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The improved design of sub-assembling tray for an engine

Aiping CHEN ^{a,*}, Le ZHOU ^b

^aWuchang Institute of Technology, Hubei Wuhan 430065, China

^bWuhan Style Automobile Equipment Co., Ltd, Hubei Wuhan 430063, China

Abstract

Aiming at the original sub-assembling tray for an engine manufactured by Wuhan Style Automobile Equipment Co., Ltd, some improvement measures were improved. On the one hand, a high intensity rotary mechanism was added to make lifting easier, and to simplify assembling process. On the other hand, thanks to the profiling technology used for the design of support rack shape, 14 kinds of support rack shape have taken over from the parallelogram shape, the compactness was enhanced. Adjustable device was applied to the connection of the supporting frame and the base, so as to meet the various size specifications of the engine mounting requirements. It is proved in the engineering practice that the revised structure design achieve the desired effect, providing a good foundation for the promotion of efficiency and accuracy of the engine assembly

Keywords: Tray; rotary mechanism; support assembly; profiling

1. Introduction

Sub-assembling tray is applied widely on the engine assembly line, and it is the carrier for carrying engine. Along with the sub-assembled tray engine is automated guided by the transport vehicles to the assembly line of each station. Because the engine is still in the tray in most of the cases, the tray has a direct influence on the positioning accuracy and assembly efficiency of the engine.

2. Structural defect of original assembly tray for engine

The original sub-assembling tray structure diagram is shown in Fig. 1. The tray is composed of a bottom plate 1 and four engine supports 3 on the bottom plate, support block 4. The base plate of the engine tray is welded and fixed with 4 supporting pillars; the left pillar is higher than the right. The supporting block and the supporting column are also fixed by welding. The section shape of the support block is a simple parallel quadrilateral; the upper

* Aiping CHEN. Tel.: 18607108216; E-mail address: 37610361@qq.com

surface of the 4 support blocks is inclined to the same direction. These shape features lead to three obvious defects in the tray.

The tray fixed engine with simple support blocks, all support blocks are distributed on the edge of the geometry rule, but the shape of engine is irregular, so the shape of the tray and the engine is in a poor fit, thus the fixed effect is not satisfactory, which affects the engine assembly accuracy. The connecting mode between the support and the bottom plate is welding; they can't rotate and move, thus, each of the different assembly postures of the engine is required to relocate the engine and the tray, which creates the operation tediously. The vexing part is the fixed position of 4 pillars. Once the tray is made, the size and the shape cannot be changed; it makes a tray can only be adapted to an engine, so the versatility of the tray is poor

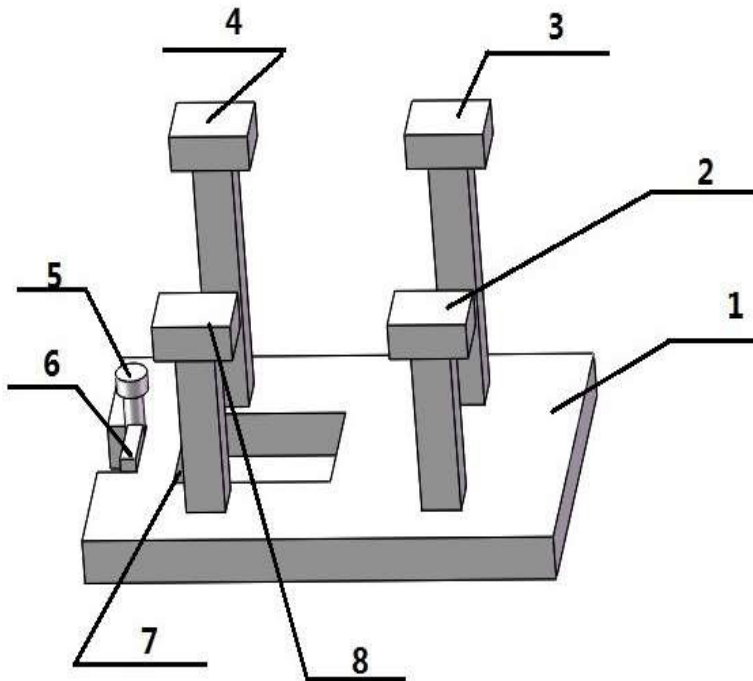


Fig.1 structure of the original tray

3. Improvement scheme

3.1. Improvement target.

In view of the shortcomings of the tray, three goals of structural improvement are proposed: The first is to simplify the operational difficulty for the engine's transport and assemble, and to improve the assembly efficiency by 5%; The Second is to improve the assembly precision; the third is to enhance the adaptability for the tray.

3.2. Improving design scheme.

According to the goal of improvement, three improvement measures are proposed. First way is to add the rotating mechanism (including rotating parts, positioning components, rotary table), which make the assembly of the location of the transformation for the engine is more convenient and fast. The assembly efficiency of the engine can be promoted. Second way is to improve support frame shape by using profiling method, thus the improved support

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