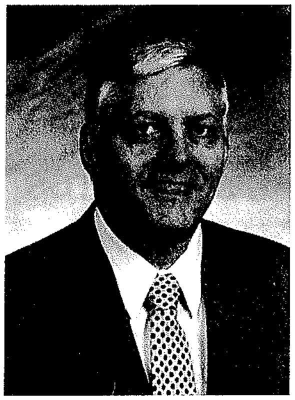

Letters to the Editor

Jack Champaigne
Editor of The Shot Peener

Dear Jack,

We have swing table type blast cleaning machines and presently we use rubber sheets to cover the table top. The life is found to be too short and due to this, the up-time is also less. Can anyone suggest a better material for enhanced performance?

M.Tamilmani at mtm@alh1.global.net.in
Hosur, Tamilnadu, India

Dear Jack:

I have a basic question as to the definition of ALMEN. When a spec calls out saturation shot peen at .008 / .012 almen, is the .008 almen simply a "diameter measurement in inches of steel"?

Thanks,
Matthew DeRosier at mderosier@sierracin.com

Dear Matthew:

No. A special strip of spring steel, an Almen strip, is clamped onto a flat block and then subjected to the blast stream. When the strip is unclamped it will curve since the top surface has been dimpled and stretched. The amount of curvature, the arc height, is what is read on the special Almen gage. Your spec range of .008-.012 inch is the range of curvature that the strip may exhibit. The curvature of the strip is proportional to the blast stream energy.

You have to submit a minimum of 4 (fresh) strips for increasingly longer exposure times and construct a "Saturation Curve". The knee of the arc-height curve is then the intensity. This knee is defined as the first point on the curve that, when the exposure time is doubled, only goes up an additional 10%.
Hope this helps.

Jack

Dear Jack:

You mentioned in your reply that the curvature is proportional to the blast stream energy. Is it directly proportional? I.E. if deflection was .008 and is now .016, is the kinetic energy received by the strip also twice as much? How can I convert the strip test result to a kinetic energy value?
Thanks for the help,

Brian

Editor's Note: *Most of these letters were sent to me via LETTERS ON LINE@shotpeener.com.*
To send a "Letter to the Editor" online, just go to our web site at www.shotpeener.com—directions will be provided.

Lambda Product Literature Available

2000030

Efficiently Optimizing Manufacturing Processes Using Iterative Taguchi Analysis

Introduction

Taguchi experimental methods are now widely used in many industries to efficiently optimize the manufacturing process. An iterative approach allows multiple complete properties to be rapidly optimized at minimal cost.

Taguchi design of experiment (DOE) methods incorporate orthogonal arrays to minimize the number of experiments required to determine the effect of process parameters upon performance characteristics. The Taguchi experimental approach allows a statistically sound experiment to be completed while investigating a minimum number of possible combinations of parameters or factors. A Taguchi experiment can be accomplished in a timely manner and at a reduced cost with results comparable to a full factorial experiment.

Lambda Research offers studies designed to optimize properties such as residual stress, retained austenite, phase composition, texture and cold working measurable by x-ray diffraction based upon Taguchi techniques. Minimizing tensile residual stresses in machining and grinding and optimizing the depth and magnitude of compression in shot peening while maintaining cold work are typical process optimization studies amenable to Taguchi methods. The following Diffraction Notes article describes the application of Taguchi DOE methods to optimize the heat treatment of a bearing steel. Our engineering staff would be pleased to discuss application of Taguchi methods for the optimization of other manufacturing processes.

Experimental Design and Technique

The objective of this study was to determine a procedure for the heat treatment of 52100 steel yielding simultaneously the highest hardness and the lowest level of retained austenite employing a Taguchi experimental design. The factors identified as affecting the retained austenite and/or hardness were austenitizing temperature, tempering temperature, tempering time and cold treatment.

To identify any interactions that may take place among the factors, an L16 $(2)^{15}$ array, with two levels for each factor, was chosen for the initial experiment (DOE A). The recommended heat treatment commonly performed for 52100 steel was the basis for selection of the initial two levels for each factor. The L16 $(2)^{15}$ designation refers to the number of experiments (16), the number of levels for each factor (2), and the number of factors or interactions (15).

Once the possible interactions were identified, an L9 $(3)^4$ array, employing nine experiments, three levels for each of the remaining four factors or interactions, was chosen for a second analysis (DOE B). Finally, a third Taguchi experiment (DOE C) was performed to refine the results of the second experiment and approach the optimal heat treating parameters.

—Diffraction Notes, Lambda Research
Winter, 2000

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