Introduction to Lean Construction
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Module1 – Lecture 52
Some Key Lean Concepts, Focusing on frontline Execution, CPS – Collaborative Planning System

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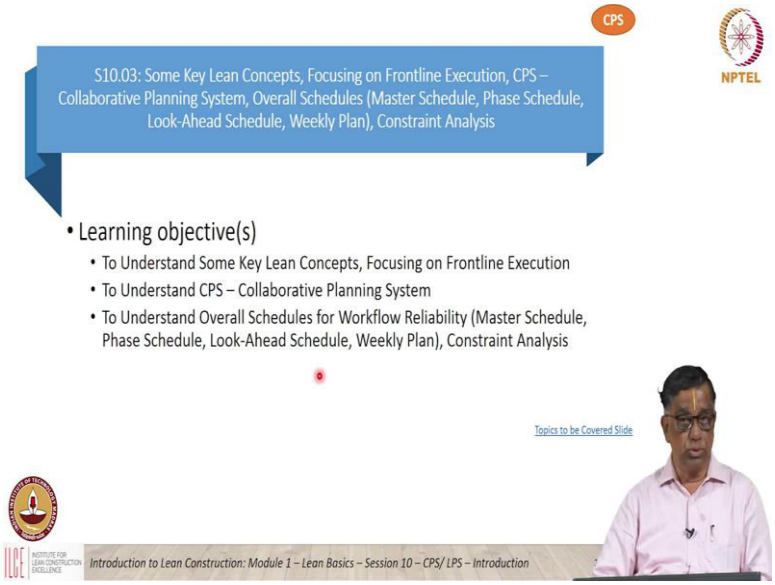

In the next session on the 03, we look at the following objectives to understand some key lean concepts, which are focusing on the frontline execution to understand the collaborative planning system or CPS better, and then to understand the various schedules for workflow reliability, starting from the milestone Master Schedule, Phase Schedules, the Look-Ahead planning and Weekly planning, also the constraint analysis.

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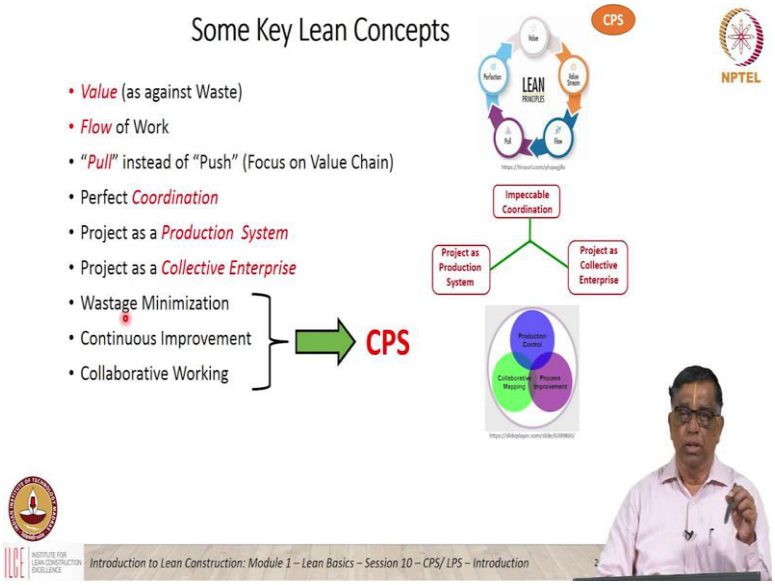

If you look at some of the key basic lean concepts, value is a main concept. The entire project is working towards creating value for the client. That is the main thing. Values as opposed to waste. We want to eliminate all kinds of wastage because waste does not create value for the client. So, if the focus is primarily and consistently and continuously on creating value for the client, then we are on the right track.

And in that quest, we do not look at the isolated individual activities, but we are going to look at the overall flow, whatever is you know, creating value is in a continuous flow of work, we want to focus on that. And then again, if you look at typical sites, from one activity to another activity, people tend to push the work down to the succeeding activity.

For example, a rebar compared to a concreting activity the rebar man is not concerned whether the concrete man is ready with the front ready with these methods see, you know, labor all those things, he will keep on producing rebars rebars rebars and they all keep lying, whether used or unused, we do not know at what other entail that is actually work in progress, that involves working capital, which is not productive. Till the rebars get embedded in the concrete get properly build and get paid by the client is not creating value.

So, we have unnecessary work production which is not contributing to the client. So, we tend to push the work not pull push the work. But if you adopt a pull approach, the concrete man dictates the sequence he says today I require so many tons of rebar of the various types, tomorrow require you know a different quantity and so on, and the rebar man produces

according to this kind of requirement, then whatever he produces, is going to be utilized gainfully that is called pulling the work.

So, each succeeding activity pulls work quantity and quality wise from the preceding activity to the extent it can handle. So, there is no buffering, there is no unnecessary stock, no WIP or work in progress, and we have better value creation all the time. So, this pull versus push is a very important concept of lean and please understand that very thoroughly right at this stage.

And then with multiple theaters of operation, we need to enter we need to ensure perfect coordination. What happens in a typical site? You have the frontline people, you have the you know the service suppliers, for example, the p&m man, stores man, labor supplier, material supplier and so on. All the coordination is being done by the planning manager. The request for something goes from the concerned person to the planning manager and then he coordinates, a feedback goes to him that again talk to somebody else.

So, all your communications are vertical from the concerned department to the planning manager and then again in return. So, the planning manager is overburdened with the coordination work and there is no communication across the levels where the actual work is taking place. In contrast to this, if you allow the people actually doing the work to communicate to the suppliers of services, materials, equipment, labor and so on, then they can communicate better among themselves telling exactly when they require something what they require, how, what form all that and they get an assurance in return for the coordination becomes much better.

The biggest bugbear of today's construction is lack of coordination and that bug you know we need to beat by ensuring the proper coordination at the level of people actually doing the work, that is what happens there. And if you look at a typical factory, you know day after day, the you know the products keep getting produced in a controlled manner, in predictable manner.

So, the owner can definitely say, on a given day, I am going to produce so many units, that is called production. Whereas in a construction site project, it does not happen, because we are not in that kind of mode of mode of production. Whereas if you are able to organize the construction project, as a production system, with more reliability, more certainty, then you can predict better saying that, I will produce so much quantum of work on every day as per planning. And that is where Lean comes in, by all these systems.

And again, you know, we do not depend only on the planning manager or the frontline as different entities, different systems, we every we ensure that they all work as a combined unit as a well-oiled network. There is good communication between the planning team, the execution team, the supplies team, there are not properly interlinked, and working as a collaborative team. That is the key to lean also.

To look at the three the triad, if you look at the triad of what we call the triad, you have impeccable coordination, we have project as a collective enterprise with all the units working together, and then finally, we get the project as a production system, where we get good reliability and good certainty.

So, with all this, we are able to minimize wastage, we are able to have continuous improvement with a good robust feedback system. And we have collaborative working. So, these are combined together forming what is called the collaborative planning system, or a takeoff from the last planner system, I will explain to you later.

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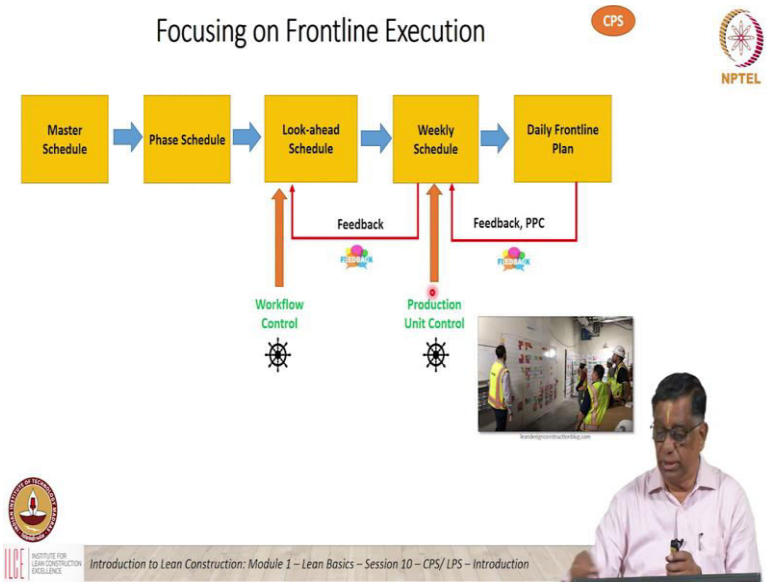

If you look at the conventional way of working with a large critical path network, MS project or Primavera or whatever it is, it is all made well in advance of the work actually being done. You have too many activities spanning across to larger time. So, you are not able to have good control and you do not know exactly what is going to happen downstream.

So, in Lean what we do, we start with the overall network, very, very broad granularity, we have what is called the master schedule, the master schedule actually looks at the main milestones, the broad understanding contractual agreement between the client and the

contractor. So, we do not go into too much detail at this stage, we have the broad item of the sequence and the timelines.

And then we split up the project into a number of phases. For example, you know, a group of buildings, we can see each building will be one different phase, or a multi storey building, we can say, so many floors, first phase, so many for second phase, all the services will come in a subsequent phase, so we split up the project into a number of phases, which we can control, understand and coordinate in a much better manner.

Then what we do, we come down, we narrow our focus, still more from the overall master schedule, become to the phase schedules, then we take up a portion of the work in the next six to eight weeks, for example, it can be anything from three weeks to 16 weeks, depending on the size of project, we have what is called a look ahead window, we focus on the works, which are going to be done in the near future.

So, we have better understanding of where exactly we stand with respect to the overall timeline. And we know what problems were encountered previously. And we can actually address these problems in advance prima facie, or pre or post before beforehand. So, we make the Look Ahead schedule with the activities in the proper sequence in a proper timeframe.

And then from the Look ahead window, we carveout cardboard weekly works. Every week, you know, we have for example, a six week look ahead window is actually a rolling window. Today, for example, you look at 1 to 6. The next week, we look at 2 to 7, 3rd week look at 3 to 8, and so on, we keep on rolling down.

So, when you come to the sixth week, for example, I would have looked at the six weeks works six times beforehand. So, I know exactly what is going to happen at the end of five weeks in the sixth week, I anticipate the potential constraints, why the works in the sixth week cannot be done or can be done. I planned for it beforehand. And I keep reviewing that every week. So, when it comes down to that my uncertainties are all addressed previously. And any smart project team would have removed the constraints by the time.

So the works which are coming up in the sixth week will flow through very smoothly, very comfortably without any strain. And that is why you come to the weekly schedule as a part of the Look Ahead window. And then within the week, every day we look at the work. In the

weekly schedule what we do? We plan what will be done on Monday, Tuesday up to Saturday.

And every day you know we say okay, today we have planned this much work. We started the morning and come to the evening. And we take a process check whether we could complete what we planned or not. On the given day, if not done, we analyze the reasons, we do not just keep quiet, we want to find out why I could not achieve what a plan for that given day.

And then I have what is called a root cause analysis. I do not accept the ostensible or apparent cause, I dig deep, and find out the real root cause, why I could not accomplish what I set out to accomplish in the morning. And then we make corrective measures. So, the next day when I go into the project, and start doing the activities, and be able to complete them in a much better certainty and achieve what they plan to achieve.

So, if we look at the progression of control, we start with the master schedule, the phase schedules, the look at planning, and the weekly planning and the daily planning. So, it all goes on a smooth flow. And then every time my focus is narrowing down into smaller and smaller focus, till I focus on the given day.

If you look at this particular slide, you will notice two important things, the feedback cycles. For example, from the weekly schedule, we have a feedback coming into the Look ahead schedule. And for the daily planning again, we have a feedback coming into the weekly schedule.

So, each time we if you are not able to meet our commitments or promises, we find out the reasons I told you about the root cause analysis, then we apply the learnings into the previous cycle. For example, weekly planning, we keep on finding that a particular equipment's productivity is less than what we planned what we envisaged, so next time, you know, for the next week planning, we take the revised input, and then plan accordingly. So again, we do not make a mistake of not being able to meet our commitment.

Same way with the daily planning we find in the current week, you know, we are having a say like monsoon conditions, the productivity is less than what we plan, for the next week, you know, we know that again, there is going to be a problem so we apply the feedback, so when we do the weekly schedule for the next day, next week, we learned we take that learning into account.

So, the feedback cycle is very, very important. For the Look Ahead schedule, it helps you to have a control on the workflow, because we are looking at the next, you know something like five to 10 weeks or 15 weeks like that, and we plan the work accordingly. So, we are clear about the workflow, where do we head from today towards the end, how are we progressing? That flow is properly controlled. And then the actual production that takes place on only the daily basis. So, the weekly planning and the daily planning, they constitute the actual production control.

So, we have the workflow control, and we have the production control and all linked upon a feedback cycle. So, then the reliability improves much better. And the overall production also, we are heading towards the project as a production system that we should keep into account.

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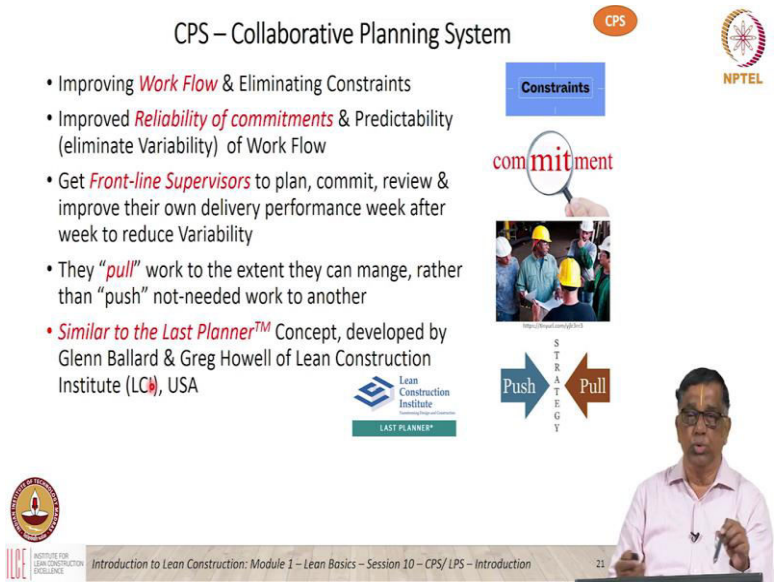

So how do we do that? We look at the workflow and eliminate constraints beforehand. And then there is a method of doing the weekly planning, I will come to it later, where the commitment level is very high. So, I will explain to you right now in the weekly planning what we do, we have a broad, we have a big what is called a big room. The big room concept is again, another very interesting concept in Lean.

We say that, you know when people are talking to each other across the phone, or through drawings, or through third parties and all that a lot of communication gap is there. So, you put all the interested parties or related parties in a single big room, let them talk to each other among themselves, and come to their settlements. I want some services from another person

and the concrete man. I want so much of firm work, so much of rebar, a batching plant, a transit mixer, labor and so on.

I do not talk to the planning manager directly. I talk to all these individual suppliers. And they tell me yes, they can or they cannot give, and a plan may work accordingly. And then there may be some other downstream man, for example, the electrical conduit man, he may come and ask me, are you going to give me the floor by the given date? So, I can do my electrical work? I say yes or no depending on what I am able to get from the others.

So, if you look at the reliability of commitments, I am getting a commitment from my friends, like, my colleagues are all in the same room and we are talking to each other across the room and we get the commitment. So, the reliability of commitments that goes much more. And consequently, the predictability that again improves and the variability comes down.

And conventionally the all the planning even the daily planning is normally done by the planning manager in consultation with the project manager, and there is a big disconnect between the frontline people and the planning team. And in Lean what happens, we get this last mile planning, you know, the Look ahead planning and the weekly planning by the very frontline supervisors, they get into the big room, and they have the other stakeholders, the service suppliers and the you know, whoever else is interacting with these people.

They are all there the same room, and the planning is done at that level. And all the promises are given and taken among friends, among colleagues in the same room. So again, the certainty level keep on keeps on increasing. And how do we start the work from A to B, we start from the end, we pull work. So, it starts in a reverse manner, conditioner planning is done from front to end. Here, we start from the end and work backwards in a reverse scheduling by the pull process.

For example, the electrical man says, I am going to do so much of… so much of electrical work, I require so much of concrete area to be given to me. And the concrete man says I want so much of formwork and rebar. And again, it goes backwards like this in a reverse planning process. For every stage, there is a pull planning going on, instead of each activity trying to push unwanted work to the next succeeding work, where it just gets piled up as work in progress, which is a total waste.

So, this basic concept came from something called the Last Planner concept, which is a trademark of the Lean Construction Institute of US. Two great people of Lean, Mr. Greg Howell and Dr. Glenn Ballard, of Lean construction Institute US, they were the people who formulated the initial concept. And today we have practiced all over the world in different forms.

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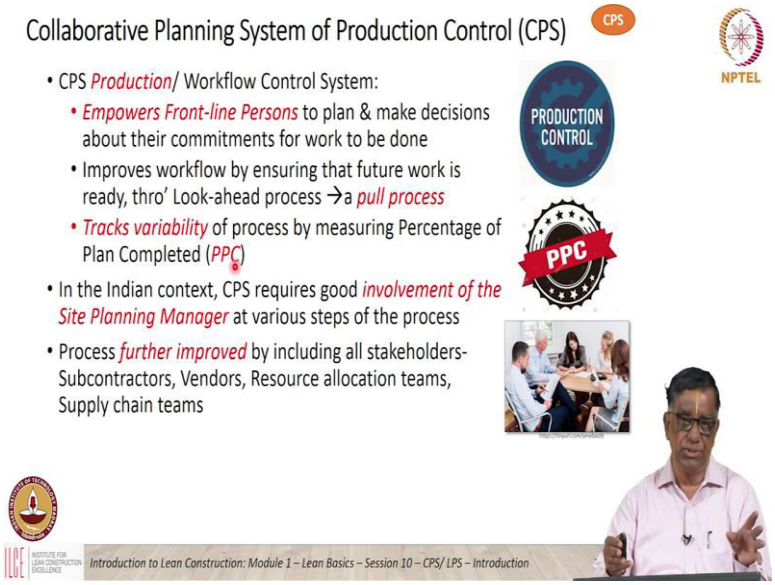

So, looking at the collaborative planning system of production control, in a better manner. All the frontline people now were fully empowered. Earlier, you know, they were having a total disconnect from planning. Somebody tells them what to do, they just go do it. But now the planning is done by themselves, and they are fully empowered. And then you know, the use of pull process to improve the workflow and the variability is again tracked.

There is a great factor called PPC or Plan Percent Complete. The Plan Percent Complete measures how many promises on a given day, we have completed in full. If I say that, you know, I plan to do six activities. I do all the six, I get 100 percent PPC, if I do for example, five activities out of 6, or get 5 out of 6, something like 80 percent. So, PPC is a tool, which measures a number of things indirectly. So after having done a look at planning, weekly planning, talking to by you know, colleagues and all that, if I am not able to achieve 100 percent PPC, then we need to understand why.

So, PPC is a great factor in that respect. And then you know, we can keep on improving the process further by including more and more people in the in the big room. We can get your subcontractors we can get the vendors. So, whenever somebody wants a promise or to make a

promise, we have all the stakeholders, all the world with us in the same space and talking to each other.

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