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PROPOSAL MODULAR ROBOTIC SYSTEMS WITH ROBOT SCARA

The paper describes the methods and principles to a variety of storage components. Briefly explain 1D, 2D and 3D methods for storing components on a pallet. It deals with the modularity and reconfiguration. Finally, it describes a flexible modular unit.

Keywords: *paletization, robot, modular*

Introduction

The modularity of us expresses the ability of composing any functional device satisfied the strength, reliability and safety conditions of mutually compatible modules using auxiliary connection elements. The degree of utilization of the individual building blocks considered assortment, expressed a high degree of modularity. This feature allows for the design affect the following important factors:

- shortening the design,
- reduce the amount of construction work,
- simplify the process of production, ordering and storage
- reduce the range of materials,
- reduce labour content production,
- simplify the process of maintenance and repair.

Especially in creating a platform of tender lists building blocks palletizing - assembly cells reflected the importance degree of modularity. The designer of such cells has provided an objective indicator, which can be used to evaluate the effectiveness of the proposal in terms of using modules making up the platform. The inputs to determine the degree of modularity allow objective evaluation design in several ways, and we understand it in this system as an indicator of accelerating convergence to the optimal solution. The methodology supports the qualitative approach to theory construction.

The term reconfiguration means the ability of a device using simple and rapid action to change its shape according to well-defined requirements. Factors that require reconfiguration palletizing - assembly of cells based on the needs of companies ranging in most industries, they need to have high quality products at the lowest cost in the shortest time their adjustment. Using reconfigurable modules can be easily rebuilt palletizing cell assembly by changing parameters required by customers, allowing us to palletize and produce a large number of modified parts. The situation in the current industry seeks to maximize the potential of the potential of flexible palletizing - assembly lines, in order to achieve maximum customer satisfaction.

Algorithm for storage of objects on the palette

The principle consists in regular palletizing, respectively. irregular depositing objects on a pallet handling. The aim is to make the best use of space, variety and thus achieve its maximum usefulness. In this method, the material still lies on the palette with which they are transported. Parts on a pallet can be stored and in several layers one above the other - stacked. Methods palletizing can be separated into:

1D palletizing: This is a storage object on a pallet in one direction. In this type of palletizing robot uses a simple control the robot with the recalculation of one grid - other coordinates are in each cycle remains constant. Palletizing is done either horizontally or vertically.

2D palletizing: Objects are stored on a pallet in two directions. The two coordinates are changing and the third remains constant. The palletisation is used when creating the layout object model in a single layer so. Pattern.

3D Palletizing: In 3D palletising terms of adding a third coordinate storage facilities. A process, which comprises establishing a pattern in 2D palletising, then this pattern is repeated

in several layers on each other. But it may vary in individual layers. In this type of palletizing very account the stability of the stored objects on the pallet.

Palletized can be different or the same objects, including in the event of varying or different shapes. On this basis, creating algorithms and is based on their complexity.

The algorithm stores the objects in 1D palletising

In 1D palletizing there is a problem saving objects in only one direction. Objects are stored next to each other or to themselves. FIG. 1 shows the distribution of objects in 1D palletizing.The algorithm is very simple. The constant value is always added to the last position, which consists of two components, namely the size of one side of the object and the distance to the object palette. This distance is usually small value and if the objects are to be stored side by side, only the tolerance class is it intended to errors storage of objects on the pallet. But this kind of algorithm applies only to objects of the same shape. If you store objects of various shapes, feed rate varies according to a certain size. This value is measured by sensory systems and changes during each cycle.

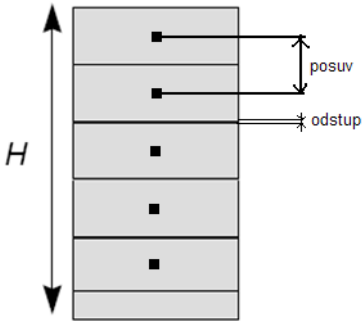

Fig. 1 Distribution of Objects in 1D palletising

The algorithm stores the objects in 2D palletising

The difference to 1D palletising is that this algorithm is extended with one coordinate, that is, one direction of storage facilities. This coordinate is composed of displacement and distance, which performs the same function as in the previous case. Feed rate varies according to the authoritative dimension, for example. The average length of an object or if the stored objects of different shapes. 1D and 2D algorithms have the conditions for terminating the cycle incorporated in them. This is formed from the border size (length and width palette). The whole cycle of meeting the pallet stops when the sum of shifts and spacing exceeds this value and passes to the fulfilment of the following palette. FIG. 2 shows the distribution of objects in 2D palletising.

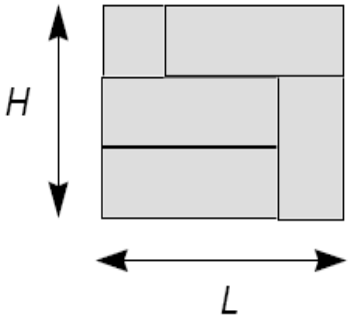

Fig. 2 Distribution of objects in 2D palletising

The algorithm stores the objects in 3D palletising

3D palletisation is essentially 2D palletisation by the third dimension. It is usually designed so that the patterns created from 2D palletizing is not stored on himself on several layers. The amount of cargo must comply with the terms of carrying capacity and stability of the pallet load.

Proposal of assembly cell with robot

Recently, the emphasis is mainly on development for flexible modular structures that are composed for unitized modular components able to cover diverse of user requirements and implementing the latest construction technology. This goal can be met only through a system approach to design process, which in addition leads to design and construction activities that includes process of knowledge development trends at construction for modular devices. Flexibility is divided into the following two basic forms:

Static flexibility – configured installation remains stable when set of combination products and can be changed only when altered product interface will change and will require another type of system. Reconfiguration basis for exchange of specific tools, supplies, and accessories or overall reconstruction system is made separately and processing by new installation that can be performed during design of a new product.

Dynamic flexibility - in this case, flexibility is managed on - line: there exist possibilities to adapt different tasks, while system runs through predicting and preparing a scenario. This

may enable a person or system can adapt itself control, which means that system has knowledge about their own options and decision algorithms that decides which modules can be used, how and in which case continue. Modular solution structure palette - assembly cell uses a variety of modular components that allows providing the required diversity of transported products, great variety of configurations and options.

The module is a unit in accordance with one or several parts, which performs one or more defined functions and provides an interface to other modules. This interface may be available in different ways. Catalog variants can be created by an exchange of modules. Each module is optimized for the exercise of those functions. Individual modules must comply with its technical parameters and final assembly is created by combination of available modules to meet requirements of stability device as a whole and must meet safety requirements. Fig. 3 is shows a modular principle for construction palette - assembly workstations.

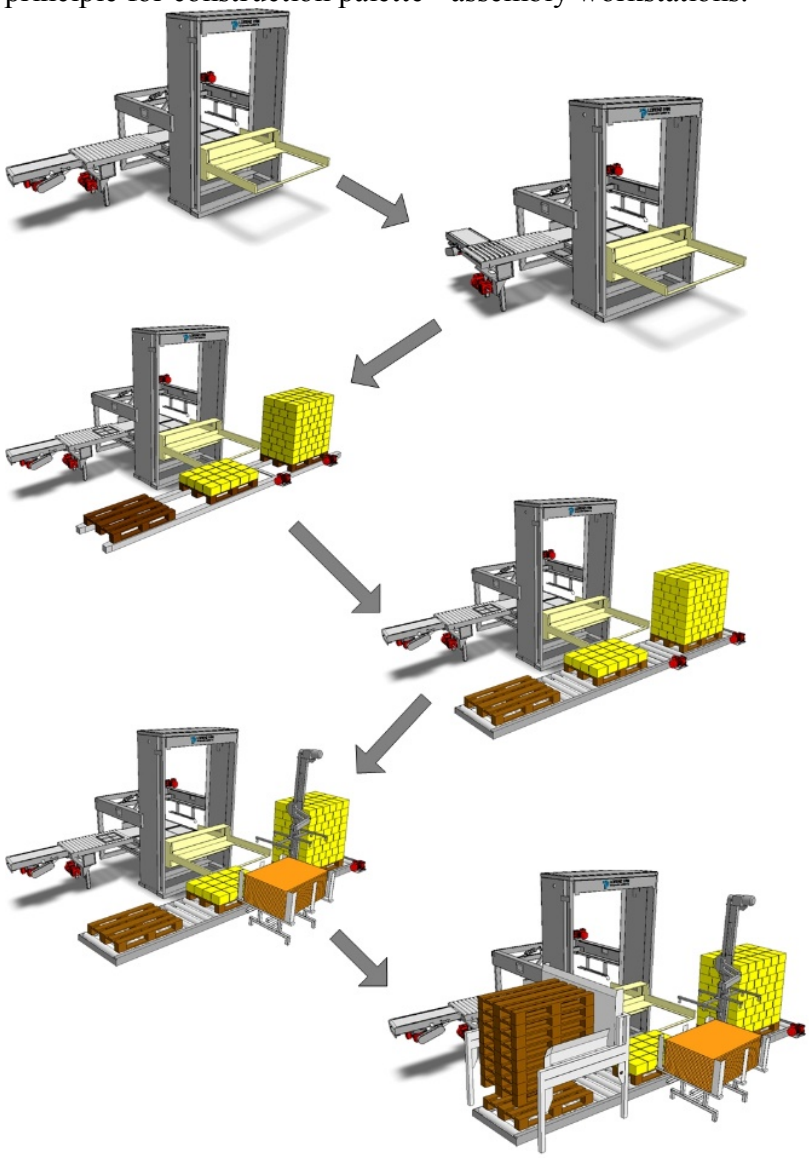

Fig.3 The modular principle for construction palette – assembly workstation

In the field of design so called flexible assemblies manipulation devices, that are constructed on basis of unified modular components is possible to find their application of complex CAD systems. Their application in the pre-production stages brings the following benefits:

- shortening of continuous time proposal,
- flexible adaptation to new conditions,

- variant way for solution proposals
- use of optimization methods,
- carrying out of engineering analyzes,
- simulation capabilities.

In engineering practice, the process of designing an efficient modular system follows important information:

- Analysis device to determine groups of modules, which are important in terms of its diversity and flexibility,
- creating a platform of maximum number of modules that are common to typical representatives of production program to increase efficiency and productivity,
- identification modules based on relevant criteria,
- creation of size among to the various types of modules for required power equipment classes by using similarity theory and dimensional analysis,
- minimize the number of modules in final assembly (time saving),
- built a flexible system that suppliers a modules flexibly responding to the immediate production requirements.

Conclusion

With the increasing degree of automation are still growing the demands to intelligence palletizing and assembly workstations. The article is an example of palette-assembly structures by using principles of modularity. Development is moving towards to making smarter workstations where all modular components integrated into one cell.

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