ANNALS of Faculty Engineering Hunedoara
International Journal of Engineering
ISSN: 1584 - 2673

APPLICATION OF SEQUENTIAL DIAGRAM IN THE SHELF STORAGE SYSTEM

[1.] Nina DANIŠOVÁ, [2.] Jozef MAJERÍK

[1] Institute of Production Systems and Applied Mechanics, Faculty of Materials Science and Technology in Trnava, Slovak University of Technology In Bratislava, SLOVAKIA

[2.] Departament of Engineering Technology and Materials, Faculty of Special Technology, Alexander Dubcek University in Trencin, SLOVAKIA

ABSTRACT
In this contribution is presented a complex sequential diagram application of shelf storage system, which is one of the main subsystems of intelligent manufacturing cell. This manufacturing cell is situated at the Institute of Production System and Applied Mechanics. The complex design of shelf storage system is going out intelligent manufacturing systems knowledge. As a tool for design of shelf storage system running are used a sequential diagrams. The running of shelf storage system is worked in form of the sequential diagram. After this sequential diagram are designed sensors systems for this storage system.
KEYWORDS: system, diagram, mechanics, shelf, manufacturing

1. INTRODUCTION

The flexible manufacturing cell (FMC) was situated on Institute of technological devices and production systems. This flexible cell consisted of the main supporting subsystems as e.g. shelf storage system and cartesian robot.

They were suggested the following additional intelligent components and sensorial items for primary informations processing on the previous knowledges of intelligent manufacturing systems studies. Componets as a result of many scientific researches have a function in comunication between particular subsystems and main controlling system. It was necessary to determine requirements for intelligent manufacturing cell projection before the individual sensorial parts.

Fig.1 Flexible manufacturing cell

This proposed intelligent cell have to know and response for various situation originated in manufacturing process i.e.:

- For shape changes of manufactured part,
- Change of dimensional features of manufactured part,
- Alocation and unallocation of individual subsystems by manufacured parts,
- Extemporary changeover for different type of articles.

It was a requirement in order to save for two fundamental subsystem and five manufacturing phases (as in flexible manufacturing cell) by the intelligent manufacturing cell (IMC) project. It was very important to direct individual access for each subsystem by the projection of sensorial components. At the beginning of overall submission of sensorial equipment was very important to determine each manufacturing functions and particular operations. It is so necessary by determination of proper functions and movements in manufacturing cell.

2. SCRIPT METHOD SELECTION OF EACH COMUNICATION SYSTEMS IN IMC

It was necessary to create registration of each individual object sequences when manufacturing IMC process starting before the whole submission of sensorial equipment of individual subsystems. We are designated the proper method of making scripts for better exposition of comunication between each individual aspects and manufacturing process movement to making description in all IMC subjects. For each single devices of intelligent manufacturing cell were possible to suggest sensorial items on the basis of IMC function script and IMC comunication between subsystems. It was chosen the sequential diagram method as a proper script form of comunication between all components, which make for account mutual comunication of particular subjects in time.

3. THE SOLUTION OF SENSORIAL EQUIPMENT IN SHELF STORAGE SYSTEM

One of the main part of IMC consists of self storage system, which insures the following operations in cell (blank holding, final parts before expedition holding, manipulation with blank and its transit to working area, manipulation with final parts and its transilt back to self storage system. The shelf storage interpolator have to be in fundamental position before the IMC is on by the START button pushing and consequently starting the proper program for given part. The manipulator must find the proper position, where the relevant palette is situated and also controll if the palette is correct after the IMC is on and running. Then the operating system takes from the shelf and gives into the rotating unit. Its important has good comunication and cooperation between shelf strorage manipulator with direction system and other parts of cell in order to realize succesful operation in IMC. This can we reached by the sensorial equipment for all parts of shelf system. It was perforced to elaborate proper submission for the all shelf storage system sensors before this. The mutual cooperation was important by the palette choice for all system. The comunication of all components in the whole system depending up time above was described by the sequential diagram method (e.g. Take palette form shelf storage system). The palette choice is divided into single movements and time sequences in diagram. If it depends whether the done sequence then the specification shine on red colour (only if the sequential condition is completely realised in diagram). The entering method properly describes the shelf comunication with individual devices in cell at palette choice and signalizing of informations into cell operating system and back by the sequential diagram.

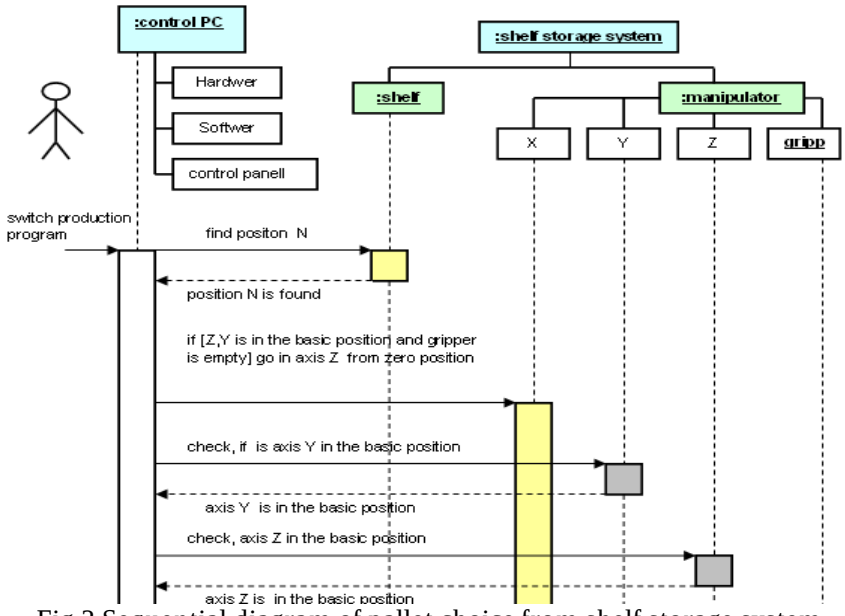

Fig.2 Sequential diagram of pallet choice from shelf storage system

On (Fig.2) is possible to see sequential diagram „Take palette form shelf storage system“. Its possible to see the end of this sequential diagram „Take palette form shelf storage system“ on Fig. 3.

It was possible to suggest sensorial elements by means of sequential diagram method basically on shelf storage system of registration activity. It was necessary to solve the following placement of sensors by the required activities seeing that was uprised from sequential diagrams of single shelf storage system operation:

- The shelf storage system manipulator position unloading of single driving gear.
- Pallet standing in manipulator finger.

- The system projection of each palettes recognition and their standing in particular shelf cells.

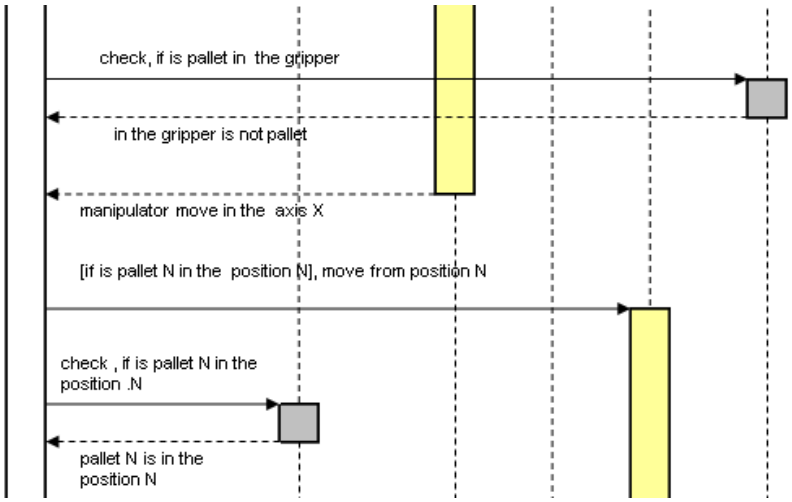

Fig.3 The end of sequential diagram „Take palette form shelf storage system"

Design of shelf storage system sensors will presented at the contribution 2.

4. CONCLUSION

At the intelligent manufacturing cell construction project and shelf storage system was in final consequences applied the sequential method of description. By this method is created very good description of individual communication in cell during the production process. The sensorial elements was projected for the shelf storage system and then for the all parts of intelligent manufacturing cell.

This paper was realised by feasibility study: VEGA 1/0206/09 lntelligent assembly cell

REFERENCES / BIBLIOGRAPHY

[1.] *N. DANIŠOVÁ, E. HRUŠKOVÁ, K.VELÍŠEK: "Application of sequential diagrams in manufacturing assembly cell." In: Annals of DAAAM and Proceedings of DAAAM Symposium. - ISSN 1726-9679. - Vol. 20, No. 1 Annals of DAAAM for 2009 & Proceedings of the 20th international DAAAM symposium "Intelligent manufacturing & automation: Focus on theory, practice and education" 25 - 28th November 2009, Vienna, Austria. - Vienna: DAAAM International Vienna, 2009. - ISBN 978-3-901509-70-4, s. 0199-0200*

[2.] *N. DANIŠOVÁ, K. VELÍŠEK, P. KOŠŤÁL "Automated tool changing system in the intelligent manufacturing and assembly cell." In: ISCCC 2009: Proceedings of the 2009 International Symposium on Computing, Communication and Control, October 9-11, 2009, Singapore. - Singapore: International Association of Computer Science and Information Technology Press, 2009. - ISBN 978-9-8108-3815-7. - S. 1-8*

[3.] *A. MUDRIKOVÁ, P. KOŠŤÁL, M. MATÚŠOVÁ, "Building of a production system program control laboratory" In: Annals of DAAAM and Proceedings of DAAAM Symposium. - ISSN 1726-9679. - Vol. 20, No. 1 Annals of DAAAM for 2009 & Proceedings of the 20th international DAAAM symposium "Intelligent manufacturing & automation: Focus on theory, practice and education" 25 - 28th November 2009, Vienna, Austria. - Vienna : DAAAM International Vienna, 2009. - ISBN 978-3-901509-70-4, s. 0603-0604*

[4.] *J. NOVÁKOVÁ., L. PETŘKOVSKÁ., J. BRYCHTA , D. STANČEKOVÁ. 2009. "Influence of Cutting Parameters on Integrity Surface at High Speed Cuttin". Transactions of the VŠB - Technical University of Ostrava. Mechanical Series, 2009, ročník LV., číslo 1/2009, Česká republika. Ostrava : VŠB – TUO, 2009, s. 203 – 209. ISBN 978-80-248-2051-4.*

[5.] *Z. GODAVOVÁ, K, J. MAJERÍK, „Mechatronic Product Proporcionality and Inter-Changeability Management: Mechanical Components", November 25-28, 2009, In: Annal of DAAAM for 2009&Proceedings of the 20th International DAAAM Symposium Intelligent Manufacturing & Automation: Focus on Theory, Practice and Education: World Symposium. - ISSN 1726-9679. - Vienna: Vienna University of Technology, 2009. - ISBN 978-3-901509-70-4. - p. 1933-1934.*