

REAL-TIME AGV ACTIONS CONTROL BY DIALOGUE TO REALIZE AUTONOMOUS DECENTRALIZED FMS

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ABSTRACT. *One of the new technologies for a production system is an autonomous decentralized Flexible Manufacturing System (FMS). The autonomous decentralized FMS aims at high production efficiency by giving self-control or decentralizing the plan, design and operation of FMS. This paper discusses the research necessary for realizing an autonomous decentralized FMS with Automatic Guided Vehicles (AGVs) and Machining Centers (MCs). This research develops a real-time production control method based on the predictions that grasp not only current production situations but also anticipate future ones. From the developed system it can be seen that multi-production that keeps the target production ratio is possible even though neither AGV actions' plans nor parts input schedules are given beforehand. Especially, it can be shown that the method will operate a FMS without influencing the production ratio even when unpredicted troubles happen, which is often seen in an actual factory.*

Keywords: Intelligent system, Autonomous decentralized system, FMS, Hypothetical reasoning, Dialogue

1. Introduction. One of the near future production styles is an autonomous decentralized Flexible Manufacturing System (AD-FMS). The AD-FMS aims at high production efficiency by giving self-control or decentralizing the plan, design and operation of FMS. This paper discusses the basic research necessary for realizing AD-FMS with AGVs to carry parts and Machining Centers (MCs).

This research develops a real-time control method for Automatic Guided Vehicles (AGVs) actions based on the predictions that grasp not only current production situations but also anticipate the near future ones after exchanging information for each AGV and MC, and acquiring it. Also, the developed real-time control method is applied to AD-FMSs. Because of the results, it can be seen that multi-production that keeps the target production ratio is possible even though neither AGVs actions' plans nor parts input schedules are given beforehand. Especially, it can be shown that the method will operate a FMS without influencing the production ratio even when unpredicted troubles happen, which is often seen in an actual factory.

There is little research done for a AD-FMS [1, 2]. They do not consider what will happen in FMS. Our research's characteristic is to foresee the near future situations of AD-FMS. In this point, the research is different from ordinal researches.

2. Real-time Action Decision.