A SURVEY OF VIBRATION CONTROL METHODS

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SUMMARY

In this paper a general survey of Vibration Control methods in Engineering is presented. Among passive methods structural and/or parametric modifications of the systems with/without applying damping treatments (dynamic absorbers, vibroisolation devices, sandwich constructions, damping coatings, etc.) are discussed. Active methods are connected with applying automatic control systems with external power supplies.

The criteria for proper control (mainly reduction) of vibrations should be taken, among other considerations, from current knowledge of human capabilities, comfort and safety limits, and knowledge of the body's mechanical response.

1. INTRODUCTION

Mechanical vibrations and the shocks and noise caused by them are becoming increasingly severe in modern technological society. The intensity of vibrations is closely connected with the main trends of contemporary technology. First of all, the increase of machine efficiency, obtained by increasing

operational velocities, power and load obviously causes an intensification of superfluous dynamic interactions. In addition, new and more severe environment conditions (e.g. high or very low temperatures or pressures), new materials and new requirements stimulate the development of new machines and new technologies. Second, the weight and dimensional optimization (i.e., mainly minimization) of machines, which reduces their rigidity can, in turn, give role to an increase in vibration. These trends, with the mass utilisation of technical means, lead to an increase of intensity in vibrational and acoustical fields and create a menace for man and his environment.

The protection of the human environment from hazardous vibrational and acoustical fields should naturally begin at the very source: machines must be designed in such a way that the level of transmitted vibrations and noise is kept within admissible limits. The control of vibration in mechanical systems subjected to vibration excitation, characteristic of modern aerospace, marine and ground dynamic environments, has become one of the most challenging problems for the engineering analyst and designer. They are faced with the task of finding a solution to determined in excess problem with many contradictory requirements.

The role of Vibration Control may be formulated as follows: to provide maximum efficiency in essential machine operation and minimum secondary distress effects, mainly in the nature of vibrations and noise. This purpose can, in practice, be reached by means of a proper construction of the machine and