Automation in Production Systems and Management
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Flexible Manufacturing Systems (Part - I)
Lecture - 39
Basic Features of FMS: Control Subsystems and Manufacturing Control Activities

During this week we will be discussing in detail the Flexible Manufacturing Systems.

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Now, during this lecture session on the FMS flexible manufacturing systems I am going to discuss basic features of FMS where I will be identifying the control subsystems along with the manufacturing control activities.

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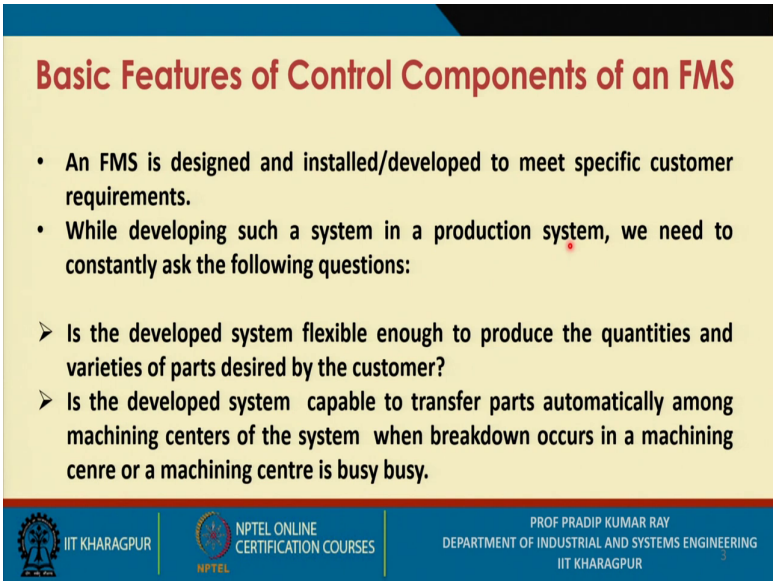

An FMS is designed and installed or developed to meet specific customer requirements. While developing such a system in a production system, we need to constantly ask the following questions.

Is the developed system flexible enough to produce the quantities and varieties of parts desired by the customers? That means, two important aspects you need to consider. One is the volume of production and the second one is the varieties of parts.

Second question is, is the developed system capable to transfer parts automatically? Many activities you carry out in a sequence and all these activities which you are supposed to carry out can you make them an automated one and there will be loading, unloading, transferring of parts from one particular point to another and to what extent you can transfer the parts, either in semi the finished condition or in finished conditions automatically.

So, the next question is, is the developed system means, the FMS capable to transfer parts automatically among machining centres of the system. When breakdown occurs in a machining center or a machining center is busy.

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So, now, when you are aware of that what kinds of the control systems you have. Now, obviously, this control components will be dealing with or are dealing with many kinds of the control activities. So, you must be able to identify those control activities. So, during this lecture session we will be identifying all these the control activities manufacturing control activities.

There are 8 specific the control activities.

The 1st one is work order processing and part control system, prior to loading all these parts on and on an FMS, there is an order and with respect to that order you need to process certain number of parts. Once you are successful in carrying out this control activity.

The second important control activity is machine-tool control system including inspection machines means CMM, that is a part of the physical subsystem of an FMS. The machine tool control system you must be you develop.

3rd one is the tool management and control system. The tool management and control system. It is a temporary storage in a specific the tool magazine

The 4th one is the traffic management control system, usually the traffic means essentially the movement of the parts. So, how do you control the activity just referred to as the transfer of parts the transferring activities.

Fifth one is quality control manage management system.

Quality of conformance system means, the number of accepted units for a particular part and for all types of parts means, it should be as high as 100 percent means, there must be no defect. The quality control management system should be very strong.

6th one is maintenance control system, there could be a breakdown and how efficiently you carry out your repair work, how efficiently how quickly, kind of that the diagnostics you have, identify the kinds of faults that have occurred as quickly as possible. Sometimes they are referred to as the ATE Automated Test Examination, automated test and examination.

7th one is the management control system mainly by dealing with the production require production requirements whether you have to maintain a particular production rate. So, whether you have enough control on the production rate or not.

And, the last one is very important that is control subsystems must be properly or appropriately interfaced with the central computer means, for each and every control activity to be carried out there must be a subsystem and, ultimately all the subsystems all the several subsystems they should be controlled by a central computer.

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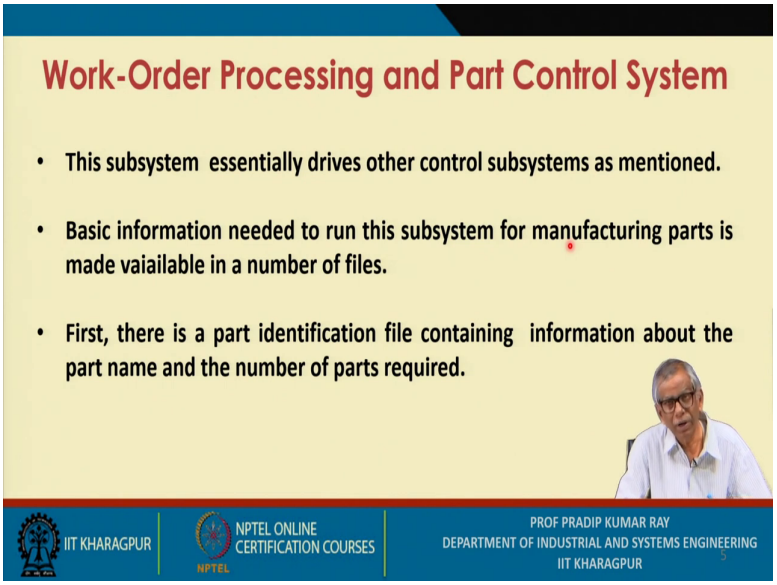

First let us talk about the work-order processing and part control system later on in the next week we are definitely we are going to discuss the problem formulation. The details about the problem formulation their solutions kinds of tools and techniques you need to use to address the different kinds of problems for different the work systems of an FMS.

Now, this subsystem that is work order processing and part control system essentially drives other control subsystems as stated.

Basic information needed to run the subsystems for manufacturing parts is made available in a number of files.

First, there is a part identification file containing information about the part name and the number of parts required.

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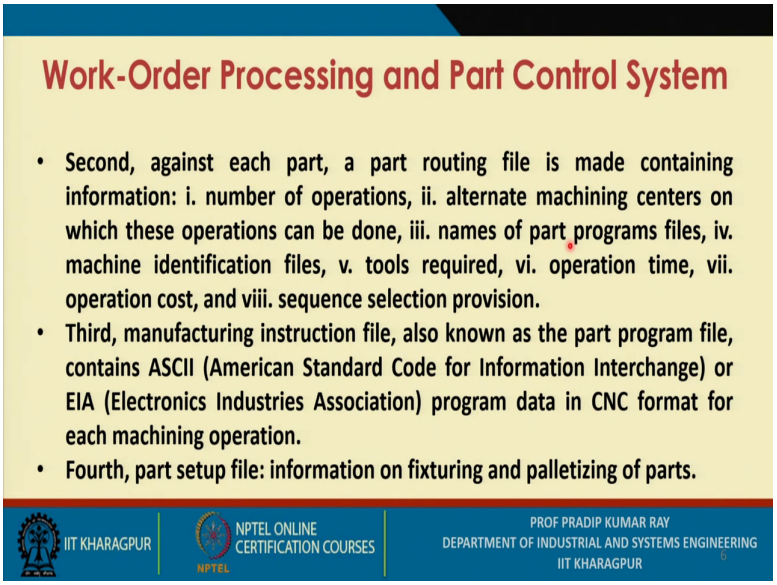

Second one, for each part, the part routing file contains information such as number of operations, alternate machining centers on which these operations can be done, names of part programs files, machine identification files, tools required, operation time and operation cost, and sequence selection options.

The manufacturing instruction file, also known as the part program file, contains ASCII (American Standard Code for Information Interchange) or EIA (Electronics Industries Association) program data in CNC format for each machining operation.

The part setup file contains information on fixturing and palletizing of parts.

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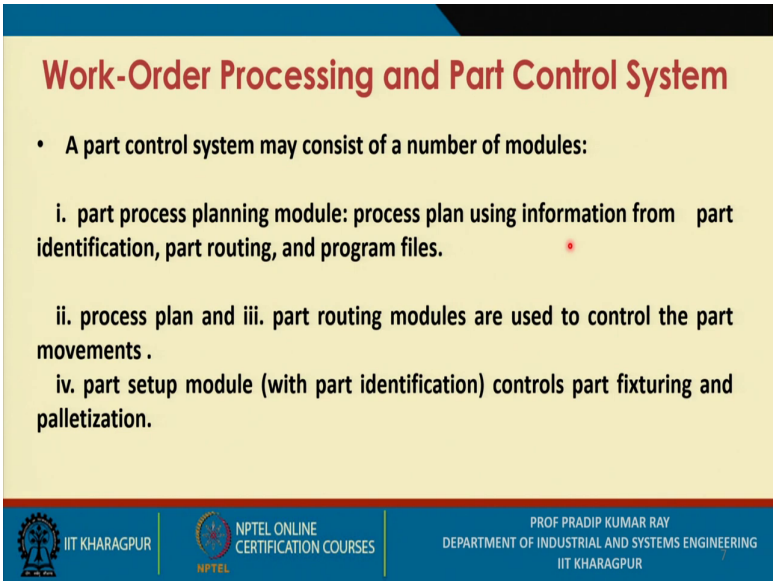

The part control system consists of a number of modules. For example, the part process planning module creates a process plan using information from the part identification, part routing, and program files. The process plan and the part routing modules are used to control the part movements in an FMS. The part setup module in conjunction with part identification controls the fixturing and palletization of parts.

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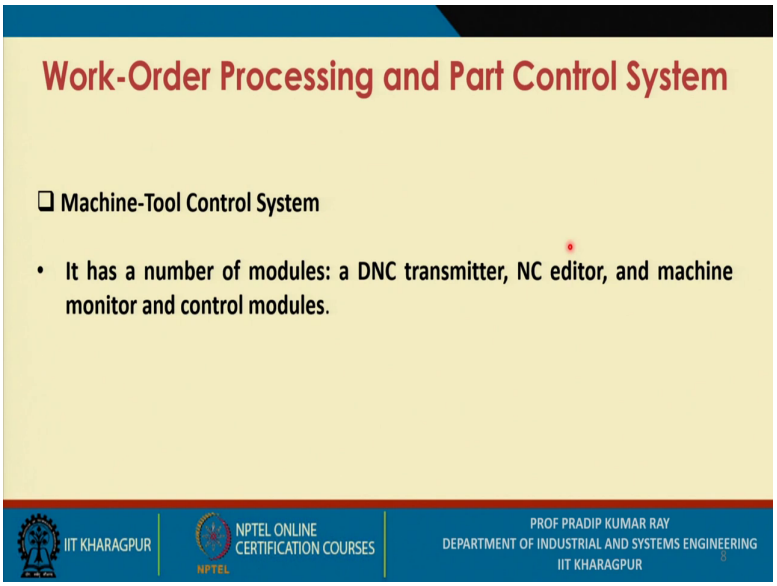

Now, as far as the machine tool control system is concerned, it has a number of modules. One is a DNC transmitter, then NC editor, and machine monitor and control modules.

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Now, let us to talk about the next subsystems that is tool management and control system, the tool means the cutting tool and we are referring to the machining activities or metal machining activities.

One of the distinguishing features of an FMS is the tool magazine, which holds a large number of tools. The tool magazine capacity is an influential factor in determining the flexibility of the system. A proper tool management and control system is needed to control the processing of parts and enhance the flexibility to manufacture variety of parts. Tool identification, tool setup, and tool routing are accomplished by the tool management and control system. Tool replacement strategies can also be part of such a control system. Details of various tool replacement strategies are given in later sections.

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Now, let us talk about the traffic management control system. The material handling and storage control system coordinates part routing, fixtures, pallets, and tool module.

Fixtures and pallets – now, these are used for holding the parts, and sometimes you use the temporary storage. The main objective is to track the destination of parts.

It records and controls the storage and retrieval of parts tools fixtures and pallet us for quick availability. The part and entire part, fixture, pallet along with the tool in a dynamic condition they form one particular entity, and there must be perfect coordination between a number of activities.

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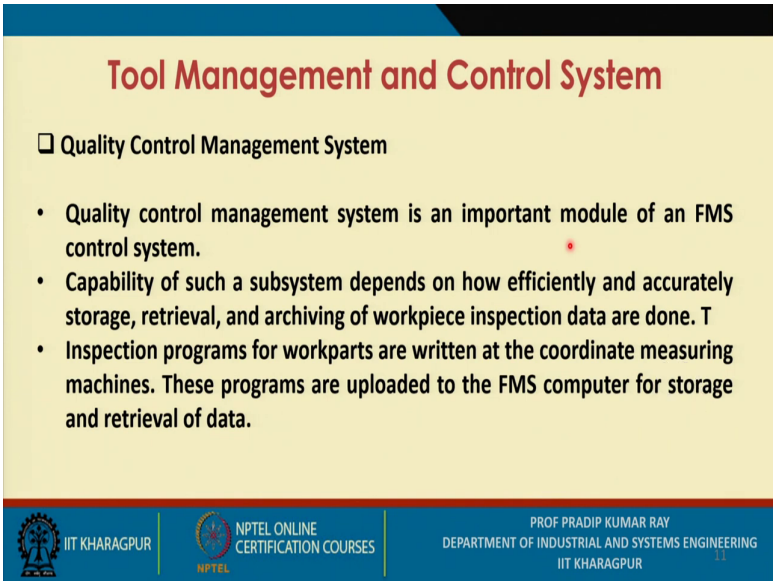

Now, let us refer to the quality control management system. Quality control management system is an important module capability of such a subsystem depends on how efficiently and accurately storage retrieval and achieving of work piece inspection data are done.

Inspection programs for work parts are written at the coordinate measuring machine. So, these programs are uploaded to the FMS computer means, the main computer for storage and retrieval of data.

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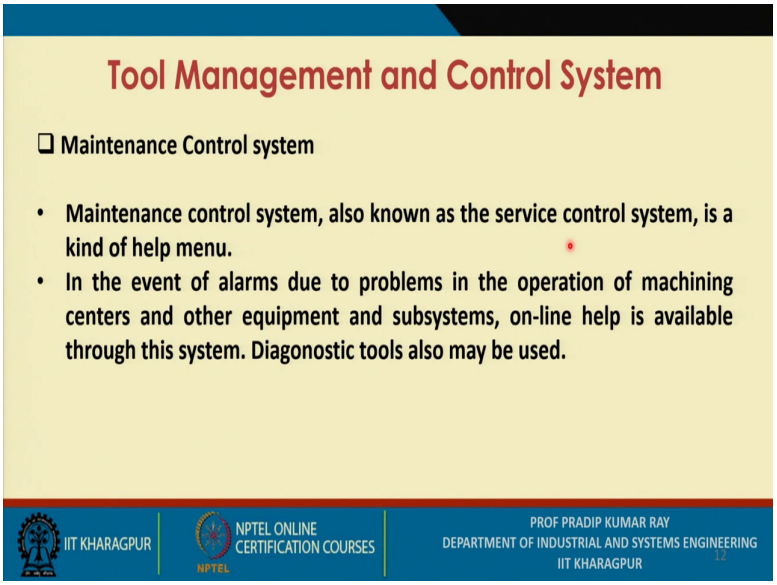

Next comes the maintenance control system. The maintenance control system, also known as the service control system, is a kind of help menu. In the event of alarms due to problems in the operation of the machining centers and other equipment and systems, on-line help is available through this system.

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The management control system is designed to provide the management status of output performance. It consists of a number of modules that coordinate with various other systems,

including a provision for manual scheduling and control, scheduling of parts based on their requirements available from the material requirements planning (MRP) system, and report generation on output statistics of parts.

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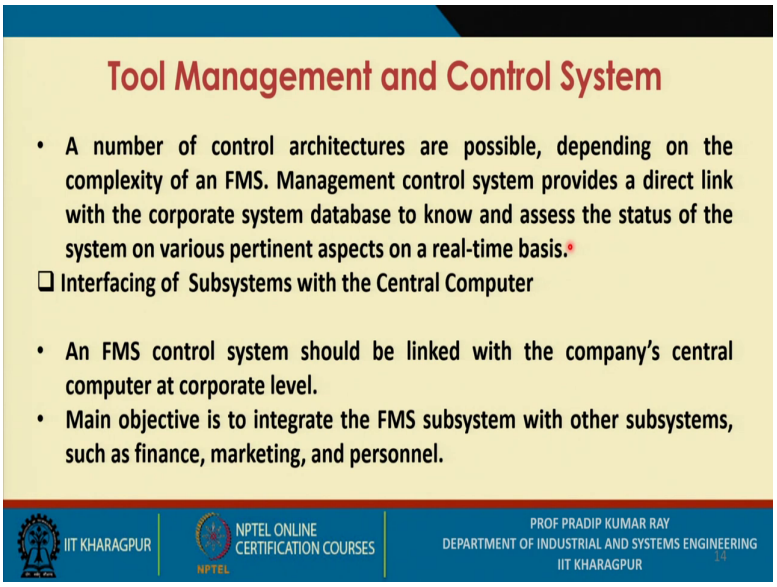

A number of control architectures are possible, depending on the complexity of an FMS. However, the management control system provides a direct link into the corporate system database. This helps provide management information on the status of the system on a real-time basis.

Interfacing of These Subsystems with the Central Computer.

The complete FMS control system can be linked with the company's corporate computer. The objective is to integrate the FMS subsystem with other subsystems such as finance, marketing, and personnel

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