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The Changing Face of Mechanical Manufacturing Reliability

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Abstract: Reliability in the process of machinery manufacturing is a very important indicator of concern, through the optimization of the design of reliability has completely changed the traditional mode of China's mechanical design and production, greatly improving the production efficiency and product quality, for the precision of China's machinery industry, automation has made a great contribution. At the same time, in the production process reliability can help us find the causes of production failures and problems faster, to avoid greater economic losses, reliability as a key factor in a scientific production method, in the development of machinery manufacturing industry plays an extremely important role.

Keywords: Machinery, Reliability, Development, Fault Tree, Productivity, Product Quality.

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1. The Concept of Reliability of Machinery Manufacturing

Machinery manufacturing reliability, is a big concept, which covers all aspects of the entire machinery manufacturing process from design, manufacturing, process, equipment maintenance, product output.

Reliability of the basic concept of the product (the product refers to the object of concern) in the specified time and conditions, the ability to complete the required action. That is, within a certain period of time has its own should have the possibility of the size of the ability is called reliability. For the machinery manufacturing industry, combined with the characteristics of the machinery manufacturing industry and the basic concept of reliability, the concept of reliability of machinery manufacturing can be defined as: mechanical equipment and products in the process of its use, in a certain length of time and under certain working conditions, the ability to play its normal function. In this definition, we need to pay attention to the point is that, for all the reliability, the discussion of the target for a certain number of basis of a group, that is, reliability is a probabilistic concept, reliability of the actual service life of a single product has no practical significance.

2. The Generation of Mechanical Manufacturing Reliability

For machinery manufacturing and its manufactured products, we can be roughly divided into three categories, the first category, advanced technology, high-precision machine tools and machinery; the second category, with a certain degree of advanced technology, mainstream numerical control machinery and a certain degree of precision of the ordinary precision machinery; the third category, without information technology, digitalization and upgrading of the ordinary machine tools and machinery.

Reliability is related to the third type of machinery manufacturing and its finished products. For this type of machinery products, its production and design use of the traditional mechanical design and manufacturing methods, that is, "the implementation of the results of the cause - through empirical design and practice to find a program that meets the design conditions." The process is time-consuming and labor-intensive, and the efficiency and service life of the products often do not reach the optimal cost-effective. Moreover, with the continuous development of the machinery manufacturing industry, some production processes require higher precision and more complex structure of the machinery, through the traditional design of the time required geometrically increased, in this context, the traditional empirical design has become a stumbling block to hinder the development of the machinery manufacturing industry. At this time, optimized design with structural topology as the core gradually appeared in front of designers, and quickly replaced the traditional design method in most fields. An important part of optimization design is reliability design, which is the source of mechanical manufacturing reliability.

3. The Current Situation of the Development of Machinery Manufacturing Reliability

For a wider range of mechanical enterprises in China, China's machinery manufacturing industry, the understanding of reliability is not enough, only a small number of enterprises have the ability and awareness to focus on their own use of machine tools, machinery, and the reliability of the finished product, for the majority of low-cost small-scale machinery manufacturing enterprises, the use of the reliability of the design, focusing on the reliability of the machinery manufacturing cost is too high.

Generally speaking, China's machinery manufacturing reliability is in a period of rapid development, but our existing machinery manufacturing reliability is low-level, imperfect, high-cost. In this regard, we need to continue to work hard to build up our machinery manufacturing reliability industry chain, and promote our machinery manufacturing industry to a high level, high precision direction.

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4. The Function of the Fault Tree

For the application of mechanical manufacturing reliability in the production process, the most representative is the fault tree. Fault tree is a measure of the entire design and production to the output of finished products in the process of each process on the final reliability of the product of the system, it is a scientific assessment system to get rid of the traditional fault detection process of high time-consuming, inefficient, wasteful defects.

Fault tree consists of nodes, left subtree, right subtree to form the basic unit, the whole fault tree is composed of many such units. When a fault occurs, from the top of the fault tree down in accordance with a certain method of traversing the entire fault tree, to find the node of the fault, to repair.

5. Conclusion

For China's machinery manufacturing industry, reliability in the industry as a whole is still only the tip of the iceberg, but the reliability of the use of mechanical production in the benefits are obvious, we optimize the design of reliability through the way to solve many of the traditional design can not solve the problem. I hope that the reliability of China's machinery industry can continue to flourish, and soon realize the real modernization, automation of the machinery industry.

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Conflict of interest

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