Design of high performance parallel arm robots for industrial applications.

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Abstract

A method for finding parallel arm robot structures with the same performance as the FlexPicker robot from ABB is presented. The method is very simple and based on systematic clustering of the links connected to the actuated platform of the robot. In the case of 3 DOF actuation, 3 new useful clustering schemes have been found. With these clustering schemes as a starting point, new parallel arm robot concepts have been identified. Besides fulfilling the basic properties of the FlexPicker robot, these concepts will make it possible to design more compact robots, to design robots with selective tilting movements and to design robots with SCARA type kinematics. These new design possibilities may be useful for several potential applications of parallel arm robots in the future.

Key words: Robot, kinematics, parallel, design, assembly, SCARA, DELTA, FlexPicker.

Introduction.

In 1998 ABB released its first parallel arm robot, the FlexPicker, see figure 1. This robot is designed for applications needing fast pick and place operations and it can perform a complete pick and place cycle in 0.4 seconds. The working range is a cylinder of 1.1 meter in diameter and with a height of 0.25 meters. Maximum payload is 1 kg, max speed 10 m/s and max acceleration 100 m/s².