Design of Metallurgical Sawing Machine

Huatao Chen, xiaofei Tang, Ruichang Wang, Hanhui Chen

University of Science and Technology Liaoning, Liaoning, China.

Abstract

According to the Report on Market Development Status and Investment Trend Analysis of China's Sawing Machine Tool Industry from 2019 to 2025 released by Boss Data, this paper summarizes the sawing machine tool industry, analyzes the current situation of China's sawing machine tool industry, analyzes the competition pattern of China's sawing machine tool industry, analyzes the operation status of key enterprises in China's sawing machine tool industry, and forecasts the development prospect and investment of China's sawing machine tool industry. Metal cutting machine tools have very important needs.

Keywords

Metallurgical; Sawing Machine; Tool.

1. Introduction

Today, people's requirements for metals are constantly improving, and a large number of new machines are coming into people's eyes. My group and I have launched an in-depth discussion on the project of metallurgical sawing machine. Metallurgical sawing machine is suitable for trimming, cutting and blanking of ferrous and non-ferrous metal profiles and pipes, and is widely used in metallurgy, machinery, petrochemical and other industries. Traditional cutting of metal profiles and pipes is realized by old-fashioned bow sawing machines or metal sawing machines. There is still something interesting about this production. After searching, the patent of China Patent PublicationNo. CN2319190 discloses a metallurgical sawing machine tool, which integrates mechanical, electronic and hydraulic technologies, and adopts mechanical and hydraulic transmission systems and electronic control systems, so that the rotating metallurgical saw blade can continuously cut the workpiece, thus improving the saw blade efficiency and the deflection accuracy of the bow and arrow saw mouth. A metallurgical saw sawing machine in the above patent has some shortcomings. In use, the pipe to be sawed is easy to shake, resulting in poor cutting effect, and the sawing will produce huge noise. Therefore, it is necessary to design a metallurgical saw sawing machine to solve the above problems. In a word, the original intention of our team is to design a sawing machine to improve this problem

2. Design ideas and innovations

1. The metal pipe can be placed in the placing groove on the fixed block through the fixed block, threaded rod, abutment plate, rotary table and rubber pad, and then the threaded rod is rotated and adjusted to drive the rotary table to move downwards. Instead, the abutment plate on the vertical rod moves downwards to clamp the metal pipe, and the rubber pad on the abutment plate can prevent the pipe from being crushed. This structure can quickly fix the metal pipe, making the pipe sawing more stable and better in use effect.

2. Through the set limit rod, lifting plate, first spring and protection angle, the vibration generated during sawing will be transmitted to the Shenjiang plate, so that the lifting plate will move east on the limit rod and compress the first spring, which can play an effective role in damping and reducing noise. At the same time, the protection angle on the bottom plate can be avoided, and the vibration can be transmitted to the ground, resulting in better noise reduction effect.

3. Through the fixed frame, protective frame, sliding plate and slag collecting box, the sliding plate on the protective frame can be clamped in the fixed frame to fix the protective frame. Sparks generated

during cutting will be blocked by the protective frame, which effectively improves the safety performance of the machine tool. Moreover, slag cooled by sparks will fall into the slag collecting box, which is convenient for unified cleaning, effectively avoiding damage to the machine tool, and is more practical.

3. About the use of saw blades

1. Basic requirements of cemented carbide saw blades for sawing machines. The sawing machines should have high stability. The frame adopts multi-ribbed and solid mechanism; The saw box is equipped with rigid square guide rail. The saw box guide rail system consists of sliding and rolling system combined mechanism and is equipped with multi-stage buffer and automatic clearance elimination device. The feed of the saw box should be driven by hydraulic motor and precision screw to achieve stable and constant feed and stepless speed regulation. The main spindle box of sawing machine is equipped with anti-wear rolling bearings, which are driven by bevel gears made by quenching and grinding, and the back gap is completely eliminated by anti-stress pretensioning device to achieve stable operation; Damping mechanism of saw blade must be equipped to eliminate vibration of saw blade during operation and cutting.

2. Check and replace the saw blades in time to reduce consumption. The top of the teeth of the saw blades are constantly worn during use, and some even have the phenomena of tooth beating, tooth dropping, tooth heel cracking, serious substrate swinging, etc. Check the condition of the saw blade frequently during shift change and use, and replace it in time, which can keep the saw blade serrations in good condition, reduce the number of replacement cutter heads, and continue to use them better only after grinding. The saw blade can be reused many times, which can effectively reduce the sawing cost.

3 When the saw blade is working, it should be cooled to reduce a large amount of heat generated during the cutting process of the deformed saw blade, and it should be cooled by the air cooling system of the saw machine; In order to ensure that the maximum temperature of the saw blade during cutting is lower than 180°C, the gas pressure of the high-pressure gas of the compressed air cooling system is not less than 06Mpa, and to ensure that the nozzle is facing the sawtooth direction, the nozzle position and gas pressure should be checked regularly to ensure normal cooling, so as to avoid melting of the welding layer of the welding saw blade due to excessive temperature, which may lead to tooth loss of the saw blade and even deformation of the substrate.

4 When the saw blade works, it must ensure that the guide platen is lubricated well. And if the gap between the pressure plate and the saw blade substrate surface is within the required range, if the guide pressure plate is not lubricated well during the saw blade cutting process, it will cause dry friction between the guide pressure plate and the saw blade substrate, which will cause serious deformation or strain after the substrate is heated, causing the blade body to fail to work normally or cause other accidents; If the gap between the guide platen and the saw blade is adjusted too much, it will not play a guiding role and cause the saw blade to cut normally. If the gap is too small, the saw blade will be locally heated and deformed during cutting, which will aggravate the abnormal wear of the guide platen.

5. When the saw blade is working, remove the chips. The sawing machine for reducing plug teeth must be equipped with a sawdust catcher (wire mesh brush) which can be adjusted according to requirements to remove sawdust. Regular inspection and replacement should be carried out to effectively remove the cutting in the tooth slot, so as to avoid damaging the saw blade saw teeth and saw body after tooth plugging.

6 Installation of saw blade: Before installation, the inner and outer flanges of saw blade should be cleaned, and the surface of core shaft should be kept clean and undamaged. If the flange surface is stuck with impurities, the core shaft is dirty or damaged, the installation of saw blade is not in place, which will easily cause the saw blade to swing when cutting, and make the saw blade scrap. Clean

up the iron filings and dirt around the mandrel and flange plate in time, and regularly check the surface of the mandrel for special damage.

7. Treatment of Saw Blade Tooth Loss and Tooth Beating. When using the saw blade, it is necessary to check and replace it in time. If it is not replaced in time, the cutter head will be jammed, resulting in continuous tooth beating and even serious consequences of scrap of the saw blade, which will increase the use cost.

8 Storage of saw blades Packaged saw blades can be placed in the packing box, and used saw blades should be placed in a special saw blade leaning frame to avoid serious tilting and leaning, resulting in serious deformation of the substrate. It is forbidden to pile up and mix with heavy objects on the saw blade table.

9 Treatment of saw blade deformation After the saw blade is deformed, it can be adjusted and returned to the factory tension and end jump value requirements. It can be used normally

4. Some things about metal sawing machine

Common product names: sawing machine, band sawing machine, band sawing machine, double column band sawing machine, metal band sawing machine, band sawing machine. After installing the saw blade, the tension of the saw blade must be checked. If the saw blade is not tight, it is easy to produce saw skew. Inspection: After the guide bracket is locked, put it in the middle of the saw blade inside the two brackets, and push the saw blade, so that the saw blade has a certain force.

Saw, shall not impact down. Operators are strictly forbidden to leave their posts and wear gloves during cutting. Every shift must disconnect the power supply, open the shield, and take the chips near the saw wheel for daily and cleaning work. Especially, remove screws must be put in a special box to avoid losing them. After loading, all the contents in the box should be used, otherwise the loading will be incomplete. The cutting accuracy of band sawing machine is directly related to band saw blade.

According to the Report on Market Development Status and Investment Trend Analysis of China's Sawing Machine Tool Industry from 2019 to 2025 released by Boss Data, this paper summarizes the sawing machine tool industry, analyzes the current situation of China's sawing machine tool industry, analyzes the competition pattern of China's sawing machine tool industry, analyzes the operation status of key enterprises in China's sawing machine tool industry, and forecasts the development prospect and investment of China's sawing machine tool industry. Now there is a very important demand for metal cutting machine tools, and what our team shows is a kind of patent that can be improved according to Chinese Patent PublicationNo. CN2319190. This utility model relates to a metallurgical sawing machine tool, especially a metallurgical sawing machine tool integrating mechanical, electronic and hydraulic technologies.

Metallurgical sawing machine is suitable for trimming, cutting and blanking of ferrous metal and non-ferrous metal profiles and pipes, and is widely used in metallurgical machinery, petrochemical and other industries. The traditional cutting of metal profiles and pipes is realized by the old bow sawing machine or metal sawing machine. The old bow sawing machine adopts the machine bar saw, and the bar saw reciprocates to achieve the purpose of sawing the workpiece. Half of the sawing routes during the reciprocating movement of the bar saw are idle strokes without sawing the workpiece, which is an important reason for its low sawing efficiency. The purpose of this utility model is to provide a metallurgical sawing machine tool with high sawing efficiency in view of the shortcomings in the sawing machine technology.

The sawing machine of the utility model consists of a machine body, a workbench, a main shaft, a metallurgical saw blade, a motor, a reducer, a hydraulic system and a feeding raceway, and the metallurgical circular saw blade installed on the main shaft of the machine body is driven to rotate by the motor through the reducer to realize continuous sawing of workpieces. The rotating speed of the spindle, that is, the rotating speed of the metallurgical circular saw blade, can be adjusted by two handles on the reducer. The feeding of the worktable can be directly propelled by the single hydraulic cylinder in the hydraulic system, and the speed can be smoothly adjusted. During feeding, the

workbench moves through the connected proximity switch to change the oil circuit of the hydraulic system. Control the feeding speed of the workbench to saw the workpiece. After sawing, the proximity switch is controlled in the electronic control cabinet of the programmable controller to change the oil circuit of the hydraulic system, so that the workbench can return to the original station at a faster speed.

When the metallurgical saw blade saws the workpiece, the workpiece is clamped by the double-seat vertical clamping mode through the double-body hydraulic cylinder, and the clamping force can be adjusted by changing the oil pressure.

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References:

[1] Rao Rongshui. Development of ladle baking technology [J]. Industrial Heating, 2000,(03):8-10.

[2] Yin Tao. Design and application of regenerative ladle baking device [J]. Metallurgical Energy, 2015,(5):25-27.

[3] Wang Kun, Zhou Li, Li Xiaosheng, Liu Jianting. Fatigue analysis of muscles using computer mouse for a long time [C]. China Sport Science Society. Compilation of abstracts of papers of the Tenth National Sports Science Conference in 2015 (I). China Sport Science Society: China Sport Science Society).2015:573-574.

[4] Liu Jianting. Analysis of muscle fatigue when using computer mouse for a long time [D]. Xi 'an Institute of Physical Education, 2013.