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«Metrological Support of Innovative Technologies» ICMSIT-II 2021

«Improvement of the method of relative measurements using a lever micrometer when setting up the end measures block»

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ICMSIT

Metrological Support of Innovative Technologies

Problem statement

- Metrological support of production is one of the urgent tasks of improving the quality of machine-building products . At present, new approaches to the repair and metrological support of production are being developed, measurement methods are being improved, and the calculation of losses at the tolerance of control products . In addition, the accuracy normalization standards are improved
- Improvement of the technique of relative measurements of deviations using a lever micrometer in case of deviations outside the measuring range of the reader, and provided that the tolerance does not exceed the measurement limits

Solution methods

- Let us consider the technique of adjusting a lever micrometer using gage blocks. When adjusting the micrometer with finite measures, it is not necessary to calibrate and zero the micrometer.
- Select the size of the final measure block according to the following recommendations.
- If the maximum absolute value of the limit deviation does not exceed half of the reference range of the reference device, it is recommended that the device be adjusted to the size of the end measure block L_{bl} equal to the nominal size d_n:
- $L_{bl} = d_n.$ (1)
- If the size tolerance is less than the reading range of the reader, and one of the maximum deviations exceeds half of the reading range, then the block of finite measures is selected equal to the average size:
- $L_{bl} \approx d_a = \frac{d_{max}+d_{min}}{2}.$ (2)

Solution methods

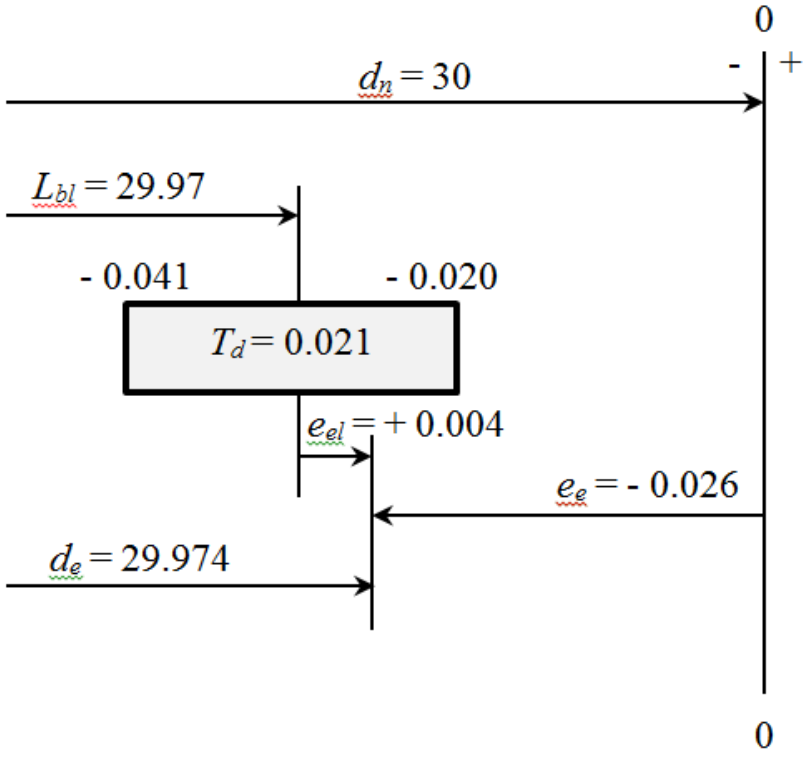
- The limit values of the deviations of the part from the dimensions of the end measuring unit are determined and the deviation indicators are set in accordance with them:
- $es' = d_{max} - L_{bl}$, (3)
- $ei' = d_{min} - L_{bl}$. (4)
- Determine the deviation of the block of end dimensions from the nominal:
- $e_{el} = L_{bl} - d_n$. (5)
- By rotating the micro screw, the measuring surfaces of the heels are raised to a position where the end measures can freely fit between them.

Solution methods

- Between the measuring surfaces of the heels, a block of end measures is inserted and, by rotating the drum, the scale arrow is set to zero. Fix the micro screw with a locking ring (stopper). When the stop is pressed, the block of measuring blocks is removed, and the measured part is inserted instead.
- The actual deviation of the part size is calculated as the algebraic sum of the deviation of the block size of the end measures from the nominal size e_l and the reading of the reader arrow when measuring – X:
- $e_e = e_{el} + X.$ (6)
- The part is considered suitable if the actual deviation is within the tolerance. With this approach, the time for monitoring is significantly reduced, since you do not need to turn the micro-screw and read the readings on it. And when you use the adjustable arrows on the scale of the device, the control process will be even faster

Conclusions

Results, implementation



- Dimension measurement implementation dia $30^{-0.020}_{-0.041}$

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Conclusions

Results, implementation

- The method of adjusting the lever micrometer is determined in case of deviations outside the measurement range of the reader, and provided that the tolerance does not exceed the measurement limits

Contacts

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