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一种适用于飞机装配的新型随动定位器

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A New Posture Following and Keeping Fixture for Aircraft Assembly

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摘要

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摘要 在飞机机身等大部件位姿调整、对接及精加工等装配过程中, 如何保持调整后的飞机部件位姿不变并对其进行可靠固持一直是个技术难题。为此, 提出一种基于气浮和万向球座的机身部件随动固持方法。采用该方法进行随动固持的具体步骤: 首先将与机身部件刚性连接的芯轴插入处于浮动状态的万向球座中, 芯轴在进入浮动球体的过程中, 球体可在上、下半球座之间进行任意转动; 然后根据受力状态使球体和上、下半球座一起平动; 芯轴完全进入浮动跟随装置之后, 液压锁紧上、下半球座和球体, 同时锁紧芯轴, 在保证不改变飞机大部件位姿前提下实现对其可靠固持; 将油压卸载就可以释放与机身部件连接的芯轴, 使机身部件恢复到自由调姿状态。试验和应用分析表明, 这种新的随动固持方法可以满足机身对接装配、精加工要求。

关键词: 飞机 装配 精加工 位姿调整 夹具 万向球座

Abstract: How to keep and fasten reliably the adjusted posture of large components such as airplane bodies is a key issue in the application of posture adjustment and fixture. Based on the principle of aerostatic bearing and universal ball joints, a new posture following fixture method for large components is presented in this article. This method can be described as follows: first, insert the mandrel rigidly jointed with the large component into a sphere body which can rotate freely between the up-semi-ball-seat and down-semi-ball-seat; then, the mandrel pushes the sphere body to make it rotate between the up-semi-ball-seat and down-semi-ball-seat and translate with them. After the mandrel reaches the target location the hydraulic devices lock the up-semi-ball-seat, down-semi-ball-seat, the mandrel and the sphere body in order to keep and fasten reliably the mandrel without any posture change of large components. By unlocking the mandrel, up-semi-ball-seat, down-semi-ball-seat and the sphere body the adjustable posture of the large component may be resumed. The experimental and analytical results show that the new posture following and keeping fixture can meet the requirements of aircraft assembly and finish machining.

Keywords: aircraft assembly finishing posture adjustment fixture universal ball joint

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