

Design of a Dual Cam and Incomplete Gear Transmission Mechanism

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Abstract: From the main classification of incomplete gears, incomplete gears belong to an important formation of full gears, and belong to a special type of gear in its composition structure. From the analysis, it can be seen that from the perspective of the structure of the incomplete gear, there is a case where the gear circumference does not have gear teeth. In the field of industrial applications, an incomplete gear is generally a gear structure that is processed by a full gear and then processed twice. In terms of characteristics, incomplete gears have unique characteristics in terms of the number of teeth and layout. This feature can ensure that they can have better application scenarios in industrial sites, especially compared with other mechanisms, incomplete gears can It has high efficiency and compact structure, and is widely used in industrial machinery structures. In view of the application advantages and application scenarios of incomplete gears. This paper analyzes the characteristics of the incomplete gear mechanism and the laws of motion, designs a transmission structure based on the combination of dual cams and incomplete gears, and analyzes the structural characteristics and basic principles of motion. Finally, the transmission mechanism proposed in this paper the basic advantages are analyzed.

1. Incomplete Gear Overview

1.1 Definition of incomplete gear

Incomplete gears have important applications at present, and have played an important role in many occasions. Especially in modern industry, incomplete gears have played an important role in improving the efficiency of industrialization.

From the main classification of incomplete gears, incomplete gears belong to an important formation of full gears, and belong to a special type of gear in its composition structure. From the analysis, it can be seen that from the perspective of the structure of the incomplete gear, there is a case where the gear circumference does not have gear teeth. In the field of industrial applications, an incomplete gear is generally a gear structure that is processed by a full gear and then processed twice.

In terms of the performance of the incomplete gear, its design is unique, and the basic structure is designed according to the design rules of the full gear. Therefore, its overall use is not much different from that of the full gear. Incomplete gears. In terms of characteristics, the number of gear teeth and the layout have unique characteristics. Such characteristics can ensure that it can have a better application scene in the industrial field, especially compared with other mechanisms, incomplete gears can have higher efficiency, compact structure, and incomplete gears because of the full gear mechanism. Features are more common in industrial machinery structures.

1.2 Development Status of Incomplete Gears

As early as the last century, scholars have conducted a lot of research on incomplete gears, and have achieved many research results. The most important thing is that from the perspective of theory and practice, great progress has been made in the research of current incomplete gears. In the current research, most of these research results have been put into current practice, and they have played a role in the development of the machinery industry To the important role of advancement.

At present, incomplete gears have a wide range of applications, and are mainly used for occasions with unidirectional motion and for intermittent motion. This is because the structure of the incomplete gear itself is less used in some occasions with reversing motion.

Therefore, in view of the application advantages and application scenarios of incomplete gears. This paper analyzes the characteristics of the incomplete gear mechanism and the laws of motion, designs a transmission structure based on the combination of dual cams and incomplete gears, and analyzes the structural characteristics and basic principles of motion. Finally, the transmission mechanism proposed in this paper the basic advantages are analyzed.

2. Design of a Dual Cam and an Incomplete Gear Transmission

2.1 Basic principles of gear drag

Judging from the current practice, in the process of mechanical power output transmission, it is generally through the output of multiple axes to cooperate with the gears for mechanical transmission. In this case, the mechanical slave transmission is generally realized by gears, etc. Therefore, a more important issue for the current multi-axis output is to change the direction of rotation and speed through gears to achieve position. Regulation.

Judging from the current industrial mechanization practice, the transmission of gears is generally achieved through the combined transmission of driving wheels and driven wheels, and the cooperation of this transmission together achieves the joint operation of machinery. According to the current analysis, it is generally known that gear transmission is formed by the joint cooperation of a driving wheel and a driven wheel. This structure is called a "one-to-one" joint transmission. Theoretically, the biggest feature of this transmission structure is that in the process of practice, it can achieve complete transmission of energy. In other words, the characteristic of "one-to-one" gear transmission is that an equal amount of exchange can be formed between the output energy of the entire machine and the input energy. There is no loss of energy.

From the perspective of industrial practical applications, another practical application scenario is through the practice of "One Belt and Two", which is what we often say is to achieve the joint dragging of two driven wheels through one driving wheel, so as to compare Good implementation for energy transmission. From the perspective of industrial practice, the current cooperation of one motor and gear to achieve the transmission of the cooperation of the other two electrical machinery and equipment can save costs to a certain extent, and can play a role in energy conservation and emission reduction Role. From an application perspective, this "One Belt Two" conduction model can reduce costs to a certain extent, and can form a certain application value advantage. This "one belt, two" gear cooperates to form a transmission box, which is widely used in airport and other transmission shafts.

2.2 Design ideas and points

The design ideas and design points of this article are as follows

(1) First, it is necessary to enlarge the size of the driven wheel during the meshing process of the driving wheel and the driven wheel. By meshing the gear of the driven wheel with the driven wheel, a tooth pitch on each driven pinion gear is formed so that two driving wheel pinions can be fused simultaneously;

(2) For the driven wheel running on one side, in the process of meshing the teeth on the front of the driving wheel, the idler on the other side will form an idle state with the teeth of a driving wheel behind the driving wheel. From the opposite perspective, this will form another state form, which is to make the meshing of the gears of the driven wheel form a state that is completed with each other;

(3) In practice, it can be found that when the driving gear teeth and one of the driven gear teeth mesh, the idler teeth of the other driven gear teeth also correspond to the non-meshing state. Such a form of movement will form a change in meshing. We usually form this meshing change as a reduction in meshing time. From the specific principle, the entire meshing of the master and slave gears becomes a master-slave meshing in a short time;

(4) Under the rule of meshing change of the above three points, an alternating transmission effect will be formed. The essence of this action is the continuous operation of the propulsion gear through inertia. Therefore, in practice, the driving gear forms a so-called "one-to-one" energy for one of the driven gears and the gear teeth. In the traditional process, the other driven gear is also in a non-meshing state.

Through our experimental research, it can be proved that in practice, if the driving wheel rotates once, then the two driven wheels can also rotate once. In this way, the operation efficiency can be improved to a certain extent, and the transmission efficiency of the operation can be improved to a certain extent.

2.3 Transmission advantages and precautions

(1) In this gear transmission mechanism, the "gear combination" method is a conventional improvement implemented by the current standard gear meshing transmission. Looking straight, it is a standard Move the gear wheel teeth, remove one gear tooth at intervals, and then mesh with the driving wheel;

(2) The spur gear selects the spur gear. The assembly must ensure good meshing, that is, the helical angles of the helical teeth of the two driven wheels are the same. On the contrary;

(3) Considering the smoothness and continuity in the transmission, in addition to the spur gears, the installation requirements for the driven spur gears are symmetrically distributed relative to the driving spur gears.

Conclusion

From the main classification of incomplete gears, incomplete gears belong to an important formation of full gears, and belong to a special type of gear in its composition structure. From the analysis, it can be seen that from the perspective of the structure of the incomplete gear, there is a case where the gear circumference does not have gear teeth. In the field of industrial applications, an incomplete gear is generally a gear structure that is processed by a full gear and then processed twice. In terms of characteristics, incomplete gears have unique characteristics in terms of the number of teeth and layout. This feature can ensure that they can have better application scenarios in industrial sites, especially compared with other mechanisms, incomplete gears can It has high efficiency and compact structure, and is widely used in industrial machinery in view of the application advantages and application scenarios of incomplete gears. This paper analyzes the characteristics of the incomplete gear mechanism and the laws of motion, designs a transmission structure based on the combination of dual cams and incomplete gears, and analyzes the structural characteristics and basic principles of motion. Finally, the transmission mechanism proposed in this paper the basic advantages are analyzed. The research conclusions designed in this paper are as follows: structures.

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References

- [1]. Zhang Xiaorui, Zhang Lizhong, Li Xiaoming. Design of Double Cam and Incomplete Gear Transmission Mechanism [J]. Journal of Changchun University of Science and Technology (Natural Science Edition), 2019 (4).
- [2]. Jia Xian, Wang Yi, Wang Du, et al. Carbon-free trolley for steering control based on incomplete gear and crank-rocker mechanism [J]. Machinery Manufacturing (12): 36-38, 2017.
- [3]. Wang Xiaojing, Shang Zhendong. Design of Control System for Gear Grinding Device [J]. Science and Technology Wind (5): 140-140, 2018.
- [4]. Heng Ming, Yang Cheng, Zhang Wenxu, et al. Friction reduction mechanism of low frequency vibration assisted gear forming [J]. Journal of Plasticity Engineering, 2019 (2).
- [5]. Li Feng, Liu Zhiyuan, Jin Siqin, et al. Research on Calculation Method of Lubricant Viscosity for EMU Gearboxes [J]. Modern Manufacturing Technology and Equipment, 2018 (6).
- [6]. Wang Baoping, Wang Guiyong. Research on Measuring Method of Gear Ratio Parameters of I/O LINK Tool Magazine Axis Based on FANUC System [J]. Manufacturing Technology & Machine Tool (8): 109-112, 2019.
- [7]. Yang Haibing, Li Yifan. Application of Great Wall AP Gear Oil on Eickhoff Coal Shearer [J]. Petroleum Business Technology, 2019 (4).
- [8]. Xiu Zuogang. Precision control of gear teeth of transmission [J]. Science & Technology Wind (6): 182-182, 2017.