



BASIS DEVELOPMENT OF RECONFIGURABLE MACHINE SYSTEM

ZÁKLADY VÝVOJA REKONFIGUROVATELNÉHO SYSTÉMU STROJOV

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Abstract

The paper presents primer base of knowledge in field of development of modules of machine systems, including their formation into specific assemblies in accordance with development, manufacturing and utilization strategy. The paper is based on elaborated strategy of architecture and evolution of reconfigurable machine system. Related to their use in broad spectrum of demanding technical operations with optical systems and precision positioning. The development and application of the modular base is dominated themes: adaptation, multi-functionality and reconfigurable of the locomotion module with an emphasis on complex, concentrated solution of functions within the machine node..

Key words

Producing technical, operating technical, dynamic module, integrated kinematics

Introduction

Current trends oriented on development and exploitation capital asset are ahead into the bargain, that is need to search solution with new and high by effect. Aunts solution are mostly coupled with effort about complex, concentrated solution function in the frame assembly machine, devices and the system with propagator function building modulated and its integrated stays (assembly). Their applying allows develop new conception machine and furnished with sufficient process parameters, with high effectiveness, low weight, with bigger control range and high process reliability. Contribute to some growth concentrated productions, combination several methods, raisings performance parameters, simplification textures technological place of work and primarily to filling claim to custom prepared mechanical systems with custom limited technical and economical parameters.

Defining the problem

Evolution and application machine system (production and operating technology) opens new themes, what he brings advanced technical and economic effects. Determining factor evolution machine system are demands technological process, specialization level their manufacture and unceasing stress on the cost reduction and beating up ratios between loads and utility value. Answer this too orientation producers on innovation change policy's and rescheduling firms' programs regarding marketer adaptability, effectiveness production and service activity.

In the sphere of productions and application machine system innovation direct to motional



module, control and creation integrated configuration contiguous with its employ in wide - spectrum technical difficult operation with visual system and accurate positioned. Rises share of such technology into final and service activities.

Strategy of reconfiguration

In the development of machine system with integrated and reconfigurations effects are based on the requirements of applied fields and the technical capabilities of the components that are abstracted into a model-Fig.1. For he could clarify the influencing factors and functional ties.

The analysis focused on the purpose of handling / confirms the role of technology influencing machine system, in particular the mechanical, physical and topological nature, weight, accuracy and stability of position control method and sorting and object exchange rate of production.

Analysis of the nature and terms of application environment confirms influence machine system, in particular the work area (location, shape, size, input), technological dislocation axis (location, access, function), an interactive relationship systems (function, identifying, blocking, movement forward - backward), energy (distribution, transformation, branching flow), mechanical (unification, separation, variability) and realized the nature of technology / process handling (processing / handling tools, process parameters-load, accuracy, stability and performance time modes).

Analysis of the production system confirms the influence of particular machine based on its technical parameters (power-productivity, positioning accuracy, kinematics and dynamic properties), design parameters (baseline layout for the premises, the building interface), connecting mechanism, the program and energy treatment of cross-links (energy and information interface), and integrated technology-related activities (handling, transport, storage and ancillary).

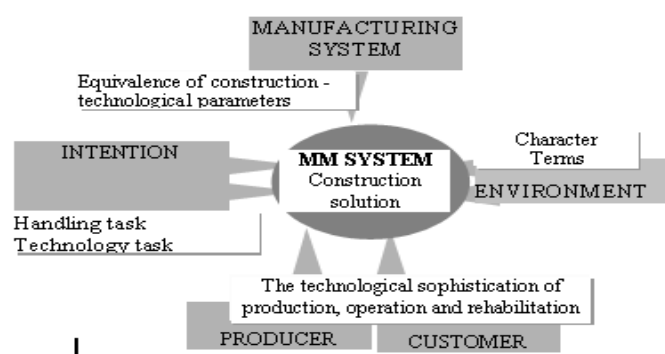


Fig.1 Factors affecting the structure of the locomotion module

Analysis of the impact of the manufacturer and the user confirms the influence of particular machine based on the technological possibilities of production, guaranteeing fixed service and maintenance activities, the level of servicing and maintenance, the maintenance of operational capability.



Construction morphology modular machine system

Architecture of building modules is based on the needs of the targeted grouping of suitable modules into the architecture of MSS, which is repeatable in the form of structural bases for specific application types. A characteristic feature is that the modules are characterized by high level of conformity (standardization) and autonomy (they can work as stand-alone systems).

This approach allows the formation of products and technology platforms, which leads to effective and flexible production in small production volumes (high variability of the products). Platforms creating is appropriate to realize on the principle of grouping suitable modules MS in sets of modular reconfigurable system (MRS), which are repeatable useful in a form of construction base for certain types of applications in the architecture of the MSS. This principle, Fig. 2, has features:

- the platform is set of modules MS_i (e.g. M_1, M_2, M_3) used in more complete sets MSS (MP – Modules of Platform), e.g. MSS_1, MSS_2 ,
- the set of modules MS_i is participating in more sets MSS_j (MM - Multimachine Modules), e.g. M_5 ,
- the set of modules MS_i participating in only one set MSS_j (MS - Singlemachine Modules), e.g. M_4 ,
- platform can be extended by complementing other construction modules MS_i appropriate to extend the functionality and features of possible options in the set MSS_j ,
- allow assess the level of modularity of created sets through the levels of a constructing modules MS_i in a particular set MSS_j .

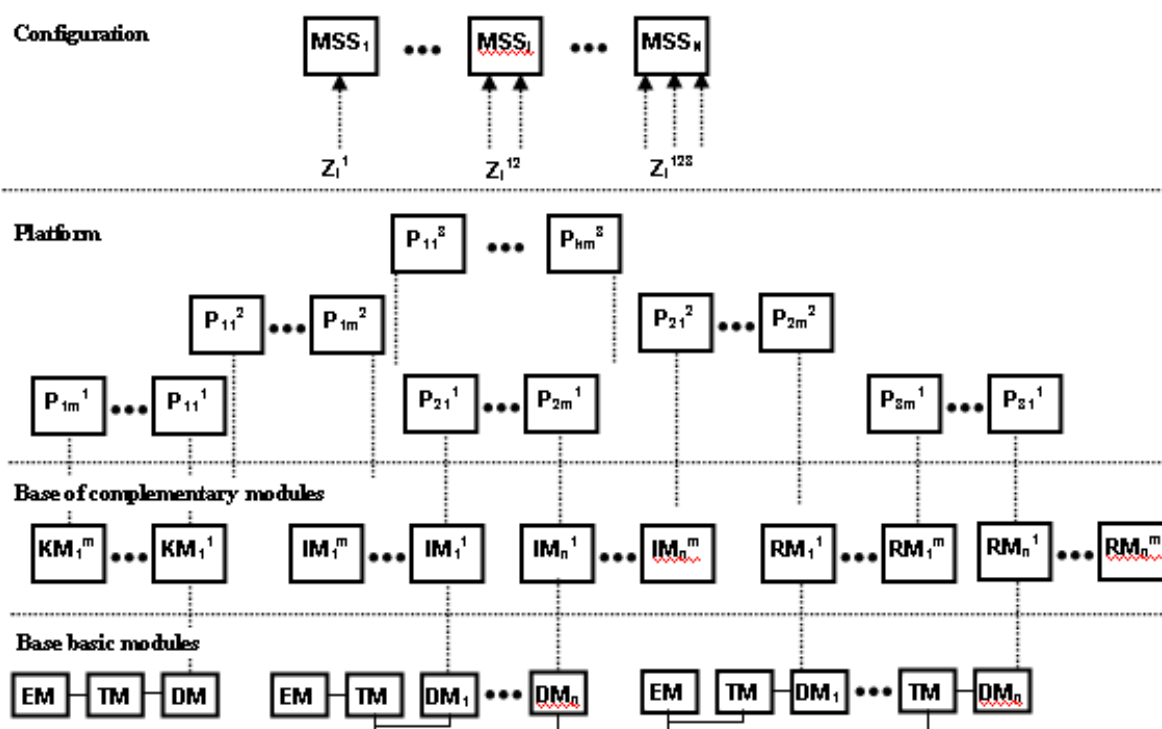




Fig. 2 Construction morphology modular machine system

Thus adopted platform's concept is understood as a higher form of implementing modular concept of elements of the production system (the minimum number of modules to assemble the largest possible number of variants). It is advisable to assemble structure of the assessed sets the MSS into so-called map of modular system - a summary conception of the structure of individual sets and conception application of individual various variants of constructing modules in sets MSS.

Conclusion

The present contribution provides information on creating a modular reconfigurable machine system based on more variants of design and technology links. These links allow us to implement the required functions concentrated in the lean and open assembly machinery system that can easily complement and change the role and easily ridden. Results solutions are the basis not only for creating new concepts of machine systems to the complex concatenation of production activities, but also on how to expand or modernize its manufacturing base and broad impact on production machinery based applications support systems based on new positioning elements in machining, welding and assembly.

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