ROBOTS EFFECTOR TRANSFORMATION BY AUTOMATED SYSTEMS

TRANSFORMÁCIA EFEKTORU ROBOTA PROSTREDNÍCTVOM AUTOMATIZOVANÝCH SYSTÉMOV

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Abstract
This paper presents the issue of end effectors assembly equipment. End effectors are separate functional modules, which are in immediate contact with the object assembly. It deals with the design end effectors mounting means for the technological requirements of the assembly process. Emphasis is placed on the elimination of linear and angular variations using different methods to eliminate the differences.

Key words
assembly, effector, differences elimination

Introduction

An important technical tool that enables effective way to increase flexibility and expand the application possibilities of assembly robots are automated exchange tentacles, assembly and technological heads. These systems can be considered as one of the important features of the development of robots effectors. Robotic assembly whiles the dominant area of their applications. The robotic assembly systems, their importance is growing on the grounds that their use is changing not only technical, but also technological conditions for the realization of the assembly process. An automatic exchange of the load receiving means and the heads are an effective technical means, even if they increase by the times in respect of their handling and exchange.

Principles of automated data exchange effector assembly robots

Increased productivity robotized assembly work mainly in flexible assembly can be achieved by reducing the times. Is therefore required to equip assembly robots assembly, handling and contact effectors. For the implementation of the functions of rapid adaptation to changes in technology or handling operations are used the following methods:

- method of automatic exchange of individual effectors,
- method using multifunctional mainly revolving effector systems.

The principle of automatic exchange of effectors

- increased costs of deploying exchange system,
- higher weight and dimensions of the effector system,
- greater loss of cycle time for exchanging effector.

The use of automated exchange of effectors creates some issues to consider when designing the organizational structure of the assembly process into account.
The basic problem is associated with an increase by times spent on handling and exchange of effectors. This is presented in the diagram, depending on the time of movement in the type-installation cycle, wherein the end effector, the exchange (Figure 1). In this case, will have the time of assembly cycle, the relationship: [1]

$$T_M = 2 * \frac{T_{vE}}{1} + H_{hU} + T_{hZ}$$

Time legend:

T_{vE}- by-time exchange effector, T_{hU}- time grasping part, T_{hZ}- time-based components
Z - Lift mikroposuvovej units, ZM- vertical lift AM

Where: 1 - Number of assembled subgroups stored on pallets, storage tanks and the like.

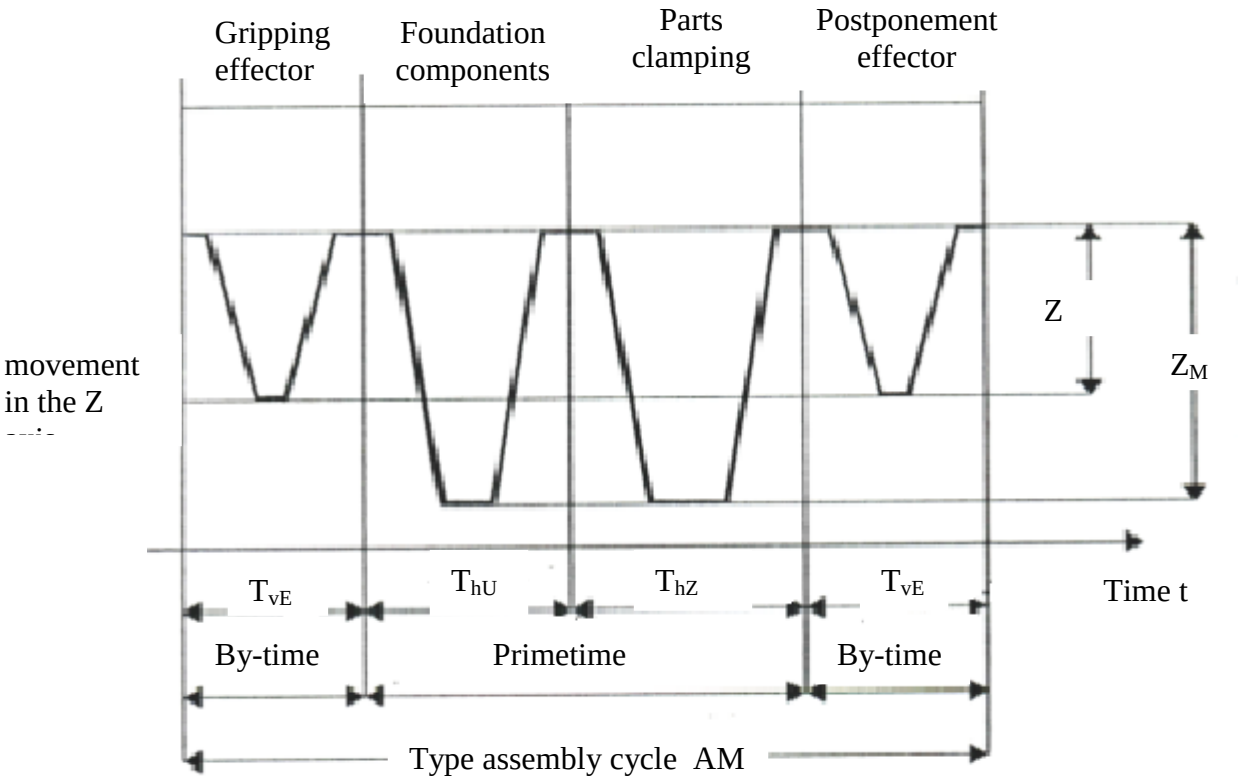

Fig.1 diagram movement time in type installation cycle [1]

Method using a multifunctional effector systems
It uses the principle of a pivoting head. They are able to work with a broader set of effectors without replacing the base member. The advantage of this method is:

- allows to realize a wide range of essential functions,
- low cost of development and implementation of new tools,
- the possibility of wider use of sensory systems,
- unified management functions for basic effector unit,
- transfer to the working position possible during the movement of an industrial robot - mostly rotational movement.

The disadvantage is the greater weight multifunctional effector system with corresponding larger size, which reduces accessibility for installation in confined spaces. [3]

The principle of technological solutions exchange systems effector robot

Effective technical solution is to use a turret system (Figure 2). They essentially eliminate component side of the ball.

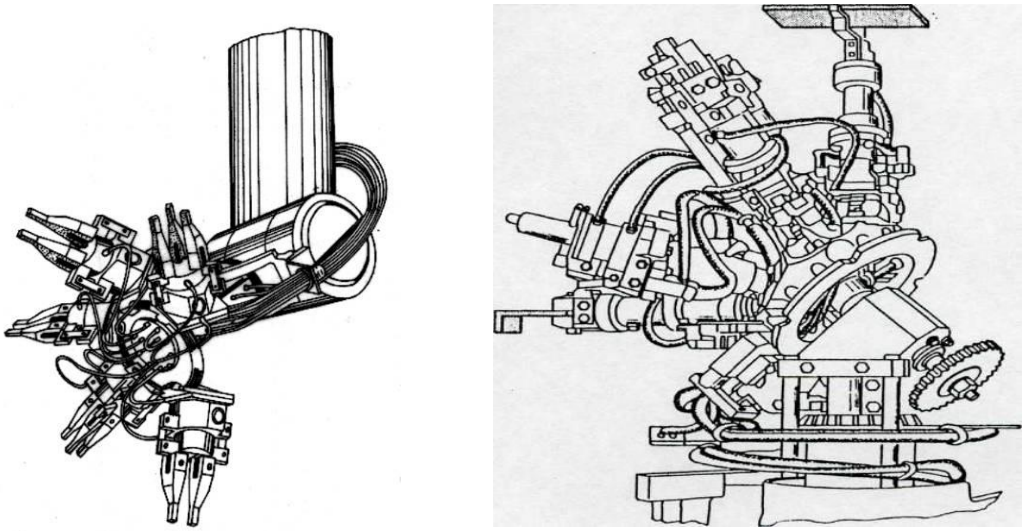

Fig.2 Example 2 multifunctional effector system

- implementation of handling and assembly operations selected or gripper head, mutual precise positioning bonded elements of the system
- secure connection and disconnection of fixed and interchangeable parts exchange system,
- energy transfer (pneumatic and electrical channels),
- Low weight,
- high positioning accuracy (repeatability position),
- Simple adaptation to different configurations of the spreader or heads, quick-change heads and tentacles,
- protection of tentacles and heads from damage, overload and under.

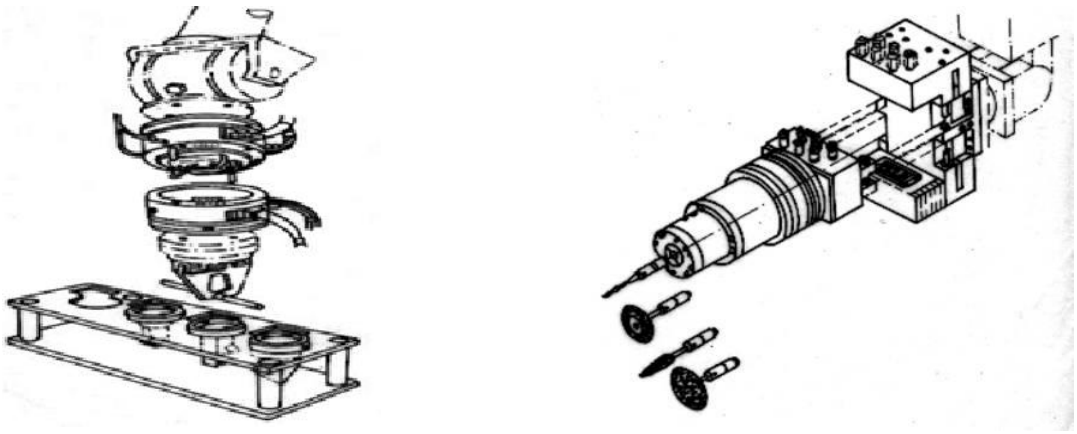

Figure 3a Examples of solutions of automated data exchange tentacles and assembly units

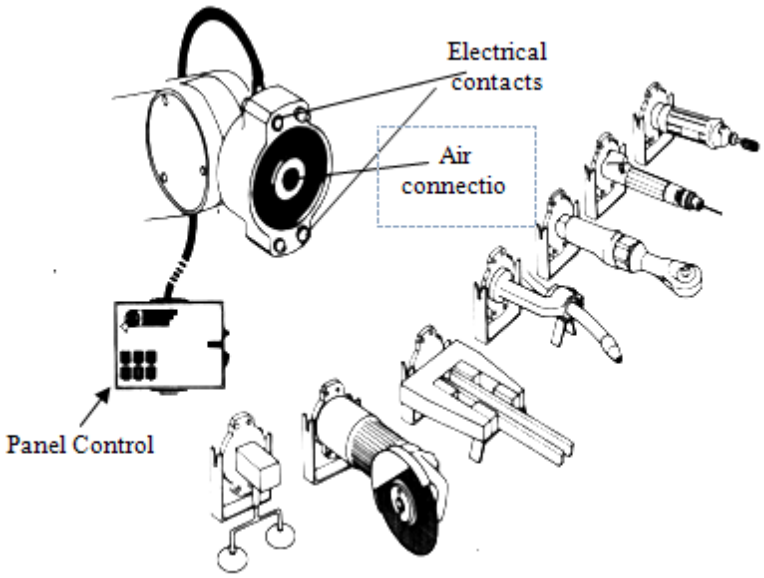

Figure 3b Examples of solutions of automated data exchange tentacles and assembly units

When analyzing the requirements for automated exchange of tentacles and heads is an important task determine their degree of flexibility. In practice, a number of proven design principles. Examples are shown in Fig. 3 a, b. [1]

Conclusion

This paper presents problems of the end effector assembly means. End-effectors significantly affect the quality and success of the implementation of assembly technologies. End-effectors are separate functional modules that are in direct contact with the object assembly. A major problem the solution is in the process of contacting the object assembly of the end effector orientation issues and mutual positioning, shape, size and quality of the object assembly, as well as the question of concentration and differentiation handling and assembly operations.

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