THE METHODS OF MONITORING A SLIDING CONTACT QUALITY AND THEIR SENSITIVITY ON MECHANICAL STIMULIS

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ABSTRACT

This paper deals with problems of sliding contact in electric machine. Utilize of methods monitoring sliding contact is limited by the conditions in whish is the machine work. Most of problems are produce especially vibrations. These are negative interact of sliding contact quality by slight size of vibrations amplitude. The problems are examined on experimental devices.

1 INTRODUCTION

Sliding contact is just inherently connection linked to electric machine, in which play also in presents unsubstitutable role. Functionality and reliability(service life) machines with sliding contact depends particularly on that, how this part of machine filing-up its role, because other parametrs are given in the manufacturing. Problems with sliding contact are very large, because is it electromechanical system. The consideration in this work is dedicated to diagnostic of sliding contact.

The sliding contact diagnostic is provided on two experimental devices. Act is about device with excentric rings and lamella-rim device. Both devices are identified for experimental monitoring of quality sliding contact and measurement statical and dynamical parameters of sliding contact.

2 THE QUALITY OF SLIDING CONTACT

The sliding contact is defined as two electrical conductive surfaces, which are press on togehter of constant force or variable force in dynamical mode. In this case is electric contact forms with carbon brush and lamella-rim. There are a number of process in this surfaces contact, that depends on material contact compound, on structure and kinematic magnitudes. The both surfaces must by from itself 2 nm off when tunel effect has exercise. In opposite case are scintillation and electric arcs generated. The quality of sliding contact is also directly proportional voltage drop, which set in conductive surfaces boundary if them is the current

flow. To diagnostic are used an electric signal with a diferent parametrs. All above is used a sin wave dc and ac electric signal [2]. The application of ac signal is not reach so quality results as if dc signal is used, because the ac signal is interferenced with circuit capacitances.

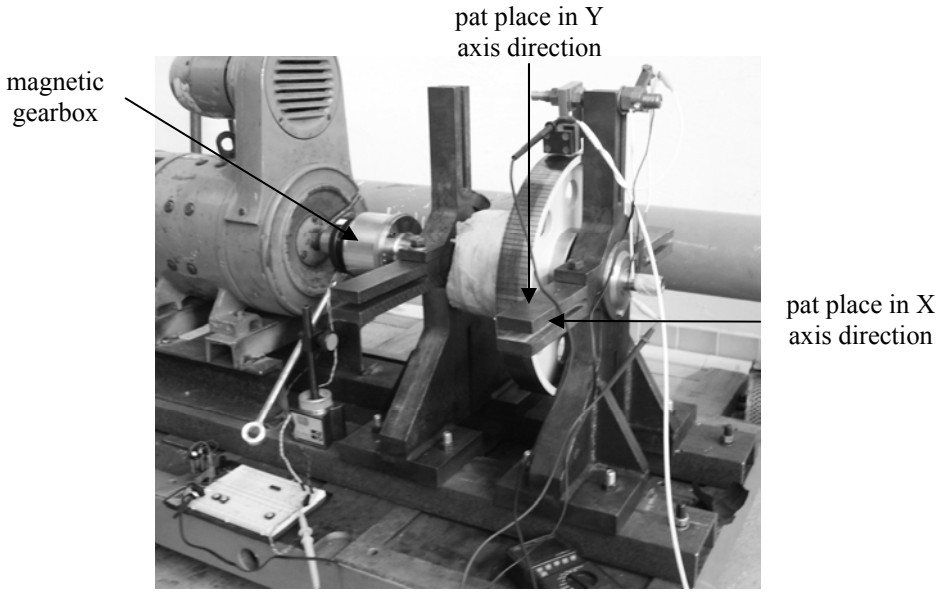

Fig. 1: *The experimental measuring workplace with lamella-rim.*

3 INFLUENCE OF VIBRATIONS

The measurement workplace is for examining of quality sliding contact and its parts. There are examined a different kinds of a brush holders and brushes. On workplace must by security to incoming not system vibrating, that have would influence the measurement. The largest problem are a vibrations that are generated as effect of kinematic processes [3].

Has been found by the experimental research, that measured dc voltage curve on osciloscope is evidently by the vibrations affected, that are generating as, that model device is imbedded on the same frame as a power. Hence, has been proposed, that current mechanical gearbox will by substitution a magnetical gearbox (fig.1). This way was succesful for elimination a rough vibrations. For a influence vibrations finding has been used an artifical generated vibrations. Therefor has been manufactured a special silon roller. With him are these vibrations generated. Parameters of roller: diameter 50 mm, lenght 100 mm. With a 2 Hz frequency pat on model device frame in 1 and 2 positions has been generated a stationary vibration, which has been displayed on osciloscope monitor. In turn has been generated a vibrations in X and Y axis directione, i.e. in direction a rotation axis of model device and in perpedicular direction on rotation axis. There are on picture (fig. 2, 3 and 4) a measuring data. Is evidently that in Y axis direction are vibrations very small, nearly inperceptible. In Y axis direction its approve oneself very strongly effect of vibrations, probably its caused of whole structure preparation. Presently is whole system of brush gear made from steel, in which are mechanical vibrations and sound wave very well expanding. To elimination this effect has been proposed, that material with big coeficient attenuation value must by apply.

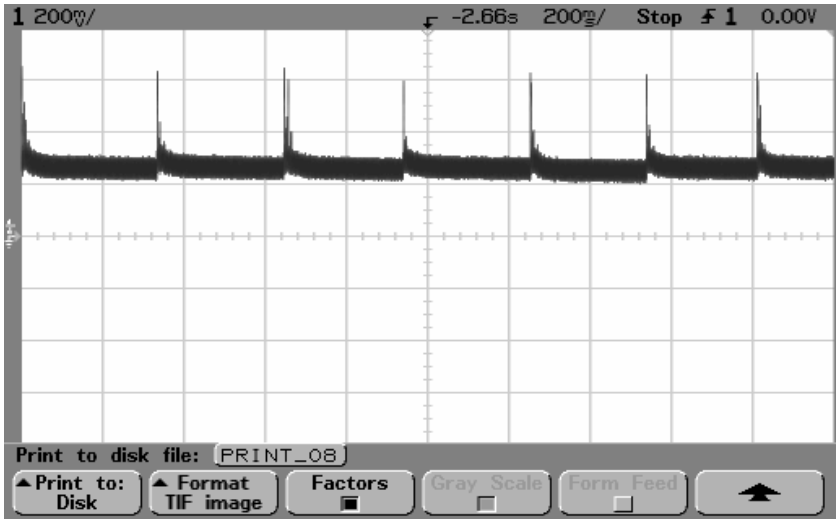

Fig. 2: *DC voltage curve measure on sliding contact boundary by vibrations pat in X axis.*

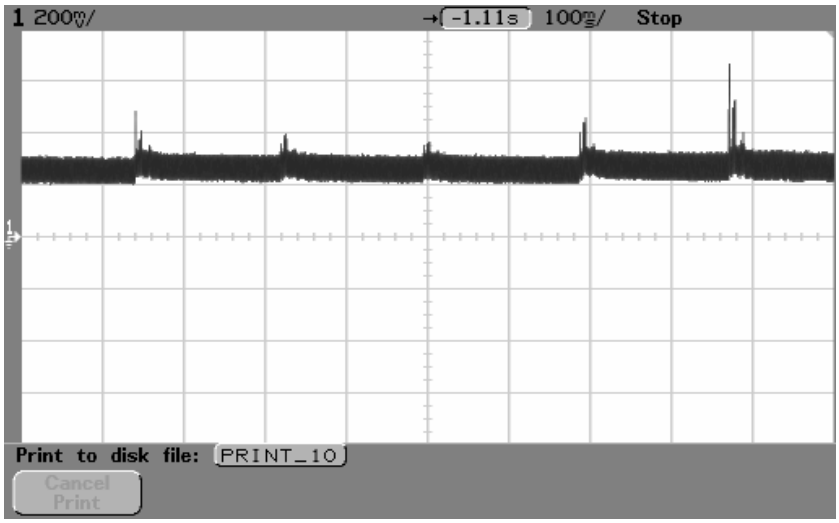

Fig. 3: *DC voltage curve measure on sliding contact boundary by vibrations pat in Y axis.*

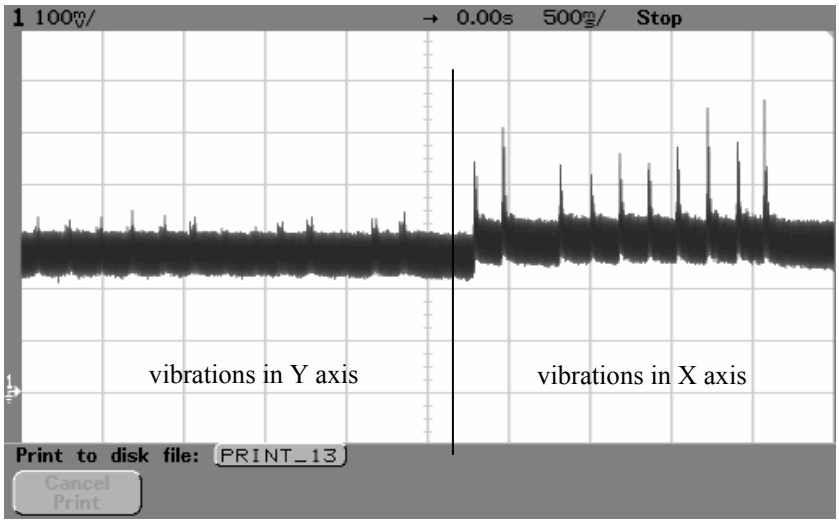

Fig. 4: *The vibrations are firstly excited in Y axis and then in X axis.*

4 CONCLUSION

It is evidently from presented results, that the vibrations effect on the sliding contact quality is significantly. In this case they are caused through construction of the model device. The model device is installed at welded frame and screwed to aluminum alloy frame. In Y axis directions it has major stiffness thanks for frame gripping. In X direction are vibrations affecting a brush-holder stud, thereby also brush-holder and brushes much more. Inhibit negativ influence of a vibrations it is possible, if we apply the material with big coeficient attenuation value. This work contribute to inovation of sliding contact.

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