

Introduction to full hydraulic rolling shear equipment

Taiyuan University of Science and Technology, in cooperation with Taiyuan Heavy Industry, Northeastern University and other organizations, pioneered large hydraulic rolling plate shearing technology and equipment (Figure 1), filling production requirement for wide and thick plates worldwide. The full hydraulic rolling shear equipment is one of the three key equipment in the wide and thick plate production line, which is mainly used in the production of high quality wide and thick alloy steel plate for shipbuilding, chemical industry, electric power, national defense and other important equipment. The equipment up to more than 10 meters, weighing more than 300 tons, shearing force of more than 16000 KN, is a typical complex large-scale metallurgical complete sets of equipment, and each set of equipment can produce an annual output of 1 million tons of high-strength steel plates with 2800~4100 mm × 6~60 mm.



Figure 1 Hydraulic rolling shear equipment

The core technology and the whole equipment structure have been granted total 21 invention patents, with all independent intellectual properties. It invented a new rolling shearing method of steel plate using hydraulic cylinder-driven compound connecting rod mechanism, and realised the pure rolling shear within the full specification range of wide and thick metal plate. It overcame the defect of shear quality and deficiency shear capacity caused by the shearing trajectory not being adjusted with the specification of steel plate, and laid a technical foundation for improving the shearing quality of wide and thick metal plate. The Invention of the new 11-bar hydraulic rolling shear mechanism and the whole machine structure established the new shear mechanism kinematics, dynamic analysis method and optimisation design method, and innovated a new type of rolling shearing mechanism and structure with high stiffness and high motion accuracy. The structure solved the problem that the weight of the equipment increases sharply with the width and thickness of the shear steel plate, and the weight of the whole equipment is reduced by more than 40% comparing to the mechanical rolling shear. It invented a new structure of hydraulic cylinder and frame horizontal articulation of the additional force, and its design method could make the shear capacity put about 2.7 times the hydraulic cylinder thrust. It solved the problem of deficiency shear capacity and severe wear of hydraulic cylinder under partial load caused by the

controllable performance fell sharply in the large stroke, large swing angle, high load, strong impact, large partial load conditions, and improved the controllability and the running smoothness of hydraulic servo system.

The creation of 3500 x 60 mm, 4300 x 50 mm and other series of large-scale hydraulic rolling cutting machine has been used in HBIS Group China and other large-scale steel enterprises, mainly producing 900~4150 mm × 6~60 mm high-strength steel plates of different specifications, creating significant economic benefits for the enterprise.