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RESTORATION OF THE PRESSURE OF THE STATOR CORE OF A POWERFUL GENERATOR

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Анотація.
В доповіді розглянуто метод відновлення тиску пресування осердя статора за допомогою гідроциліндрів та вимірювачів переміщень натискної плити.
Ключові слова: тиск пресування, гідрогенератор, контроль, щільність.

Abstract.
The report discusses the method of restoring the pressing pressure of the stator core according to with the help of hydraulic cylinders and pressure plate displacement meters.
Keywords: pressing pressure, hydrogen generator, control, density.

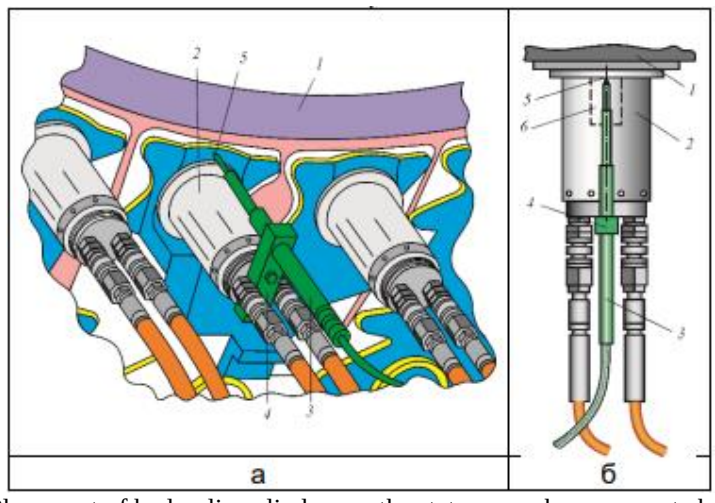
Introduction

The mechanical characteristic of the stator core of a powerful generator that determines it workability, there is a state of elastic compression, which is ensured by its pressing during manufacturing [1]. As you know, in a compressed state, the heart is held with help pressure flanges (plates) and tension pins with nuts. Twisting to the desired limit nuts, achieve the necessary tension in the studs, which in turn provides the necessary pressing pressure. Later, during the operation of the machine, there is a decrease in effort, heart-wrenching. This leads to a loss of reserve capacity and is potential causing dangerous damage to the stator.

The easiest way to restore the tension in the pins and, accordingly, the pressing pressure there is a tightening of the tightening nuts. The process requires stopping the machine and is also time-consuming and long-term.

Research results

One of the methods used to stabilize the pressure of compression of the core stator is the use of special hydraulic devices (hydraulic cylinders), which automatically tighten the clamping nuts [2]. In fig. 1 a - the placement of hydraulic cylinders is shown on the stator core, and in fig. 1b is a separate hydraulic cylinder, where: 1 is the stator core turbogenerator; 2 – hydraulic cylinders; 3 – generator pressure plate displacement meter when tightening nuts; 4 – plate for mounting the meter on hydraulic cylinder 2; 5 – contact tip meter 3; 6 – tie pin.



Drawing 1 a – Placement of hydraulic cylinders on the stator core; b – a separate hydraulic cylinder

Hydraulic cylinders can be placed both on one side of the core and on both sides. Number of tie pins with hydraulic cylinders may vary depending on specific requirements. The signal for pressing the core in each hydraulic cylinder can be, for example, the measured value of the force in the clamping prism.

When designing the device, it is necessary to take into account not only the amount of compression core, but also the tension of the tie pin. For this, it is necessary to take into account such ratios.

$$dXc = (X2 - X1) - ((dP * Ah) / ((Ab * E) / L))$$

where dXc is the change in the axial length of the core;

X1 is the measured displacement of the pressure plate to application of the tension of the tension pin;

X2 – measured displacement of the pressure plate after application of tension;

dP – hydraulic pressure change; Ah is the active area of the hydraulic cylinder;

Ab – cross-sectional area of the tie pin; E is the modulus of elasticity material of the tie pin;

L – is the effective length of the through bolt.

As a gauge of changes in the axial length of the core (in fact, the displacement of the pressure slabs) linear displacement meters with the required element can be used measurements (transformer, capacitive, etc.). With this hydraulic system can be implemented using serial devices with small modifications to take into account constructive features of generator cores.

Fastening systems allow you to ensure the required density of iron pressing stator core, as well as with the use of control and measuring equipment to ensure control of changes in pressing density due to generator usage modes.

Conclusions

Climate change has become a fact, but achieving the goals of the Paris Agreement is becoming more difficult. Warming exceeds permissible limits, the main cause of which is the emission of greenhouse gases. The transition to clean energy is urgent. Darier rotor hydroturbines are efficient sources of electricity. They can help reduce dependence on fossil fuels and reduce greenhouse gas emissions.

REFERENCES

1. Operation of generators and synchronous compensators. https://kek.edu.ua/3-ekspluatacija-generatoriv-i-sinhronnih-kompensatoriv/

2. Ковбасюк А. І. Distributoin network capacity assessment: variable dg and active networks [Electronic resource] / А. І. Ковбасюк, С. С. Никипорець // Матеріали XLIX науково-технічної конференції підрозділів ВНТУ, Вінниця, 27-28 квітня 2020 р. – Електрон. текст. дані. – 2020. – Режим доступу: https://conferences.vntu.edu.ua/index.php/all-hum/all-hum-2020/paper/view/9734.

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