

# The investigation of precision of installation pieces of cylindrical gears in the process of rolling gear shaving.

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In this article there is given the analysis of the friction process on contact surfaces of the rotary cutting tool as well as theoretically demonstrated possibility of friction management by changing the geometry of the tool.

**Keywords:** friction, contact surface, design change, rotary cutting tool, high-strength materials, MRT-multiblade rotary tool, running-in a ball, turning.

## INTRODUCTIONS

One of the tasks of Mechanical Engineering is to create new and modernize existing technologies. These methods should provide the necessary technologically high quality machine components.

While processing gears on gear cutting machines based on the principle of unity of bases on the possible most operations combining technological bases with designing is recommended. On hobbing operations and processing with flow forming tool, as a rule, usually the surface of the hole or the end perform as an installing base.

The main condition of choosing the technological base for flow forming tool treatment should be ensuring the accuracy of the position of bases.

When finishing the teeth of gear ring blanks of a gear wheel must be installed with precision, depending on the accuracy of the gear ring of the wheel. It is believed that in the radial direction when measuring by a pitch diameter the installation error should be one quality class higher. Consequently, radial direction on pitch diameter installed on the machine, which forms part of the tolerance on the diameter.

Below, the article describes the requirements that apply to the installation of precision of gear blanks, manufactured at state-

run enterprise Navoi mining metallurgical complex in the flow forming tool processing.

The gears at production association Navoi machine building plant are made following the requirements of the 8th to the 5th degrees of accuracy. Separating wheel diameters of manufactured wheels are made in two bands of pitch diameter son GOST1643-81 which is  $d < 125$  and more than. 125 to 400 mm.

Wheel module is manufactured in two bands. These are modules from 1 to 3.5 mm and more than. 3.5 to 6.3 mm.

In the literature there are requirements for the precision of gear blanks installation. For example, B.A.Tayts [1] when installing wheel blanks with the base on clamping hole recommends the requirements for radial radial direction depending on gear parameters. Table 1 shows the data in practicable to the gears, manufactured in machine-tool units of production association Navoi machine building plant in state-run enterprise Navoi mining metallurgical complex.

Accuracy degree of the wheel	Wheel diameter, MM.				
	To 50	50-80	80-120	120-200	200-300
6	-	-	25	30	35
7	-	-	40	50	60
8	-	-	75	90	120
9	-	-	120	150	170

**Table . 1.** *Facts with regard to the gears*

In the literature for the installation precision of various operations date is also given. For example G.I.Kovan [2] sets out the requirements for the accuracy of the installation of base surfaces of machine tools on gear shaving. Table 2 provides data for the conditions of Navoi machine building plant in state-run enterprise Navoi mining metallurgical complex.

However, if we compare the limit values of deviations of base surfaces with the requirements on the accuracy of the ring gear wheels in accordance with GOST 1643-81 (take for an example the requirements for radial radial direction Fr), it can be seen that the possible setting errors exceed the allowable values for radial radial direction of the ring gear. Consequently, in the processing gears at these

requirements development of radial radial direction deviations beyond the permissible on GOST 1634-81 are possible.

We have established the requirements for the installation precision of gear blanks for the limit values of pitch diameters and the values of wheel module.

The basis for determining the installation error we accept requirements for radial radial direction of gears. Table 3 shows the requirements for radial radial direction Fr of ring gear wheels in accordance with GOST 1643-81 and on their basis we calculated the requirements for the installation error of the a- radial radial direction.

Accuracy level of gears processing in GOST 1643-81	Wheel diameter in mm.					
	До50	50-80	80-120	120-200	200-320	320-500
1. Tolerance to the diameter of landing centering sleeve						
6		-			g6	
7		g6			f7	
8		f7			e8	
2. Geometric tolerance to eccentricity of rotation of landing centering sleeve of the adaptation in micrometers.						
6	6	8	9	10	12	15
7	7	9	9	12	15	20
8	10	12	12	15	18	22

**Table . 2.** *Tolerance for diameter and radial runout of the landing gear surface*

	Model, mm	Accuracy level 5		Accuracy level 8	
		To 125 mm.	More than. 125 mm.	To 125 mm.	More than. 125 mm.
Fr	from 1 to 3,5	0,016	0.022	0,045	0,063
	More than. 3,5 до 6,3	0,018	0,025	0,050	0,071
a	От 1 до 3,5	0,010	0,015	0,036	0,050
	More than. 3,5 до	0,011	0,016	0,040	0,056

	6,3			
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**Table . 3.** *Infelicity in the installation of gear wheels.*

When installing the blanks on the requirements given in Table 3 it may be more likely to ensure the accuracy of gear ring within specified requirements.

**Literature**

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