

The Interoperability between CNC Machine Tools and Robot Handling Systems Based on an Object-Oriented Framework

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Abstract : A flexible manufacturing system (FMS) is a manufacturing system having the capability of handling the variations of products features that is the result of ever-changing customer demands. The flexibility of the manufacturing systems help to utilize the resources in a more effective manner. However, the control of such systems would be complicated and challenging. FMS needs CNC machines and robots and other resources for establishing the flexibility and enhancing the efficiency of the whole system. Also it needs to integrate the resources to reach required efficiency and flexibility. In order to reach this goal, an integrator framework is proposed in which the machining data of CNC machine tools is received through a STEP-NC file. The interoperability of the system is achieved by the information system. This paper proposes an information system that its data model is designed based on object oriented approach and is implemented through a knowledge-based system. The framework is connected to a database which is filled with robot's control commands. The framework programs the robots by rules embedded in its knowledge based system. It also controls the interactions of CNC machine tools for loading and unloading actions by robot. As a result, the proposed framework improves the integration of manufacturing resources in Flexible Manufacturing Systems.

Keywords : CNC machine tools, industrial robots, knowledge-based systems, manufacturing resources integration, flexible manufacturing system (FMS), object-oriented data model

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