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EXPERIMENTAL RESEARCH CONCERNING THE VIBRATION OF THE HYDRAULIC PUMP MACHINE THAT INJECTED ALUMINIUM, DEPENDING ON THE TYPE OF HYDRAULIC OIL USED

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Abstract: The paper propos to analyze the comparison, in terms of vibrations, the yield of the functionality of two similar pumps, which alimented the two injectors, but which operates with different oils (oil and oil additives).
Key words: lubrifiant oil, machine tool, vibration.

1. INTRODUCTION

1.1. Generality

As is known, the vibration represents a system response from an internal or external stimulus that makes this system to oscillate. There are, literally [1], [2], the hundreds of specific problems, which may lead to exposure to excessive vibration of a machine.

Where the machine and equipment with which they are provided are not designed, constructed, fitted and adjusted properly, their operation may be accompanied by a series of undesirable effects: dynamic transmission of requests by the foundation or the neighboring construction elements, producing noise with high level, the achievement of low performance or sometimes even inadequate fulfillment of their functional role.

2. CAUSES OF VIBRATION MACHINE

There are a number of factors that can influence the performance of machine tools including the temperature, the lubrication, the calibration tools and the industrial environment in which it is located. One aspect to be taken into account shall relate to the presence of vibrations in the location in which it is attached [1].

Vibrations in the production departments have several causes: the presence of pneumatic presses, the power hammers, the machine-tools, the cranes, the fans and the compressors etc. So, thanks to various sources, the vibrations can have different behaviors and intensities.

It is interesting to study the mechanical vibrations, especially the propagation of the hydraulic pump level. The answer machine from this shock is the dynamic element deformation, i.e. element deformation of sub-assemblies, characterized by relative movements between them, and the elastic deformations of the structural components.

The vibrations produced by the machine during operation can have very different causes [1]:

- the nature of technological process which it carries out, the principle of operation of the machine and the drive module, execution and assembly errors of elements of the car, wear etc.

The nature of the technological process that you realized of the machine-tool is causing the

vibrations produced by some types of technological machinery: crushers, vibrating sieves, bucket elevators, forging presses, hammers, etc. In these cases, the vibrations can be reduced through standardization of the operation of the machines in question, and by using an effective, active isolation to avoid transmitting vibrations to other equipment or construction.

The operating principle is the cause of the occurrence of vibrations from machine with alternative motion: motors, compressors and piston pumps, etc. This type of machine, causing the occurrence of vibrations are regular forces that occur during their operation.

Vibrations that cannot be avoided by other measures, they can be reduced through proper design and implementation of unvibrating or isolation methods through the use of appropriate hydraulic oils, in case of using hydraulic pumps.

So, one of the factors that may cause the appearance of mechanical vibrations is faulty or improper lubrication of machine tools, therefore, will continue to present some aspect concerning the hydraulic lubrication fluids.
Hydraulic fluids intended for installations must respond to two important issues:
• hydrostatic power to transmit;
• to ensure lubrication of parts in motion inside the hydraulic system.

3. EXPERIMENTAL RESEARCHES

3.1 General aspects of vibration measurements

The purpose of this study, along with a few other tests conducted on the injected hydraulic machine-tools are testing of the oil produced by firm CHEM Trend, Italy regarding these machines, in comparison with other hydraulic fluid.

The tests for measuring vibrations and noise have been carried out during a day, inside the hall of the Bialetti firm, located in Romania.

Such as, a machine injected is working with normally liquid lubrication and called it machine 2 (see Fig. 1a.) and the second machine tool with lubricating fluid produced by the CHEM Trend company called it the machine 7 (see Fig. 1a)

Measurements were carried out on two machines vibration hydraulic injected which realized product aluminum inner coffee cup of the Bialetti brand.

These machines were chosen because they had the same technical features up, the running and engines and pumps identically [2], [3].

a.

b.

Fig.1 a. The injected pump;
b. Vibration apparatus measure.

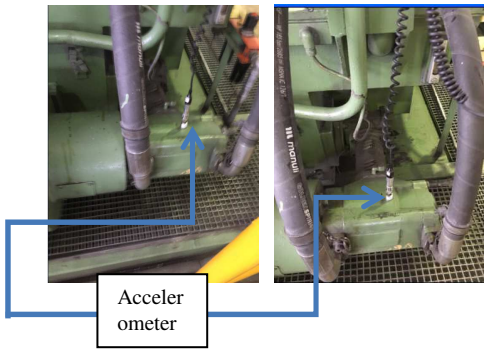

Fig. 2 Position of the accelerometer on the machine.

3.2 Machine 2 measurements

The reasons for vibration measurements on these components parts of the machines were the analysis of vibration and noise during functioning.

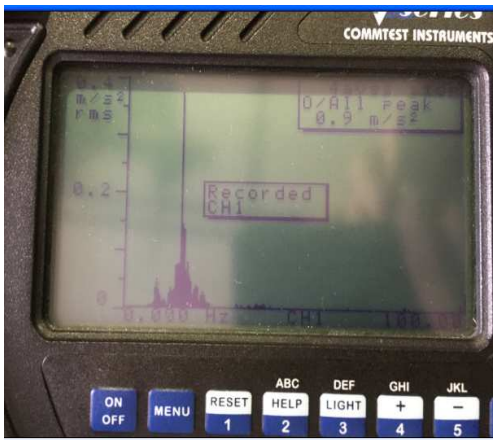

Fig. 3 Vibration graphical display.

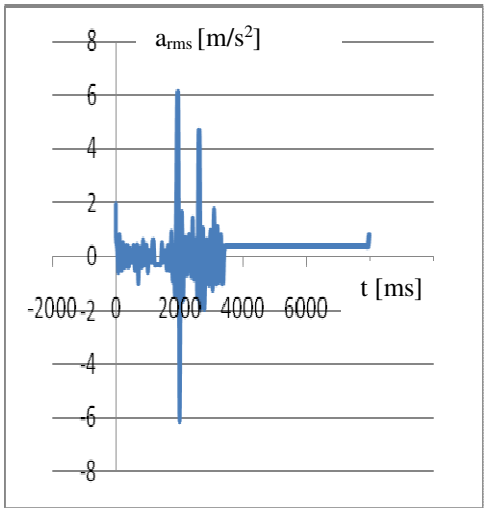

Fig. 4 RMS acceleration exprimed in time (8 ms during injection pieces).

3.3 Machine 7 measurements

All measurements conditions shown in figures 4-5 are the identically with machine tool .

It will validate the experimental mesearements to chose the same conditions of the both machine-tools (same power, same alimentation with fluid etc.).

The measurement of vibration of the machine 2 was effectuated with a monoaxial accelerometer as part of industrial vibration measuring device VB 3000 produced by COMTEST-New Zealand (Fig. 1b), has been fitted with a magnetic foot on the pump 2 on the machine (Fig. 2).

The vibration measurements were made, in the same operating conditions in both time and frequency, and in the paper it represents graphical in time, only (Fig. 4-5).

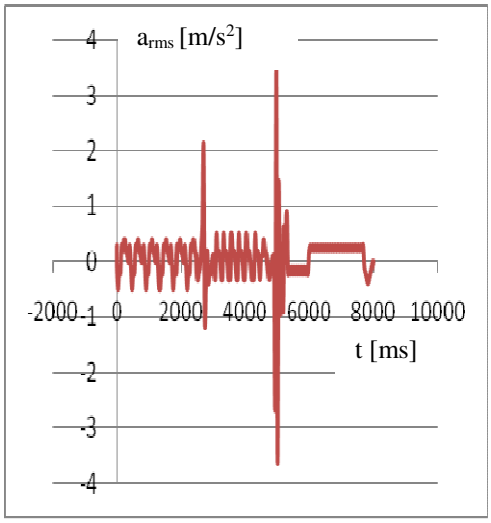

Fig. 5 RMS acceleration exprimed in time.

4. VIBRATION ANALISES

By making a comparison between the average value of measured accelerations in time for the two machine pumps 2 and 7, shown in figure 6 (time measurements) it observes that the highs are (0.6 m/s^2) for machine tool 2, which works with NORMAL lubricating fluid. To the machine tool 7 (red line) the values of vibration accelerations are small, respectively, very small(0.3m/s^2), which proves the effectiveness of lubricating fluid produced by CHEM Trend.

The peaks obtained of the figures 6 are during into the two stages of the injection process (8 ms).

It observed, clearly, that machine 2 with NORMAL oil has the biggest values of the graphes (blue line). With this, in comparison, the ADITIV oil of the pump 7 function in a good conditions, there are obtained the smalles values of acceleration (red line).

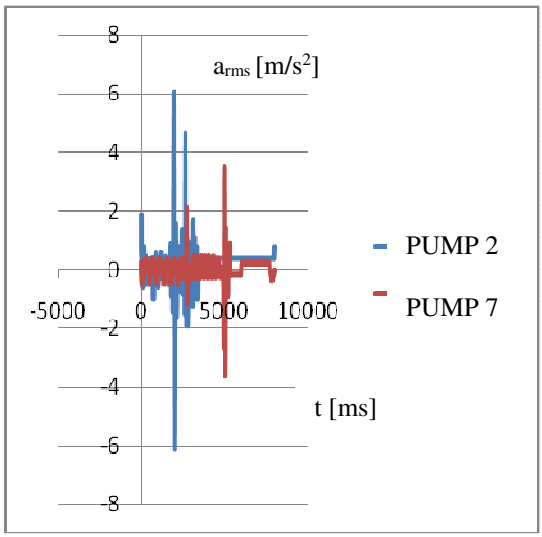

Fig. 6 Comparative measurements between accelerations of machines 2 and 7 in time (8 ms).

5. CONCLUSIONS

In conclusion it can be said that the efficacy of the lubricating liquid with additives produced by CHEM-Trend, Italy is clearly proven by measurements of vibrations they compared the two identical machines tools, in the same conditions technical and operating, the machines 2 and 7.

The level of superiority of this additive (Fig. 6) symbolized with red on the graph can be observed through the more low values in comparison with a normal liquid lubrication (machine 2 - symbolized with blue color on the graph).

It was noted that the values obtained from the two pumps are higher at the pump which uses normal liquid and much lower at the pump using fluid with additives lubricating, produced by CHEM Trend, Italy.

The results obtained are of great importance, because they are validated the fact, experimentally, that the use of a lubricating fluid of high quality, machine-tools vibrations decreases and increase productivity.

6. REFERENCES

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Cercetări experimentale privind vibraţiile pompelor maşinilor hidraulice de injectat aluminiu, în funcţie de tipul uleiului hidraulic utilizat

Rezumat: Lucrarea isi propune sa analizeze comparativ, din punct de vedere al vibratiilor, randamentul de functionalitatea al doua pompe similare, care alimenteaza doua masini de injectat aluminiu, dar care functioneaza cu uleiuri diferite (ulei normal si ulei aditivat).
Cuvinte cheie. Maşină unealtă, ulei aditivat, vibraţii.

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