SAE International™

SURFACE VEHICLE RECOMMENDED PRACTICE

SAE J443

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(R) Procedures for Using Standard Shot Peening Test Strip

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1. ***Scope—***This SAE Recommended Practice provides uniform procedures for using the standard shot peening test strips reported in SAE J442. Standard test strips are used to establish saturation, determine intensity, monitor repeatability of the shot peening machine operations, and can be used to predict a desired result on a part. It is recommended that the standard test strip A be used for intensities that produce arc heights of 0.10mm A (0.004 inch A) to 0.60 mm A (0.024 inch A). For intensities below 0.10 mm A (0.004 inch A), the standard N strip is recommended, and for intensities above 0.60 mm A (0.024 inch A), the standard C strip is recommended.

The process of shot peening, in common with many other processes, cannot at present be adequately controlled by nondestructive inspection of the peened parts, therefore, it is necessary to control the process itself to achieve consistent, reliable results.

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2. References

2.1 Applicable Publications—The following publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest version of SAE publications shall apply.

2.1.1 SAE PUBLICATIONS—Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

SAE J442—Test Strip, Holder and Gage for Shot Peening
SAE J2277—Shot Peening Coverage

3. *Peening Intensity*—Intensity is expressed as the arc height of a shot peened test strip at saturation. The intensity is a function of the mass of the shot, its hardness, its velocity and its angle of impingement on the peened surface of the strip to the shot stream.

4. *Saturation*—A plot of peening time versus arc height is used to define saturation. By peening a series of test strips, using increasingly longer peening times, with all other conditions maintained constant, and plotting the series of points on a graph of exposure time versus arc height, a curve will develop. These points define a curve with a general shape as shown in Figure 1.

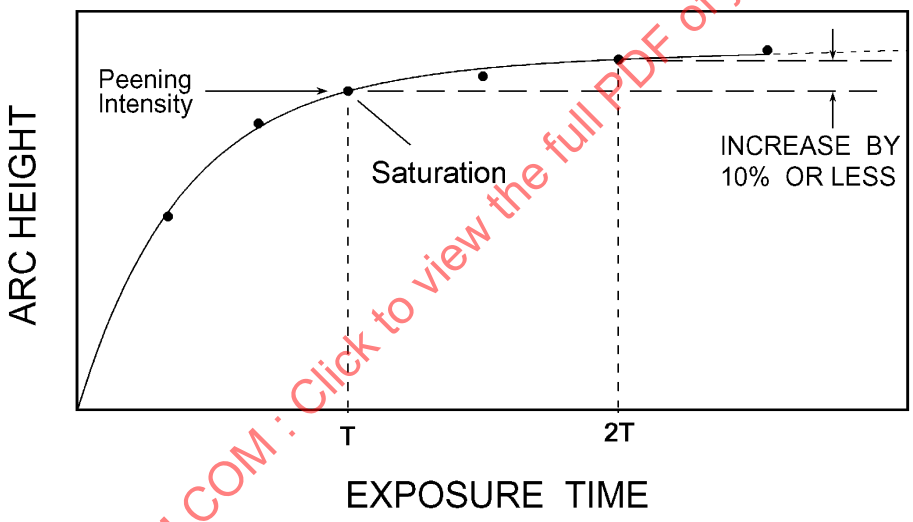

FIGURE 1—SATURATION CURVE

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Saturation has been attained when the “knee” of the curve is passed and increasingly longer periods of peening time are required for a measurable increase in test strip arc height. The location of the knee, saturation point shown in Figure 1, can be defined as the first point on the curve beyond which the arc height increases by 10% or less when the peening time is doubled.

5. Procedure Based on Arc Height Versus Exposure Time Relationship

General—Prior to use, the zero position of the gage shall be checked with a flat calibration block (see SAE J442) and, if necessary, adjusted. Test strips should also be checked for flatness prior to use, in accordance with SAE J442. Pre-peen out of flatness measurements may be used to compensate raw arc height readings.

5.1 Fasten the test strip tightly and centrally to the test strip holder, avoiding entrapment of any foreign material - such as media.

5.2 Expose surface “X” (SAE J442) of the test strip to the peening stream to be measured. Record the time of exposure or its equivalent.

5.3 Remove the test strip from the holder and measure the arc height on the Almen gage, ensuring that the indicator stem contacts the unpeened face of the test strip.

5.4 Using different exposure times, repeat steps 1, 2, and 3 sufficiently (minimum of 4 test strips) to determine a curve similar to Figure 1.

5.5 Peening intensity is determined by interpreting the curve. Intensity is the value of the arc height at time T, which increases by no more than 10% when the exposure time is doubled - time 2T. The graph shall be constructed by using a minimum of four points other than zero.

NOTE— Test strip readings are "arc height," not "intensity." Therefore, exposing a single test strip will not reveal intensity. Intensity can only be determined by the procedure outlined previously.

5.6 Test strips peened at time T and greater shall exhibit uniform coverage. This requirement ensures that portions of surface "X" (as defined in SAE J442), exclusive of hold down screws, have not been shielded from the peening stream. It should be noted that part coverage time can not be associated with test strip saturation time (see SAE J2277 for part coverage).

6. Production Setup Procedure—Intensity Measurement—The procedure to be used in making a production setup in which a setting of the machine is to be determined for a desired intensity may be described as follows:

6.1 Provide fixture which supports the test strip(s) in a manner to simulate the selected surfaces of the part to be peened. Test blocks (see SAE J442) shall be mounted on the fixture to duplicate the angle and location of these areas. Setup shall be qualified by placing the test strip setup fixture in the machine in the same orientation to the shot stream that the part will be exposed during processing. Air pressure or wheel speed shall be adjusted to yield designated intensities. Nozzle positions or wheel cages should be set so that the shot stream(s) have an angle of impingement between 45 and 85 degrees to the test strip surface.

6.2 Intensity shall be determined by exposing individual test strips at each location in the test strip fixture for increasing periods of time and plotting the results from each location on a saturation curve (see Figure 1). Re-use of test strips is not permitted.

6.3 If the intensity measurement obtained from the curve does not fall within the specified tolerance, changes to the machine settings or shot characteristics not specified by the responsible authority are permissible. Steps 6.1 and 6.2 shall be repeated until the intensity falls within the specified tolerance.

7. Process Control of Intensity—When the machine settings are found that yield an intensity that falls within the specified tolerance, a means of process verification and control shall be implemented. Confirmation readings shall be taken at a frequency determined to be appropriate to assure consistent peening intensity. Confirmation of peening intensity is accomplished by shot peening a test strip at the time T, as determined in the previously established saturation curve. The arc height of this test strip shall fall within the intensity tolerance specified for the part.

8. Notes

8.1 Marginal Indicia—The change bar (l) located in the left margin is for the convenience of the user in locating areas where technical revisions have been made to the previous issue of the report. An (R) symbol to the left of the document title indicates a complete revision of the report.

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