Rational exploration of Flexible manufacturing systems

[1]P. NagaBharam, [2]N. Gopikrishna

Department of Mechanical Engineering, S. R. Engineering College, Warangal

Abstract: Present paper covers and sheathes major constituents, elements of flexible manufacturing systems. Industries are trying to make manufacturing systems flexible due to increase in wants and demands of facilitations to consumers. Several attempts are made to make manufacturing systems flexible, though it is flexible but not cent percent in achieving its features due to its failures, firms those who achieved it effectively, became pioneered themselves in manufacturing industries. Due to continuous change of preferences, choice and needs, and pressures - Organizers, companies, and industries to make manufacturing systems flexible to deliver what sort of requirements are on use in acute.

*Keywords***:** manufacturing systems and flexible manufacturing systems.

Introduction:

The general problems facing in industries are vehicle scheduling and material handling. Manufacturing system wants flexibility and utilization of it for systems high level of output. Exploration foregrounds the contributions made to flexible manufacturing systems. Study explores the aspects as, Advancements of automated guided vehicles, scheduling, artificial neural networks with its application in the progress of flexible manufacturing systems and Simulation modeling with its application in the evolution of flexible manufacturing systems.

Automated Guided Vehicles:

An automated guided vehicle is a mobile robot which follows wires in the floor for general navigation. They are used in industrial applications for moving materials around a warehouse. Application of AGV's vehicles has widened during late 20th century. The AGV's able to tow objects to which they can autonomously attach and to see that whether it is operating at appropriate levels or not. These can be used to move finished products or raw materials. The AGV is able to store objects on a bed. The objects placed on a set of motorized conveyors & then pushed off by reversing them. AGV's are employed in nearly every mechanical industry, including, pulp, newspaper, paper, metals and general manufacturing. Transporting

materials such as food, medicine in hospitals also is done.

An AGV can also be called as LGV vehicle (laser guided vehicle). In Germany this technology was popular and well known as Fahrerlose *Transports system* (FTS). Lower cost versions of AGVs are often called as Automated Guided Carts (AGCs) and are usually guided by magnetic tape. AGCs are available in a wide variety of models & can be used to move the products on an assembly line, transport goods throughout a warehouse, and to deliver the loads.
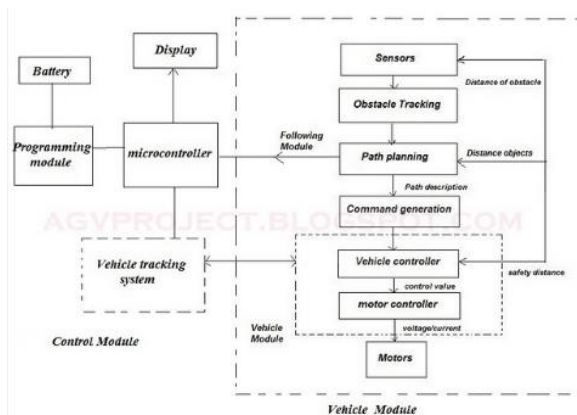

Fig: General layout of Automated Guided Vehicles

Flexible manufacturing systems (FMS) have got an automated material handling system, which is a part fixture, a storage system, the human operator, the workstations and computer numerical controlled Machines (CNC). Perfect planning is necessary for achieving operational efficiency and can be achieved by adapting the FMS's flexibility. CNC machines are used to

optimize the parts flow for a material handling systems and central control computer for machine flow.
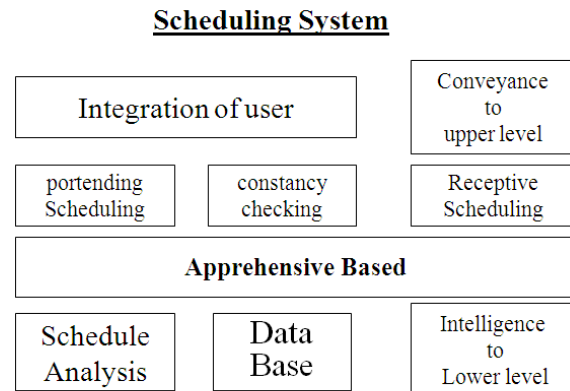
Scheduling system:

Fig: Reference model for a Scheduling System

It is the process of arranging, controlling and optimizing work and workloads in a production process or manufacturing process. It is used to allocate plant and machinery resources, plan human resources, plan production processes and purchase materials.

Artificial neural networks:

Interconnected group of nodes said to be an artificial neural network, corresponding to the neurons network in a brain. Here, an arrow illustrates a connection from the output of one neuron to the input of another and each circular node illustrates an artificial neuron.
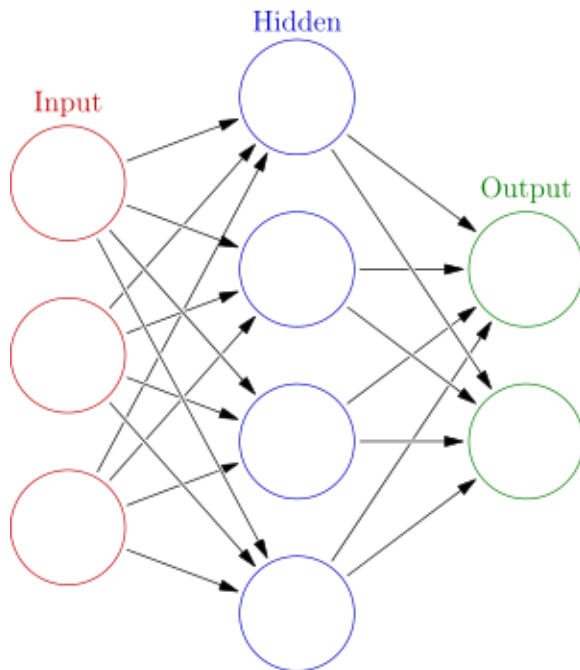
Fig: Artificial Neural Networks

Systematic exploration:

The sequencing and scheduling: Algorithms and complexity given by L. Lawler Eugene entails manufacturing systems abilities and compatibilities. The analysis of material handling and its performance are studied by the Devikar et al. 2010; the part launching and sequencing decisions are studied by Joseph. Principles of sequencing and scheduling given by Baker R. Kenneth Tuck the School of Business Dartmouth College in Hanover, New Hampshire Dan Treitschke College of Engineering American University of the Armenia Yerevan, Armenia Mathematical algorithms have created and used for scheduling problems by a number of researchers and the specific FMS configuration

and the objective is to optimize FMS, which is dealt by kumanam & Udhayakumar et al, 2010. The sequencing and part launching decisions are studied by Joseph et al, 2010. The scheduling capability, Planning, and their increasing type of dynamics in the nature of the manufacturing systems have seen as their focus by the authors Smith, & Peters Drake, 1995.

Basic commences of flexible manufacturing system (FMS):

Literature based on the Flexible manufacturing systems (FMS) the procedures, operations, methodologies and processes can be categorized in the below given approaches:

➔ For increasing level of productivity and the flexibility of any integrated manufacturing environment, the automation technology is to be in the front run. In this regard the fully designed and managed automated guide vehicle and material handling system is needed. The application of AGV (frequently used for applications of conversions of transport patterns) for any material handling is increasingly rapid in all areas and the fields of manufacturing systems. For the purpose of path selection, Positioning AGV, those are equipped with

the battery and the program for the movement of an unfurnished vehicle.

➔ The Scheduling problems are very complex & they willn't work according to the finite requirements of the components of the FMS. Thus application of the AGV has been sorted. These vehicles were equipped to assist the storage equipment, production, and controlled intelligent system. In developed manufacturing units, the application of these vehicles, increasing exceedingly for material transfer in any type of production lines.

➔ Mathematical programmed formulations don't give yield in adequate as a simulation model for operating problems. Simulation tool has been used for decision support as well as to bridge the gap in the real world situations. Simulation as a scheduling tool has been described by researchers. The production system and its model was constructed & inspected for mechanical and manufacturing industries.

➔ Basically procedure of artificial Intelligence uses two methods,

1. Expert system
2. Planning (problem solving).

➔ It is used for the operation and technical procedural problems and is involved in developing difficulties which are having large space in the developed system. These techniques are used for general and basic purpose problems for the instance research in processes and procedures of flexible manufacturing systems.

Advantages:

➔ The literature survey reveals major difficulties, conflicts and few issues found during survey related tasks and useful works were successful, the variations in process routing.

➔ When numbers of machines are less increase in utilization of machines, is one of the advantages in flexible manufacturing systems. It reduces inventory & labor requirement to a greater extent.

➔ The consequence of the issue stated above ensures shorter manufacturing lead time, which yield further high productivity.

➔ It also requires efficient methodology of scheduling and executing contraption to handle movement of goods. Further challenge is to manage the effectivity of

tools availability and also their allocation to the processes.

Conclusion:

Manufacturing systems has to make some sort of developments in the area of scheduling and problems of system control units. Industries have to take initiation to make control systems to enhance performance, which seizes the influence of convolutions of communication of multiple amenities in the flexible manufacturing systems.

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