

CAVITATION EROSION FOR STAINLESS STEELS HAVING VARIABLE NICKEL CONTENT

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Abstract. *The paper present the characteristic cavitation curves obtained in the magnetostrictive facility of Timisoara Hydraulic Machinery Laboratory with four stainless steels having 0.1% C, 12% Cr and variable nickel content. Because nickel is an expensive material it must be kept at a reduced level but with the most favorable characteristics. The result of this study is important for economic manufacturing of those hydraulic turbines parts subjected to cavitation erosions. The optimum nickel content was found to be around 5%. In the future the interval (4.5...6)% must be more attentively tested. No heat treatment was applied because in the present research only the influence of chemical composition was studied.*

Keywords: cavitation erosion, cracks, chemical composition of stainless steels

1. Introduction

The lower limit of the pressure in a hydrodynamic flow is the value of the saturated vapours pressure, at the working temperature. If in a point of the liquid stream the pressure reaches this limit, in this point occur a bubble filled with vapours and dissolved gasses (a cavity). Carried away by the flow, when the cavities reach a zone with increased pressure they suddenly disappeared. This phenomenon is called “cavitation” and can be defined as the process of formation and disappearing of bubbles in a liquid as a result of pressure decrease under a critical limit. Cavitation is a phenomenon similar to boiling. The difference consists in the fact that boiling is produced by heat supply while cavitation by pressure reduction.

The presence of cavitation in a hydraulic device generates three undesirable effects: noises and vibrations, drastic reduction of efficiency and strong erosions of the solid walls which, guides the flow. There are also other fields of human activities in which, cavitation is used as a working process. In medicine it is used for breaking into small pieces the kidney stones [1]; in environment protection for destruction of plankton in lakes, ponds and see [2]; in shipyards for peeling off old painted surfaces [3].

With an improved manufacturing process of hydraulic devices (hydraulic turbines, pumps etc.) the erosion reduction can be reduced, in certain limits

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