STUDIES ON THE POSSIBILITIES OF PROGRAMMING INDUSTRIAL ROBOTS

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Rezumat: *Acest proiesct descrie o aplicatie pick&place, cum trebuie si cum nu trebuie programat un robot industrial. Metoda de programare folosita este Teach-in (cu telecomanda. Aplicaţia consta asamblarea a 3 piese: una cilindrica si doua paralelipipedice poziţionate. Ordinea de asamblare a pieseleor este: piesa paralelipipedică; piesa cilindrică; piesa paralelipipedică*;

Abstract: *This project describes an application pick & place, the way of programming an industrial robot. The programming of the robot was made with the teachpad in order to to increase accuracy and optimize the robot trajectory in its workspace. .In this program have been used three pieces: one cylindrical and two rectangular. The order of assembly is: first rectangular piece; the cylindrical piece; second rectangular piece;*

*Keywords :*Industrial Robots; programming; traiectory; teach-pad

1. Introduction

An Industrial robot is a multifunctional manipulator that controls and reprograms the position automatically, with more degrees of freedom and being able to manipulate materials, parts, tools or special devices along planned pathways to pursue variety of tasks. (ISO Standard)

The most commonly used robot configurations are *articulated robots*, *SCARA robots* and *Cartesian coordinate robots*, (aka gantry robots or x-y-z robots). In the context of general robotics, most types of robots would fall into the category of robotic arms (inherent in the use of the word manipulator in the above-mentioned ISO standard). Robots exhibit varying degrees of autonomy:

- Some robots are programmed to faithfully carry out specific actions over and over again (repetitive actions) without variation and with a high degree of accuracy. These actions are determined by programmed routines that specify the direction, acceleration, velocity, deceleration, and distance of a series of coordinated motions.

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- Other robots are much more flexible as to the orientation of the object on which they are operating or even the task that has to be performed on the object itself, which the robot may even need to identify. For example, for more precise guidance, robots often contain machine vision sub-systems acting as their <<eyes>>, linked to powerful computers or controllers. Artificial intelligence, or what passes for it, is becoming an increasingly important factor in the modern industrial robot.

Typical applications of robots include welding, painting, assembly, pick and place, packaging and palletizing, product inspection, and testing, all accomplished with high endurance, speed, and precision

They are in principle a simple piece of equipment and therefore highly adaptable. The 6-axis industrial robot is certainly the most flexible type and can be used in many different ways.

In addition, robots that are more specialized are used in quite specific applications. Some applications are very simple and have been done thousands of times before, but there are more and more industries that are turning to machines and more specifically robots, to increase production and quality while lowering costs and waste.

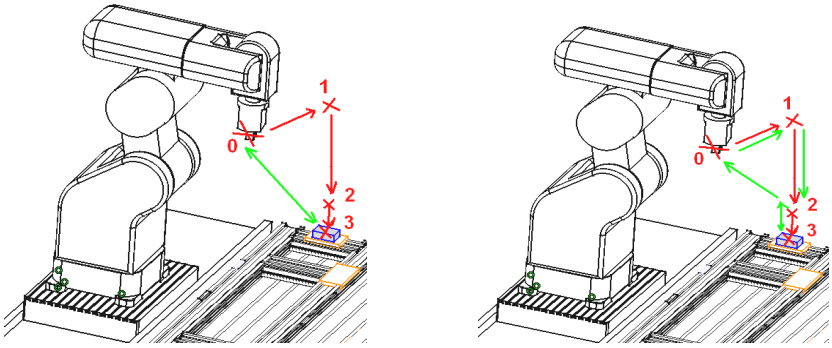
2. Robots Programming

The programming method used was with the robot teach-pad. By using this method we decrease the risk of collision of the articulated arm robot with the elements in his workspace, we optimized the trajectory of the robot according with relative position.

First we studied theoretical the possibilities of teaching the robot by teach-pad.

We establish the number of points necessary for a correct trajectory in order that the robot is able to grip the pieces.

Is very important to define the correct way of approaching and retracting of the robot arm and gripper near the pieces.



Errors in robots passing points Correct number of passing points

Fig.1 Industrial Robots teaching points

3. Study Case:

For application it was used three pieces (two prismatic and one cylindrical), a Mitsubishi robot and a work bench. It was needed attending to three phases:

1) The first phase was needed equipment R.I. with an appropriate gripping or resistive system for safe handling of three parts.

2) The second phase consisted of positioning the reverse pieces on the premises and choice of assembly point. The third phase consist in programming of I.R. to execute the operations necessary for positioning parts of the premises to the assembly point safely placing pre-orders.

3) The third phase consisted of programming of I.R. to execute the operations necessary for positioning parts of the premises to the assembly point safely placing pre-orders. This phase included the following steps:

-zero-setting details of R.I.; -coordinates of points, saving each song in part for its safe handling and paths between them; -setting speed and movement between points that have to execute your gripper to safely handle parts; -verification program and resolving issues arising from it.

Points which had to teach the I.R. and trajectories between of these are presented in the figure 2.

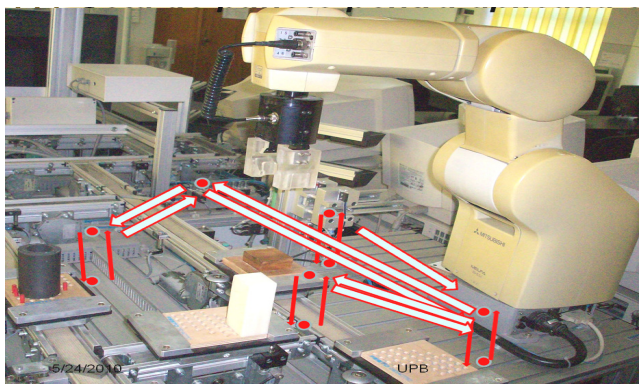


Fig. 2. Passing points and trajectories

Conclusions:

The benefits of introduction the robots in industry includes management control and productivity and increasing product quality.

Robots can work day and night without fatigue or reduced performance. RI principal advantage of remote programming consists of minimum collision risk because there are taken into account all aspects of real workspace.

Another advantage is the possibility to choose the type of trajectory (Joint, linear and circular) robot positioning necessary to points of interest.

Optimization of working time (low-speed travel around high speed tracks and their repositioning).

A disadvantage is relatively the high amount of time spent programming the machine.

R E F E R E N C E S

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