A. Kachanivska, Master student
V. Loev, PhD in Engr., Prof., research advisor
I. Melnychenko, teacher, language advisor
Zhytomyr State Technological University

THE INSTRUMENTAL AND TECHNOLOGICAL PROVISION OF MAKING OF ELEMENTS WITH THE COMPLEX SHAPE OF SURFACE CONNECTION

Recently EC-profile connection (profile connections with equiaxial circuit transmitted the moment) has been found in various kinds of equipment. In foreign engineering building practice, EC-profile connections are used in gearboxes and guitars of semi-automatic lathes which are produced by companies «Pittler», «Fischer», «Schaublin», «Bamessberger», in the building car engines of «Volvo», press-forging equipment and tool-in-use systems [1].

In engineering, the following profile connections are commonly used: profiles with three faces EC-3, profiles with three cut faces EC_c-3, profiles with four cut faces EC_c-4 and with five faces EC-5 and EC_c-5.

Non-splined connections have operational advantages which are determined by high spinning toughness, wearability, endurance strength, on load centering, low level of noise and vibration, the possibility of reducing the weight by 20-40% and also the size of machine transmitting elements. These connections are more durable, reliable, have less metal intensity and their production is less time-consuming than of slotted and splined. From economic point of view, EC-connection is more beneficial and provides low producing and composing rates of prime cost.

Issues in calculating of EC-profile connection elements concerning static force, toughness and vibration strength are not completely resolved and usually it leads to oversizing of shaft cross-section and other parameters. Normal size row of profile shaft and ports with balance circuit of EC-3 type has range from 13 to 100 mm. As the basis for the calculation of the shaft a scheme is taken accepted in engineering practice in the design of machine parts:

1) project calculation EC-3 of profile shafts – equiaxial circuit edge on static force formula;
2) checking calculation of EC-3 profile shafts – toughness on bending, static force and endurance strength.

According to this method, comparative calculations of core, slotted and round shafts were performed [2]. Studies have shown that performance indicators of relevant shafts on 10 .. 45% higher than splined and 30% higher than slotted. At the same time the approaching tendency of operational indicators of EC-3 and EC-5 profile shafts on indicators of round shaft could be observed. The experiment has also shown that safety of the type profile is higher than of slotted shafts on 26%. Profile shafts of EC-3 and EC-5 type are mostly equal to slotted shaft and only slightly exceed the latter on toughness. Calculations also showed that toughness on rotation of profile shafts in 1,4…1,8 times higher that of slotted ones. In case when the same load amount influences comparative shafts profile shafts EC-3, EC-5 have less mass per length unit than splined shaft – 5%, 8%,12%; slotted shaft – 27%, 30%, 36%.

The most common method of processing of EC-profile shafts is turning on lathes. Lathes of this type are equipped with tool holders and revolver heads of various configurations. For their usage several modifications of peakless bevel incisor were made. Polishing is used as a finishing operation for shaft processing which could be held by modernized lathes of general use which are equipped with special devices. For port processing broach bits with EC-profile tooth are used, the finishing processing of which is made on round polishing and modernized lathe backed-offs. Also ports could be made by boring, milling and grinding, but one of the advanced techniques-battering.

Research of connections with complex profile surfaces is assume to continue using modern computer technology.

REFERENCES

1. Rozhkova E. A. Theory and methods of designing profile undismountable connections with an equiaxial circuit with interference: Candidate's thesis: 05.02.02 / E. A. Rozhkova - Chit, 2014. - 182 p.

2. Timchenko A. I. The technology of making of elements of profile non-splined connections / A. I. Timchenko. - M., 1988. - 159 p.