MAKING A THE MODEL FOR SOLVING A THE CHAIN OF SIZE WHAT IS TEMPERATURE INFLUENCED

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Abstract: In this paper is presents a mathematical model of resolving chains of size which are influenced by temperature. It was taken in the study, a simple chain size format at mounting and functioning of a reducer. During operation the reducer, the pieces are heated to a certain temperature of working and for this reason their sizes reaching a certain size. In this paper will present order of the of calculation to solve the chain of the sizes when unknown is a primary element.

Key-words:tolerance, chain of size, error of compensation

1. INTRODUCTION

To the processing the parts on machine and at their exploring appear cases where appear the occurrence some errors a the component element is accompanied necessarily of appearance of errors the other component elements. If in dimensional circuit these errors have different directions, then they compensate each other, which leads to a significant reduction of the oscillation of of the closing element. Such errors that constitutes, in finally, elements we will name them errors of the compensation, in elimination of errors by calculation of the chains of sizes.

2. THE MODEL CONCERNING SOLVING A CHAIN OF SIZE INFLUENCED OF TEMPERATURE

To illustrate of the foregoing, we study a concrete example, namely a simple chain of sizes which format at mounting and functioning of a reducer.

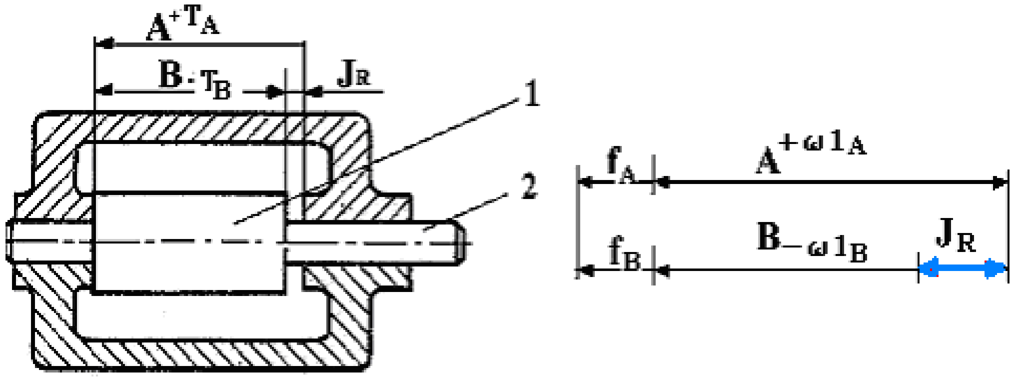
If you must to be determined the size the variation the play J_R at mounting and at functioning of reducer (fig.1, a), will take into account the fact that during the operation of the gear unit, the pieces are heated to a certain temperature of working and for this reason their size reached at a certain size (dilation of the parts material).

Shaft 1, which has a length B, for gear with greatest diameter, is installed in the body 2 with the length of the cavity A.

At the installation and the functioning of mechanism must should ensure a certain play J_R. The variation the games at different reducers will influence the process of mounting, appearing as a result of oscillations ω_{1A} and ω_{1B} of the dimensions ***A*** şi ***B***.

Thus, the oscillation the closing element J_R will be:

$$\omega_{JR} = \omega_{1A} + \omega_{1B} \qquad (1)$$



a b

Fig.1. a- JR The game that appears to mounting the reducer with one gear. b- The scheme the chain of sizes to the reducer, where f_A şi f_B are

errors what appear due to of temperature increase.

In fig.1.a it is presented the scheme the chain of the sizes, as described by the equation:

$$J_R = A - B \qquad (1)$$

In this work paper, will present the order of calculate at solving chain of the sizes, when unknown is not the closing element J_R, but the primary element (this is the method of calculation for the inverse problem encountered in determining the unknown elements and unknown tolerances of a chain of size).

Starting from this idea, Suppose the known dates of chain of the sizes are: the closing element $J_R = 1^{+0,5}$ and one of the primary component elements $A = 21^{+0,6}$. You must should be determined element's characteristics ***B***, at which it is known that elements ***A*** and ***B*** present the erore of compensation in the limits 0,4mm

The calculation is done in the following order: - the range's amplitude of the scatter for the element

$$\omega_J = \omega_A + \omega_B - 2f$$

$$\omega_B = \omega_J - \omega_A + 2f = 0,5 - 0,6 + 2 \cdot 0,4 = 0,7$$

$$\frac{\omega_B}{2} = \frac{0,7}{2} = 0,35\,[\text{mm}]$$

(2)

The average value of the tolerance field for the closing element (the play) J:

$$T_{medJ} = \frac{ES_j + EI_j}{2} = \frac{0,5 + 0}{2} = +0,25\,[\text{mm}];$$

(3)

The average value of the tolerance field for the element A:

$$T_{medA} = \frac{ES_A + EI_A}{2} = \frac{0,6 + 0}{2} = +0,3\,[\text{mm}];$$

(4)

upper limit of the element B:

$$ES_B = T_{medB} + \frac{\omega_B}{2} = 0,05 + 0,35 = +0,4\,[\text{mm}];$$

(5)

lower limit of the element B:

$$EI_B = T_{medB} - \frac{\omega_B}{2} = 0,05 - 0,35 = -0,3\,[\text{mm}]; \quad)$$

The nominal dimension of the element B:

$$B_{nom} = A_{nom} - J_{nom} = 20\,[\text{mm}]; \qquad (7)$$

Following calculations resulted the reducing primary element:

$$B = 20^{+0,4}_{-0,3}\ [\text{mm}].$$

Comparing the received value of element B to that which appeared on the contour in fig.1, at solve the inverse problem, convincing us that the value B was found correctly.

As can be observed, the example of studied refers to chains of sizes which are formed from the assembly of parts.

3. CONCLUSIONS

Will present the order of calculate at solving chain of the sizes, when unknown is not the closing element J_R, but the primary element (this is the method of calculation for the inverse problem encountered in determining the unknown elements and unknown tolerances of a chain of size). For the determination of primary element reducing to take into account of amplitude the interval of dispersal that was influenced by errors value of compensation ***f***. In its turn, the amplitude the interval of dispersal has influenced upper limit and lower limit of unknown element. Through the mathematical model presented have been determined both nominal dimension to reducing primary element and its deviations.

4. REFERENCES.

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