



AN INSIDER'S PERSPECTIVE

Kumar Balan | Engineer | Empire Abrasive Equipment

Shot Peening Achievement Exams: A Review

Every expert was once a beginner and every expert had to pass many tests to achieve such a high level of competency. That said, a casual google search on “fear of exams” came back with 21,100,000 results in 0.52 seconds! For most of us, a formal examination is thankfully a distant memory. As the 25th US Shot Peening and Blast Cleaning Workshop was coming to an end, certain emotions were perceptible among the students. They ranged from anxiety, curiosity, nervousness, and of course, a

reasonable sense of accomplishment since more than two days of information had been thrust upon them, earning them a Certificate of Attendance. Many of the students would be taking the EI Achievement Exams. This review will help attendees of future shot peening training programs prepare for the exams. The exams are meant not only to add to existing memorabilia in your work space, but also to inform your peers that you are a trusted knowledge base for the peening process.

The History of the Shot Peening Achievement Exams

At the 2016 workshop, Jack Champaigne, President and Founder of Electronics Inc. (EI), explained the history, need and significance of the three levels of exams.

“The exams were designed to recognize a student’s level of competence in shot peening,” Jack explained. “To some extent, they were also a barometer of the quality of shot peening education from our speakers at the workshop. As the workshop gained popularity within the industry, vendors supplying critical components to the shot peening industry expanded their participation by speaking about their individual expertise, leading to the growth of the course curriculum. As a natural progression, these vendors brought with them process control expertise that resulted in repeatability, reliability, accuracy and fine tuning of the peening process. The three levels of testing were created to establish the student’s expertise, understanding and ability to handle peening projects of increasing complexity.”

Dave Barkley, Director of EI Shot Peening Training, said, “FAA recognition of our training programs came in 2000 with



their acknowledgment of the importance of process control, knowledge and competence in shot peening. This led to EI’s development of three levels of testing —Level 1: Beginner, Level 2: Advanced and Level 3: Professional.”

Active participation in the shot peening workshop is necessary when preparing for an exam. The workshops cover the core material and FAA-accepted material found in Level 1 and 2 exams. Students

with industry background will find the first two exam levels very manageable, which is also why they are permitted to take them at the same workshop. The workshops also offer advanced classes conducted by industry experts. These classes focus on real-world, practical applications with interactive discussions to help students taking the Level 3 exam.

Level 1: Beginner

The Level 1: Beginner exam is split into three parts. Part A is a series of true/false questions, Part B has multiple choice questions and Part C tests the student’s knowledge of saturation curves. The mechanics of peening, and the fundamentals of stresses, peening media, intensity, coverage and saturation curves are also covered. A student must have a basic understanding of graphs—how to plot, read and ultimately draw direct inferences from the data.

A student that earns the Level 1 Achievement Exam certificate understands the basics of intensity, coverage, process control and saturation. Obtaining the knowledge required to pass the Level 1 exam is beneficial to many different members of a shot peening team. A manager will appreciate the effort and time invested in a sound peening process. The process engineer learns the variables that influence the outcome of his or her shot peening process. The operator receives a proper foundation for the task ahead—whether it be the next two levels of exams or setting up a peening process at work.

Shot Peening Level 2: Advanced

Most students take the Level 1 and 2 Achievement Exams on the same day. However, passing the Level 2 exam

usually requires real-life industry experience in addition to understanding the information provided in the core workshop classes. Achieving Level 1 and 2 Achievement Exam certificates therefore establishes a student's technical proficiency in the shot peening process.

The Level 2 exam has questions in several different formats including true/false, multiple choice, fill in the blanks and the student's ability to visually inspect media. Requirements for the exam include:

- Real-life training (machine maintenance, design and selection) is a definite asset. It will help when answering questions related to media inspection and "what to do when" questions. For example: The media stream contains non-round contaminants or striping appears on the part while spinning in a nozzle stream.
- Knowledge of auxiliary equipment such as the Vibratory Classifier, MagnaValve, Spiralator and their influence on peening results.
- Knowledge of commonly used specifications; particularly where they pertain to media inspection, plotting the saturation curve, etc.
- Practical knowledge of how variation in process parameters effects the velocity in peening machines. For example, how the increase in air pressure affects intensity or how the size of shot affects coverage.

Bob Nirmaier, Automation Product Manager at Empire, has worked on shot peening projects for several years. "I finally decided to attend the workshop and take the Level 1 and 2 exams, which I passed. This qualification adds credibility when I help our customers design their peening process. I can now clearly articulate the metallurgical impact of process control in the machines we design and build. As an automation engineer, the merger of electronics, process and metallurgy is paramount to me in explaining the criticality of this process to our customers," said Bob.

Shot Peening Level 3: Professional

This exam requires a student's practical knowledge and real-life experience with a successful shot peening process, and less on memorizing slides and data. It's an essay-based exam and the questions are about many different aspects of shot peening—even topics that weren't discussed in any appreciable detail in the various classes.

The Level 3 exam should be approached with a healthy dose of caution because a question may require the ability to state the reasons for reaching a conclusion. For example, if a question is about the suitability of a wheelblast or airblast machine for an unknown application, the correct way to answer the question would be a listing of the pros and cons of each machine.

It is very common for students to allow a gap of one or two years between Levels 2 and 3, with the gap ideally spent

gaining practical experience. When asked to comment about the Level 3 Achievement Exam, Dave Barkley didn't mince words. "The exam is purposely difficult and not based on workshop curriculum. Having an EI Shot Peening Training Level 3 Certificate tells the industry that you are a shot peening guru, so you have to earn it by truly knowing the process," he said.

A Testimony to the Benefits of Achievement Exams

Leo Krieger, the Advanced Manufacturing/Tooling Supervisor with Meggitt Aircraft Braking Systems, has been a regular attendee at the EI North American shot peening conferences. He is Level 3 Certified.

"The material covered in the core and break-out sessions pretty much covers all aspects of the Level 1 and Level 2 exams. The Level 3 exam involves "real-world" scenarios, and there may be one or two questions that could pose a challenge for some unless they have experienced these scenarios themselves. However, with a clear understanding of the shot peening process and by following the correct set-up procedures (saturation, intensity, coverage), you will be on your way to not only responding to the exam questions but also identifying and solving an existing problem in your current process at work," said Leo.

"My participation and success in the exams have definitely helped increase the quality of our peening operations here at Meggitt. It has helped me make our operators aware of the importance of plotting a saturation curve, and the appreciation that the slightest change in a setup (air pressure /wheel speed) can alter the intensity. In turn, our operators now appreciate the impact that making changes in the setup can have on the final products which in our case is very critical. Being able to help our operators when they run into a problem eliminates wasted time and improves overall operating efficiency. Information in the break-out sessions at the workshop has helped tremendously in this respect," added Leo.

Leo is confident the workshops and exams will encourage the future generation of shot peeners. He said, "I have witnessed many on their first day at the workshop tell me that they were attending the training and taking exams to better familiarize themselves with shot peening. By the end of the workshop, these individuals have a greater understanding of shot peening and feel encouraged to take their knowledge back to their workplace and attend future workshops."

As you can tell from Leo's comments, the benefits of taking the exams far outweigh the fear.

Examining the Future

The EI Shot Peening Training team regularly updates the Achievement Exams to keep pace with the expanding training curriculum, specification conformance, and advancing technology, thereby guaranteeing our success in a growing shot peening universe. ●