!3558 EUREKA Elisa

Electro spindle with intelligent solutions and applications

One of the most important parts of the manufacturing processes based on the machining is machine tool performance. A lot of efforts to increase the machine tool performance have been provided. Unwanted vibrations at higher rotational speeds are the major drawback to increase the material removal and quality of machined surfaces. Relative vibrations between a cutting tool and work piece may result in bad quality of a machining process with surface location errors. To avoid these unwanted causes of errors and to increasing efficiency of tools and consequently the quality of machined surfaces contemporary with tool capacity rising, the new and innovative solutions are required in the field of construction and dynamic balancing of tools and spindles. The main aim of the project was to develop a new generation of innovative electro spindles and adequate tool-lock mechanism with a wide application spectrum for different manufacturing fields, with very high rotational speed and power performances.

Janez Zepic, Director of PMV d.o.o.

»In produced prototypes we have followed our goal – maximal precision, simplification and cheaper component parts. In this way we developed new innovative system of spindle and electro motor connection with fewer parts. This solution is cheaper and technologically advanced because reduces transmission of unwanted vibrations on spindle and so considerably elongates life cycle of the product.«

The main technological advantage is achieved with innovative approach at model-aided prediction and design of dynamically appropriate structure of motorized spindle and tool-lock mechanism operated at very high rotational speeds. These electro spindles consist of fewer parts (easier production, maintenance and reliable operation) than traditional one and have lower production costs.

The main results are developed products and prototypes of AC in EC electro spindles, operating at very high rotational speeds. The spindles are not so demanding for the production and use and consequently, they could be very competitive on the market.

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The most interesting is the construction of high speed AC electro spindle with water cooling system, operating at 60.000 rpm with 11 kW of power and rated torque 1,8 Nm. Tool clamping is realized in accordance with standard for HSK 32 tool taper.

On the field of lower power have been developed high speed EC electro spindle operating at 60.000 rpm with power of 50 W, max. continuous torque 30,6 mNm and pull off force > 300 N. In the spindle our own patented collet chuck is built-in and clamping of tools is perform with the lever (electro driven or manually by hand).

On the field of lower power have been developed also high speed EC electro spindle operating at 60.000 rpm with power of 50 W, max. continuous torque 30,6 mNm and pull off force > 150 N. The newness is also axial screw mechanism for clamping tools.

We can conclude that the Slovenian partners on the !3558 EUREKA Elisa project have performed extraordinarily R&D work resulted in developed prototypes. These properties are extremely promising, in some points even over expectations. This enables us to reach the main target i.e. the development of the technically acceptable product which is widely used and also commercially successful.

In the present phase the developed products of lower power are ready for commercialization. Concerning the construction of spindle of higher power, the industrial partner(s) interested in production and further development is desired.

The project's web site: http://www.sloles.com/EUREKA_Elisa