Manufacturing Systems Technology

Prof. Shantanu Bhattacharya

Department of Mechanical Engineering and

Department of Industrial and Production Engineering

Indian Institute of Technology, Kanpur

Module - 03

Lecture - 15

Hello and welcome to this module 15 of manufacturing systems technology. So, in the last few modules, we have actually tried to have a brief idea of how computationally a problem can be solved in terms of back end program, where various geometries you know whether it is complex or regular geometries is can be plodded in terms of surfaces, in terms of curves and you know their coordinate data can be extracted successfully. So, we also considerate in this aspects some fits, where you can construct reconstruct surface based on the actual surface data which is available may be at a few point. So, can we really map even if it is a complex to apology inside those points a particular surface can be easily now a day's computationally handled.

This data which comes out of a CAD package is actually more inform of a, you know sort of a number data and this number data has to be handled in a proper manner. So, that it can go to the next level, which is actually you know what is needed for processors, particularly the pre and post processor for different machines which can understand this data and try to work on the different parts. So, systems based on that.

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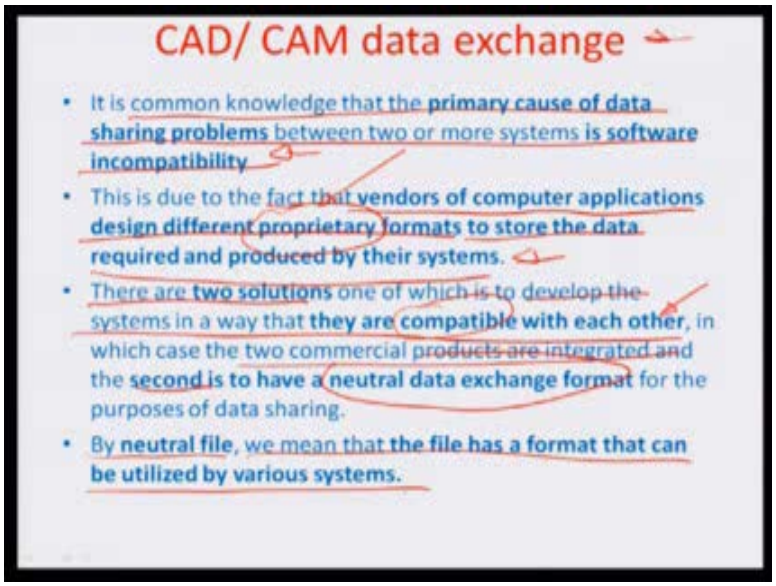

So, let us look into the first aspect which is important for us to learn here, which is the CAD CAM data exchange aspect of such exhaustive data that has been computed as has been illustrated earlier through different transformation etcetera. So, it is common knowledge that the primary caused of data sharing problems between 2 or more systems is really due to software incompatibility, and there is a fact which remains in business that most of the vendors of computer applications design different proprietary formats to store their own data required, and produce their own systems based on that and its. In fact, proprietary the word proprietary here is important, it is because they hardly disclosed, what is the format in which the computer application is going to store the data? So, when we are trying to inter connect many machines, where there are different software's or different applications there is a huge problem of how that data can be processed in a particular manner, which can be read by series of controllers you know which can eventually go into the implementation of some of this data in terms of operations of stepper motors etcetera, which happens in to an nc system or nc machine.

So, there are two solutions; one of which is really to develop the systems in a way that they are compatible with each other which is a very, very course or very, very difficult solution, I do not think there is any capability which can governed that in this whole business of computer applications every system is interconnect, because of compatibility there is no unified code which is available. And obviously, there is competition where 1 form of coding is considered to be more efficient or less efficient in comparison to the other form. So, hardly there is any compatibility with exists, and the other way out is that

you know the 2 commercial products which are available in the market there integrated by another means of a neutral data of exchange format.

So, here the purpose of data sharing is that you know develop a format, which is a compatible format of all the application which have been developed. So, all though the computational speed etcetera is varying based on the, you know the process requirement the particular application software which is handling that requirement; obviously, it is a combination of the software and hardware, which key gives you the data processing speed. So, can they are be exchange format which is like neutral format which is format where all the data can be converted into and this can be either read or written, because it is a neutral format shared by all or all the applications. So, by neutral file there for we mean that the file has the format that can be utilized by many systems or most of the systems.

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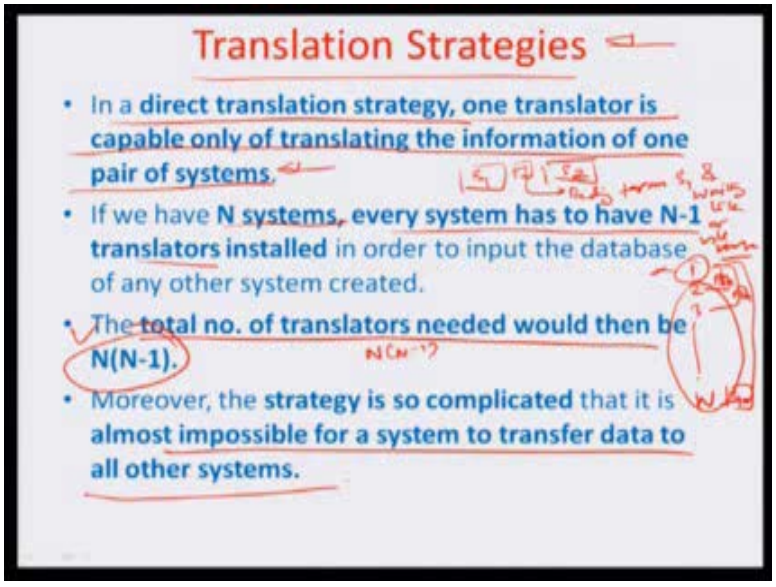

So, let us look at the translation strategies, which are important for having some idea of the require the number of processors, which are needed for such translation. So, translations means that one language to another language or one format to another format something which is comprehend on one system is not comprehend another system. So, you had a process the data in a manner from the first system, so that the second can read it. So, those issues are translation essentially. So, in a direct translation strategy 1 translator is capable only of translating the information of 1 pair of systems. So, if you have a system s 1 and a system s 2.

Let us say and you are translated t in between this translator is only capable of reading from s 1 and recording or writing 2, s 2 or vice versa. So, that is how you can do 1 form of translation. So obviously, if you have N systems every system has to have N N minus 1 translator right, because let us say you have 1, 2, 3 . So, on up to N such machines and 1 interacts with the remaining other N minus 1 with at least N minus 1 different translators. So, there is 1 translator t 1 to 2 between 1 and 2. So, 1, 2, 3 between 1 and 3 and so on so for up to 1, 2; and so there about N minus 1 such translators which need to be available for doing the job, you know of the direct translation. So, the number of the total translators that would be then needed is actually N into N minus 1, its pretty high number right. So, you have each machines for which there are N minus 1 translator there about N machine. So, you have N into N minus 1 translator, which are available this is something, which is not possible its very complex strategy; it cannot work out and almost impossible for a system to transfer the data to all other systems by means of a different translators. So, each machine should be equal to with N into N minus 1 translator, this is absolutely ridiculous.

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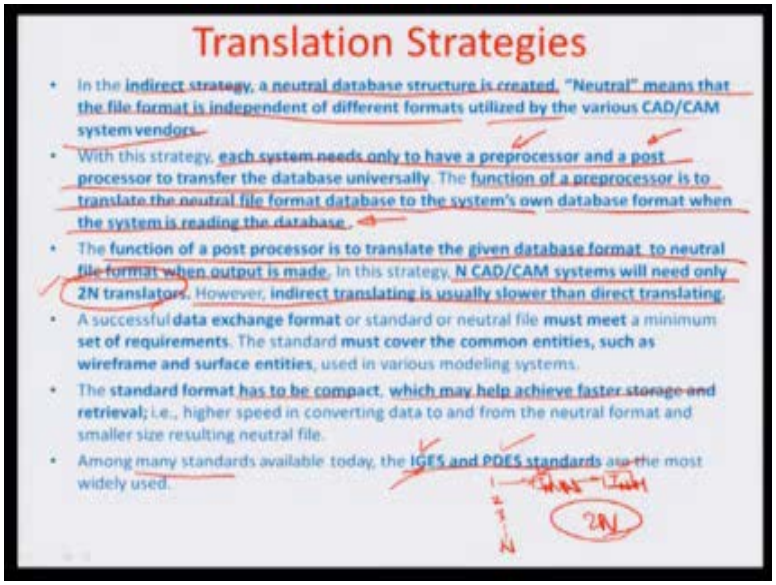

So, therefore, the other aspect is to create a neutral data base as I had earlier mentioned. So, the indirect strategy a neutral data base structure is created neutral means that the file format is independent of different formats. So, utilized by the various CAD, CAM system vendors and with this strategy its system only needs to have a 1 post processor and 1 pre processor. So, you have a post in a pre processor to transfer the data base universally, and the function of a pre processor is to translate the neutral file format data

based to the system. So, own data base format on the system is reading the data base and the function of the post processor is nearly to translate the given data base format to the neutral file format when the output is made.

So, in this strategy if N CAD CAM systems are existing they will only need about 2 N translator 1, which is needed to convert from that is a 1, 2, 3. So, on up to N is the number of systems, so 1 into the neutral. So, there is a translator converting into neutral. So, machine to neutralize call it trans MC, and the other is basically trans M N, I am sorry; N is the neutral format, the other is N to M again. So, M is this machine. So, there are only 2 such for each machine and your exactly 2 N number of translator, which are needed is much lower than N into N minus 1; obviously, right.

So however, because every time you have to convert into a neutral format, there is an issue of speed, which comes into question and the time really is a very critical aspect in such translating strategies and they are. In fact much, much lower than direct translating if there was a dedicated translator for 1 system to be sending the data directly to the other system that would have been a much faster process. So, there are at least 2 N translator which are shorter numbers, and obviously this is more beneficial to cover it into a neutral data exchange format. So, let us look at such neutral data exchange formats, and if we talk about standard available in the industry, which has capability to be compact and which helps to achieve faster storage; there are 2 or 3, such formats which exist between all the different processors, and the 2 most important formats which were developed were the IGES and the PGES formats of data structures.

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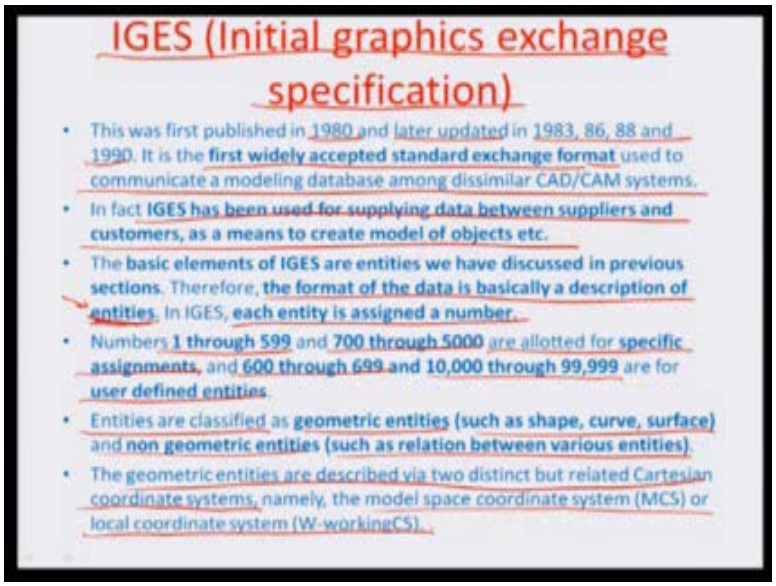

So, I am going to look into the various different formats, which are available like this is IGES, as you can see here is the abbreviation form for the full initial graphics exchange specification. So, its published in 1980 and updated later several versions we are updated in to it as in 83, 86, 88 and 1990, and this was actually one of the first widely accepted standard exchange formats used to communicate a modeling data base among the similar CAD, CAM systems actually so. In fact, idea has been used for supplying data between suppliers and customers as a means to create the module of objects, etcetera. So, what are the basic issues about IGES or what are the basic elements that the IGES software would have the format of the data is basically the description of entities. So, there are geometric entities, which we have talking about and somehow we have to store or structure that data in a manner.

So, that moral is this entity should have some kind of a number assigned. So, the number assigned here let us say through 1 through 599, and 700 through 5000; they are allotted for specific assignments and 600 through 699 and 10000 through 99999 are for user defined entity. So, entities are classified; obviously, as geometric entities such as shapes curve surfaces etcetera and some non geometric entities, such as the relationship between the various geometric entities which are held in unison. So, the geometric entities again are described by 2 distinct that related Cartesian coordinate system namely the model space coordinate system or the local coordinate system, which is used in this particular case. So, these are a numbered structure of the data base, where you have the basic user defined entities the geometries which have the majority of that data base formulate the majority of that data base and other one is basically the relationship between such numbers, which are such user defined entities, which are present in form of the specific assignments related to the data base.

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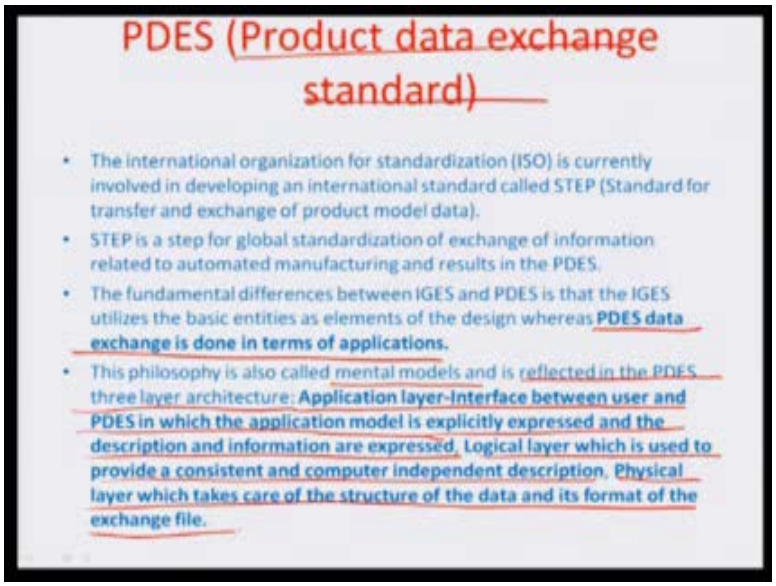

The other form which is very commonly available is the product data exchange standard PDES, and again the PDES data exchange in is really a very complex, it is a much more complex form of the data then the earlier IGES and the PDES data exchanging is done in terms of applications. So, there is philosophy where there is there are mental models you know and it is reflected somehow in the PDES 3 layer architecture; layer 1 is an application layer interface between user, and the PDES in which the application model is explicitly expressed, and the description of the information are expressed; there is a logical layer, which is used to provide a consistent and computer independent description, and then there is physical layer which takes care of the structure of the data and its format of the exchange file. So obviously, there are now a layered basis 1 of them is interface between the users.

So, if the user wants to entity to become in a certain way and all that you can use this particular layer, there is a layer which is a logical layer, which interconnects actually the various descriptions and information coming out from the user layer on to do with the data structure, and the data structure is actually at the last level, which has you know the physical layer, which takes care actually of the structure of the data, and its format of the exchange file. So, that is how the PDES has been developed. So, it has more user sensitiveness, I would saying comparison to the IGES file which was or IGES standard which was developed earlier.

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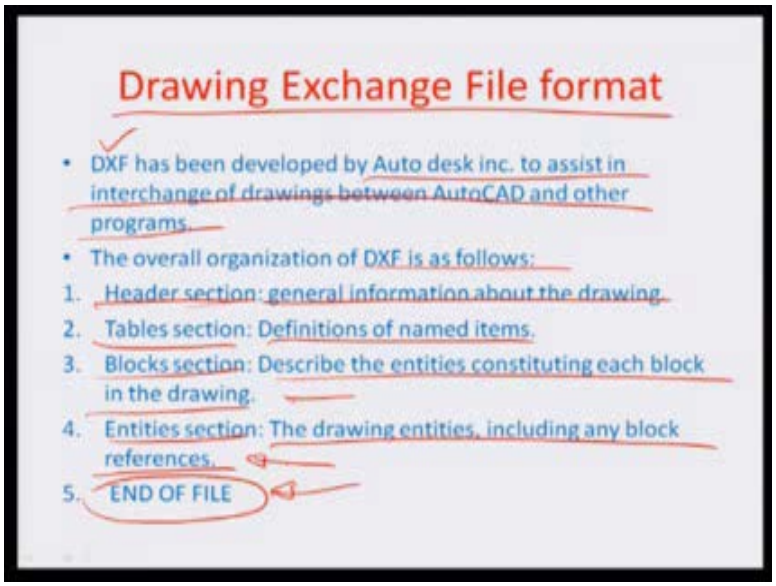

The other exchange file you know is a most commonly DXF, which is actually called the drawing exchange file format, and this was developed by auto desk particularly to assist in interchange of drawings between AutoCAD and other programs. So, here the overall organization of the DXX, DXF is as follows, you have a header section which actually is about general information about the drawing etcetera, there is a table of section, which is definitions of the named items; there are block sections which are describe in the entities constituting any block in the drawing, and then there are the entities section where the drawing entity is included any blocks or reference to duly. So, there is obviously, an end of file kind of a thing which actually you know indicates where the reading has to be completed and where it end, actually of the DXF format. So, these are…

In fact, some of the formats which are available for doing data exchange for doing, you know some kind of neutral format creation, which can then easily go between the different pre processor and post processor of the various system. So, a very important part, now we have mentioned it is, now how to sort of align it to a machine which would actually do the job. And that is where the process planning comes into picture that if your wanting to work on producing something on real time. Let us see you have part with you need to machine for example…

So, there are various processors or various sequences of processor, which are needed to realize that somehow that logic has to be fed in the system that computer integrated manufacturing system. So, that whatever data or whatever format of the data has come out from the CAD has to be now implement the question of implementation comes. So

obviously, the first aspect is to be a process planning on the design, which is emerge in terms of the data, and this process planning is very intelligent activity, because it is a I would say a digitization of the thousands of hours of experience of various people who indirectly been involved such processor to can the processor.

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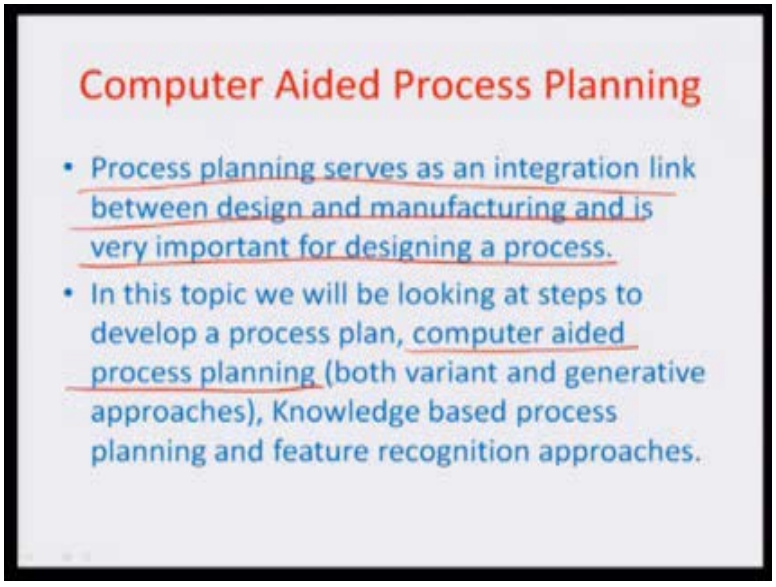

So, the process planning serves as an integration link between the design, and the manufacturing stage very important part for designing a process. And obviously, process planning can be carried to the next level, where we can talk about computer assisted process planning, and this can be known as capp or cad, sorry capp, and there can be various approaches in computer assisted process planning like the variant or the generative approaches to do, you know such process plans, and then there can be knowledge based approaches also. So, I am going to in the next module on wards describe details about how we can integrate this design data, which is come out of a CAD package with the experiential process design, you know expertise which is emerged, you know as a result of thousands of hours of contact direct contact with the different processes various people in a very logical formative manner.

So, that there is a plan emerging as soon as design comes to system something of that order doing. So, we would actually look across mostly machining activity, because these are the most automated processes, as if now in the industry for example, you know things like assembly or things, where there is more human intervention involved have never been automated to the level of a completely computer integrated manufacturing system, but that has been the case with machining processes. So, one of the reason while only

look at the machining process to understand the computer related process planning, and then followed by that we will have some module on how the cnc code, etcetera can be develop. So, it the machine can finally start to implement what did you support to do from the design data, I stop here this module, and welcome you to actually now look through the computer related or computer assisted process planning approaches following the starting from the next module.

Thank you.