

DIESEL ENGINES ON-SITE REPAIR SERVICE EXPERIENCES

Marine Diesel Remanufacturing Technology on Site Hudong Heavy Machinery (HHM) Global Service Center Metallock Qingdao Engineering Co., Ltd.

Summary:

Remanufacturing marine diesel engines is a national advocacy method for energy conservation and emission reduction. Hudong Heavy Machinery Co., Ltd. and Metallock Engineering (Qingdao) Co., Ltd. has long-term cooperation, according to the characteristics of marine diesel engine, developed on-site remanufacturing development in the production practice, has made gratifying success stories.

This article describes the damage that has occurred around the cylinder head bolts on two MAN MC models of the same type but of different sizes. This type of damage has affected the overall strength of the diesel engine. Therefore, the Classification society requires the participation of diesel manufacturers must be accepted. To this end, we have worked together to design a repair program approved by the classification society to successfully repair the diesel engine frame.

Subject: Marine diesel engine's re-produce in place is a new develop trend created by HHM GTS and Metallock Qingdao. The article summarized 2 successful re-produce cases.

How to develop remanufacturing technology with Chinese characteristics is an industrial development direction of Hudong Heavy Machinery. Hudong heavy machinery production of low-speed marine diesel engine with large size, weighing hundreds of tons and other characteristics can't be returned to the factory according to the conventional mode of modifications. Therefore, starting from 2014, in response to the national remanufacturing technology development direction, Hudong Heavy Machinery (HHM) and Metallock Engineering (Qingdao) Co., Ltd. forced to work on-site remanufacturing technology line. Preface Introduction to on-site remanufacturing technology for marine diesel engines is a kind of advanced manufacturing technology based on performance failure analysis and life assessment analysis. The latest industrial technologies are used to meet the requirements of new diesel engine manufacturing standards so that the remanufactured product quality should meet or exceed the new product. Through a series of industrial processes, the use of old parts cannot be used parts by remanufacturing technology repair, mainly with advanced on-site processing technology, a variety of repair techniques, making the repaired marine diesel engine to meet the new machine performance and life standards . For example, diesel engine combustion system reform, by increasing the diameter of cylinder liner, with an increase of diameter renovation pistons, increase fuel injection and other means to improve the work of diesel engine remanufacturing technology line. This is a comprehensive calculation of the performance of diesel engine design, calculation of the strength of diesel engine, piston renovation. Cylinder liner boring / honing, fuel injection pump and other technological transformation of the remanufacturing technology. For another example, diesel engine power reduction transformation, a few years ago, due to high oil prices, ship operation difficulties, Hudong Heavy Machinery (HHM) introduced a diesel engine power reduction remanufacturing technology services. The technology combines the on-site measurement of diesel shaft power and other work data, and the optimization and calculation of diesel engine performance. Through the modification of the spool valve of the oil supply system and finally the change of the working performance interval of the diesel engine, the goal of reducing the power consumption is achieved.

Case Study 1:

Introduction of Diesel Crankshaft On-site Remanufacturing Technology in April 2015, under the specific guidance of Hudong Heavy Machinery Global Service, the two parties co-operated and undertook the on-site mechanical repairing and repairing of the crankshaft of MAN 6S70MC model of Taiwan Wanneng Company. After 8 days of on-the-spot work, the crankshaft crank pin reduced by 3.5 mm. With all the undersize bearings customized by HHM Factory, all the technical indicators completely met the factory's standard of the new machine. The test was successful and the container ship was put into operation rapidly. If the crankshaft out of space, back to the factory repair route, the ship repair phase at least 5 months or more. Repair hundreds of times the total cost of on-site remanufacturing techniques.

Case Study 2:

Remanufacturing of Cylinder Head Bolt Base for Marine Diesel Engine Casing in 2013, our two co-operators took over the project of two serious damage around the cylinder head bolts of the main engines, namely, the MAN STX 6S70MC and MAN B&W 5S50MC diesel engine block had been damaged. Both of these diesel engines affected the overall structural strength of the machine frame with one of them. The classification society completely rejected the repairs plan of a European maintenance service company invited by the owner itself and left the owner with a loss of suspended service for three months. After accepting the invitation from Ship Owners, we sent engineers to the vessel for on-site survey & measurements and also invited HHM Technical Center to recall the technical data of the diesel engine. Through the analysis and research, we determined the independently designed on-site remanufacturing plan. The plan eventually passed the strength analysis and technical audit of HHM Technical Center and the Classification Society. Finally, the audit is conducted on the portable field milling machine designed by Metalock Qingdao.

After the entire milling process, the new cylinder head base designed by us was mounted on the diesel engine frame to restore the original size and original strength of the diesel engine frame surface.

Original damage status: 2015 In the Cylinder head water jacket and other parts before demolition, we can see that the crack cylinder head bolt base had been damaged and separated. The situation is more serious.



30.12.2015 Before the removal of cylinder head water jacket and other spare parts, it can be seen that the cylinder head bolt base on the frame has been damaged and separated severely. After dismantling, it was

found that the situation worsened. MAN5S50MC diesel engine models, the entire base only a small part of the intact, the rest have different sizes of damage According to the new scene, we determine the overall replacement of the base technology route. To this end, the need to design suitable for on-site machining equipment. In this case, we combine on-site milling, tap drilling, thread trimming and sealing. The basic requirement of on-site remanufacturing technology is to meet or even exceed the machining accuracy of the general machining shop at the work site. Therefore, the manufacturing standards obtained on-site remanufacturing are equivalent to the mechanical shop.

On-site remanufacturing: The first application of on-site milling process, portable milling machine to determine the level of parallel with the diesel engine frame, the solid, began milling, the processing shown in the picture, you can see the damaged surface gradually become no cracks, or very little Crack defects on the final surface.



Completely after the milling work, has been fully machined base ring plane, the new base can be successfully mounted with a new base



Mounting: After the new base is molded, the surface flaw detection, to determine the existence of defects or cracks, and reported to the Class Surveyor on-site inspection, you can enter the next step procedure. The new base has been successfully placed. And the use of the original cylinder head bolt positioning inspection and verification.

New base installation: Newly processed base after forming, surface inspection, to determine the existence of defects or cracks, and submitted to the Society On-site Surveyor site inspection can enter the next step procedure. The new base has been successfully placed. And the use of the original cylinder head bolt positioning inspection and verification.



Test pressure and test run After the replacement work is completed, the first to do 8 kg hydrostatic test, after the site survey by the surveyor, into the diesel engine test, and submitted to the user.

Through the success stories of on-site remanufacturing of the three ship engines mentioned above, the cooperation between Hudong Heavy Machinery Co., Ltd. (HHM) and Metallock Engineering (Qingdao) Co., Ltd. hit the road of innovation for on-site remanufacturing of ship's machine with Chinese characteristics. We will continue to summarize our work experience with diesel engine Industry Features Improve on-site remanufacturing technology for marine diesel engines.