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PROSPECTS OF STANDARDIZATION OF THE ENERGY METHOD OF NON-DESTRUCTIVE EVALUATION OF OPERATIONAL QUALITY INDICATORS OF CONSTRUCTION MATERIALS

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Abstract
The study of friction of structural materials used in friction conditions under the influence of complex mechanical and mechanochemical processes.

Keywords: rotational, plastic deformation, reinforcement, hidden energy, irreversible energy, sorbet structure

Introduction

Today, there is no method of evaluation for constructional materials used in conditions of friction ingress, that is, for constructional Steel, which is very widely used in various industries, and also bypassing the testing of their operational quality indicators to such important exploits as failure, shrinkage, torsion, ingress, etc. The variety of standardized testing methods on highlighted exploits will make labor and expenditure immensely time along with being complex.

The purpose of our research is to standardize a new method that will allow to predict their operational reliability, that is, the main quality indicator, in advance, through the energetic indicators formed in the conditions of operation, on the basis of the study of friction ingress of materials observed in the impact of complex mechanical and mechanochemical processes. As an object of research, Standard structural Steel with wide coverage and abrasive rolling conditions were selected, in which the friction rolling was accelerated. External friction is regarded as the process of plastic deformation and absorption, which characterizes the process of bending is usually located on the surface layers of friction pairs. [1,2] interrelated and competitive processes of simultaneous occurrence of plastic deformation and absorption of materials ingress:

it is more accurately manifested in the thermodynamic concomitant to the consistency and absorption in the process of ingestion, under the influence of external friction, cases of strengthening, and solidification. In the deformation of the surface layers of friction materials, the non-absorbable energy can be divided into two parts (Figure 1). The first part of its relatively large (up to 30%) is inextricably linked with the accumulation of ΔUe energy, hidden in the decor - masked layers and in the products of the diffraction, with the gradual emergence and delay of various natural defects in the deformable layer (dislocation, vacancy, etc.), thalophatation (submicroscopic violation of integrity) and their transformation into critically-sized micro and macrodarzes. And the hidden energy **ΔUe** represents the strengthened state of the material.

The analysis of numerous studies shows that friction ja-rayonida surface layers are strengthened up to the limit amount (packed tightly), when the resistance of the material to plastic deformation is over, cracks begin to appear, they form a layer of crumbling eyeball particles that grow, that is, the hidden energy We can be a measure of material injury, and for absorption, it can The second part of the friction work **(up to 70%)** is converted into irreversible **Q** heat due to the processes of vibration movement and return of defects (destruction) and structuring processes, that is, the connection of friction with the thermal effect. Heat energy represents the state of the material in which it is solidified. Part of this energy is distributed to the environment on account of heat exchange in **Qt**. The Bunda **ΔUt** part is a measure of material injury, just like the hidden energy of deformation, by weakening the bonding of atoms by increasing the deformable volume and temperature.

ΔU_e hidden energy too, **ΔU_T** (heat exchanger of internal energy) internal heat exchange energy is also common in material deformation volume ΔU standing change internal energy. Conducted studies, including standard cimewi compound uglerod rail Steels, showed that when Thermo-treated to the same hardness, different sorbit treatment and sorbit release structure are formed, the wear resistance is different. Thermo treated rail head with Sorbit treatment to sorbit discharge Thermo treated rail head (**h_{co}=5 мм, HV_{co} = 40 МПа**) relatively quot; deeprok and bridge; (**hsz=9 mm, Hvsz=70Mna**) has a consistency. Therefore, the workability of the rails with a refined sorbit structure is much higher than that of the rails in the loosened sorbit structure.

Reinforcement is the result of the absorption as a part of the deformation energy of the railhead and the hidden energy returning. The higher and deeper the level of reinforcement, the more hidden energy accumulates in the material. Consequently, if the material of the rails can accumulate a lot of hidden energy in the hook in its volume, or the energy capacity of the material is large, the resistance to cracking will be so high:

$$\frac{U_1}{U_2} = \frac{d_1}{d_2} \qquad (1)$$

Friction is the latent energy that accumulates in the deforming materials of the surface layers, that is, the work of deformation of the energy capacity of the plastic deformation of the material with W the latent energy is the similarity between it and the diagram of a truly stretching in the load along one axis, that is, **S = f(e) = U=f(W)** find out from (Picture 2) possible [3]:

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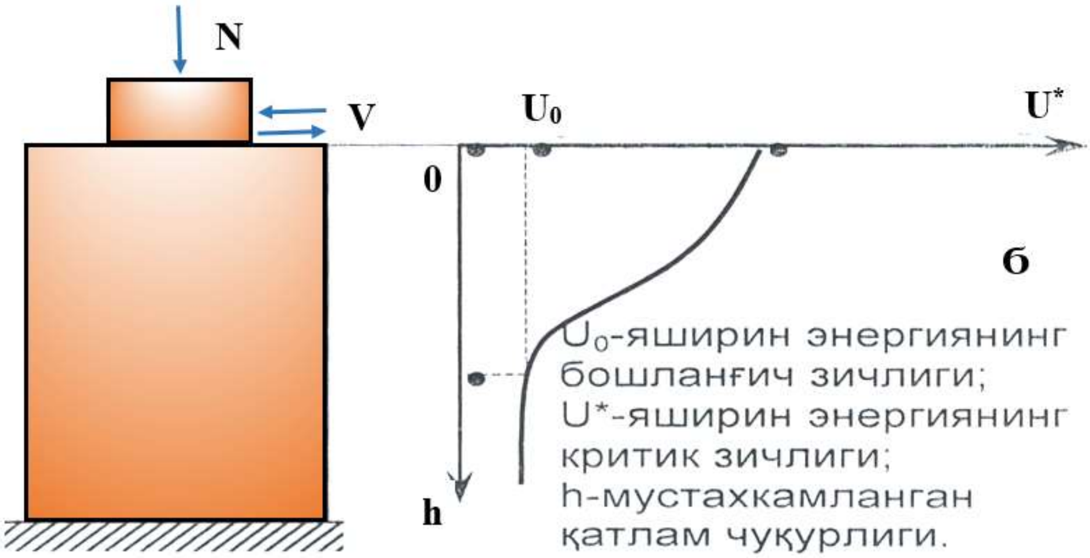
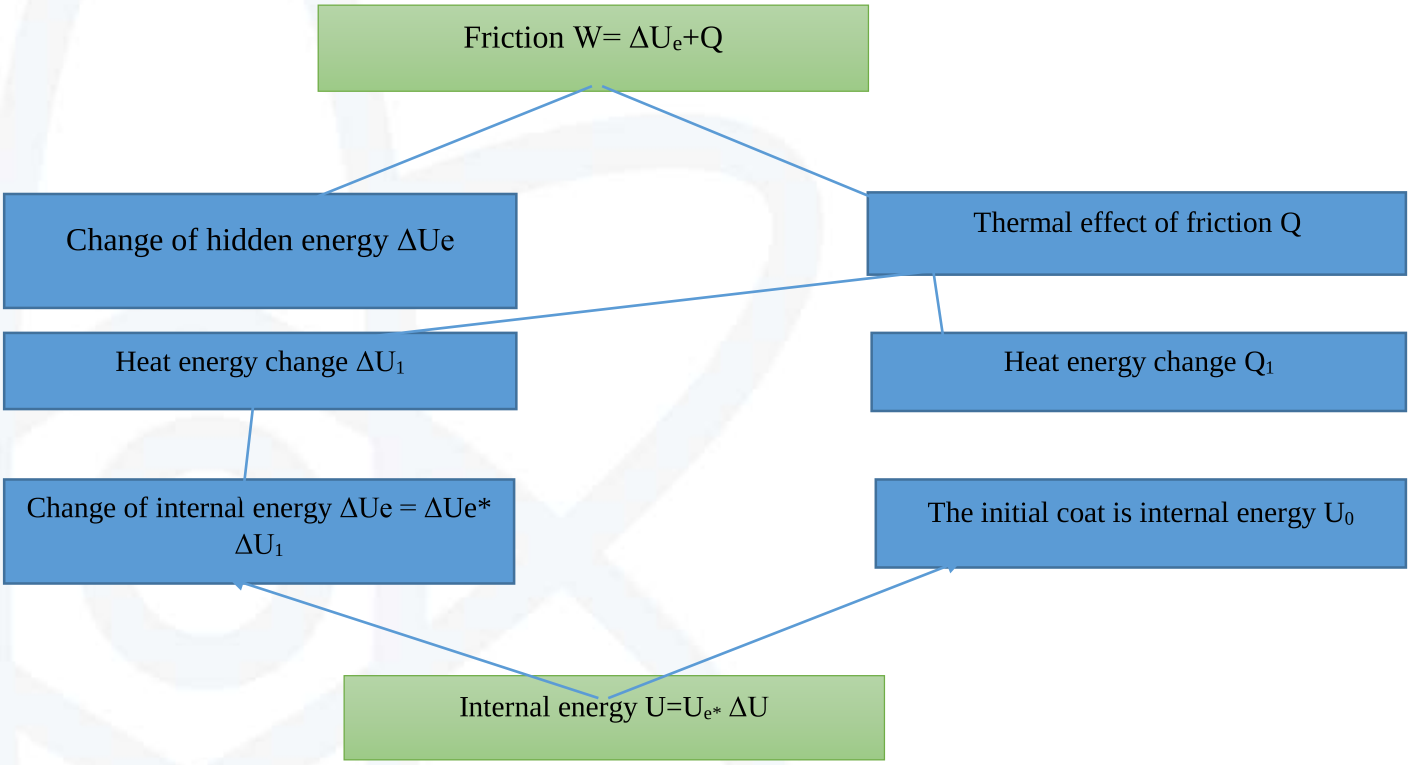
$$U_k = W_k \, dk \qquad (2)$$

The coefficient of deformation reinforcement **d** is **d** in the unit of tension, which serves as a measure of true reinforcement in stretching.

It is known that the relative bending endurance of the rails is assessed by the amount of work performed by comparison, that is, the amount of load spent. Hence the case of deformation $W_{K1} = W_{K2}$ the same. In that case (1) and (2) from



1-picture. Absorbent energy in the deformation of surface layers of friction materials



$$\frac{d_1}{d_2} = \frac{k_1}{k_2}\frac{d_1}{d_2} = \frac{U_{E1}}{U_{E2}} \qquad (3)$$

Here:

$$U_{k=}\frac{U_E}{W_E} = U$$

represents the relative value of the hidden energy accumulated during a break in the sample material when tested for stretching.

In comparison with a simple stretch along an axis, the absorption of the surface layers of the rail head occurs in a state of complex tension. If we use a uniform deformation diagram due to the rule of the theory of plasticity, then the break in the deformation of the stretch along one axis can be applied to the absorption during the Rolling of the wheel along the rails.

Classifications of standard mechanical tests of deformed latent energy sine rail Steels [4,5]:

σ_B - consistency limit, σ_O- fluidity limit, $\psi_к$- relative contraction is easy on the identify. Even with the research of the workmanship of the rails, it can be said that the more the strength of the reinforcement, the more the energy capacity of the material, the more it will be useful to fatigue strength. The analysis of the data presented showed that the rails steel with an accounting consistency corresponds satisfactorily to the Real bar - bearing of the rails on the road.

If (3) expression **k1 = k2 if**

$$\frac{d_1}{d_2} = \frac{d_1}{d_2} \qquad (4)$$

(4)- the coefficient of deformation reinforcement according to expression is greater than that of d relative abrasive wear resistance δ both shunts are clamped. All in all vailma dose also reduced tinnitus.

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