
弯管机的液压系统及其机械结构设计

摘 要

随着工业生产和科学技术的不断发展，管材的弯曲加工在金属结构、工程机械、石油化工、动力机械以及锅炉、航空航天、等工业部门，占有着非常重要的地位，也对管材的加工技术提出了更高、更新的要求。这就使得设计出一台可靠的弯管机尤为重要。

本文研究的弯管机是一种将管材弯曲成一定半径和角度的弯管的设备，其液压系统对加工弯管的质量有着重要意义。本论文针对管件的弯曲，介绍了常用的弯曲加工方法和弯管设备，分析了国内外弯管机的现状及发展趋势；本文在研究弯管机工作原理的基础上，通过对弯管工艺的分析，研究设计了弯管系统的液压系统，利用电气系统实现液压系统的自动控制。本文计算了弯管机力能参数，以此为基础设计出弯管机机械结构，并对主驱动机构进行了计算。验算了液压系统的性能进行并选择了液压元件。最后，本论文基于 SolidWorks 对弯管机进行三维建模，实现了弯管机加工过程的仿真。

关键词：弯管机；液压系统；机械设计；过程仿真

Hydraulic system and mechanical structure design of Bending machine

ABSTRACT

With the continuous development of industrial production and science and technology, pipe bending plays a very important role in metal structure, engineering machinery, petrochemical industry, power machinery, boiler, aerospace, and other industrial sectors, and also puts forward higher and newer requirements for pipe processing technology. This makes it very important to design a reliable pipe bender.

The pipe bender studied in this paper is a kind of equipment which can bend pipe into a certain radius and angle. Its hydraulic system is of great significance to the quality of pipe bending. Aiming at the bending of pipe fittings, this paper introduces the common bending processing methods and bending equipment, analyzes the current situation and development trend of the bending machine at home and abroad; based on the research of the working principle of the bending machine, this paper studies and designs the hydraulic system of the bending system through the analysis of the bending process, and realizes the automatic control of the hydraulic system by using the electrical system. In this paper, the force and energy parameters of the pipe bender are calculated, and the mechanical structure of the pipe bender is designed on this basis, and the main driving mechanism is calculated. The performance of the hydraulic system is checked and the hydraulic components are selected. Finally, based on SolidWorks, this paper carries on the three-dimensional modeling to the pipe bender, and realizes the simulation of the pipe bender machining process.

Keywords : Bending machine ; Hydraulic system ; Machine design ; Process Simulation

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