# Article information:

Experimental measurement and analytical determination of shot peening residual stresses considering friction and real unloading behavior - ScienceDirect  
<https://www.sciencedirect.com/science/article/pii/S0921509316300697>

# Article summary:

1. This article presents an analytical model to predict the residual stress distribution induced by shot peening, a cold-working process used in industry to improve the fatigue performance and surface nano-crystallization of metallic parts.

2. The model takes into account the elasto-plastic unloading phase of shot impacts using two nonlinear kinematic hardening models considering the Bauschinger effect, as well as the effect of Coulomb friction between target surface and shots.

3. Experiments on medium carbon steel validate the results obtained from the analytical model, which agree well with experimental data.

# Article rating:

Appears moderately imbalanced: The article provides some useful information, but is missing several important points or pieces of evidence that would be required to present the discussed topics in a balanced and reliable way. You are encouraged to seek a more balanced perspective on the presented issues by exploring the provided research topics and looking at different information sources.

# Article analysis:

The article presents an analytical model to predict the residual stress distribution induced by shot peening, a cold-working process commonly used in industry to improve the fatigue performance, stress corrosion resistance, and surface nano-crystallization of metallic parts. The article provides a comprehensive review of previous analytical and numerical models for estimating the shot peening residual stresses and highlights their limitations.

The authors have made modifications to the existing analytical approach based on the work of Shen and Atluri (2006) to account for elasto-plastic unloading of shot impingements, friction coefficient effect, and the fraction of kinetic energy transmitted to the treated material. The authors have also carried out experiments on DIN 1.6582 medium carbon steel to validate the results obtained from the analytical model.

The article provides a detailed analysis of various factors that affect residual stress distribution induced by shot peening, including hardening models in loading and unloading phases, offset determination of yield points, Bauschinger effect, and friction coefficient. The authors have taken into account these factors in their analytical model to predict more realistic residual stresses.

However, there are some limitations to this study. Firstly, while the authors have considered various factors that affect residual stress distribution induced by shot peening, they have not explored counterarguments or alternative explanations for their findings. Secondly, while they have carried out experiments on DIN 1.6582 medium carbon steel to validate their results, they have not tested their model on other materials or under different conditions.

Furthermore, there is a potential bias towards promoting the use of shot peening as an effective method for improving fatigue performance and stress corrosion resistance without adequately considering possible risks associated with this process. The article does not provide information about any potential negative effects or risks associated with shot peening.

In conclusion, while this article provides valuable insights into predicting residual stress distribution induced by shot peening using an analytical model that accounts for various factors affecting this process, it has some limitations in terms of exploring alternative explanations or testing its model under different conditions. Additionally, there is a potential bias towards promoting the use of shot peening without adequately considering possible risks associated with this process.

# Topics for further research:

* Risks associated with shot peening
* Alternative methods for improving fatigue performance and stress corrosion resistance
* Effects of shot peening on different materials
* Comparison of shot peening with other cold-working processes
* Optimization of shot peening parameters for maximum effectiveness
* Impact of shot peening on surface roughness and microstructure

# Report location:

<https://www.fullpicture.app/item/dfc4fdddb9d7bedc6233f2d2dd5a4018>