CALCULUS OF AN ANGULAR POSITIONING KINEMATICAL CHAIN WITH ELECTROMECHANICAL DRIVE

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Keywords: moment of inertia, mechanical drives, kinematical structure, rotary assembly.

In this paper there are presented the main stages of calculus concerning design of parts and mechanisms and the choice of electrical driving motor for kinematical chains with angular positioning motion. Such kinematical chains are part of the auxiliary kinematical chains used in many machine-tools and equipments.

There are considered some structures of such kinematical chains, existent in some machine tools as lathes and aggregate machine tools, or connected systems (tool magazines, conveyors). The parameters needed in design are: angular speeds, weight, transmission ratios, moments of inertia, moments of friction, moments and power for drive motor's spindle.

The output is defined by the angular displacement γ_{OL}, angular speed ω_{OL}, accelerating/braking time $t_{a\text{-}f}$. The driven assembly has different constructive variants: disk, drum, rotary table or driving plate. This data, with the parameters which define, constructively and cinematically, the studied kinematical chain's elements and mechanisms, determine the driving motor's characteristics.

There are presented the results of applying this methodology on main spindles drum kinematical chain of a multi-axis automatic lathe. The calculus shows that, for multi-axis automatic lathe SAM 25/8, the driving motor must have a minimum power of 12 kW, for ensuring the simultaneous driving of main kinematical chain, control shaft's rotation kinematical chain and auxiliary positioning kinematical chain. The intermittent positioning motion is ensured by the Maltese cross mechanism M_{CM} (fig. 2).

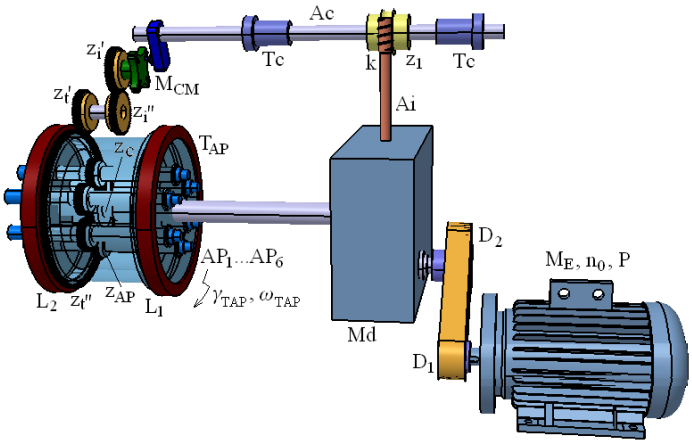

Fig. 2. The drum's angular positioning kinematical chain – simplified 3D representation.

This calculus methodology can be applied also for other assemblies with circular trajectory positioning motion.

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