

3 rd International Conference on Quenching and Control of Distortion
Topic: Effect of Processes on Distortion

THE DESTRUCTION MECHANISM of COMPLEXLY STRESSES
DETAILS AT PLASMA SUPERFICIAL HARDENING

Dr./Mr.Petrov S.V

Plasma superficial hardening allows to lower wear and to increase service life of heavily loaded machine parts in 2-5 times. The novel actively developing method of plasma hardening is technically and economically preferable at heat treating of a large number of details. Among the methods of a local heat treatment involving highly concentrated heat sources, the plasma method has the highest efficiency and capacity. It is characterised by reduced costs, affordability of process equipment and larger treated volumes.

The authors have confronted with the phenomenon of unexpected destruction of steel details under internal residual stresses at their plasma surface hardening. Formation and growth on a surface of a microcrack are preceded their destruction. The nature of this phenomenon was unknown. The given work is devoted to research of the mechanism of formation and growth of a crack on a surface of a steel detail with residual tensile stresses at its heating by a highly concentrated source of energy. Is established, that the in this case driven temperature field causes sign variable shift of a superficial layer of metal, which is at first in an elastic, and then in a plastic strain. Such deformation changes microstructure of a grain and strengthens microstresses on defects of metal. The heat treating by a highly concentrated flow of energy of a steel surface of a detail with residual tensile stresses causes on a surface occurrence deformation grid of metal as " of the fish scales ", which is looked through a lens with increase x7.

Are carried out: computer modeling of process of plasma hardening, experimental research on real objects - the bandages of locomotive wheelsets, micrograph analysis of microstructures. In view of carried out researches the technological measure, which exclude formation cracks, are developed.