The re-manufacture engineering technology and application in our country heavy load equipment

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Abstract:

It was pointed out that re-manufacture of the heavy load equipment parts will be highly effective, safely, reliable, the energy conservation, and promotes the development strategy of the northeast old industrial base. The status and function of the advanced re-manufacture engineering technology were elaborated, and the application methods and the instances of re-manufacture technology in the mechanical industry were particularized. The actuality and development of the re-manufacture technology were described.

Keywords: The re-manufacture engineering technology; Heavy load equipment parts; Surface engineering technology; Coating repair

Introduction

Along with the high speed development of our country modernization industrial technology, happening the random exploitation to the limited resources at the same time. Infinite destruction to the limited environment, has worked the short of future resources and environment pollution and so on the major issue in our country. The mechanical device manufacturing industry is the biggest resources user in particular, also is one of the biggest environment destroyer. According to the preliminary statistics, the promote of the northeast old industrial base needs that mechanical heavy load old equipment parts of the re-manufacture (mine, mechanical and electrical, electricity generation, vehicles manufacture, military equipment and so on) achieves the number 1,000,000 sets of. Statistic number from the environmental protection and economy shows that the re-manufacture of the heavy load equipment parts will advantageous protection environment, save several hundreds of millions Yuan funds, and might simultaneously increase re-employment post tens of thousands every year.

Therefore, Xu Binshi academician of the Chinese Academy of engineering and so on some senior experts established the green re-manufacture engineering technology, and which is important

strategy of promoting the northeast old industrial base economy and enhancing the synthetical benefit.

1. The re-manufacture engineering technology

The re-manufacture engineering technology is a taking the product total life cycle design and the management as the instruction, taking high quality, highly effective, the energy conservation, the nodal wood, the environmental protection as the goal, taking the advanced technology and the industrialization production as the method, taking object of the repairs or the transformation worn out product. The re-manufacture engineering technology is namely the industrialization of high-tech service.

The re-manufacture engineering technology is used, which adopts the high new superficial engineering technology to fabricating coating and modified processing and other processing technology to original parts surface, to restore the size and the shape and the performance of the parts and form the re-manufacture production.

The re-manufacture satisfies the demand of sciential economy, saving energy and material, decreasing environmental pollution development. It not only can enable the product to obtain the technological transformation unceasingly and reduce the latter half of one's life expense, but also expands the connotation and lengthening product lifetime, creates more profits. The re-manufacture is the advanced technique of manufacture 21st century promotes, and the important part and the development direction of promoting old industrial base development. It has become a kind of rising industry of having extreme potential.

The re-manufacture engineering concentrate the theories and technology and up to date production of the material, metallurgy, mechanics, electronics, physics, chemistry and so on domain. It mainly includes superficial analysis and diagnosis technology, superficial coating technology, superficial modifying technology, superficial manufacture technology and superficial examination technology etc.

2. The application and example

2.1 The application of the re-manufacture engineering technology

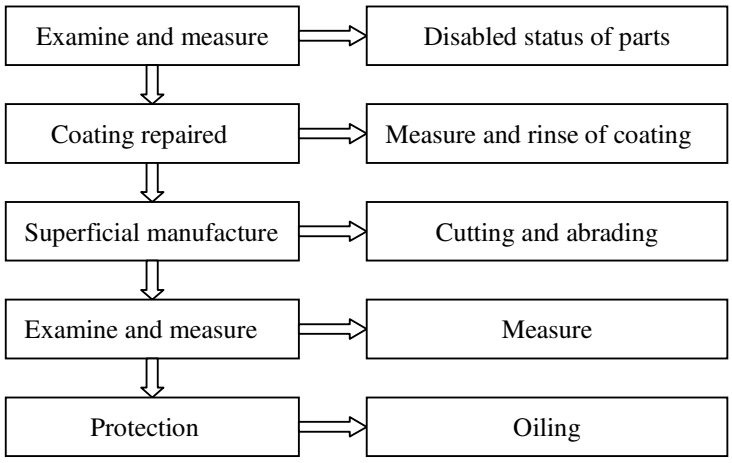
Mechanical heavy load equipments were massive wasted owing to the wear out, corrosion, fatigue etc in the long-term use. Adopting the re-manufacture technology, the disabled heavy load equipments may be restored the performance of the equipment and the parts massively, service lifetime prolonged, the total lifetime cycle cost reduced, raw material saved, the environmental pollution reduced. The re-manufacture technology may form the new industry, absorb the specialized technology talent, offer the employment chance, solve re-employment of the unemployed worker, creation value and

form the new economical point of growth rapidly. Basis the centrality decision-making, the large amount of money was used to promote the northeast old industrial base because that the northeast is our country's old industrial base and a great number heavy load equipments and parts are demanded to restore performance using the re-manufacture technology. According to the preliminary statistics, the 20% above renewal and transformation including the mine equipment, the mechanical product equipment, the electromechanical device, the generate electricity set, the automobile and agriculture machine made equipment and so on can use the re-manufacture technology to repair and intensify. For promoting the northeast old industrial base, country invests several hundred million Yuan to give support. But large numbers equipment of old industrial base is dated and backward and is in the renewal time. The scientific transformation of the existing equipment must use the re-manufacture engineering technology to meet the need of the new time industrial development by the lowest funds investment to enables the old equipment to display the best potency.

2.2 The example one, the re-manufacture of mechanical and electrical rotor spindle

After the heavy curved surface parts was repaired one time using the re-manufacture technology to some power plant, the conclusion proves that the unit rotor spindle and the dust removal electrical machinery rotor spindle (about 2.5T) and so on can use three years. The cost repaired is about 0.7 times of the new. The result shows that the old rotor, repaired by the re-manufacture technology, is cheaper than the new.

The technical route of the re-manufacture is as follow:



2.3 The example two, the re-manufacture of diesel engine cylinder

Cylinder is one of the most important parts in the diesel engine,

because the cost of cylinder is about 25% of the unitary machine. The disabled cylinder owing to attrition and distortion was researched and analysed, and a set of effective service method had been explored. Tests showed that the repaired product by re-manufacture technology had achieved basically the new product technical standard and the service life was almost the same with the new product.

The method of the re-manufacture is as follow: Firstly, the form of the cylinder disabled parts and the result analysis. Secondly, the analysis and research of the re-manufacture including Electronics brush, hot spraying technology, cold and hot manufacture technology, enchasing and sharpening etc. Thirdly, the methods of the re-manufacture were chosen. According to various function holes attrition situation, the method of welding processing formation was selected, high efficiency cold welding method-plug welding stainless steel, then bores again or the polish formation method and newly bore method and so on. Finally, the reliability and the service lifetime analyze of the cylinder repaired by re-manufacture technology.

2.4 The example three, the re-manufacture of balance elbow of some heavy load vehicles

Balance elbow is important parts of some heavy load vehicles motion part. This part continuous works 500-1000 hour, which needs overhaul or replacing. Some repair factory, which passes through the analyze, proves that the performance of the balance elbow repaired by the re-manufacture is 0.6 times higher than the new product, the working time is two times than the new and the repaired cost is 4/5-9/10 times of the replacing new product's.

The method of the re-manufacture is as follow: Firstly, examination of disabled part. Secondly, coating repaired. Thirdly, examine and measure. Finally, oiling.

3. The development present situation of the re-manufacture engineering

At many very developed countries, the re-manufacture industry receives high regard and has been formed the scale huge group of the re-manufacture industry. The average annual production of American re-manufacture industry has amounted to 40,000,000,000 US dollars at 2003, occupies its GDP 0.4%. There are 84 kind of different type products manufactured by the re-manufacture manufacturer in database of US, including the automobile fitting, the medical diagnosis using the magnetic resonance image equipment, the duplicator and so on. At present, the re-manufacture engineering has already been widely researched and industrial applied in the industry developed country. Europe has passed the related law and the regulations that are advantageous to the re-manufacture engineering, and the center of the

re-manufacture engineering has been constructing at Germany.

"The re-manufacture industry has bright prospect in our country". In the Chinese circulation economy development forum 2005 meetings, Chinese Academy of engineering academician Zhang Yanzhong expresses that the re-manufacture industry has huge development potential in our country by way of the important way of the development circulation economy, saving the resources effectively.

Basis the statistics, the quantity of our country automobile will achieve 45,310,000 to 47,000,000 and discarded automobile will be above 2,000,000 next every year. According to this tendency estimating，if discarded vehicles 30% are repaired using the re-manufacture technology, then yearly average sales volume might create 36,000,000,000 Yuan, recycling added value 49,000,000,000 Yuan, solution employment 180,000 people and reducing the carbon dioxide withdrawal 2,300,000 tons.

Chinese Academy of engineering academician Xu Binshi as early as appealed in 2004 national circulation economy workshop that the re-manufacture engineering will be established to become a pillar industry of manufacturing industry in our country and upbuild correlation auxiliary industry system aimed to draw the national economy and realization re-employment and the continuable development. The market prospect of the re-manufacture industry is extremely huge, which mainly incarnates in resources benefit, environmental protection benefit and social efficiency. Because that the re-manufacture can directly use the product parts to produce, the re-manufacture engineering is able to save the massive materials and the energy. So, the majority of materials (about 85%~95%) used in the original product first manufacture and the energy (about 85%) can be conserved and decreasing mine to original mining.

The re-manufacture has caused highly regarding of the party and the country. The green re-manufacture technology had been listed as one of key technologies in "2020 the medium and long-term science and technology development plan" constituted by the nation, and the 21 number documents "the key work notice of about completing and constructing the saved society in the near future" was issued by the State Council in 2005 and the 22 number documents "certain opinions of about speeding up the development circulation economy". It is supported by the nation that the worn out mechanical and electrical products repaired using the re-manufacture technology. At the same time, increasing enterprises will aim to the re-manufacture market. Therefore, an emerging industry, namely "the re-manufacture industry", has been already more and more regarded by the industry developed country.

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