Methods for Reducing Vibratility and Increased Gear Durability

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ABSTRACT

This article discusses the improvement of designs and technologies in order to create more reliable, economical machines. Gears are included in the design of almost all types of modern machines. High-quality manufacturing of gears affects the level of the state of technology in all branches of engineering. The main difficulties in the practical use of gears in mechanical engineering is the complication and increase in the cost of the technological process of their manufacture and assembly. Currently, much attention is paid to the improvement of the geometric shapes of the gear teeth. In mechanical engineering, involute gears are widely used, they have an increase in their load capacity and improve dynamic characteristics by optimizing geometric parameters

Keywords: design, technology, more reliable, gears, modern machines, mechanical engineering, economic feasibility, use of gears, geometric shapes of teeth, manufacturing and assembly.

Introduction

One of the main components of scientific and technological progress is the constant improvement of designs and technologies to create more reliable, economical machines and, above all, their most critical systems [1-4]. These systems include gears that are part of the design of almost all types of modern machines. At the same time, the degree of perfection of their designs and manufacturing technologies affects the level of the state of technology in all branches of engineering.

The main part

The creation of gears corresponding to a high scientific, technical and production level is a difficult task that requires the evaluation of all quality indicators. To use gears in modern machines and equipment, it is necessary to improve the elements of the designed transmission in order to assess the economic feasibility of the options under consideration [5-9].

Since the time of the invention of gears, close attention has been paid to the study of the properties of gears. difficulties in the practical use of gears in mechanical engineering are the complication and increase in the cost of the technological process of their manufacture and assembly. When looking for ways to reduce the vibroacoustic activity of gears, it is necessary to be based on the general laws of the theory of oscillations and to clearly understand the main reasons that determine the nature and intensity of vibrations that occur in gears.

A promising direction for reducing the level of vibrations is the creation of composite gears with an elastic connection between the crown and the hub [10-14]. The presence of elastic elements between the rim and the wheel hub allows, in some cases, to achieve of significant isolation of other links of the kinematic chain from high-frequency vibrations generated in the gearing. Currently, a search is underway for acceptable solutions for the design of gears in production conditions. The main difficulties in the practical use of gears in mechanical engineering are the complication and increase

in the cost of the technological process of their manufacture and assembly.

Recently, much attention has been paid to improving the geometric shapes of the teeth and the cavities between them. For the rational use of the geometric shapes of the teeth, modified initial contours are used. Great opportunities for solving problems are provided by the development of new types of gearing, rational structural forms and ratios of gear profile parameters. For some applications of gears, it is effective to switch from involute gearing to Novikov gearing, cycloid gearing, arched teeth, etc.

The widely used involute gears still have reserves for increasing their load capacity and improving dynamic characteristics by optimizing geometric parameters. Increasing the load capacity of involute gears is achieved by the rational selection of displacement coefficients for mating profiles.

The stress state of the teeth during bending is also determined by the shape of the transition curve - the fillet of the tooth. The choice of the optimal shape opens up additional ways to increase their bearing capacity [14-16].

It is possible to reduce the negative impact of gear errors on the transmission dynamics by increasing the deformation of the teeth at the moment of their engagement.

Increasing the strength and improving the quality characteristics within the framework of standard initial contours requires looking for new forms, ratios of the parameters of gear profiles, and methods for the formation of gears.

It is also possible to reduce dynamic loads and load concentration along the length of the contact lines by making circular grooves at the ends of the wheels (Figure 1, a), increasing the height of the teeth at the ends (Figure 1. b, c), drilling teeth (Figure 1, d).

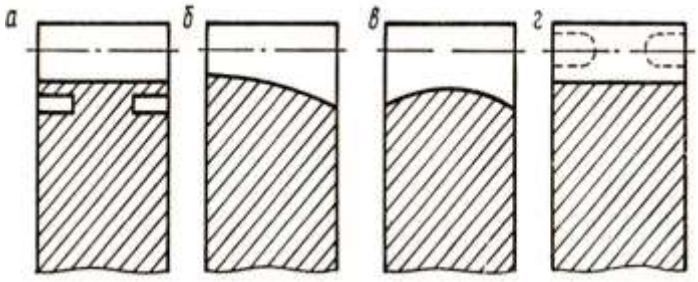

Fig. 1. Tooth shapes are recommended to reduce dynamic loads and load concentration along the length of the contact lines.

Conclusion

Thus, an urgent task is to create and implement a methodology for predicting the residual resource of gear drives by vibration characteristics, taking into account the influence of new parts (their resource) installed during repair work on changes in vibration parameters and residual resources of gear drives in general.

It should be noted that a complete rejection of the PPR system (scheduled preventive maintenance) is impossible for economic reasons. The choice of operation strategy for a particular piece of equipment depends on many factors, among which is the ratio of the planned costs of work and the costs of eliminating the consequences of equipment failures.

References

1. Крутихин, Д. Л. (2011). Методика оценки эффективности функционирования служб технического обслуживания и ремонта оборудования на промышленном предприятии. *Экономические науки*, (83), 129-132.
2. Комбалов, В. С. (1974). *Влияние шероховатости твердых тел на трение и износ*. Наука.112 с.
3. Ишин, Н. Н. (2013). Динамика и вибромониторинг зубчатых передач. *Минск: Беларус. навука*, *432*, 5.
4. ISO 6336-5-2003. Calculation of load capacity of spur and helical gears- Part 5: Strength and quality of materials.
5. Берестнев, О. В., Жук, И. В., & Неделькин, А. Н. (1993). Зубчатые передачи с

повышенной податливостью зубьев. *Берестнев ОВ, Жук ИВ, Недělькин АН–Минск: Наука и техника*.
6. Тилавалдиев, Б. Т. (2022). Определение Усилия Крутящего Момента Т1 В Ветвях Ременной Передачи. *Periodica Journal of Modern Philosophy, Social Sciences and Humanities*, *12*, 230-234.
7. Тилавалдиев, Б. Т. (2022). История появления резьбовых соединений. *European Journal of Interdisciplinary Research and Development*, *9*, 137-140.
8. Маткаримов, А. А., & Тилавалдиев, Б. Т. (2021). Перспективы развития машиностроения в Узбекистане. *Теория и практика современной науки*, (1), 244-247.
9. Tadjikuziyev, R. M. (2022). Analysis of Pollution of Automobile Engines Operating in the Hot, HighDust Zone of Uzbekistan. *Eurasian Journal of Engineering and Technology*, *7*, 15-19.
10. Тилавалдиев, Б. Т., & Рахмонов, А. Т. У. (2021). Оценки сейсмического риска территории городов республики Узбекистан. *Oriental renaissance: Innovative, educational, natural and social sciences*, *1*(10), 143-152.
11. Решетов, Д. Н. (1989). Детали машин. 4-е, переработанное и дополненное. *М.:«Машиностроение*, 496.
12. Тилавалдиев, Б. Т., & Абдуллаев, З. Д. (2021). Информационно-коммуникационные технологии управления в условиях чрезвычайных ситуаций. *Universum: технические науки*, (11-1 (92)), 31-33.
13. Ergashev, N., & Tilavaldiev, B. (2021). Hydrodynamics of Wet Type Dusty Gas Collector. *International Journal of Innovative Analyses and Emerging Technology*, *1*(5), 75-86.
14. Тилавалдиев, Б. Т. (2020). Угол и конус трения. *Журнал Технических исследований*, *3*(2).
15. Mamatqulova, S., & Tadjikuziyev, R. (2020). Метод оцінки рівня кваліфікації ремонтних роботників підприємства автомобільного обслуговування. *Лóгос. Мистецтво Наукової Думки*, (10), 41-44.
16. Tadjikuziyev, R. M. (2022). Technology of repair of press molds for production of machine parts from steel coils, aluminum alloys. *American Journal Of Applied Science And Technology*, *2*(04), 1-11.