

Geometric and mechanical parameters for the adjustment of the preload of differential bearings in gearboxes of automobile axles

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Abstract

This article discusses the construction of bearing units of different cars differentials and provides the analysis of technical requirements for the adjustment of the preload of bearings. There are four most commonly used methods for the adjustment of the preload. This paper defines a method for the adjustment of the preload based on deformation of bearing seats, which is the most acceptable in production and which is characterized by the least indirect adjustment and consequently the least number of failures. A formula is given for the calculation of the required preload force based on the failure in opening the joint in the unloaded bearing. A description of industrial equipment for the implementation of this method is presented.

Keywords

Configuration Management, Aerospace, Requirements management, Systems Engineering

Back Ground

When assembling gearboxes of driving axles of automobiles and other vehicles, the final operation of the gearbox assembly process, i.e. the creation and the adjustment of the preload of differential bearings, is one of the most complex and responsible operations that determine the assembly quality and operational reliability of the driving gear. At this stage of the assembly, the required gearing parameters of the driving gear of the gearbox and the preload of the differential bearings are achieved. The Department of Engineering

Technologies and Equipment of Moscow Polytechnic University (Mospolytech) developed a methodology which determines the required preload force for the bearings of the driven gear of the gearbox and the interconnection of indirect parameters of the bearing preload, the design features of the gearbox and force factors arising in operation was established. To achieve the target on the basis of the constructive scheme a simplified scheme has been developed for creation and adjustment of the preload of differential bearings. In this diagram, tapered roller bearings are presented as conical springs, and threaded adjusting rings are shown as screw pairs which create axial compression on the springs.

Conclusion

Based on this model special industrial equipment was developed at the Department of Engineering Technologies and Equipment in Mospolytech. It is a control clip for the adjustment of the preload of the differential bearings of the drive axle gear, shown in Figure 8. This equipment consists of a special eccentric clamp for fixing the clip on one bearing seat, which is used as a measuring tool, and a dial indicator with the scale of 0.01 mm is installed on the opposite side of the bracket. The stem of the indicator touches a flat surface of the second bearing seat using a balanced lever. Rotating the threaded adjusting rings there is a bearing compression and deformation of bearing seats (the jaws) which is registered by the indicator.