

Performance analysis of hydraulic hammer at home and abroad

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Abstract: This paper firstly introduces the development status of hydraulic hammer at home and abroad, as well as the market analysis of hydraulic hammer, models are described in detail, Then analyze and compare the total weight, working flow, working pressure and frequency of the hydraulic hammer that suits 25t excavator, At last, the development trends of hydraulic hammer is explained. This will have an important reference value for the development of hydraulic hammer.

Key words: hydraulic hammer; market analysis; performance analysis; trend of development

I. INTRODUCTION

Hydraulic hammer known as the crusher, In China, it is also known as the hydraulic impact crusher. Hydraulic hammer started mainly to be used in the demolition of buildings and breaking roads. With the development of technology, hydraulic hammer is also used in the mining industry, it is now widely used in metallurgy, railways, buildings and other fields. The hydraulic hammer can be used in conjunction with the excavator and loader, so as to improve the efficiency of the crushing work. and it has many advantages such as the diversity of the carrier equipment and the working flexibility.

II. THE PRESENT SITUATION OF HYDRAULIC HAMMER AT HOME AND ABROAD

2.1 The development status of abroad

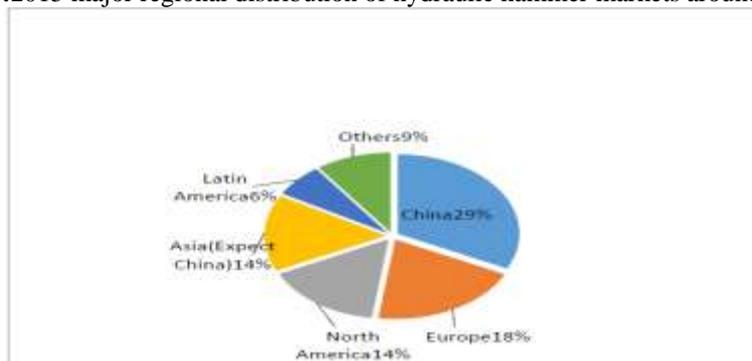
In foreign countries, hydraulic hammer began to develop in the late 1960s, after 50 years of development, it has become a huge industry. Globally speaking, the main manufacturers of hydraulic hammer about 60, according to region can be divided into China, Korean, Japanese and European and American style. South Korea is extremely rapid development, there are many well-known brands, such as SB, KOMA, GB, DXB, RGB, SG, etc. The German Krupp has experienced many generations of innovation and has become the world first-class level in terms of Technology. In addition, Japan's Fuchs and Komatsu are the lead of hammer industry.

2.2 The development of the domestic status

Compared with foreign hydraulic hammer, the total development status of hydraulic hammer in our country is that it is not late, but the development is slow. In 1970s, China began to develop hydraulic hammer. In the early 1980s, many companies participated in researching hydraulic hammer, but most manufacturers because of the quality and sales, and they no longer produce these products, only Changzhi hydraulic company has been producing hydraulic hammer. After twenty-first Century, the GT and Sunward Intelligent Equipment company began to produce hydraulic hammer, but the scale is still relatively small.

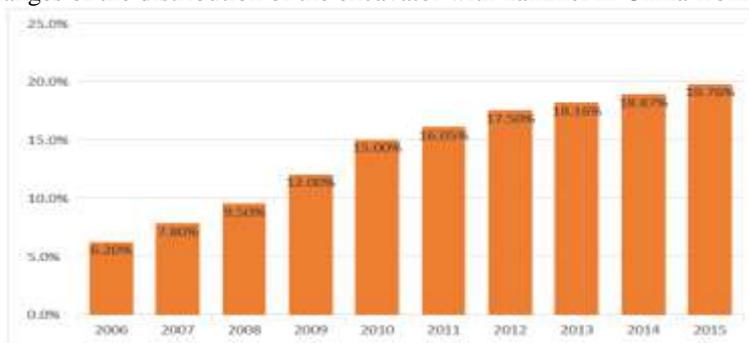
Global Market Overview of hydraulic hammer Since the first hydraulic hammer came out by the German Krupp company, after more than 50 years of research and innovation, hydraulic hammer has become a large industry. According to incomplete statistics, in 2015 the global hydraulic hammer total sales of about 262000, the main markets are Europe, North America and China, India. But Europe and North America due to the impact of the financial crisis, the market of hydraulic hammer slowed down, and China's hydraulic hammer market developed rapidly, and has been occupied a very important position in the world.

Figure 1 : 2015 major regional distribution of hydraulic hammer markets around the world



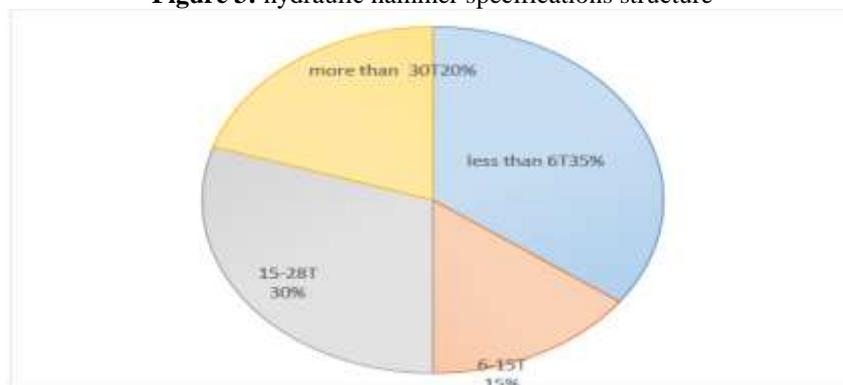
From excavators with hammers rate, in 2006 China hydraulic excavator with hammer only about 6.2%, this figure grew faster, by 2015 it has reached 19.7 percent. At present in developed countries excavator with hammer is more than 35%. In Japan, South Korea and other island countries can reach 60%, and in Saudi Arabia and other Gobi Area excavator with hammer rate up to 80%, but in developing countries, the probability of excavator with hammer is very low, and it is less than 20%.

Fig. 2 the changes of the distribution of the excavator with hammer in China from 2006 to 2015



From the point of hydraulic hammer specifications, under 6T for miniature hydraulic hammer, accounted for 35%; 6-15T for small hammer, accounted for 15%, 15 to 28T for medium-sized hammer, accounted for 30%; More than 30T for big hammer, accounting for 20%.

Figure 3: hydraulic hammer specifications structure



II. PERFORMANCE ANALYSIS OF HYDRAULIC HAMMER

There are many hydraulic hammer companies in the world, each manufacturer produced different kinds of hammer, and there are differences in performance. Our country has many hydraulic hammer companies, for example: Giant Hydraulic Tech Co., Ltd, Its production is mainly GT, for example: GT08, GT10, GT20, GT40, GT80, GT150, GT200, GT450 etc. the scope of the adapter is also very wide range, ranging from 0.8T to 90T. The productions suit 25T excavator for GT90 and GT130. BLT Machinery Co Ltd had many productions, for instance, BLT30, BLT40, BLT50, BLT60, BLT80, BLT81, BLT150, BLT165, BLT175 etc. With advantages of large hitting power, low noise, super durable, low failure rate and so on. The productions suit 25t excavator for BLTB150T, BLTB140T, BLTB150S, BLTB140S, BLTB150B and BLTB140B.

Addie Pml Precision Mechanism Ltd has developed EDT100 EDT200 EDT300 EDT400 EDT2000 EDT2200 EDT3000 EDT3500 EDT6000 E DT8000 EDT10000 and so on, The productions suit 25T excavator for EDT2000 EDT2200 EDT2000F and EDT2200A. The production of Yantai Xinren mechanical and electrical equipment co., LTD Characters with high quality, high precision, high stability, high durability, and can completely replace the imported products, it has developed DBK680, DBK1000, DBK1400A, DBK1650, DBK1750, DBK1900, GTX1400, GTX1650 and GTX1750. The productions suit 25t excavator is DBK1400. (Because our country has a lot of companies producing hydraulic hammer, here I just give some influential manufacturers).

Table 1: The summary of the hydraulic hammer for adapting to 25t excavator in China

types	The diameter of drill rod (mm)	quality (kg)	frequency (bpm)	pressure (kg/cm ²)	flow (L/min)
GT90	140	1947	350-500	160-180	120-180
GT130	150	2352	350-500	160-180	150-190
BLTB-150T	150	2300	300-450	160-180	150-210
BLTB-140T	140	2050	350-500	160-180	120-180
BLTB-150S	150	2670	300-450	160-180	150-210
BLTB-140S	140	1960	350-500	160-180	120-180
BLTB-150B	150	2800	300-450	160-180	150-210
BLTB-140B	140	2050	350-500	160-180	120-180
EDT2000I	135	1658	400-800	160-180	130-150
EDT2000F	135	1668	360-460	160-180	145-180
EDT2200	140	1767	350-500	160-180	120-180
EDT2200A	140	1805	350-500	160-180	120-180
EDT2200	140	2052	350-500	160-180	120-180
EDT2000F (135	1868	360-460	160-180	145-180
EDT2000	135	1852	400-800	160-180	130-150
EDT2000A	140	2090	350-500	160-180	120-180
DBK1500	150	2114	300-450	160-180	150-210
DBK1400	140	2050	350-500	160-180	120-180

From the table, we can see that the diameter of drill rod in hydraulic hammer which adapts to 25t excavator has only three kinds, respectively 135mm, 140mm and 150mm. The drill rod of EDT2000F and EDT2000 are the minimum diameter which is 135mm. In terms of total quality, the quality of EDT2000 is the minimum which is 1658kg. In terms of the frequency, the range of EDT2000 frequency is more wide from 400Bmp to 800Bmp. In terms of work flow, the range of hydraulic hammer for adapting to 25t excavator from 120L/min to 210L/min. And the working pressure is between 160kg/cm² and 180kg/cm².

From the above analysis we can know that according to incomplete statistics, the hydraulic hammer that suits 25t excavator is EDT2000 which is developed by Addie Pml Precision Mechanism Ltd, This type of hydraulic hammer is best in all aspects of performance.

There are many hydraulic hammer companies abroad, there are many company producing hydraulic hammer in Korean, for example, GB which has many models, such as GB-630EL, GBT250, GBT130, GBM90L, GBF270, GBE500, GB3TPB etc. the hydraulic hammer that suits 25t excavator is GBF270. ABOUTUS is the only company to set up the Institute of hydraulic hammer, and has many models, such as SU155TSP SU165TSP SU145TSP SU125TSP SU105TSP SU55TSP SB60TRF etc. The hydraulic hammer that suits 25t excavator are SB81TRF and SB100TRF.

Wongjin has many models, such as WJB1750 WJB1550 WJB1500 WJB1400S WJB1350 WJB1000 WJB900 WJB750 WJB150 0T WJB1500S WJB1400T etc. the hydraulic hammer that suits 25t excavator are WJB1400S WJB1400T WJB1500T and WJB1500S. HiTech has created value for the customer and committed to becoming a world-class hydraulic hammer, which has many types, including HiTech810 HiTech200 HiTech1000 HiTech1500 PKB68 PKB100 PKB150 PKB135 PKB155 etc, the hydraulic hammer that suits 25t excavator is HiTech1000.

There are many hydraulic hammer companies in Japan, such as FURUKAWA TOKU KONAN TEISAKU and so on. FURUKAWA and TEISAKU have a certain influence on hydraulic hammer. FURUKAWA as one of the world's three Mining engineering machinery manufacturer, which has many types, including Fs6 Fs22 Fs27 Fs37 Fs45 Fs47 HB20G HB27G Fs22TBOX Fs27TBOX etc, the hydraulic hammer that suits 25t excavator are Fs27 and Fs27TBOX. .T TEISAKU set correctly broken position highly Efficient high safety, Non pollution machinery which has many models, such as TB20 TB30 AB22 AB44 AB60 TR100 TR210 TR220 TR300 TR600 TR800 TR26G and so on , the hydraulic hammer that suits 25t excavator are TR220 and TR26G.

There are many hydraulic hammer companies in Europe and America, such as Caterpillar, AtlasCopco, SANDVIK and so on. Caterpillar was founded in 80, which rapidly become one of the biggest companies in construction machinery and mining equipment, which has many types, including B20 B35 etc. the hydraulic hammer that suits 25t excavator is B20.

The production of hydraulic hammer which are produced by AtlasCopco are very strong in the flow and pressure, and have high flexibility, which has many models, such as MB750E MB1000E MB1200E MB1500E MB1700E MB750DP MB1200DP MB1500DP M B4700DP MB5800DP MB10000DP and so on, the hydraulic hammer that suits 25t excavator are MB1200E MB1500E and MB1700E. The first-class technology of SANDVIK can produce all kinds of hydraulic hammer which has many advantages including crushing demolition, recycling, mining, Quarrying and construction and so on, which can meet different customer's needs. SANDVIK has many types, including BR321 BR422 BR825 BR999 BR1229 BR2155 BR2577 BR3288 BR4099 BR4511 BR70 13ect, the hydraulic hammer that suits 25t excavator are BR2155 and BR2577. There are many companies produce hydraulic hammer in foreign countries, especially in South Korea, Japan, and here I just give some manufacturers that have important influence in the world.

According to an uncompleted statistic, the following summary table of the hydraulic hammer that suits 25t excavator in foreign countries:

types	The diameter of drill rod (mm)	quality (kg)	frequency (bmp)	Pressure (kg/cm ²)	Flow L/min
GB-F270	140	1605	350-380	160-180	120-150
SB100TR-F	150	2065	300-450	160-180	150-210
SB81TR-F	140	1830	350-500	160-180	120-180
SU-105TS-P	145	1984	350-500	160-180	150-210
SU-85TS-P	135	1915	400-550	160-180	120-180
WJB1500S	150	2144	300-450	160-180	150-210
WJB1400S	140	1740	350-500	160-180	120-180
WJB1500T	150	1972	300-450	160-180	150-210
WJB1400T	140	1754	350-500	160-180	120-180
RGB1000	140	1740	400-490	160-180	120-150
ENB1000	140	1740	400-490	160-180	120-150
FS27	140	1986	350-850	160-180	145-220
FS27T-BOX	150	1929	400-850	160-180	150-220
TR26C	140	1790	275-350	140-180	105-145
TR220	135	1700	310-390	140-160	120-155
MB1700	140	1709	320-640	160-180	130-170
MB1500E	135	1500	330-680	160-180	120-155
MB1200E	120	1200	340-680	160-180	100-140
BR2577	150	1700	450-750	160-180	140-200
BR2155	140	1220	490-780	160-180	120-180

From the table, we can see that the diameter of drill rod in hydraulic hammer that suits 25t excavator has four kinds, respectively 120mm, 135mm, 140mm and 150mm. The drill rod of EMB1200E is the minimum diameter which is 120mm. In terms of total quality, the quality of EMB1200E is the minimum which is 1200kg. In terms of the frequency, the range of FS27 frequency is more wide from 275Bmp to 850Bmp. In terms of work flow, the range of hydraulic hammer that suits 25t excavator from 100L/min to 220L/min. And the working pressure is between 140kg/cm² and 180kg/cm².

By comparing the domestic and foreign hydraulic hammer that suits 25t excavator, we can conclude that there is a large gap between the domestic and foreign in terms of performance. In terms of the diameter of drill rod, China's minimum is 130mm, but the foreign can get 120mm. In terms of total quality, China's minimum is 1658kg, however, the foreign can get 1200kg. In terms of the frequency, in foreign country the range of frequency from 275Bmp to 850Bmp which is wider than hydraulic hammer in china. In terms of work

flow, the range of flow is wider from 105L/min to 220L/min abroad. In terms of working pressure, in foreign country the range of pressure from 140 kg/cm² to 180kg/cm² which is wider than the domestic.

Through the above comparisons we can know that there is a large gap between the domestic and foreign in terms of performance. So, We need to continue to work hard, and we also need to develop the independent innovation of highly efficient hydraulic hammer.

III. THE DEVELOPMENT TRENDS OF HYDRAULIC HAMMER

In the future, the development trends of hydraulic hammer are that the high impact power, high energy utilization rate, Easy to maintenance, Piston stroke and frequency are adjustable, the output may be determined by the external resistance, which can make hydraulic hammer more efficient and longer life. At present, people are more concerned about the noise, hence, the main factors making hydraulic hammer progress is that the manufacturers try to reduce the noise and vibration.

To sum up, the development trends of hydraulic hammer are that functional varieties, flexibility of structure, Intelligent.

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