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Case-hardening of metals by shot-peening

This dissertation was prepared at the Department of Mechanical Engineering and Materials Science and Engineering of the Cyprus University of Technology and it was conducted by the supervision of senior lecturer Mr. Lazaros Lazaris.

In a few words, shot peening, is a surface treatment that is performed in order to increase the strength of metallic materials, which is applied in the last stage of the production line. The strength of the increase is achieved by developing residual compressive stresses near the surface of the material, after the impact of particles at high speeds.

This dissertation consists of five chapters. In the first chapter, is being presented a theoretical overview of traditional and non-traditional methods of case hardening, including the categories of shot peening treatment. Afterwards, in this chapter, is being presented a theoretical description of shot peening treatment and of its technological problem.

In the second chapter, is being described the technology and the means of implementation of the treatment, as well as basic concepts and terminology which is used by the industry and the academic community. Also, is being described how its checking is being performed and the results that it brings.

In the third chapter, is being presented an analytical approach of the fundamentals of shot peening by the use of existing analytical solutions, which have been used by various researchers, in attempt to describe the impact of a shot on a surface and thereby the fundamentals of the treatment.

In the fourth chapter, are being presented some of the industrial applications of case hardening via shot peening, highlighting the advantages and the disadvantages of this method.

In the fifth and final chapter, are being presented the conclusions that have been drawn and extracted through the completion of this dissertation.