

# CALIBRATION OF VIBRATION SHOT PEENING FATIGUE LIFE AND LIMIT RESIDUAL STRESSES AFTER TECHNOLOGICAL PROCESS

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## ABSTRACT

*Wöhlers curve shows us behaviour of steel materials under permanent loading, resistance of material Knowledge, that the Shot Peening helps and saves material from the residual stresses. Fatigue of material must be under checking. Causes of fatigue can be different but vibrations must not have value for decreasing mechanical properties. Speaking in general Shot Peening increasing fatigue stresses and higher quality is evidenced – improvement in the fatigue limit if is following Wöhlers diagram. Same thing is in HOOK'S LOW – betterment of mechanical properties.*

## KEY WORDS

*Calibration, Vibration, Dampers, Shakers, excitations, excitors, Fatigue, Limit, Residual Stresses, Yield point, Hooke's rule, Braking strength, Hardness Wöhlers curve.*

We know that vibrations are not useful. They can cause certain damages. One wisdom for any manufacturing of machine or something equal. Let Your generator producing electric energy, let Your mills producing satisfied switch gear, let Your mill producing good engines, let Your plant producing satisfied heating for every body. But in some cases is recommended: please to decrease and not producing noise and vibrations. Vibration increasing cause in growing the fatigue of material. Typical curve of Wöhler says us that some metallic items have fatigue life and limit. How to avoide these vibrations? What is necessary to take in consideration. The Shot Peening can decrease fatigue stresses of metallic items. Therefore is necessary to research al details of construction. Where are finding damping. Shaking, exciting shocking points on one construction? Today is not enough to tell the fatigue is one tremendous – huge problem for cracking and final disaster one steel structure. Previously is necessary how is Wöhler curve for that material as Fig 1. Structure under continual loading have fatigue life and

limit. What is possible to make betterment. First would be very useful to know and to mark: where is exciter, where is shocks, where is shakers point and where are the vibrations. When is this previously mentioned evidenced: no problem for repairing system. Vibrations in piping systems causing fatigue of material.

On the fig 2 piping under internal external pressure can make problem if is not exact calculate stiffening. Pipelines under sea water – fixed on the bottom sea, but all these data must be familiar with designer – projectist. Vibrations to be uniformed – equalize in allowable limits. Designer must say on the bottom sea piping systems or other where are fixed points for such. Shot peening is one confirmed method for decreasing all residual stresses in internal structures becoming from different causes. Calculation piping as fig 2 under internal external pressure (vacuum) giving dimensions – thicknesses extra bigger (piping under vacuum) and in sometimes is difficult to accept.

For piping with one internal pressure 50-100 kg/cm<sup>2</sup> we receiving thichnesses of 1-2". It is not enough classical system connection by welding. American rules for such calculation ASME (American Society of Mechanical Engineers) sect III and section VIII an API (American Petrol Institute) not enough. This is problem for such pipelines on the bottom sea (for example in golf Venice – Italy many pipelines staying there but bottom of sand is not always fixed and support for such piping are vary).

Change of sea bottom as support for pipelines cousing influence – the phenomen – appearance sea vave and sea – water horizontal streaming. These factors create one problems for such pipelines – the appearance of vibrations – increasing fatigue if we not previously not designed points: of shakers, shocks, exciters etc.

On thi way is possible to calibrate the vibrations on pipelines – structures. In short speaking ping systems can be established in one less or more equilibrium. On this way small microvibration not causing internal residual stresses. Microvibration in this can will be very useful, because decreasing such residual stresses. Shot peening is not necessary in such cases.

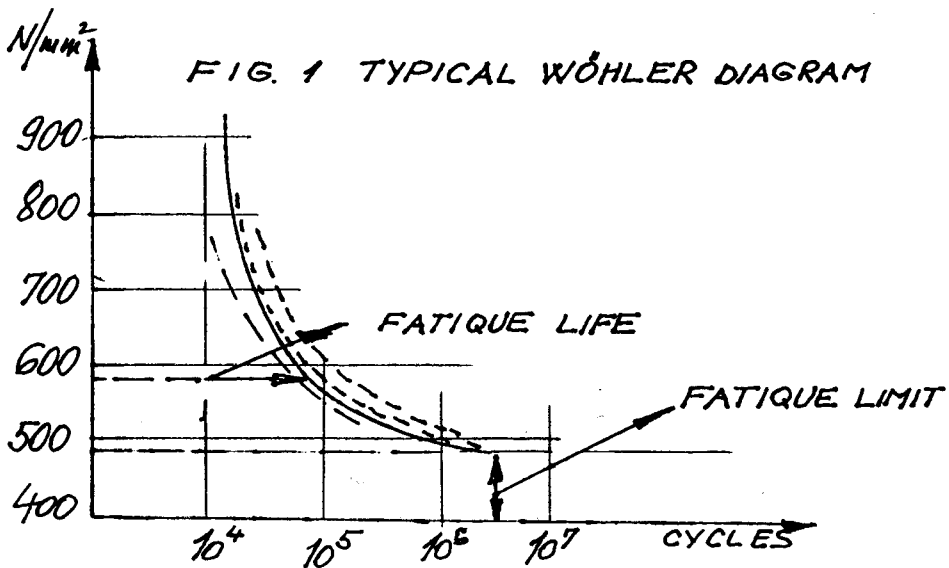


FIG2 PRESSURE VESSEL AND PIPES UNDER LOADING OF EXTERNAL & INTERNAL PRESSURES

