飞机牵引车夹持举升装置的优化设计研究

摘要

无杆式飞机牵引车是移动飞机和确保机场内飞机能够安全驶进驶出的重要的交通工具。他们的运营效率的高效与否对机场地面运输的畅通有着莫大的关系。与此同时，它们在优化提高机场的经济效率以及节约能源和环境保护方面具有巨大优势。夹持和举升装置是无杆式飞机牵引车与飞机机轮之间用来直接相连接的最主要构成部分。它的作用是完成夹持飞机轮胎的动作并再将其抬离地面。它是飞机牵引车上的最重要的结构。

夹持和举升装置的结构设计质量是提高无杆飞机牵引车工作效率的重要保证。国外的一些企业和科研机构对夹持举升机构研究起步比较早。目前，我国的民航总局认为夹持和举升装置的制造、研究和开发比重越来越大，但目前国内对夹持举升机构的设计、研发还有制造水平豆远远落后于其他国家，与之相比还存在一定差距。

本文采用 SAE 标准的无杆牵引车的设计和运行规范，为了设计一种新型的无杆飞机夹持举升装置。SolidWorks 三维软件用于制作夹持举升机构的装配图，这个机构可以连接到飞机机轮并分布以实现夹持的动作。利用 ADAMS 对机构模型进行仿真，通过有限元方法分析材料的刚度，得出机构整体刚度在工作空间内的分布规律。

关键词：飞机牵引车，夹持举升装置，有限元法分析，优化设计

Research on Tractor Fixture and Optimal Design of Lifting Device

Abstract

Rodless aircraft tractor is an important means of transportation for moving aircraft and ensuring safe entry and exit of aircraft in an airport.The efficiency of their operation has a great impact on the smooth flow of airport ground transportation.At the same time, they have great advantages in optimizing the economic efficiency of airports and in energy conservation and environmental protection.The clamping and lifting device is the main component of the direct connection between the rodless aircraft tractor and the aircraft wheel.Its job is to grip the plane's tires and lift them off the ground.It is the most important structure of the airplane tractor.

The structural design quality of the clamping and lifting devices is an important guarantee to improve the working efficiency of the rodless aircraft tractor.Some foreign enterprises and research institutions started their research on clamping lifting mechanism earlier.At present, China's civil aviation administration believes that the manufacturing, research and development of clamping and lifting devices are taking up an increasing proportion. However, the design, r&d and manufacturing level of clamping and lifting mechanism in China lags far behind that in other countries, and there is still a certain gap compared with it.

This paper adopts the design and operation specification of the rodless tractor of SAE standard to design a new rodless aircraft clamping lifting device.SolidWorks software is used to make assembly drawings of the gripper lift mechanism, which can be connected to the aircraft wheels and distributed to achieve the gripper action.ADAMS is used to simulate the mechanism model, and the finite element method is used to analyze the stiffness of the material, so as to obtain the distribution law of the overall stiffness of the mechanism in the working space.

Keywords ： aircraft tractor ,Clamping lifting device ,Finite element

analysis ,optimization design