

CURE OF STEEL GIANT

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Abstract : This article tells us the technology way of the ten thousands tons water press plunger piston damaged surface cementation repair

Keywords : water press prefill valve plunger piston wearing coating cementation repair date at least Three month .

1. Foreword

our company manufactured the largest ten thousand tons water press by ourselves in the world the large equipment of the *China First Heavy Industries* (CFHI) puts into production represents the new manufacturing level of the large forging on the nuclear power fire power petroleum and chemical industry coal and chemical industry shipping military industry in China enters the advanced line of the world .

The steel giant was paid attention all over the world when it was born reported powerfully by several medias such as people's daily, cctv ,cbs,xinhua newspaper office , worker's daily .

During the forging ,when the cross beam going down , the main cylinder in right side delayed , bader and bader in future ,at last the steel giant didn't work .after being disassembled to check ,the main valve rod's hoisting piston surface coating of the prefill valve on the top of the main cylinder was damaged all over .The prefill valve of the ten thousand tons water press is imported from one of the foreign famous company ,the excircle of the hoisting piston of the water press main valve rod is \varnothing 260mm , the length is 800mm ,the sliding surface is used from a special procedure and patent technology ,the thickness of the coating is only 0.15mm.

The ten thousand tons water press has to stop ,after urgent discussion , we think of some kinds of repair methods :

(1)、order this prefill valve aboard , it will take us several million and the delivery date in half years .

(2)、order the spare parts of this piston aboard ,it is very expensive and costs 1.5 million rmb and the delivery

(3). the piston is manufactured by ourselves ,its material is not clear, especially we don't know which kind of material of the piston surface 0.15mm and manufacturing procedure , it is difficult to make it in about two weeks .

(4). Repair the piston by ourselves . to look for the methods repair the damaged coating of the piston surface in order to recovery the ten thousand tons production . We made decision to use the fourth repair scheme after the chief leader of our company permitted and did it at once .

2 . the piston hoisting function and the performance analysis of the prefill valve 's valve rod

The operating principle of the prefill valve : the piston moves up and down by the controlling oil through the reversing valve ,the piston drive the main valve rod up and down according to this to realize the open and the close of the prefill valve . and also makes the cross beam down at idle stroke , a lot of low pressure water is from the opening valve into the main cylinder . but when it force s down at the working stroke ,the prefill valve closes ,a little high pressure comes into the main cylinder , the cross beam of the water press will make the top anvil base force down with the high pressure to realize free forging .

On account of the working properties of the Water press and working characteristic of the prefill valve , there are following features of the piston surface :

(1)、wearing .because the cross beam of the Water

press forces down and hoists frequently, so does the piston, the movement up and down makes the rubbing of its excircle against the high pressure sealing. If its surface were not wearing, it would be damaged quickly.

(2). low friction factor and high surface roughness. because the main valve rod of this valve and the excircle surface of the piston have got the high pressure sealing ring, if the friction factor is high, it is difficult for the piston to move.

By the above analysis, the cut coating 0.15mm of the import part excircle surface should be a kind of special wearing material. It was tested a kind of an nonmetal composite material by the instrument. because we haven't any information to look up, we didn't know what the material is.

According to the operating principle and the performance analysis of main valve rod of the prefill valve hoisting piston, especially it is very urgent to recovery the operation of the ten thousand tons water press, it is not necessary to research for which kind of coating and procedure of the import part. we have made up our mind to use our Chinese wearing coating and our owned adhesive technology to repair.

3、 the choice of the wearing coating

The Chinese wearing coating to choose is the self-lubricating and low friction coating of Beijing Aoyukexin company, such as AK02-3、 AK02-1, TS316、 TS215 of Beijing Tianshan company, HT316、 HT255 of Huitian company in heibei Province and BNT-1、 BNT-2 of Beijing first machine tool plant and so on. we choose the the self-lubricating wearing coating AK02-3 of the Beijing Aoyukexin company, the main properties of this wearing coating as following: compression strength 83 Mpa, tension strength 54 Mpa, shear strength 24 Mpa, hardness (D) 84

4、 repair procedure :

surface treatment: we research the peeled off surface coating of the original part, the main reason is the bad surface treatment. so we machine its surface by lathe, look at the attached sketch, the depth of

the groove is about 1mm and make the coating thicker.



Before repair



After repair

mixture : according to the production instruction of the AK02-3, the mixture should be done as soon as possible in order to have enough time to coat.

coating : to clamped a wiper on the cutting tool holder, the cutting tool holder moves along the longitudinal direction to coat the mixture along the axial direction on the adhesive area of the work piece excircle needed surface equally.

solidification : in order to improve the mechanical properties and the hardness, heat the coating in a hour. run the work piece held in the lathe at low speed to make the heat of the work piece equal, the heat temperature is about 50°C.

machining : after the solidification of the coating and the adjusting, rough machining, finish machining, finish grinding, finish polish.

it is better to manufacture it by the excircle grinding machine to make sure the precision and roughness requirement, and reduce the machining procedures. it is the best advantage to work out the problem which the wearing coating manufactured.

the roughness of the piston surface 0.2um, the

roundness is 0.015mm , concentricity is 0.015mm ,
the import parts .

the dimension tolerance is 0.03 mm , it is better than

5、 conclusion

after the hoisting piston of the main rod of the prefill valve of the ten thousand tons water press repaired , it was assembled at once and succeed . by the continuous trouble-free service , we can prove the work piece recovery the original properties completely , and improve the original part 's reliability by the special repairing procedure . it took us 36 hours to repair the prefill valve of the ten thousand tons , the steel giant can work again . if we wait for the import spare parts , we have to spend 3 or 4 months and 1.5 million yuan for the expensive fee of the import spare parts . the adhesive technology used in the maintenance and repair area of the equipment should be a deep revolution , especially it is faster for the big and heavy equipment repair on the site . the adhesive technology should be used wider and wider in the area of the equipment management, maintenance and repair .

