Q & A

THE Q & A FORUM at www.shotpeener.com is the ideal place to get advice on a wide range of topics from industry leaders and colleagues from around the world that have tackled and solved your challenges. The topics include:

- Shot Peening Process, Intensity, Coverage
- Specifications
- Equipment, Machines, Accessories
- Abrasive Blast Cleaning Process
- Media, Shot, Beads, etc.
- Ask Dr. Peener

You don't need to register to browse the forum. If you would like to post a question or respond to a post, however, you need to register and it's very simple to do. The following are a sampling of the forum's posts. Maybe you will find an answer here to an issue you are facing.

Shot Peening Process, Intensity, Coverage

Peening Parameters

Questioner: Hello every one. My question is which parameter should remain the same as the parameters at the intensity point to apply on peening the actual part:

1. Shot type and size (sure)
2. Impact angle (sure)
3. Stand off distance (sure)
4. Shot feed rate (not sure)
5. Nozzle size (sure)
6. Translation speed of nozzle (not sure)
7. Blasting pressure (not sure)
8. Rotary speed of part (not sure)

I want to change some parameters above to control the required coverage. Thank you for your support.

Answerer #1: Once you set the machine parameters and achieve the correct intensity, you must continue with these settings and no more changes. If you make any changes you must repeat the saturation curve test.

Questioner: Thanks for your feedback. But I have one confusion. If I continue with these settings and no more changes, the coverage of actual peening part seems over the coverage that I expect. In this case, what should I do? Please advise.

Answerer #2: After your machine is set to peen to the correct intensity, the only parameter you can change is the time it takes to peen the part. Understand that the amount of time you peen the part does not affect intensity. The peening time ONLY affects the coverage.

With that in mind, you can change the peening time of the actual part. I want to re-visit a couple of your parameters from above: *6. Translation speed of nozzle and 8. Rotary speed of part.* These will not affect intensity as long as the nozzle distance and media impingement angle in relation to the part surface remains the same as it was in the positive intensity test/verifications.

Answerer #1: There are two aspects to peening parameters: intensity and coverage. Intensity is established using a saturation curve. Once you have the correct intensity you must lock down all parameters of machine settings.

Coverage is only determined by observation of dent accumulation onto the part. You must peen your part long enough to dent the entire surface.

Questioner: Thank you and appreciate your support. My concern is clear now.

Surface Damage After Peening

Questioner: Has anyone ever experienced this phenomenon? A part appears to be free of defects prior to peening, then after peening a scratch or nick becomes visible.

Answerer #1: There appears to be two alternatives as to scratch origin. Either the scratch was present before peening or it was imposed after peening. If it was present before peening then the scratch cannot be sharp and must have appear to have been "blurred" by the action of peening. If the scratch appears to be sharp, then it must have occurred after peening as a result of part handling. A blurred scratch is rare but can be the result of a scratch having been smoothed over by a burnishing type of process applied prior to peening. During burnishing metal flows over the scratch hiding it from view. Subsequent peening then stretches the surface revealing a (blurred) scratch.

Answerer #2: Could it be that something has gotten into the working mix of shot that is being cycled through and shot at the part causing damage when it hits? Maybe a bit of metal or something? This would be applicable on a system without classifier screens to take out stuff like that, of course.

Questioner: The damage looks like a long scratch or groove that's been peened over. Problem is we are 100% sure it was not visible to the naked eye prior to peening. Answerer #1 seems to have hit the nail on the head.

Shot-Peened Part Warpage

Questioner: Is it possible to correct a part that has been warped post shot peen and be acceptable? The part was only shot peened on one side of the part. The other side was completely masked off.

Answerer #1: I think the first option would be to peen the other side, but the other side was masked off for a reason. Even if allowed, the part may not return to its original shape.

More important is learning why it warped. Was it peened with too high of an intensity? If so, that would be the larger issue and cannot be undone. If the peening procedure allowed for the intensity used, then the process design is in question.

Since that is often not the case you should verify the part was dimensionally correct—was it too thin?—before being peened. Next, double-check that your arc height measurements and intensity calculation are correct.

In the end, any corrective action would need approval from the part owner and/or design authority. Please let us know your findings, or additional information. I would appreciate reading a follow-up.

Questioner: Exactly what we did...peened the other side. It was optional but it did not return to the original shape. The intensity was within the allowable range as was the arc height measurements and calculations.

The part was too thin and that is why masking was required in those areas but only required on one side of the part.

I personally haven't seen that requirement before. Just makes sense to me whatever you mask and peen on one side of the part should be done to the other. Process design is checking into it. I will let you know.

Answerer: It sounds like nothing can be done for the part you've already done. Future attempts should be done by peening both sides at the same time with blast streams directly opposing each other. If that is not possible, peen one side with light coverage, then do the same for the other side. Repeat this until you've obtained the desired coverage.

Questioner: Would a warped part be rejectable as an unacceptable part in the shot peen process or in final inspection? If shot peen rejects the part, how do we back it up if it isn't covered in our specification? Thanks in advance.

Answerer: It sounds like you have an opportunity to make improvements in the quality or inspection procedures practices. There should be guidelines for acceptance/rejection of components coming into the shot peen department and again after peening.

There is a special burden on the shot peening operator. If he/she properly peens to the required peening parameters and then if the part warps (often because of thin cross section) who is at fault? The designer or the operator?

Is the operator expected to recognize if the part is warped prior to peening thus rejecting it? Are drawings complete with dimensions and accept/reject levels for both pre- and post-peening?

Perhaps some additional training for designers, inspectors and operators could help address this issue.

Questioner: You make a good point regarding additional training. We do have guidelines for acceptance/rejection criteria but they are straight out of the spec. Our customer is taking responsibility if the part warps as long as it is masked and shot peened according to the model (CATIA) which it is.

Then they will inspect it on their end and make the decision. My concern is us stamping the part as acceptable because there isn't anything in the shot peen spec that addresses accept/reject criteria for a slightly warped part.

Thanks again for your valuable response.

Edge Rollover

Questioner: Hello all. It's been quite some time since developing shot peen applications, but now I've been dragged back in. I've got a nickel-based part that will be peened at 4-8A, with the option of S110 or S170 (with CCW equivalent sizes allowed) ... so we'll go with either CCW 14 or CCW 20 ... but which one?

In our other shops with similar parts, the occasionally nagging problem has been edge rollover. The best solution is to generate the largest break edge (chamfer, radius or whatever the particular requirement is) prior to peening. However, sometimes the max allowed isn't all we'd like it to be.

So the question: Does anyone have any experience as to how much affect shot size has on rollover ... if any ... given that the intensity range must be met regardless?

Answerer #1: This old rollover problem seems to be a never ending one. In my experience the people machining parts to be shot peened rarely know what "Break Edge Condition" is needed to prevent unwanted rollover, and even if they did, they may not want to incur the extra manufacturing costs involved.

Perhaps if an additional guidance Table (linked to the data provided in Tables 1, 2, 3 & 4) was to be included in ARP7488, resolving the problem may actually get a little closer.

At least the people machining parts could be made aware of what "Break Edge Condition" we (the peeners) need to enable us to meet their requirements. Here's hoping !

Answerer #2: A sharp edge is going to roll regardless of shot size, and a rolled edge is not something you want. In fact it's strictly prohibited in most peening specifications and Nadcap requirements dictate you have methods for both detecting sharp edges prior to peening and inspecting for rolled edges post peening.

If possible make your edge breaks at least .010". I've found this to be a safe minimum.