Establishment and Application of Technical Evaluation Model for Automotive Parts Remanufacturing

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Abstract: With the development of science and technology, mankind has created a lot of material wealth. But at the same time, we consume a lot of natural resources and pollute the ecological environment on which we live. Under the new situation, especially under the premise of sustainable development, green manufacturing and circular economy have emerged as the times require for manufacturing industry. Automotive parts remanufacturing technology refers to the technology of turning automobile waste parts into new parts through technical treatment. Unlike traditional repairs, remanufacturing is for remanufactured engineering based on performance and remaining life assessments for used parts. Technicality plays a pivotal role in the overall evaluation system, and only if it is technically feasible can the next step be carried out. This paper discusses the re-manufacturing technology and related quality control technology by expounding the significance and characteristics of auto parts remanufacturing technology.

1. Introduction

With the development of science and technology, human society has created a lot of material wealth. But at the same time, we consume a lot of natural resources and pollute the ecological environment on which we live [1]. Unlike traditional maintenance, remanufacturing is aimed at the design of remanufacturing engineering on the basis of performance and residual life evaluation of waste parts [2]. Automotive parts remanufacturing technology uses advanced surface technology, composite surface technology and other high-tech, industrialized production mode, strict product quality management and market management mode [3]. Waste products can be regenerated with high quality and create new value. Related products that can currently be used for automotive remanufacturing include major automotive parts such as engines, clutches, and steering gear. Remanufacturing uses advanced remanufacturing technology to enable remanufactured products to meet or exceed new products in terms of quality, energy efficiency and environmental protection [4]. Most of the repaired products are difficult to reach the new level of the original machine in terms of quality and performance. Whether the waste parts are suitable for remanufacturing must be evaluated, that is, the evaluation is the prerequisite and prerequisite for remanufacturing and processing, so it is an inevitable link [5].

Due to the unconscious destruction of our environment by human beings and the predatory exploitation of resources, the coexisting global environment has been overwhelmed [6]. In the process of remanufacturing engine parts, the old engine needs to be disassembled and cleaned. In developed countries, many products, especially mechanical parts, can be recycled and reused, as are auto parts [7]. The base components are then tested for success in accordance with normal manufacturing standards and repaired in accordance with strict procedures. Under the new situation, especially under the premise of sustainable development, green manufacturing and circular economy have emerged for the manufacturing industry [8]. The concept of remanufacturing comes from the concept of relative manufacturing. Manufacturing refers to the process of processing raw materials into the applicable products we need [9]. With the deepening of the global concept of low-carbon environmental protection, the recycling efficiency of automotive parts in various countries is also increasing year by year. Technicality plays an important role in the whole evaluation system. Only when it is technically feasible can the next step be carried out [10].

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2. Restrictive Factors in the Development of Auto Parts Remanufacturing Industry

The determination of the weight of each index in remanufacturing technical analysis is a very important step in the calculation process of technical evaluation index. The environmental attributes of products should be considered from the viewpoint of system integration throughout the life cycle of products. Because the relevant government departments in China have not yet made clear provisions for remanufactured enterprises and remanufactured products, remanufactured products are often treated as counterfeit products at this stage. As the heart of automobile, engine plays an important role in the process of automobile maintenance. Remanufactured engines are widely used in the foreign auto repair industry. One aspect of remanufacturing is actually a process of regeneration between product repair and scrap, and another aspect is for scrapped products. The legitimacy of remanufacturing companies is often questioned by functional departments, so issues such as production licenses, market access, regulations, and government regulatory systems need to be addressed. Remanufacturing at the level of the part, in terms of its connotation, in fact, the geometry of the part is unchanged and the function is unchanged.

Remanufacturing is a technology that is part of green manufacturing. It is not just about extending the life of a product and repairing and upgrading its features. China has not fully opened the automobile waste parts circulation market. Enterprises can only purchase some faulty parts from the automobile maintenance market as remanufactured raw materials, which are far from meeting the production and market demand. The social demand for mechanical products is constantly showing a large number of diversification, personalization, product orders are gradually showing the characteristics of multi-varieties, small batches. For most engineering problems, there are few analytical solutions because of the complex geometry of the object or the nonlinearity of some characteristics of the problem. Project quality control refers to the control of the progress of each stage and the deadline for the final completion of the project in the process of project implementation. The process duration obeys lognormal distribution. Figure 1 is the result of critical chain planning.

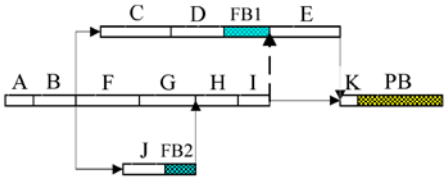

Fig.1. Key chain method planning results

The actual purpose of remanufacturing actually allows remanufactured products to continue to be used in industrial production. When the product is remanufactured, it is undoubted that it will continue to be assembled into the original equipment. The remanufacturing technology of auto parts is the application process of high-tech equipment, and the old parts are repaired and processed by using high-tech equipment. Replacement of the main wear parts to ensure that all the parts produced are successfully debugged and tested before leaving the factory. Remanufacturing is facing the whole life cycle of a product. However, traditional manufacturing is only an early part of the whole life cycle of a product. The proliferation of fake and inferior products further aggravates consumers' doubts about the quality of remanufactured products. The promotion and application of remanufactured products lack social integrity and quality assurance, which makes the remanufacturing industry fall into a vicious circle in which consumers can not rest assured to buy and enterprises dare not invest vigorously.

3. Significance of Remanufacturing Technology in Automobile Parts Manufacturing

As far as remanufacturing is concerned, the object of remanufacturing is the wear-and-tear product which can be said to be retired but conforms to remanufacturability. The dominant concept of disposable consumption among Chinese consumers is still the concept of disposable consumption. Even the remanufactured parts fully accepted by foreign customers will be frozen in

our country. The remanufacturer sells the same amount of remanufactured parts to 4S stores. In order to ensure the source of raw materials, remanufacturing enterprises require 4S stores to provide and reproduce new products. Remanufacturing is a sufficient use of the retention function of decommissioned products, and some of its remanufacturing techniques are used to maintain or even upgrade its functions. In the 4S shop, remanufactured parts and original products are sold at the same time, and the price is clearly marked, and the owner chooses to replace it.

The price of remanufactured products is much lower than the original supporting new products, which has great price advantage. The degree of specialization in manufacturing technology is high, using a streamlined production method. The production efficiency is greatly improved, and the production cost is reduced. The automotive remanufactured parts have obvious price advantages. Process control personnel must strengthen control over the materials and their use at the processing site and exercise strict controls. Use existing technology to create a multi-modal collaborative work environment. A collaborative work support platform with an integrated and integrated multimedia model. The cooperative design operation process is shown in Figure 2.

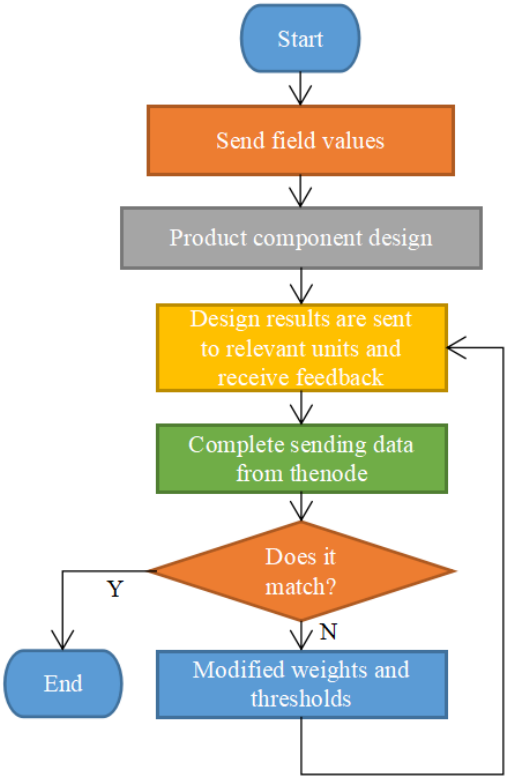

Fig.2. Mechanical processing cooperation design operation process

The conflict between economic development and the environment and resources on a global scale has become increasingly prominent, and remanufacturing engineering is in line with the key points of green manufacturing and circular economy. Recycling is only a retention function that uses decommissioned products. There is no such thing as maintaining and upgrading its original functional and quality indicators. The change in the amount of vehicle scrap is affected by many factors, and it is difficult to include all the influencing factors in the general forecast. As a large country in the manufacture and use of equipment, the number of machines facing life expectancy in China is not to be underestimated. Parts manufactured by remanufacturing technology can be directly interchanged with parts on vehicles to be repaired. It can greatly shorten the maintenance period of the automobile and restore the service performance of the automobile in the shortest time. Automobile remanufacturing engineering started relatively late in China. For some related automobile remanufacturing technology, it is also developed from some simple maintenance engineering and surface engineering. The starting point is relatively low, and there is a big gap in technology and theory with European and American countries. Automobile remanufacturing

engineering has been strongly supported by the state in recent years, and has made some progress.

4. Conclusions

Remanufacturing, as a circular economy model of green manufacturing, plays an active role in environmental protection and resource and energy conservation. With the increase of car ownership in China, the scrap volume is increasing year by year, and it is limited by resources and energy. The automobile remanufacturing industry is bound to be the general trend in the future. With the continuous development of China's national economy and the continuous improvement of people's living standards, the development of the automobile industry is growing stronger and stronger. However, the automobile remanufacturing industry is still in the growth stage, which needs further development and scale expansion. In order to meet the development requirements of the circular economy, the state has created a favorable development space for the auto parts remanufacturing industry from a strategic height. Significant achievements have been made in the development and application of remanufacturing technology, policies and regulations, innovation in recycling methods, and construction of remanufacturing bases. Remanufacturing of auto parts is a circular economy model that is consistent with China's sustainable development strategy. It not only reduces the consumption of resources, but also reduces the pollution of the environment. In the process of remanufacturing of auto parts, the support of relevant industry development policies also provides more opportunities for the development of the automobile remanufacturing industry.

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