

The Shot Peener

Sharing Information and Expanding Global Markets for Shot Peening and Blast Cleaning Industries



PeenBot, From Customized Processes to Smart Machines.

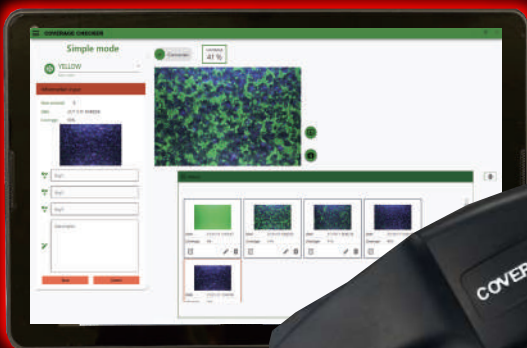
Peening Innovation

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CHECKER



COVERAGE CHECKER

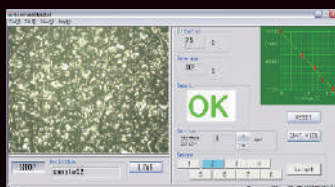
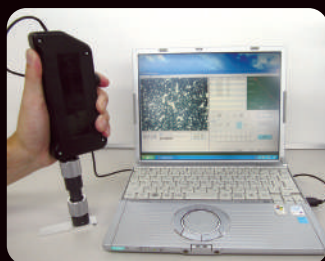
COVERAGE CHECKER the device for easy and precise coverage measurement



UV Light version New arrival!

- UV light version Coverage Checker measures coverage by the fluorescent paint peeling rate, using UV light. Therefore, measurement result will not be affected by surface condition.
- UV light version Coverage Checker can measure the coverage even on oxidized surfaces and uneven peened surfaces, which was difficult to measure with normal version.

Coverage Checker (Original) Easy USB connection to your PC



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- Evaluation of sub-nano size defect
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Specification

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sentenso's Peenbot System



Remembering Holger Polanetski

THE SHOT PEENER

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Opening Shot

For a while now, this column, and the magazine as a whole, has carried one or two editor bylines. That's changing.

Starting with this issue, the magazine isn't just being put together by one editor, it's assembled by the team behind The Shot Peener Magazine. The name at the top of the page may be generic, but the work behind it has always been more than one person's, and it's time the publication reflected that.

Why say so out loud? Because a magazine like this one only works if it's actually listening to the industry it covers, and one voice, however well-intentioned, hears less than several. Opening the magazine to more of the team means more perspectives on what's worth saying first: a different read on a submission, a different question asked of an author, a different sense of what the shop floor needs to hear about this month. The goal isn't a different magazine. It's a fuller one.

Readers need not worry. The standard for what runs here, clear, useful, worth a reader's time, doesn't change because the byline does. What changes is that more people get to hold that standard, and more of what makes this industry worth covering gets a chance to make it onto the page.

More voices, same commitment. Let's get into this issue. ●

THE SHOT PEENER

Editor

Shot Peener Magazine Staff

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The Shot Peener

56790 Magnetic Drive
Mishawaka, Indiana, 46545 USA

Telephone: 1-574-256-5001

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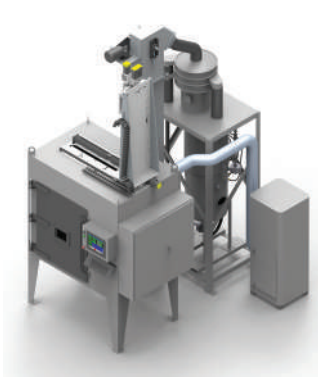
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sentenso PeenBot

From Customized Processes to Smart Machines

Modern peening systems must do more than just automated peening. They must make complex processes manageable, repeatable and cost-effective. With the PeenBot, sentenso takes an application-oriented approach. The customer does not adapt the process to the machine. The machine is built for the process.

Shot peening is a special, though an established process. Its basic physics and key parameters are well known, yet users of shot peening systems face ever more challenging demands. Parts are becoming more complex, batches are getting smaller, quality requirements are increasing, and the need for records and traceability is growing. At the same time, the pressure to finish fast in implementation and production is high.

Particularly in aerospace, automotive and medical technology, it is no longer enough to just apply shot peening to a part with fixed machine settings. The process must stay within set limits, be repeatable and traceable. At the same time, run the system at low cost and adjust it to different parts and process requirements.



PROCESS FIRST, THEN THE MACHINE

The classic view asks, “Which machine do I need for this job?” At sentenso, the initial question is “What does the process have to achieve?”

This view is key for customer-specific tasks. At sentenso, process work comes first. Only once this has been fully developed and documented is the appropriate machine concept designed.

To this end, sentenso not only contributes its machine technology but also combines it with extensive process

expertise. The company has been active for many years in the field of process and quality management for shot peening, conducts training courses on aerospace and automotive requirements as well as on relevant standards and specifications, and operates its own laboratory for residual stress measurements.



PEENBOT AS A DEVELOPMENT PLATFORM

The PeenBot was not developed as a fixed machine. It is a scalable platform. Various technology modules are available for this purpose. Robots, linear axes, rotary tables or other motion systems fit the peening task. The workpiece holders, peening system and cabinet with swing or lift doors meet the specific needs. Functions such as peening lance rotation, automatic nozzle change or additional process reliability systems can also be integrated.

The goal is not maximum technical complexity. The system should be only as complex as the process needs.

Thus, customer-specific requirements do not result in a special machine in the traditional sense, but rather in a customized solution based on a common technological platform.

AUTOMATION DOES NOT START WITH THE ROBOT

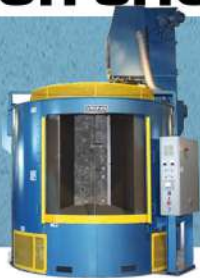
An automated system must not only technically accommodate the differences between various applications; it must manage the processes reliably.

However, a robot alone does not make the process stable. The real task is to link all key factors. In compressed-air peening, these are the shot feed and the shot energy.

flux:on is a system for monitoring and control of the actual media flow rate. The flow rate determines the media admission to the surface, but also affects the impact pattern

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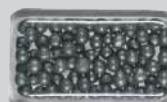
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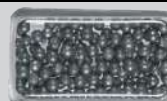
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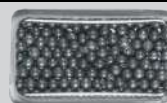
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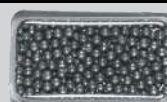
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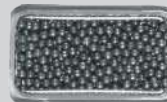
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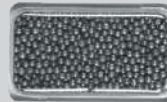
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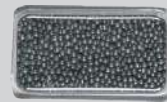
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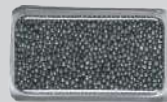
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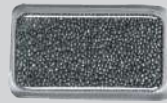
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96% min on No. 30 Screen



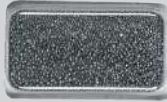
S230 All Pass No. 18 Screen
10% max on No. 20 Screen
85% min on No. 30 Screen
97% min on No. 35 Screen



S170 All Pass No. 20 Screen
10% max on No. 25 Screen
85% min on No. 40 Screen
97% min on No. 45 Screen



S110 All Pass No. 30 Screen
10% max on No. 35 Screen
80% min on No. 50 Screen
90% min on No. 80 Screen



S70 All Pass No. 40 Screen
10% max on No. 45 Screen
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and the particle velocity. The system includes a blast cyclone and a weighing bin. Flow control valves are calibrated, but also adjusted automatically.



vector:on adds direct measurement and control of particle velocity. Velocity changes with peening pressure and with nozzles, hoses, and their wear. A high-speed camera feeds a measurement system to analyze the particle trajectories. The data obtained is used to automatically adjust the peening pressure in order to achieve the target velocity.

DIGITALIZATION AND DOCUMENTATION IN PRODUCTION

In the standard procedures, a peening process is first set up and then fixed by machine settings. The settings are monitored and the result is repeatedly checked with well-established routines like the Almen test. This approach remains important, particularly where relevant standards and customer specifications require it.

At the same time, digitalization opens up extended possibilities for observing and controlling the ongoing process in greater detail.

To this end, the PeenBot records process data in sync with the process sequence and can document this on a part-by-part basis. This includes pressure, volume flow and media flow rate, as well as motion data, drive data and system status information. This information forms the basis of a digital database for the processed part.

This means that traceability is not an extra task, but an integral part of process control. The PeenBot can continuously record, process and document process data for each part in accordance with the requirements of SAE AMS 2432.

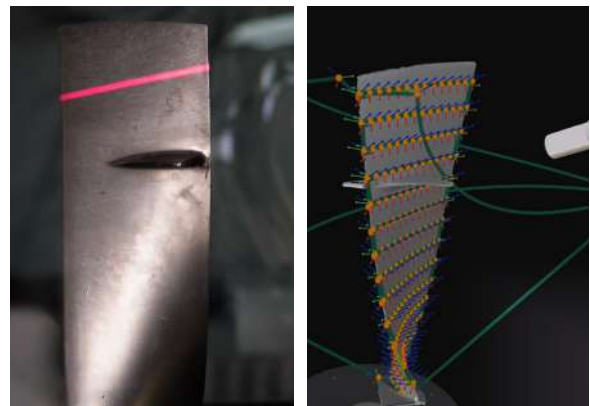
EFFICIENT OFFLINE PROGRAMMING

sentenso substantially simplifies the programming of robot paths with Augmentus' AI-supported offline robot programming software. Completed programs are imported into the robot control.

First, the shot peening machine and the 3D data of the component geometry are imported into the programming interface. The Augmentus solution can load various peening nozzles and their tool centre points for the desired impact point. The peening distance, impact angle and feed rate are then defined. The operator selects each surface to be peened with a mouse click. Based on a programming sequence, the software calculates robot paths, detects collisions and avoids singularities.

If required, the system can be expanded to include a 3D scan-and-plan system, which can both capture the part geometry and verify the position of the loaded part, whilst adaptively recalculating the robot paths.

By integrating the Augmentus offline robot programming environment into the system concept, sentenso is going to offer a pre-configured package solution, particularly for machine owners with varying or often changing range of parts.



SUSTAINABILITY AND RESOURCE CONSERVATION

Special machines do not need to be big, complex or highly consuming. The PeenBot aims to minimize the resources used to implement and run the machine.

This applies first to the installation space. PeenBots are very compact in design and require only a small amount of valuable production floor space.

Yet saving resources means above all to cut the energy needed to run the system. The initial process work at the beginning is key to this cut, mainly for less use of power and air. This also reduces the consumption of shot and wear parts. Consequently, there is less disposal of used shot and parts, which in turn must be recycled using energy.

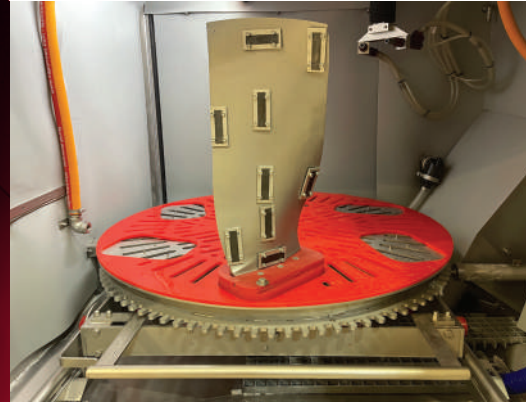
Added to this are the time and staff required. Automated



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processes, process monitoring and a system configuration tailored to requirements that minimizes wear and tear can significantly reduce operating and maintenance costs.

The real task, therefore, is not to optimize a single performance indicator. Rather, the holistic approach of Lean Peening helps to optimize not only capital costs but, above all, operating costs.

FROM PROCESS TO SOLUTION

The development of the PeenBot follows one basic principle: A shot peening system should not just move nozzles. It should conduct and map the process entirely – from process development right through to documentation.

Mechanical design, robotics, peening technology, sensor technology, control systems, software and quality management – from Almen testing to residual stress analysis – must all be considered together. To this end, sentenso employs experienced specialists and works closely with research partners in the fields of materials engineering and

process automation.

This approach is crucial, particularly for demanding applications like in the aerospace industry. Here, requirements, process knowledge and machine engineering must be joined so that a specific application can be transformed into a reproducible and verifiable solution for industrial production.

The technological and economic benefit is based on the systematic approach to solutioning, by transforming requirements into a design and the design into a certified machine. ●



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Profile Characterization of Surface Roughness in Shot Peening:

There are more parameters besides Ra

INTRODUCTION TO ROUGHNESS

Roughness is a term frequently encountered in the context of surface evaluation, yet it represents merely a component of surface texture. The overall surface structure of a part in terms of geometrical irregularities is defined as surface topography. [1] Surface texture is a subsequent term and refers to the surface without the nominal form, respectively the underlying shape. [2] It is important to note that all terms refer solely to geometry and do not include other surface properties.

The model for the evaluation of real surfaces, with all their deviations, is the superimposition of waves of different wavelengths and frequencies. The differentiation of these is achieved by filtering. The procedure and the definitions for the calculation of the profiles are given in ISO 21920-2 and illustrated in Figure 1. [2] The initial step is the removal of noise, which is the very small-scale lateral component. Secondly, the form (very large-scale lateral components) is removed. The resulting profile is the primary profile, which can be evaluated with P-parameters, for example Pa. This profile is then separated into waviness and roughness. Roughness incorporates only the smaller waves, with high frequency. In essence, roughness represents only a specific component of the entire surface profile. It is not a static property either, because the wavelengths included can change depending on the surface. Roughness for a rough cast surface is different from that of a smooth, polished surface.

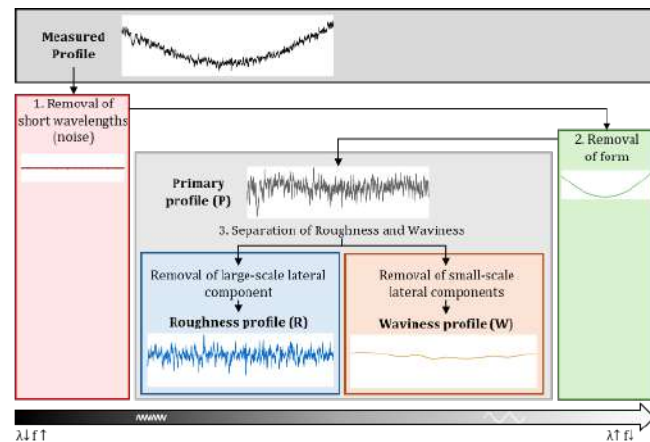


Figure 1: Determination of P-, W- and R-profiles and the respective lateral components for the example of a blasted surface profile

EVALUATION OF PROFILES WITH PARAMETERS

For the evaluation of the profiles parameters are used, since a full profile comprising thousands of points, it is challenging to

compare these to a requirement. These parameters reduce the information contained within the profile into one number. This results in a representation that only reflects specific properties of the profile. There are parameters that characterize solely the height, such as Ra and Rz. Others are associated with spatial properties, such as Rsm, or material properties, such as Rmr. Consequently, it can be beneficial to use multiple parameters, as they each represent distinct properties. The new ISO 21920-2, which has replaced the previous ISO 4288, adds even more parameters. Table 1 provides a summary of the parameters, highlighting in bold those that were already included in ISO 4288. With the new standard also changes to existing parameters are made. For example, the algorithm to calculate Rz was adjusted. The differences between the old and new standard are not included in this article.

Category	Type	Parameters
Field Parameters	Height Parameters	Ra, Rq, Rsk, Rku, Rt, Rz _x
	Spatial Parameters	Ral, Rsw
	Hybrid Parameters	Rdq, Rda, Rdt, Rdl, Rdr
	Material ratio functions and related parameters	Rmc, Rml, Rcm, Rvm, Rvv, Rdc, Rmr, Rk, Rpk, Rvk, Rmrk1, Rmrk2, Rak1, Rak2, Rpkx, Rvkx, Rpq, Rvq, Rmq, Rvmp, Rvmc, Rvvc, Rvvv
Feature Parameters	based on peak heights and pit depths	Rp, Rv, Rz, Rvt, Rpt
	based on profile elements	Rsm, Rpc, Rc, Rsmx, Rsmq, Rcx, Rcq
	based on feature characterisation	Rpd, Rvd, Rmpc, Rmvx, R5p, R5v, R10z

Table 1: Profile surface texture parameters according to ISO 21920-2 [2]

Parameters must fulfil two functions. The primary application is specification, which must ensure that the workpiece meets its designated function. In shot peening, the creation of compressive residual stresses close to the surface is the main focus, with the aim of enhancing the resistance of metallic parts and extending their operational life. [3, 4] In this regard, an increase in roughness can lead to reduced fatigue life and is therefore an undesired side effect that has to be specified. [3, 4] The secondary application is the control of the manufacturing process. In the context of shot peening, for instance, parameters require sensitivity to changes in the process, such as time or intensity.

The number of parameters is already extensive and is increasing continuously. This results in difficulties to select the appropriate parameter. In view of the restricted knowledge and the parameter overload, Ra and Rz are still the most frequently used parameters. [5]



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A Cut Above

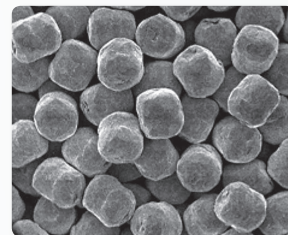


The advantage of Premier Cut Wire Shot

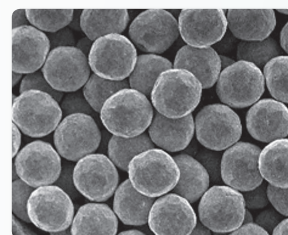
- **Highest Durability** Due to its wrought internal structure with almost no internal defects (cracks, porosity, shrinkage, etc.) the durability of Premier Cut Wire Shot can be many times that of other commonly used peening media.
- **Improved Consistency** Highest consistency from particle to particle in size, shape, hardness and density compared to commonly used metallic media.
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- **Lower Surface Contamination** Cut Wire Shot doesn't have an Iron Oxide coating or leave Iron Oxide residue — parts are cleaner and brighter.
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PARAMETERS RA IN GENERAL-ITS LIMITS AND APPLICATIONS

Ra is the arithmetic mean of the absolute values, which is obtained by integrating the profile over the evaluation length. It is equivalent to the height of a square, with the same area as the space between the profile and the mean line. But surfaces with the same Ra value can look and behave completely different. An example of two profiles that have the same value for Ra, yet are visually different, is presented in Figure 2. One profile element, which is the combination of a hill and a dale, is highlighted in red.

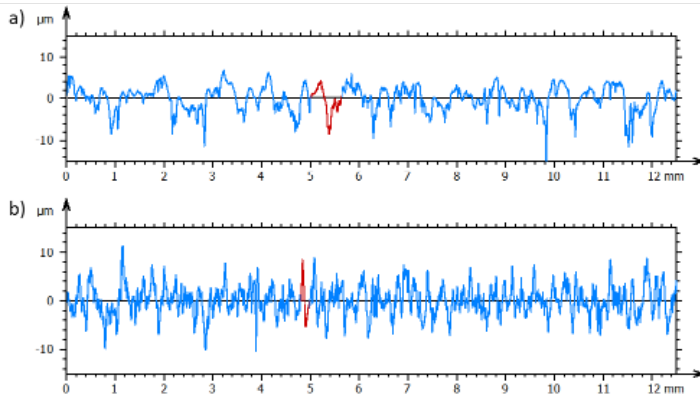


Figure 2: Roughness profiles (Nic = 2.5 mm) with $R_a = 2,37 \mu\text{m}$
a) cast surface b) blasted surface

The advantage of Ra is that it is statistically stable and reproducible. The parameter is considered suitable for stochastic surfaces, such as ground surfaces. Ra is also beneficial for the identification of divergences from a manufacturing process that has been well adjusted. A key disadvantage of Ra is that it is incapable of distinguishing between hills and valleys, nor of determining their respective locations within the profile, nor of assessing the width of the hills and dales. Consequently, Ra is unable to discern variations in profile element shapes or spatial differences. Furthermore, Ra fails to provide any information regarding the number of peaks or the way the material is concentrated. In the provided example, the initial profile of a cast surface demonstrates broader hills and a wider spacing of profile elements in comparison to the blasted profile, despite having the same Ra value.

RA IN THE CONTEXT OF SHOT PEENING

Ra is also widely used to analyze the effect of shot peening process parameters like time (coverage), Almen intensity or shot size. It is shown that Ra is connected with initial Ra, Almen intensity, shot size, surface hardness, shot hardness and time (coverage) [6 - 11]. There are also interactions of these factors, so generalizations are difficult.

As an example, the change of roughness with processing time is evaluated. Therefore, a specimen with six different shot-peened surfaces and the initial surface is analyzed. The

specimen is made from a nickel base alloy with dimensions of 76x19x7 mm. The shot is S110H and the intensity is between 0.15 and 0.2 mmA.

The peening time always doubles. Profiles were measured with a surface profilometer (Perthometer PGK-120, Mahr) equipped with a probe tip of 2 μm radius and 60° cone angle. Each surface was measured 3 times. The evaluation is done in Software RPTB, provided by PTB which is the National Metrology Institute in Germany. [12] First noise is removed with Gaussian filter and nesting index of 2.5 μm , followed by a profile F-operation.

With application of Gaussian filter and nesting index 0.8 mm the roughness profile is generated and R-parameters according to ISO 21920-2 are calculated (see examples in Figure 3). The profiles for 1T and 2T are stratified in contrast to the others. The roughening is visible due to the increasing heights. From 8T on, the profiles look very similar.

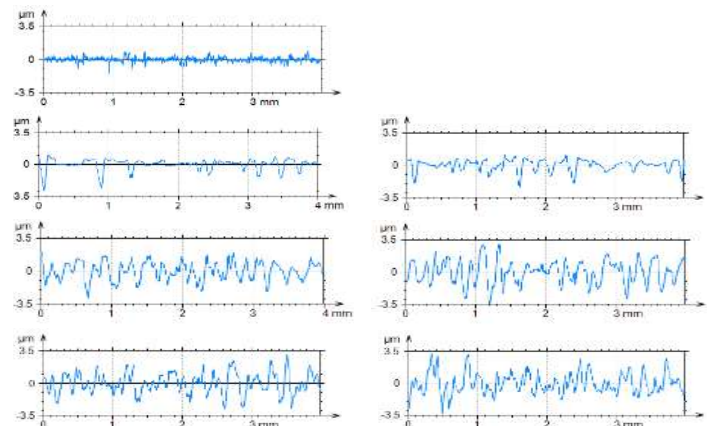


Figure 3. Example of one roughness profile for each time

The values for Ra are shown in a diagram in Figure 4. It shows a steep increase up to 8T followed by a slight decrease. Other researchers also describe an increase of Ra up to a coverage of 100% followed by a decrease for higher coverages. [10, 13] Dai et al. developed a three stage model as explanation. [14] In Stage I, roughness increases as new impacts are created, mostly in isolation from each other. In Stage II, the whole surface is covered and only repeated impacts occur. The peaks are reduced at this stage, whereas the valleys remain unaffected. Stage III is the steady state, where there is an equilibrium of new valleys and a reduction in peaks. The behavior in this example closely resembles the curves by Dai et al., except at the beginning. The first phase can be divided into two. In Phase Ia, there is a significant increase as impacts occur with little to no overlap. Each impact creates a new valley and ridge. Then, in Phase Ib, impacts occur on the initial surface, as well as overlap of impacts, resulting in a reduction of the peaks and a decrease in Ra, before it increases again. Ra can indeed describe roughening due to

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shot peening, but it cannot distinguish between surfaces with higher coverage. Therefore, other parameters may be helpful.

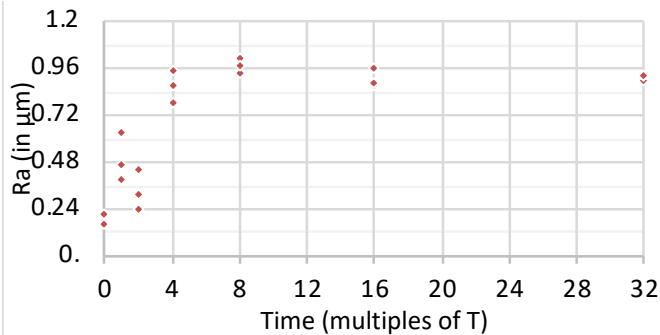


Figure 4 Diagram of Ra values for the different processing times

OTHER PARAMETERS FOR EVALUATION OF BLASTED SURFACES

In general there are two different options to choose parameters: empirical and theoretical. [15] The empirical method is founded on data and statistical analysis. The theoretical method relies on prior knowledge of the parameters and the profile to be described. Here, a combination is employed. Initially, an empirical analysis using correlation is conducted. Then, the meaning of the chosen parameters is considered to ascertain if it aligns with the explanation of the phenomenon to be described.

The parameters for further investigation were determined by correlation analysis, which provides a value for monotonic behavior characterizing an increase or decrease over the observed variable. The parameters Rpt, Rcm, Rmr, Rp and Rpk, exhibit a very strong correlation (with t ranging from 0.7 to 0.8) to time. All these parameters intercorrelate. Subsequently the meaning of the chosen parameters are discussed.

Parameter Rp is defined as the mean of the largest peaks from five sections. Rpt is the largest peak of all. As illustrated in Figure 5, both Rp and Rpt demonstrate an upward trend, ultimately reaching a plateau for Rp. This finding indicates a shift in the material distribution, with the peaks becoming more distinctive. However, Rp and Rpt demonstrate an indifferent phase at the beginning and only a slight or no decrease for very high times.

The shift in material can be described by other parameters, which are all calculated from the material ratio curve. In comparison to parameter Rp, the material ratio curve takes not only five values into account, but the entire height change of the profile. The context between the material ratio curve and the derived parameters under discussion is illustrated in Figure 6.

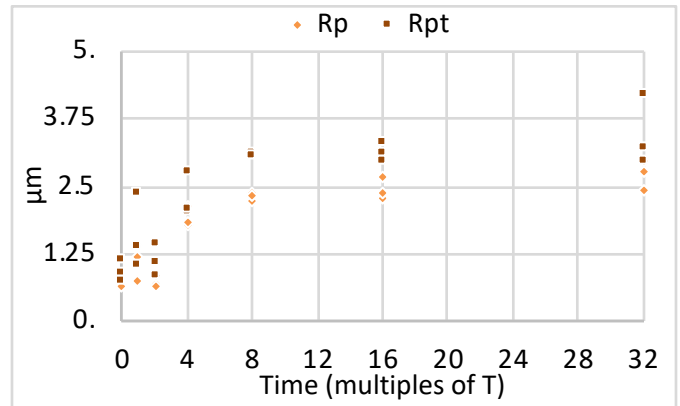


Figure 5 Diagrams of Rp, Rpt values for the different processing times

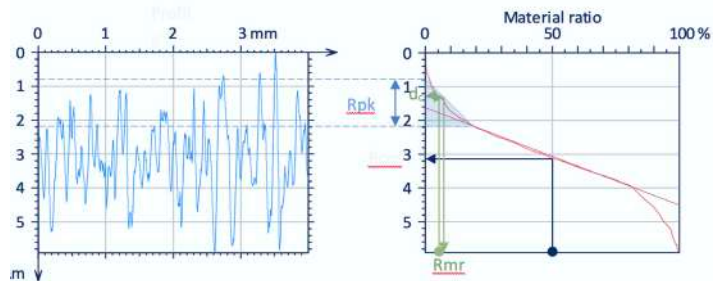


Figure 6: Explanation of parameters Rpk, Rcm, Rmr and Rpq based on the material ratio curve

Rcm is the inverse material ratio, which is the intersecting height for a given material ratio in this case of 50%. Rcm exhibits a decline over the observed time (see Figure 7). The decrease of the intersecting height for material ratio of 50% also reflects, that the peaks are increasing. Rmr is the relative material ratio. Starting by the given material ratio, here 5%, it determines the intersecting height. Then this height is reduced by distance $dc = 0,1$ and the material ratio for this reduced height is Rmr. As shown in Figure 7 Rmr declines at the beginning and is steady from 4T on. Therefore, it cannot distinguish between profiles with higher times. For both Rcm and Rmr, other values for the ratios and dc are possible. This may result in better options, but further evaluation is needed.

The parameter Rpk (reduced peak height) is the height of the right-angle triangle which is constructed to have the same area as the hill area [2]. This value increases over the complete observed time, also reflecting that the peaks getting more distinctive – that means higher in respect to the mean (see Figure 7).

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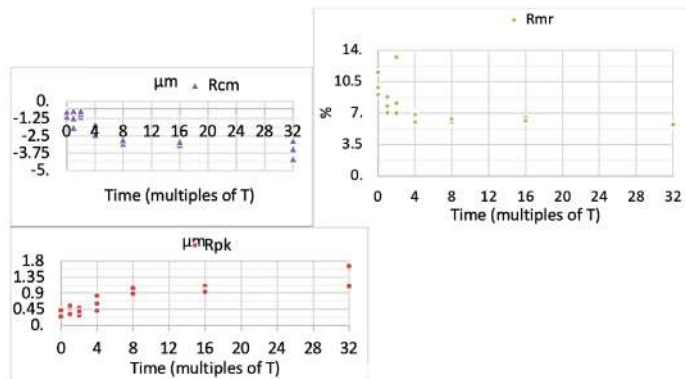


Figure 7: Diagrams with parameter values for Rcm, Rmr and Rpk over time.

Figure 8 presents examples of the respective material ratio curves to offer a deeper insight into the changes. It shows a single curve for each time. A significant difference is observed between the initial three curves (from 0 to 2T) and the subsequent ones. The graph undergoes a transition from a flat slope to a higher one, thus forming a more pronounced S-shaped curve. The first three curves exhibit the greatest changes on the right side, where material shifts due to impacts, creating valleys and a slight increase in peak material on the left side. For the first three curves the biggest change can be observed on the right side with a shift of the

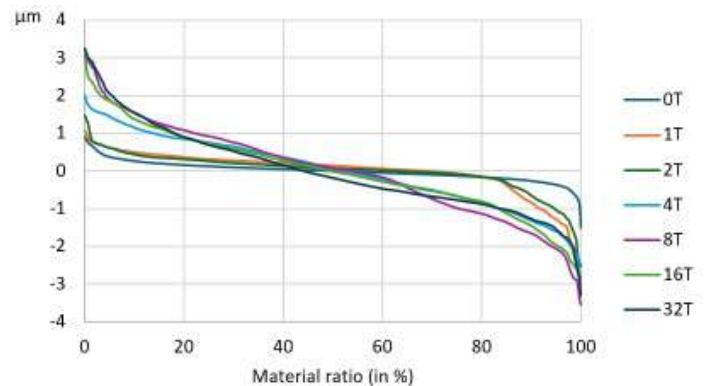
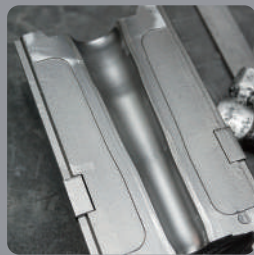


Figure 8: Example of one material ratio curve for each time.

material into valleys but only small increase of peaks on the left side. In the curves from 4T to 8T the material of the peaks is increasing. The curves 16T to 32T demonstrate a high similarity.

Overall, no parameter shows a clear distinction between surfaces throughout the observed time range. Specifically, at the beginning, the increase is often minimal, and in most cases, a plateau is typically reached at the end. Nevertheless, those parameters related to the peaks remain the most suitable. It appears that this aspect of the surface geometry is the site of alterations, even when the coverage has reached



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100%. The overlap of impacts seems to result in a reduction of peaks. To verify this hypothesis further data or areal measurement is required. These findings are consistent with Senge et al.'s statement that "Standard roughness parameters struggle to exhibit differences between surface samples of the same material with different coverage percentages above fifty percent." [16]

SUMMARY AND OUTLOOK

The present article elucidates several fundamental principles of roughness evaluation, including the limitations of Ra. The aim of this article is to enhance critical thinking when using Ra by asking whether this is truly the most appropriate parameter. The application of processing time provides examples for alternative parameters, namely Rpk and Rmc. However, no perfect parameter was identified. The application of new parameters, as developed by Senge et al., may be required [17]. Nevertheless, this article presents a procedure for selecting parameters, combining the statistical evaluation of the data with the meaning of the parameter. The study's limitations can be attributed to the number of measurements and the utilization of a single specimen. Consequently, this resulted in a small data set, which is not adequate to provide general recommendations. Also, profiles are limited in terms of their representation of the complete surface. Areal measurement can provide more information about the spatial properties and the surface structure. Therefore, a second article is planned, covering the topic of areal parameters for shot peened surfaces. ●

References

- [1] Leach, R. (Hrsg.): Characterisation of areal surface texture. Heidelberg: Springer 2013
- [2] ISO 21920-2:2021-12. ISO 21920-2. Geometrical product specifications (GPS) - Surface texture: Profile - Part 2: Terms, definitions and surface texture parameters
- [3] Schulze, V.: Modern mechanical surface treatment. States, stability, effects. Weinheim: Wiley-VCH 2006
- [4] Bagherifard, S., Ghelichi, R. u. Guagliano, M.: Numerical and experimental analysis of surface roughness generated by shot peening. Applied Surface Science 258 (2012) 18, S. 6831–6840
- [5] Todhunter, L. D., Leach, R. K., Lawes, S. u. Blateyron, F.: Industrial survey of ISO surface texture parameters. CIRP Journal of Manufacturing Science and Technology 19 (2017), S. 84–92

- [6] Chini, M.-R., Wagner, F., Benali, S., Dides, C., Bouttes, D., Besnault, L., Courteaux, M., Grente, C., Millot, M., Berthod, C., Bal-Fontaine, G. u. Picard, P.: Influence of shot peening media and parameters on carburized steel. Proceedings of ICSP 14 (2022)
- [7] Bouttes, D., Zhou, L., Wiss, F. u. Beaudonnet, A.-L.: Fine, Hard, and High Density Ceramic Beads for Shot Peening. Proceedings of ICSP 14 (2022)
- [8] Llana, V. u. Belzunce, F. J.: Study of the effects produced by shot peening on the surface of quenched and tempered steels: roughness, residual stresses and work hardening. Applied Surface Science 356 (2015), S. 475–485
- [9] Tosha, K.: Characteristics of shot peened surfaces and surface layers (2001)
- [10] Nordin, E. u. Alfredsson, B.: Experimental Investigation of Shot Peening on Case Hardened SS2506 Gear Steel. Experimental Techniques 41 (2017) 4, S. 433–451
- [11] Draganovská, D., Brezinová, J. u. Guzanová, A.: Surface Characterization after Blasting. In: Pintaude, G., Cousseau, T. u. Rudawska, A. (Hrsg.): Tribology of Machine Elements. Fundamentals and Applications. Erscheinungsort nicht ermittelbar: IntechOpen 2022
- [12] Physikalisch-Technische Bundesanstalt: RPTB, Version 3.02 beta. <https://www.ptb.de/rptb>
- [13] Yan, H., Zhu, P., Chen, Z., Zhang, H., Zhang, Y. u. Zhang, Y.: Effect of shot peening on the surface properties and wear behavior of heavy-duty-axle gear steels. Journal of Materials Research and Technology 17 (2022), S. 22–32
- [14] Dai, K., Villegas, J., Stone, Z. u. Shaw, L.: Finite element modeling of the surface roughness of 5052 Al alloy subjected to a surface severe plastic deformation process. Acta Materialia 52 (2004) 20, S. 5771–5782
- [15] Musolff, C. u. Malburg, M. C.: The surface texture answer book / by Carl Musolff and Mark C. Malburg. [Columbus, IN]: [Digital Metrology] 2021
- [16] Bosbach, W. A., Yu, B., Mieczkowski, A. u. Heiss, C. (Hrsg.): 2020 Proceedings of the 3rd International Conference on Trauma Surgery Technology. Beuth-Verlag 2020
- [17] Senge, J. F., Astaraee, A. H., Dłotko, P., Bagherifard, S. u. Bosbach, W. A.: Extending conventional surface roughness ISO parameters using topological data analysis for shot peened surfaces. Scientific Reports 12 (2022) 1, S. 5538

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One Baseline, Fewer Errors

Why aerospace shot peening specifications should converge on AMS2430 and AMS2432

HOW I ARRIVED AT THIS VIEW

Before 2001, before shot peening became a special process audited through Nadcap, prime audits often lacked a clear, consistent structure. In my experience, one audit could look very different from the next, and findings sometimes seemed based more on individual interpretation than on a clearly defined specification requirement.

I became involved with Nadcap from the beginning, helping develop the initial shot peening audit checklists. Our facility in East Hartford, Connecticut, became the first Nadcap-accredited shot peening facility. That was a major improvement: the audit process became more consistent, and the experience helped us strengthen our own internal procedures and documentation. But it was also obvious that more work remained.

That led me to the SAE committees responsible for writing and revising the AMS and J specifications. For more than 20 years, I have worked with those committees to bring lessons from audits, customer specifications, and actual processing experience back into the industry standards. The long-term goal has been simple: strengthen the common standards enough that customers do not need to recreate the same process controls in separate proprietary specifications, reducing redundant requirements while preserving legitimate engineering differences.

HOW MANY SPECIFICATIONS DO WE REALLY NEED?

Ask a shot peening supplier how many specifications govern the process, and the answer is rarely one or two. Many aerospace processors are expected to maintain dozens of customer, program, and legacy documents that address essentially the same operation.

A lot of those documents substantially duplicate AMS2430 or AMS2432. Some use different terminology for equivalent controls. Others carry forward old provisions or provide less technical detail than the AMS standards they are meant to supplement.

At some point, that fragmentation becomes a risk of its own. Every document must be reviewed, flowed down, trained to, revised, and audited, while every drawing and purchase order must be matched to the right requirement and revision. Small

wording differences can become compliance issues even when the underlying process has not changed.

MORE DOCUMENTS DOES NOT AUTOMATICALLY MEAN MORE CONTROL

More documentation can look like more rigor, but document count and process control are not the same thing.

Good shot peening control comes from the fundamentals: qualified equipment, competent people, stable processes, media control, intensity, saturation curves, coverage verification, reliable records, change management, and effective oversight.

Repeating those controls across dozens of documents does not make them stronger. Duplication can create conflicts, preserve obsolete language, complicate training, and pull attention away from the variables that determine process capability and repeatability.

WHERE THE RISK SHOWS UP

Document control is one pressure point. Each customer revision must be evaluated for its effect on procedures, training, equipment, inspection, media, parameters, records, and notifications.

Contract review has the same problem. Planners may need to reconcile specifications, revisions, drawings, purchase-order clauses, supplements, deviations, part requirements, and industry standards. Each overlap creates another opportunity for the wrong requirement to enter the work plan.

Operators and inspectors then face multiple instructions for the same process, often with different terms, forms, test frequencies, or acceptance provisions. That complexity can make the truly important requirements harder to see.

THERE IS ALSO A TECHNICAL GAP

The issue is also technical: some customer and legacy specifications are less complete than AMS2430 or AMS2432.

A proprietary specification may be detailed in one area while saying little about media testing, contamination control, equipment qualification, saturation curves, coverage, periodic verification, personnel competency, change control, corrective action, or traceability.

Those controls still have to exist. If the specification does not define them, responsibility shifts to the supplier, customer, auditor, or engineer, which can produce different control systems among approved suppliers working to the same requirement.

START WITH A COMMON TECHNICAL FOUNDATION

A more sustainable model is to use AMS2430 and AMS2432 as the common technical foundation for shot peening, then clearly identify the requirements that genuinely need to be different.

If a legacy or proprietary specification contains no unique technical requirements, it can be retired in favor of direct reference to the applicable AMS standard. If legitimate customer, regulatory, or program-specific differences must remain, those differences can be captured in a short, clause-specific exception document.

That does not reduce customer authority. The design organization still decides what the part requires. The change is simply that general process-control requirements are separated from the engineering exceptions that are truly unique.

THREE DOCUMENTS, THREE CLEAR JOBS

The structure can be straightforward. AMS2430 or AMS2432 governs the general process: media, equipment, intensity, coverage, monitoring, verification, personnel, records, and the related system controls.

A concise exception document contains only the additions, deletions, or replacements that are genuinely unique. The product definition - the drawing, repair document, or similar record - contains the requirements that belong to the part itself, such as intensity and tolerance, coverage, peening boundaries, masking, media restrictions, inspection criteria, and special handling.

MAKE EXCEPTIONS EASY TO SEE

An exception document should begin by identifying AMS2430 or AMS2432 as the governing baseline: "Shot peening shall be performed in accordance with AMS2430 [or AMS2432], except as specifically modified herein."

From there, each exception should identify the affected AMS paragraph, state the exact addition, deletion, or replacement, and include the technical basis when appropriate. A simple table can make those differences immediately visible to suppliers, engineers, planners, and auditors.

Just as important, requirements already covered by AMS

should not be copied into the exception document. Once baseline language is repeated, revisions can get out of sync and minor wording changes can create questions about technical intent. An exception document should contain exceptions - not a second version of the standard.

KEEP PART REQUIREMENTS WITH THE PART

The design organization should continue to define exactly what each part needs. Intensity and tolerance, coverage, masking, peening boundaries, surface-finish limits, media restrictions, acceptance criteria, special test specimens, and post-peening handling should remain on the drawing, repair document, or another product-specific record whenever practical.

Keeping part requirements with the product improves clarity and configuration management. It also supports electronic planning, automated contract review, and compliance databases because requirements begin to appear in consistent, predictable locations.

TRANSITION WITHOUT DISRUPTING PRODUCTION

This does not need to be an abrupt change. A controlled transition can start with a clause-by-clause comparison between each legacy specification and the applicable AMS standard. That review identifies duplication, conflicts, omissions, and the requirements that are genuinely unique.

Organizations can then decide which specifications should be retired, which can be replaced by direct AMS reference, and which need a concise exception document. Affected drawings, purchase orders, repair documents, supplier approvals, procedures, training materials, and audit checklists can be updated on a planned schedule.

New contracts and new designs can transition first. Legacy products can be converted through a defined risk-assessment process, with approved equivalency statements or controlled supplements used where immediate drawing revision is impractical. The important point is to make the change deliberate, documented, and communicated.

A PRACTICAL INDUSTRY PATH FORWARD

A practical industry effort would inventory active shot peening specifications and compare each with AMS2430 or AMS2432 to identify duplication, conflicts, technical gaps, and unique requirements.

Specification owners could then decide what should remain, be retired, directly reference AMS, or become a concise



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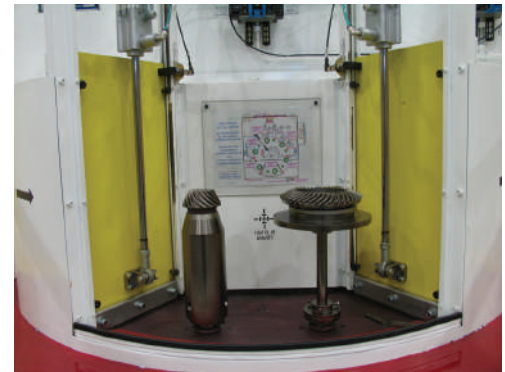


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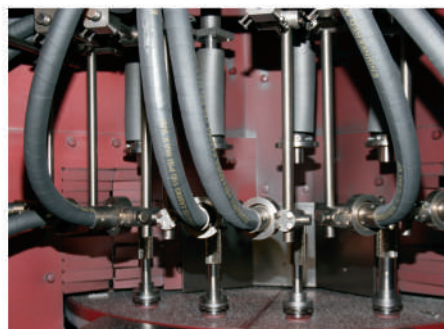
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exception document, while moving part-specific requirements to product-definition records and managing future AMS revisions through a defined transition process.

PUT THE FOCUS BACK ON PROCESS PERFORMANCE

In my experience the biggest benefit of standardization is not paperwork reduction, although that would certainly help. The stronger argument is risk reduction. Over the past 30+ years I've attended and participated in numerous shot peening workshops and training events around the world. It's clear to me that gaps in documentation, standardization and training have long been and continue to be a problem in the shot peening industry.

We already see the practical benefit with customers that specify AMS2430 or AMS2432 directly. Contract review is considerably leaner, shop personnel are well versed in the standard, and work moves through the shop faster. Clear, concise, familiar requirements benefit everyone - processor and customer alike. ●

ABOUT THE AUTHOR

Walter Beach has served as Vice President of Peening Technologies, based in East Hartford, Connecticut, since 1991. The company, which traces back to Hydro-Honing Laboratories, founded by his father Walter Alden Beach Sr. in 1966, provides shot peening services and equipment for the aerospace sector and other high-performance applications.

Walter has over 34 years of hands-on experience in shot peening. As the company's Director of Quality Assurance, he helped lead it to become the first Nadcap-accredited shot peening facility, in 2001, and he holds a U.S. patent (US 9,063,049 B2) for a method of quantifying metal surface treatment.

Active with SAE International since the early 2000s, Walter has contributed to Nadcap checklist development and, in 2025, was appointed Chairperson of both the SAE Surface Enhancement Committee and the Aerospace Surface Enhancement Committee, succeeding Jack Champaigne. In this role, he has sponsored revisions to AMS2430, AMS2432, and ARP7488. He also serves on the Board of Directors of the Aerospace Component Manufacturers (ACM).



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AN INSIDER'S PERSPECTIVE

Kumar Balan | Blast Cleaning and Shot Peening Specialist

Building the Pipeline

ANJALI'S SUMMER

There is a particular kind of silence that follows when you tell a sixteen-year-old you are available every evening to discuss shot peening intensity and coverage. It is not the comfortable silence of contemplation. In my situation, it lasted about as long as the durability of a poorly heat-treated cast shot — brief and ending in total breakdown. So, imagine my surprise when that very sixteen-year-old, my daughter Anjali, approached me this past summer asking, entirely unprompted, for a proper lesson on saturation curves. I have spent thirty-six years failing to make this subject sound thrilling at dinner parties. It took one summer job opportunity to succeed where I had not.

The job in question was an internship at Vibra Finish LTD., the Mississauga, Ontario job shop whose vibratory peening work I wrote about in these pages back in 2019. She spent her summer around the same oscillating tubs, Almen strips, and saturation curves I described in that article, except this time she was the one asking the questions instead of me.

I did not engineer this. Brian and Zach McGillivray are good friends, industry colleagues and users of Ervin shot for their cleaning and peening operations. When my daughter expressed interest in engineering education, I took her on an exploratory visit to Vibra Finish LTD. where Zach McGillivray was kind enough to offer her a summer position to help her determine the fit for her future. Curious rather than committed, and somewhere in those weeks of watching parts come out smoother and more fatigue-resistant than they went in, something clicked. A couple of weeks into her internship, she was asking me to walk her through the fundamentals properly, and not long after that, she sat for the Level 1 and Level 2 shot peening certification exams. She passed both, which is more than I can say for how she did the first time I asked her to load the dishwasher correctly.

I am telling you this not because I think every reader needs to hear about my daughter, but because her summer accidentally traced out, in miniature, the exact path our industry needs to attract new recruits. Real exposure, followed by structured training, followed by a credential that means something beyond the walls of one shop. I want to spend this column arguing that we should be building that path on purpose, for

a lot more people than just the ones lucky enough to know someone in the business.

THE EXPOSURE PROBLEM

Ask around at your next industry gathering how people got into shot peening or blast cleaning, and you will hear some version of the same story repeatedly: nobody planned it. An engineering job needed filling, a family business needed a hand, a co-op placement happened to land in the wrong building at the right time. I include myself in that list. Almost nobody I have met in thirty-six years chose this field the way they might choose aerospace or software, because almost nobody knows it exists as a choice until they are already standing in the middle of it (or sometimes slipped into it due to a shot spill).

That is a strange thing to admit about an industry this essential. Fatigue life, residual stress, surface integrity — these sit underneath the reliability of aircraft, automobiles, springs, and structural steel that people trust with their lives every day. And yet a sixteen-year-old with a genuine interest in engineering has essentially no path to discover any of it, short of the kind of lucky connection Anjali had. There is no shot peening elective, no career fair booth, no obvious first door to knock on — and then we wonder, in print, in these very columns, why the workforce is aging out faster than it is being replaced.

An internship like the one Vibra Finish LTD. offered Anjali is not a small thing. It is a company treating exposure as worth the investment, even for someone who cannot yet commit to a career. Most shops, understandably, are not set up for this — insurance, supervision, and the fact that a summer intern is not yet productive all argue against it. But somebody must go first, and I want to publicly credit Vibra Finish LTD. for doing exactly that.

Compare this to how most of our industry's public-facing effort is spent. Workshops, conferences, and columns like this one are aimed almost entirely at people already working in the field — worthwhile for retention but doing nothing for recruitment. Anjali found shot peening through a personal connection, which is precisely the problem: personal connections do not scale, and they favor whoever already happens to know somebody.

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FROM EXPOSURE TO STRUCTURED TRAINING

Exposure by itself, though, only gets you curiosity. It does not get you competence. Once Anjali came home wanting to understand the process properly rather than just having watched it, I needed a curriculum, not just my own memory of thirty-six years of field experience, which is a wonderful source of anecdotes but a poor substitute for a structured lesson plan.

I turned to the training material developed by Electronics Inc., the same organization whose shot peening workshops I have referenced more than once in these pages, and for whom I train users for Levels 1, 2 and 3 certifications. Dave Barkley, Vice-President and creator of EI Shot Peening Training, and Electronics Inc. generously gave permission for me to use their material to teach Anjali the fundamentals. I am grateful to Dave and Tom Brickley, President of Electronics Inc. for making that possible, and I want that gratitude on the record here, because it illustrates something important: good training material, built by people who have spent careers thinking about how to teach this subject clearly, is worth more than any amount of well-meaning improvisation from a parent, however experienced.

The curriculum starts where it always should: media. We worked through the history of peening, fundamentals of stress, different media types, hardness grades (as per SAE J827), and why conformance to AMS 2431 matters more than whatever happens to be sitting in the storage hopper that day. From there we moved into intensity and the Almen strip — not just how to mount an A, N, or C strip and read an arc height, but why a proper saturation curve requires at least four data points at progressively doubled exposure times, and why saturation itself is defined by a rule, not a feeling: the point at which doubling the exposure time again increases the arc height by 10%, not more or less. Only after Anjali could plot, unprompted, saturation curves by hand (instead of using a curve solver), did we move on to coverage — the visual inspection standards, factors affecting intensity and coverage, and why 100% coverage is a specification requirement (SAE J2277), not a best-effort target.

Teaching Anjali with that material rather than my own loose notes forced a kind of discipline I do not usually apply when I am simply telling a customer or a colleague something I already know. I had to sequence the concepts in an order that built on itself, check her understanding before moving forward, and resist the urge to skip ahead to the interesting parts before she had the basics solid. It made me appreciate, more than I expected to, how much of a gap exists between knowing a subject and being equipped to teach it, and why a curriculum designed for that purpose beats even decades of field experience delivered without one.

This is the piece of the pipeline that is easiest to skip and most necessary to keep. An intern who watches a process for a summer has seen something real, but seeing is not the same as understanding it well enough to apply it correctly and safely. Somewhere between the internship and the credential, someone must sit down and teach the fundamentals, using material built for that purpose rather than assembled on the fly.

THE CERTIFICATION CREDENTIAL

With the fundamentals in place, Anjali sat for the Level 1 and Level 2 shot peening certification exams. I have written before, back in 2016, about these exams from an industry perspective — what they cover, how they are structured, what they are meant to validate in a working operator or engineer. I will not repeat that ground here. What I want to describe instead is what that credential means when it belongs to a sixteen-year-old rather than a working professional.

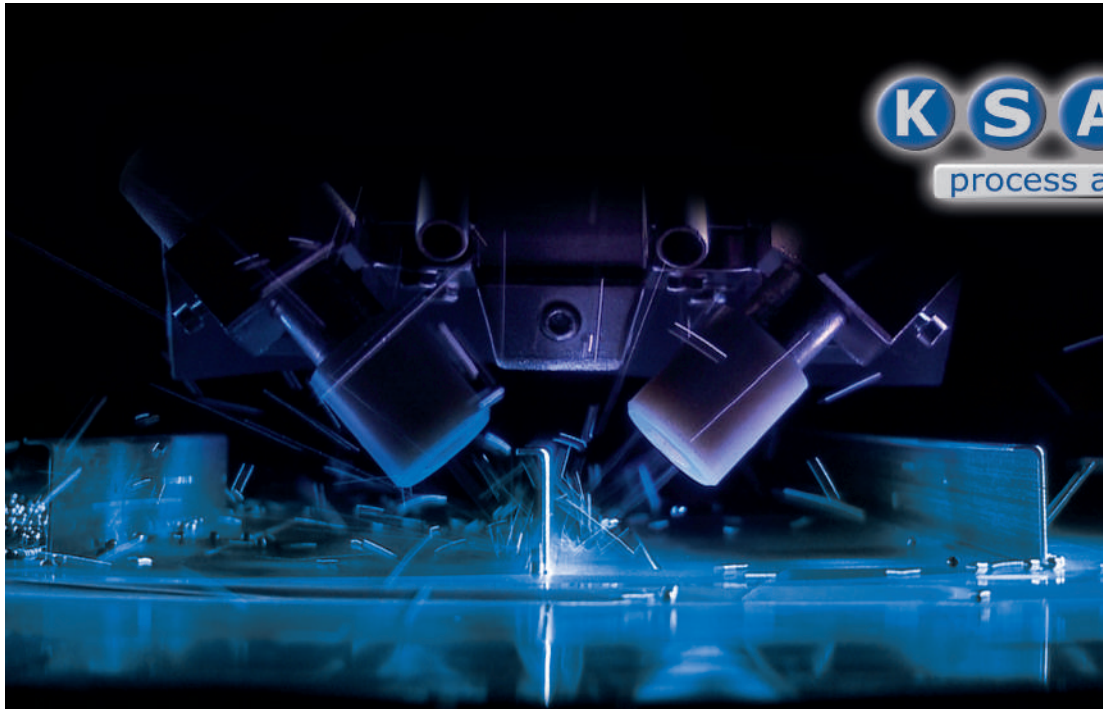
For an experienced operator, a certification is often confirmation of what a resume and a reference letter already say. For Anjali, it is closer to the opposite: it is proof, independent of me, independent of Vibra Finish LTD., independent of any family connection, that she understands the material. It is a credential she can put in front of an engineering school admissions committee or a future employer that does not require anyone to take her word, or mine, for what she learned over one summer. That portability matters enormously to someone at the very start of a path; in a way it simply does not for someone twenty years into a career.

I will make one claim here that I cannot fully verify, and I would genuinely welcome being corrected on it: as far as I have been able to determine, Anjali may be the youngest person, not just in our industry but anywhere, to hold both Level 1 and Level 2 shot peening certification. I have not found a record of anyone younger doing so. If a reader knows of one, I would be glad to be wrong, and gladder still to give that person their due credit in a future column.

It also matters to the industry, in a quieter way. Every young person who walks away from an internship with a recognized credential, rather than just a line on a resume that only means something to people who already know the company, becomes evidence to the next sixteen-year-old, and to that sixteen-year-old's parents, that this is a real field with real standards, not an odd summer job. Credentials do double duty this way — they validate the individual, and they legitimize the path for everyone who comes after. I will also admit to a selfish motive in encouraging her to sit for both levels. A formal, independent exam told me something my own proud-father judgment never could: whether what I had taught her held up. It did — and there is real satisfaction in having that

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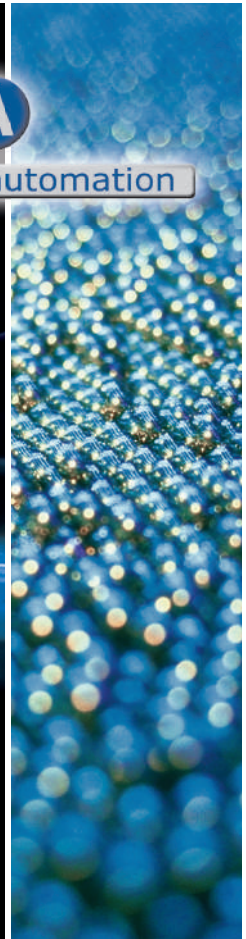
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confirmed by an exam rather than by my own hopeful read of how the lessons had transpired.

WHAT IT WOULD TAKE AT SCALE

Anjali's summer worked because three things happened in sequence, each supplied by a different part of our small industry: a job shop willing to open its doors to someone not yet employable in the usual sense, a training organization with curriculum built well enough to use effectively, and a certification body whose exams meant something beyond the company that hosted the internship. None of those three pieces is exotic. All three already exist. What does not yet exist, at any scale, is the deliberate connection between them.

I would like to see more companies treat an internship program the way Vibra Finish LTD. did — not as a burden to be tolerated, but as a genuine investment in a pipeline that benefits the whole industry, not just the host company. I know that Dave Barkley at Electronics Inc. regularly conducts one-hour introductory sessions for companies attempting an honest introduction to the subject. And I would like to see our industry associations and publications actively encourage young entrants toward certification, the way we already encourage working operators, rather than treating it purely as a credential for people already employed in the field. None of this requires a large budget or a new institution.

It requires a handful of companies willing to go first, the way Vibra Finish LTD. did this summer, and a bit of intention applied to a sequence of steps that, right now, only happens by luck — a shop that agrees to host one curious student a year, a trainer who sets aside a simplified version of their curriculum for a newcomer, an association that keeps a short list of companies willing to take that first call from a parent or a guidance counselor.

WHAT TRAINING MY DAUGHTER TAUGHT ME

I expected to teach Anjali some things about media, intensity, and coverage. I did not expect to learn quite as much as I did about how I explain this subject.

Talking to an engineer with ten years in the field, I can skip past the “why” of a concept and go straight to the “how,” because the why is assumed. Anjali had no such assumptions. The question that stopped me longest was a simple one: if an S-230 shot and a larger S-330 shot can both be tuned, through velocity and flow rate, to produce the same 10A intensity reading, why would anyone bother specifying the larger, more aggressive particle at all? On the surface, identical intensity looks like an identical outcome. It is not. The larger shot achieves that intensity with fewer, heavier impacts,

which changes the coverage rate, the surface roughness left behind, and, more subtly, how the residual compressive stress is distributed with depth beneath the surface, even when the peak reading on the Almen strip matches exactly. I have known this for decades. I had never had to say it out loud to someone hearing it for the first time, and doing so made me realize how much of what I know lives as instinct rather than as an explanation useful to a curious mind.

It was, frankly, good for me. Explaining fundamentals to someone with no prior context is a different skill than explaining a nuance to a peer, and I suspect a lot of us who have been in this field for decades have let that skill go dormant simply because we rarely need to use it. If our industry is serious about building a pipeline of young talent, we need to get better at teaching from the ground up again. Anjali did that for me before she ever sat for an exam.

CLOSING

Anjali's summer was not the product of a program, a grant, or an industry initiative. It was one company willing to open a door, one training organization willing to share what it had built, and one father willing to relearn how to explain his own field from scratch. That is not a scalable system, and it should not have to be this dependent on luck and business connections for the next curious sixteen-year-old.

If you run a shop, consider what Vibra Finish LTD. did this summer and ask whether you could do something similar, even in a small way. And if you know a young person who has shown even a flicker of curiosity about what we do, consider being the door someone was for Anjali. If she really is the youngest person to hold this credential today, I would like that to be a short-lived distinction — not because I want her record broken, but because it would mean a lot more sixteen-year-olds found their way to a door like the one Vibra Finish LTD. opened. The pipeline gets built one door at a time, or it does not get built at all.

ACKNOWLEDGMENT

I would like to thank Dave Barkley and Tom Brickley and Electronics Inc. for generously permitting the use of their shot peening training material in Anjali's instruction, and Zach McGillivray, Heidar Karimialavijeh, and the team at Vibra Finish LTD. for hosting her internship and giving her a genuine first look at our industry. ●







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IN MEMORY OF HOLGER POLANETZKI

December 13, 1956 - June 19, 2026

It is with profound sadness that we announce the passing of our highly respected and beloved colleague, Holger Polanetzki. A brilliant Engineer of Metallurgy, Holger dedicated much of his life to advancing the aerospace industry during his long and distinguished career at MTU Aero Engines AG in Munich and within the worldwide shot peening community. Holger joined MTU in 1986, initially taking responsibility for various special processes. Over the decades, his expertise deepened, culminating in his role as the Designated Process Specialist for Shot Peening and Grit Blasting, as well as the GE Certifying Agent for Shot Peening—a pivotal position he held for over 20 years prior to his retirement.

Holger's peer Alfred Pirker at MTU says "Beyond his technical expertise, we will remember Holger for his exceptional mentorship. He consistently challenged and guided his MTU colleagues in work planning and team leadership, providing cross-company support with unmatched expertise and competence."

Holger was a visionary in his field, responsible for conducting critical audits, providing expert consultations on design, quality, and manufacturing, and driving the development and implementation of new technologies, even in the face of opposition.

Wolfgang Hennig, former process owner from Rolls-Royce in Oberursel says: "I will miss the passionate discussions with Holger on shot peening processes and equipment."

Due to his ongoing dedication to shot peening as Holger was honored as "Shot Peener of the Year" (2008) by The Shot Peener magazine. He was an active member of AMEC, developed and implemented the highly advanced ultrasonic peening surface treatment process at MTU and co-developed the process and tooling for spiker needle peening. Even after his retirement he was actively involved in the German Shot Peener Forum and served as a dedicated trainer at workshops hosted by Electronics Inc. in the U.S. and sentenso in Germany.

"With his engagement in our workshops and his contributions Holger has brought technological excellence to our events. Moreover I'm missing him as a very helpful and reliable fellow over many years," says Volker Schneidau, general manager from sentenso.

Holger will be deeply missed by all who had the privilege of working with him. Our deepest condolences go out to his family and loved ones. ●

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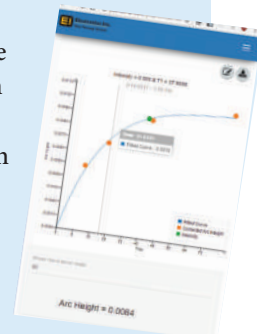
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Factory Calibration	00/00/00
Firmware	Rev 1.10 6-9-21

Active Table Settings	
Active Table	#1
Media Type	S-230
Flow Limit	30 lbs/min
Valve Capacity	30.3905 lbs/min
Pulse Frequency	30.00 Hz

Run Hours	
Power Cycles	17
Valve On-Time	1.15
Hrs <= 25C	0
25C < Hrs <= 80C	2.8
80C < Hrs <= 95C	0
95C < Hrs	0
Total Hours	2.8

Flow Control	
Local Setpoint Enabled	☐
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The Home Screen of the 678-24's web page—its web page is user-friendly and intuitive.

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INDUSTRY INSIGHTS

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Building the Procedure

INTRODUCTION

The two cases in the first part describe processes that work once the procedure is already established. They do not say how you get there.

That is the part worth spelling out, because the procedure is where the whole benefit is won or lost, and because none of it is guesswork. What follows is the sequence I use.

START FROM THE PART, NOT FROM THE MACHINE

The first step is to look at the component and to ask the manufacturer where it typically breaks.

A part is not uniform. It is not loaded uniformly, and it has intrinsic weak points. There is no such thing as peening the part — there is peening the places that matter. Where the fatigue crack initiates determines where you will need intensity, where you will measure it, and where coverage actually has to be verified.

The manufacturer already has that information. Broken parts come back.

LOOK UP WHAT HAS BEEN DONE BEFORE

The second step is literature and archives: tests run on comparable parts, matched as far as possible on material and surface hardness, to arrive at a starting intensity that stands a reasonable chance of producing a usable result.

This step exists because of what comes later. Fatigue testing takes the time it takes. Starting from a plausible intensity rather than from nothing is how you avoid spending test campaigns on values that never had a chance. If there is no literature, prepare extra patience instead.

BE HONEST ABOUT VOLUMES

The third step is an honest assessment of volume. How many parts per hour do we actually have to process?

Nothing has been built yet, but that number decides the machine and, more importantly, the layout. The procedure will have to fit inside an existing production process, so what surrounds it counts as much as the machine itself.

My own preference, for peening, is to work in batches. A

batch gives far better control over how the process evolves, and therefore over its stability.

The reflex for high volume is a pass-thru machine; this is large, it is expensive, and everything has to happen in a single pass — which means nothing is allowed to go wrong. Two batch machines, with a small buffer at the infeed and another at the discharge, can deliver the same throughput far more stably. If one of them stops, or if the amperage and the strips say it is no longer performing, the other keeps running. You are down to half. Half is not stopped.

The same argument applies to correction. On a pass-thru, the only real way to recover intensity and coverage is to slow the pass-thru speed — and slowing it slows the whole line, because the machine is the line. With two batch machines and properly sized buffers, you correct one machine and, for a short period, you have halved capacity rather than lost it.

None of this is an argument against continuous flow. Automation has largely dissolved the conflict: a layout can present itself as a pass-thru — continuous infeed, continuous discharge, nobody handling anything — while internally running in batches. There are systems where loading, unloading and even the reading of Almen strips are handled by robots. Continuous throughput, discrete process. Both are available.

POSITION THE STRIPS AGAINST THE REAL THROW

Once the fragile points are identified, the strips have to be placed where those points sit relative to the throw of the machine you are using for the test. Keep that in mind, because it will matter when the process scales to the final layout.

Not in a conventional position. In the position that maps the throw onto that geometry. This is why one installation ends up with six strips, three per side, and another with four on a control tray. Those are not numbers — they are the map of where the media lands on that part in that machine.

These are also the positions you will be reading from for as long as the process runs. Get them wrong now and the work has to be redone later to have the reference values you need.

MEDIA IS THREE VARIABLES, NOT ONE

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Media today is a varied and complex world, and there are three levers, not one: size, material — meaning specific weight — and the hardness of the media itself. All three converge on a single readable number, the Almen intensity.

Which is why enlarging the shot is the lazy way to go faster. It is one lever out of three, and it is the one that does the most damage to surface morphology.

I remain of the view that you should use the smallest media that will reach the required intensity. Throwing more kilos of fine media beats throwing fewer kilos of coarse media: the single impact does less morphological harm. Fine media typically costs more. The result is on another level in terms of coverage and consistency.

One condition attaches to this, and it is the real constraint. It requires a machine capable of running fine media properly. That is less common than it looks.

SAMPLE PROPERLY

With a starting target from the literature, prepare a small sampling. Not an enormous number of samples, but more than one, and drawn from different production lots. If there is more than one manufacturing site, take them from different sites. The purpose is to flatten out the statistics and the peculiarities each site carries.

This is the same problem the aerospace framework was built to solve — the same part behaving differently in different places. Here it is not normed. It is sampled.

PEEN, TEST, AND CORRECT IN BOTH DIRECTIONS

Peen the samples the way the process is meant to peen them, and send them to test. Then verify whether the improvement is what you expected, and correct. Higher if it falls short. But also lower: if you have tripled the fatigue life and doubling is enough, you reduce, and what you buy back is a faster process. The target is what the part needs, not the maximum obtainable.

ONE MORE THING ON CYCLE TIME

A note on what I mean by time here. I am talking about batch machines, where there is a cycle time rather than a pass-thru speed. As a very general order of magnitude, cycle times tend to sit somewhere around four to six minutes under ordinary conditions — and that figure is already 2T, the doubled time. With parameters this generic it is indicative, and there are cases that call for considerably more, or less.

Once the part is in the machine, the difference between

running the time T needed for full coverage and running 2T is marginal in practice. The part is already in there, already being worked.

What doubling the time buys is two things at once. Saturation is defined as the point where doubling the exposure no longer raises intensity by more than 10%, so running at 2T puts you past that point by definition. And coverage, which under SAE J2277 is extended beyond 100% precisely by extending exposure time, is at 200%. In industrial practice that is the reason for doing it: one decision, margin on both.

The cabin still has to be set up: parts loaded, parts unloaded. However good the handling systems are, that is time with the machine standing still. Extend the peening time and quite often it is still the standing time that exceeds the peening time, not the other way round.

The productivity lost to a doubled cycle is not nothing. But as a percentage it weighs less than the uncertainty of not doubling it.

Between literature and reasoning, there is a target value to aim at even at the start of a new process study. That is what changes the arithmetic. Say the sampling is three parts, enough to see whether the improvement is real: I can peen those three at the target intensity, using the parameters I worked out on the strips, and send them to fatigue testing — which takes as long as it takes.

Do it the other way and it becomes three samples at one minute, three more at two, three more at three. Nine tests instead of three.

The difference is that a target starting intensity is normally decided beforehand. Sailing towards the unknown is fine, but let us at least take a compass along.

SAME INSTRUMENT, BOTH PHASES

Using strips while building the procedure is what allows you to use strips to control it afterwards. Same instrument, both phases — which is what makes the control comparable to the construction, instead of being a different measurement of a different thing.

Skip that, and you are left rebuilding the reference values later, on a process that is already running. ●

ABOUT THE AUTHOR:

Silvio Ruiu is a surface engineering consultant based in Modena, Italy, with more than ten years of field experience. He works on wheel blast and shot peening installations, focusing on process setup, equipment efficiency and diagnostics.

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Shot Peening Training Announces Initial 2027 Workshop Dates

A STRONG START TO THE 2027 SCHEDULE

With 2027 approaching, Shot Peening Training is looking ahead to another year of opportunities for shot peening professionals to expand their knowledge, strengthen their skills and continue their professional development. The organization has announced its first group of 2027 training dates, with additional seminars, workshops and on-site training opportunities expected to be added throughout the year.

The initial 2027 schedule includes four seminars in locations where Shot Peening Training will continue its long-standing commitment to providing accessible, expert-led education to the shot peening industry. The first session will take place in Tokyo, Japan, on March 26, followed by San Miguel de Allende, Mexico, April 6–7, and Vancouver, Canada, April 27–28.

These first dates offer companies and individuals an opportunity to begin planning their 2027 training needs well in advance. With additional events still to be announced, the initial schedule provides an early look at what professionals can expect from Shot Peening Training in the coming year without representing the complete 2027 calendar.

Shot Peening Training courses are designed to help professionals improve their skills and reach their professional goals. Participants learn from expert instructors on relevant topics, providing an opportunity to build knowledge that can be applied to their day-to-day responsibilities within the shot peening industry.

Training can also be tailored to meet the needs of individual companies. Organizations have the option to train on their own equipment, and courses can be customized to address specific needs. Training may also include a facility and equipment review, creating an opportunity to connect classroom instruction with the equipment and processes participants work with every day.

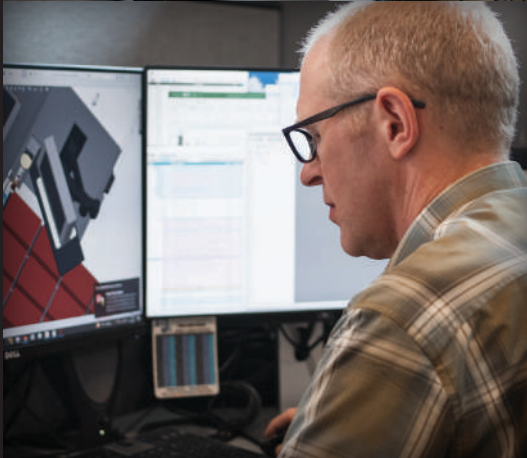
For professionals working in industries with specific regulatory and quality requirements, Shot Peening Training also offers FAA courses and is a Nadcap Partner in Education. These programs provide additional avenues for continuing education and professional development within the industry.

The 2027 announcement builds on an established training program that has served shot peening professionals across multiple locations and countries. Rather than being a new direction for the organization, the upcoming schedule continues that tradition while giving participants additional opportunities to plan ahead for training during the year.

And this is only the beginning of the 2027 calendar. Shot Peening Training notes that additional events may be added throughout the year, giving professionals more opportunities to participate as the schedule develops. Those considering training for themselves or their teams are encouraged to check the website regularly for new dates and locations.

Whether the goal is to build technical knowledge, support employee development, provide customized training or gain experience with specialized equipment, Shot Peening Training offers a variety of ways for professionals and organizations to continue their education. The 2027 schedule provides an early opportunity to start planning while leaving room for more training opportunities to come.

For the latest information on 2027 training dates, locations and registration, visit www.shotpeeningtraining.com. ●



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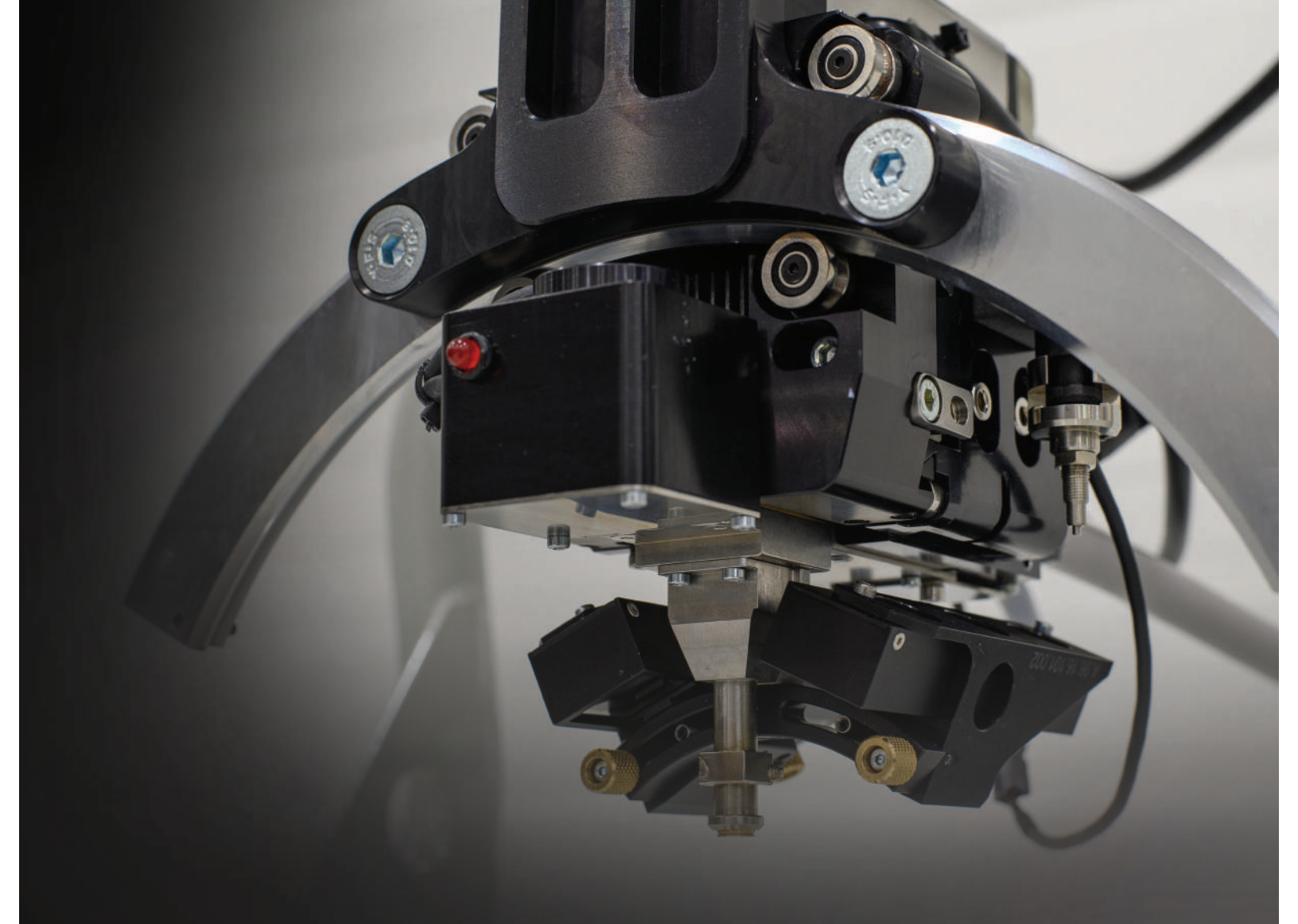
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