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Development and research of new designs of roller screws for aircraft electromechanical actuators

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Currently, works are carried out in the world aiming at creation of “electric aircraft planes” in which it is planned to widely use electromechanical actuators with translational motion of the output link (linear ones). In addition to this, there is a trend towards replacement of hydraulic actuators with linear electromechanical actuators in various products. Hence it appears that the role of electromechanical linear actuators and demand for them are on the rise. Scope of application of such drives is very wide; therefore, a set of technical and operational requirements placed to them is very diverse. The most important element of the linear electromechanical actuator is an actuating unit that converts rotary motion into translational one. To date, roller screws are most advanced and promising devices that may function as such actuating units. To rationally meet different requirements placed to them, they should have different designs and structural variations having different properties and combinations of properties. For example, by load capacity, axial stiffness, enduring accuracy, efficiency, operation speed, manufacturing technique, cost, dimensions, weight, etc. In Russia there are developed and patented roller screws without nut - a part of traditional roller screws which is most complicated in the manufacture and expensive. Compared to traditional units, the roller screws without nut may have a lower weight and dimensions, their transfer function may be arbitrary within a very wide range. When calculating and designing such unit you do not need to use the mathematical relationship of angle diameters of the screw, rolls and nuts thread and numbers of thread start for these parts, which is required for traditional roller screws. The roller screws without nut, though being inferior to traditional ones in load capacity by about 20%, may find practical application in the various products.

Biography

Blinov D S graduated from the Bauman Higher Engineering School in 1974 in dynamics and strength of machines. At the same school in 1979 completed Postgraduate studies in engineering technology, and then defended candidate and Doctoral dissertations. Currently, he is studying these units as part of aircraft electromechanical actuators and developed new designs of roller screws. He is the author of over 100 scientific publications, including 25 patents for inventions.

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