the correct way of carrying out the process. This is very encouraging to a trainer and demonstrates the impact proper training can have on an interested user.

Unique Aspects I Couldn't Have Learned Outside the Workshop

- The SMEs are from companies that compete with each other on a regular basis. Each manufacturer has their own unique way of solving commonly encountered problems. The workshop gives one an opportunity to study each presenter's unique approach when solving a problem. One such example was a presentation by Kevin Young of Progressive Surface. He demonstrated the steps they took to analyze and find the root cause of anomalous arc height readings that didn't match with the historic expectation given a specific set of process parameters. The cause was finally traced to a batch of “A” Almen strips that had undergone improper heat treatment procedure during their manufacture. Instead of hiding behind the classic “anything can happen,” I now have another possibility to explore when things go wrong in the field!
- More valuable information from the workshop was the fact that a particular grade of ceramic manufactured by Saint Gobain could develop comparable levels of intensity and residual stress as commonly used sizes of steel shot. The depth of information presented to substantiate this claim wouldn't have been readily available outside the workshop.

- The sign of a good SME is always when you see no more than a subtle hint of commercialization in their approach. Workshops always bring out the best in such presenters and greater audience participation only enhances this effect. I have learned very basic, albeit important concepts, such as the difference between arc height and intensity, saturation curves and their relationship to hardness of parts, residual stress and its calculation, S-N curves, treatment techniques post-peening to enhance peening quality, etc., from such instructors and incorporated them in my own classes, too.
- I have truly understood that every engineering problem can have more than one solution, and this is just by observing how my fellow presenters approach commonly known issues.

Can Blast Cleaning Benefit From This Workshop?

The EI US workshop is labeled “Shot Peening and Blast Cleaning Seminar and Workshop.” However, this workshop mainly attracts users of shot peening equipment rather than cleaning equipment. Being a very similar process, I’ve always wondered if users of the blast cleaning process could derive any benefit from attending a predominantly peening-based workshop?

In an article published by E.A. Borch of Ervin Industries, Inc. (“Effective use of steel shot and grit for blast cleaning” available at ervinindustries.com), he explains that “doubling shot size increases the mass or impact-power per pellet eight times. Conversely, doubling shot size reduces the pellets per pound to one-eighth.” This, to me, is a very effective means of demonstrating the concept of impact energy which governs the mechanism behind blast cleaning and also shot peening. Though we are constrained by specification in selection of media type and size for shot peening, we are at liberty to select the abrasive size for most cleaning applications. Every class at the workshop explains the concept of impact energy in different ways. Let’s see how this education will benefit a user of cleaning equipment and optimize their process:

- The application and use of MagnaValves will explain control and monitoring of mass (lb or kg per minute), leading to optimization of media flow rates, reduction in breakdown and lowering of operating costs.
- A course in the effective use of media classifiers will explain the importance of maintaining proper shot size for constant impact energy. I acknowledge that cleaning applications benefit from an operating mix and not the same media size, but maintaining consistent media size is important when surface finish is critical for an application.
- A class in wheelblast machine design and maintenance touches on velocity and the means to control/regulate/monitor it in such machines—a concept, if overlooked, can result in high breakdown rates, component wear and increased operating costs.

This list can get even longer, and the validity of the argument that this workshop will benefit users of cleaning equipment will only get stronger. The knowledge we have gained from peening is applicable to cleaning as well, and one needs to take advantage of that.

The Future of This Workshop

In my earlier articles, we discussed the role of computer controls, robotics, automation and electronics in advancing technological growth in shot peening equipment. Such developments are often discussed in various classes at the workshop. Given the growth in this sector, I can’t help thinking that we are merely scratching the surface of what these developments are capable of bringing to our shot peening machines. Other possibilities are noise control, wear resistance, portability, etc. I propose the future of this workshop, in addition to educating its attendees on basic and advanced peening concepts, focus on bringing experts from the fields listed above and educate us on what the future could look like for our equipment.

I would like to end this discussion with a quote from the famous American historian, Daniel Boorstin: “The great obstacle to progress is not ignorance, but the illusion of knowledge.” Incidentally, I heard this quote during Mike Brauss’ presentation on Residual Stress at the Shot Peening Workshop. ●

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