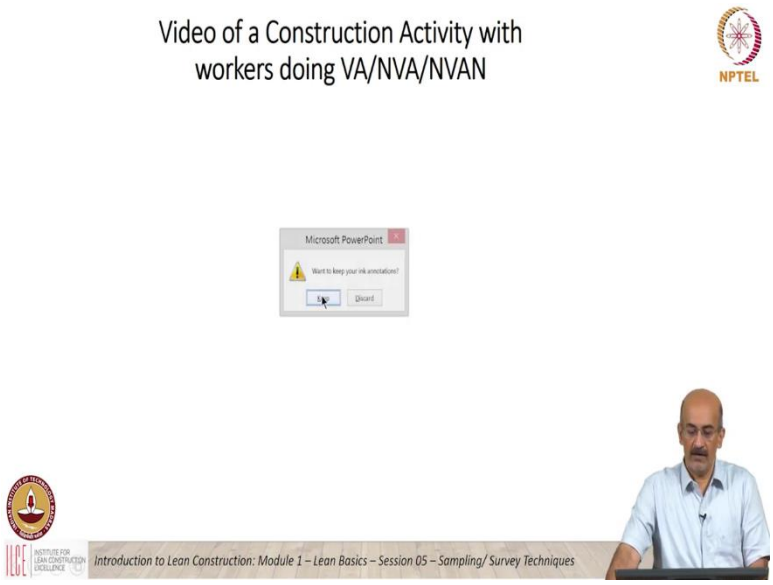
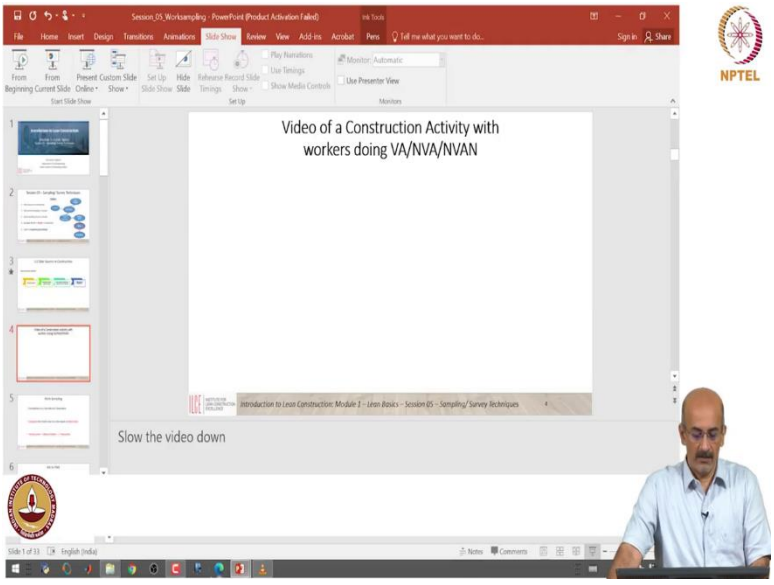
Introduction to Lean Construction
Professor Koshy Varghese
Department of Civil Engineering
Indian Institute of Technology, Madras
Module 1
Lecture 25
Construction Activity with workers doing VA/ NVAN/ NVA; WS vs PMS; Work Sampling

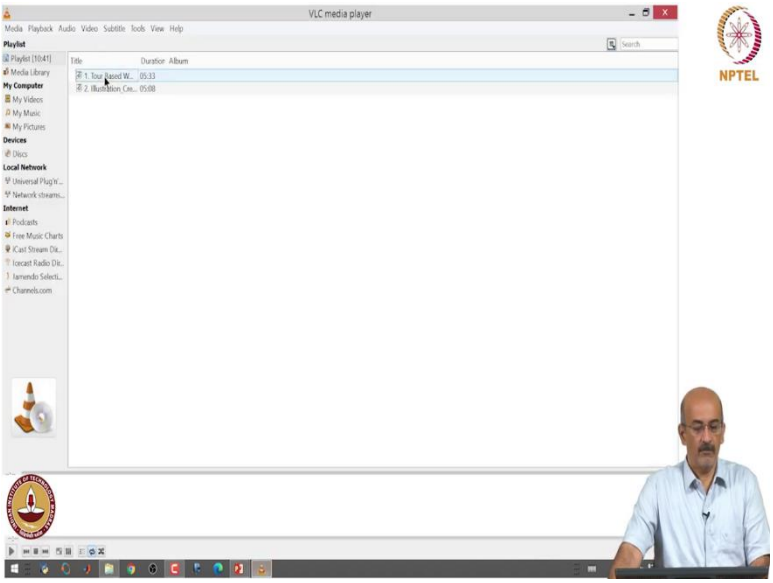
(Refer Slide Time: 0:21)



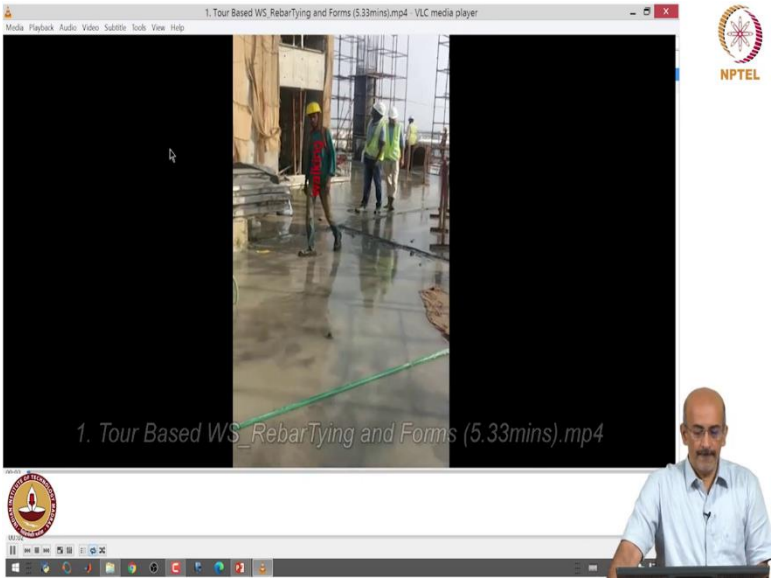
(Refer Slide Time: 0:28)



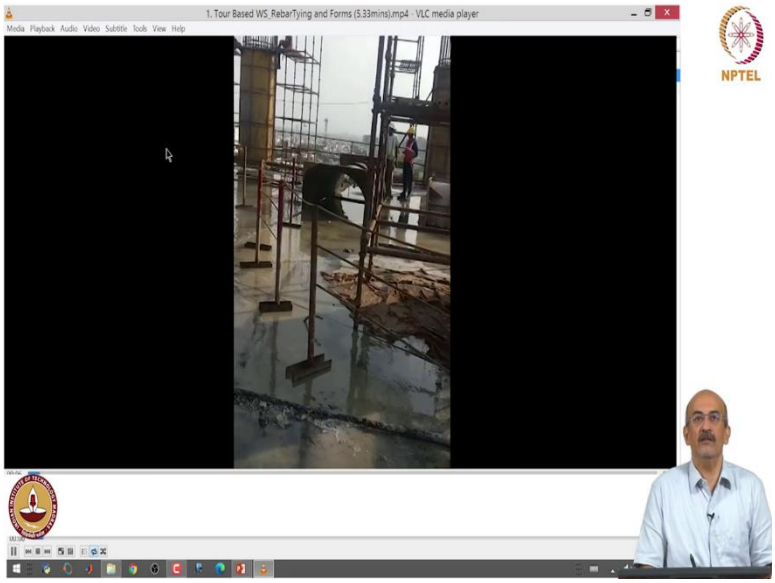
(Refer Slide Time: 0:31)



(Refer Slide Time: 0:37)

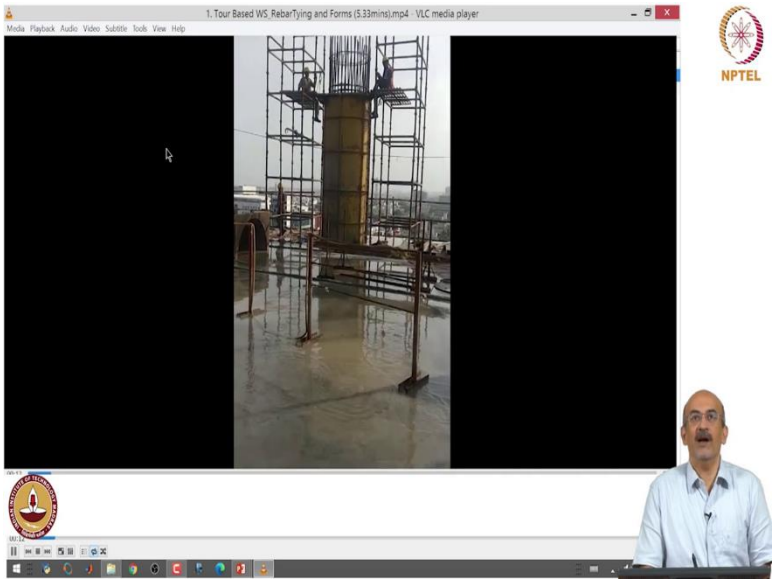


(Refer Slide Time: 0:47)

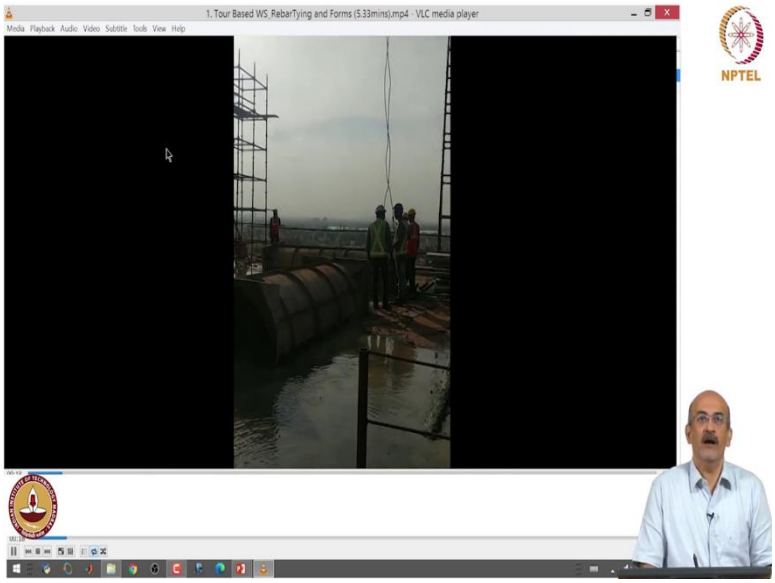


Now, when we move on from here, when we, if we take observation and we look at how we can look at observation in the context of a site, so here is a video, okay, and I am just, assume that I am just walking at the site and I am going to be able to observe my workers. So, you can see here, we are it is on top of a slab, there is quite a bit of work being done.

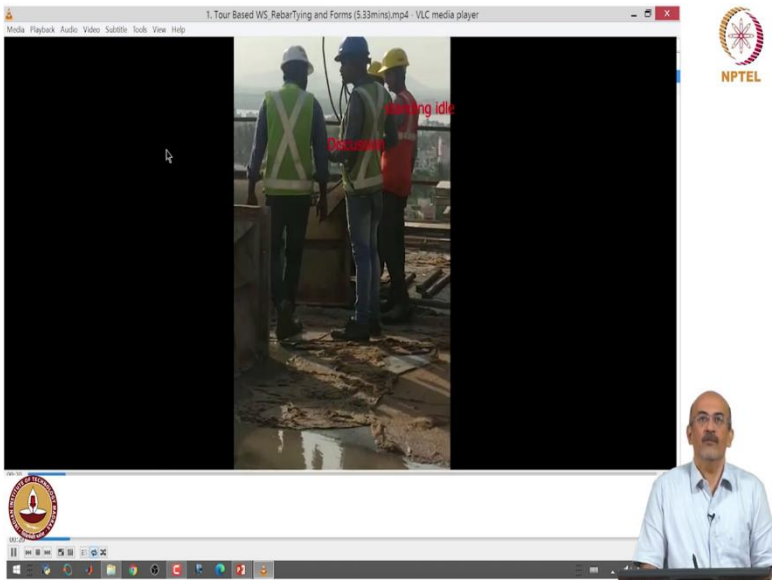
(Refer Slide Time: 0:52)



(Refer Slide Time: 01:10)



(Refer Slide Time: 1:15)

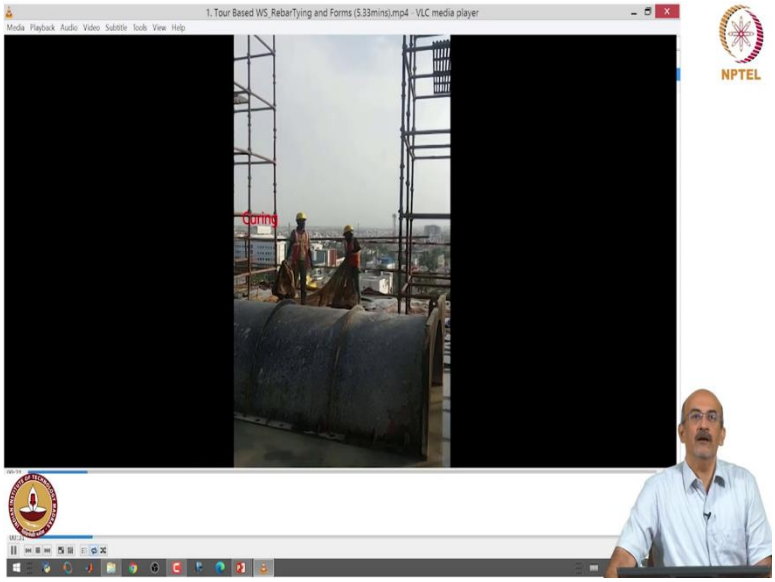


I can see some workers there, some that supposed to be tying reinforcement, the guys were sitting there, but they are right now idle, okay, so this is an observation. Here, a couple of people, one is a supervisor and worker, they seem to be discussing some work, few supervisors again discussing something, a worker standing idle, so these are observations I am making, when I am walking on a site.

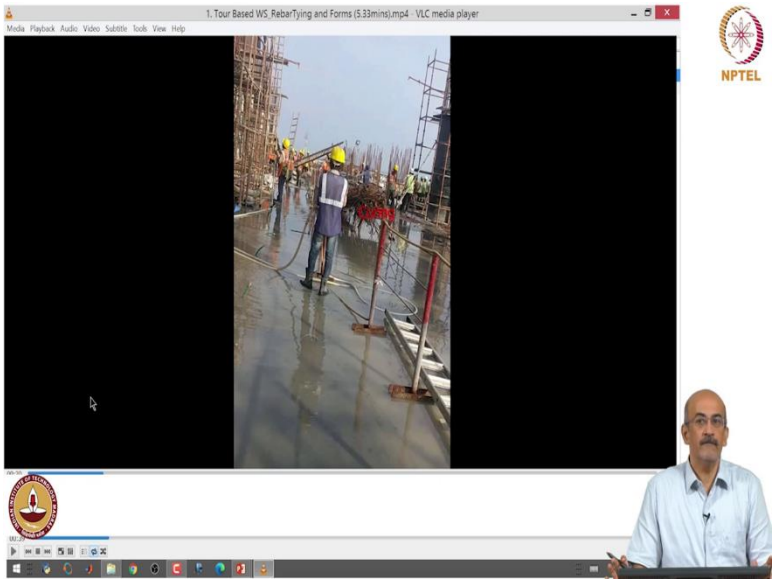
There is another worker standing idle and yet another one standing idle, the guys who are tying reinforcement are again seem to be waiting for materials there. So these are

observations that I am making on a quick walk on site, so here is a couple of workers who are covering the slab, doing curing activity, classifying as curing.

(Refer Slide Time: 1:38)

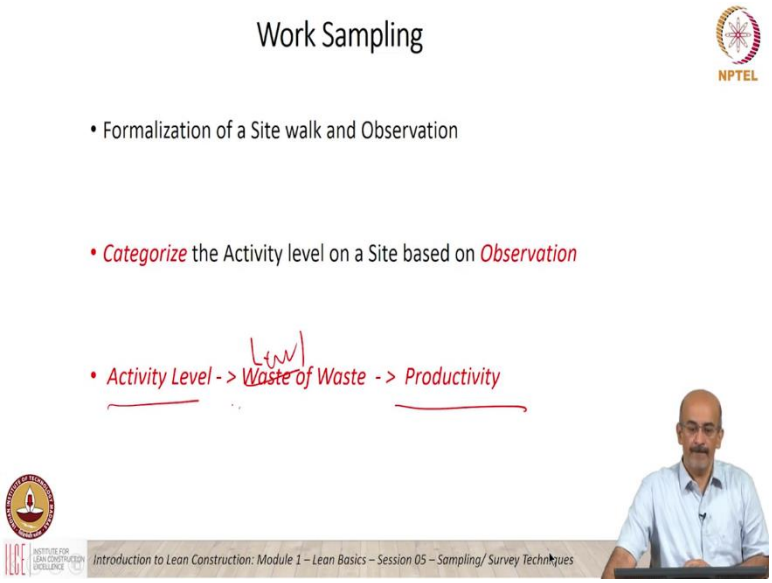


(Refer Slide Time: 1:53)



And again, you know someone moving the hose, doing curing, now I am going to stop the video at this, for any questions which people might have, anything. Do these classifications seem right? So, when I only watch the video for a few seconds and I am able to judge, what people are doing on site.

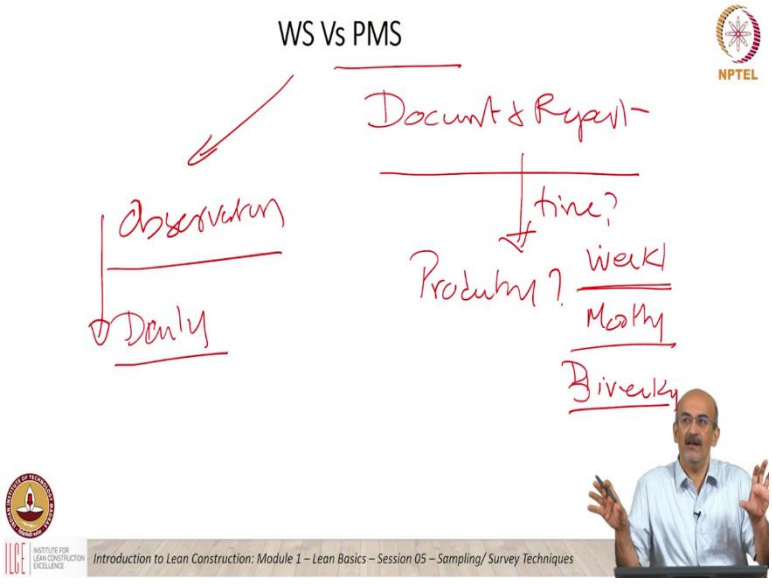
(Refer Slide Time: 2:13)



If we now go back to what, if I now take those observations and make it more formal, I am going to walk on a site as you saw, the activities being categorized, so I am going to categorize those activities just as you saw on the video, and we are trying to make this correlation between the activity level, the level of waste and productivity.

So, the question with work sampling comes, can I make an observation not just for thirty seconds, but in a systematic way when I am on a site and based on that, can I categorize the level of waste and potentially the productivity, that is where we are trying to take this kind of tool or concept. Any other questions?

(Refer Slide Time: 3:05)

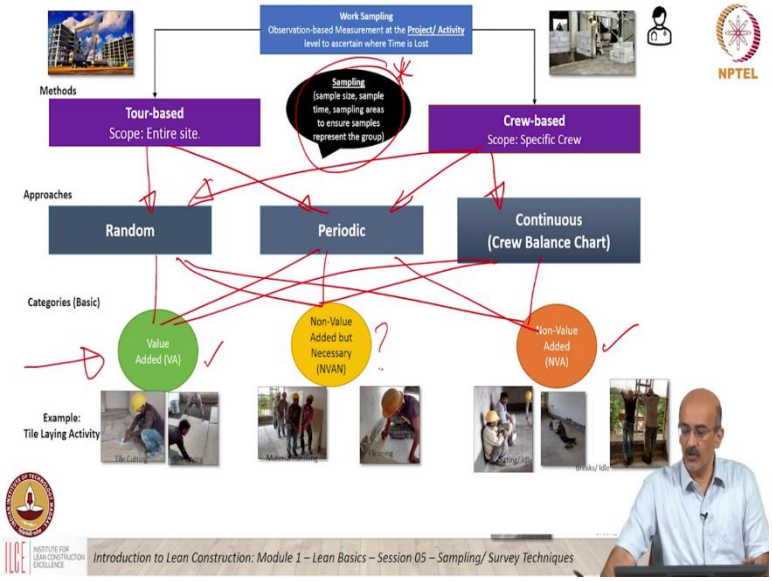


So when we look at work sampling versus our productivity measurement system, so we saw productivity measurement system is something that is a documented approach, So this is documentation. Document and reports, and this was observation. Now given that this is observation so that they know, how long do you think it takes for a document and report to give your productivity, to measure productivity? How much time do you think it takes?

Might be it is weekly, yes, you would like it daily, but it takes weekly or monthly to compile the report comes in daily, I mean, the data comes in daily, with more and more automation, this is becoming faster, but otherwise it is probably end of the week or end of the month or even by weekly. How long do you think it will take for me to get an observation-based report? if I do an observation, I am almost expecting this to come daily. So, one of the reasons for using an observation-based report is that I will generally get a much faster first-hand information on the activity level on site, I am not talking about productivity, I am only saying it is the activity level on site. If I do the observations properly, I will get a first-hand information on the activity level on site.

And if that gives me some indication of productivity, it is a faster monitoring time for me to take control. And in many contexts, work sampling and it is not work sampling or productivity measurement system, it is always work sampling and productivity measurement system. Because you need both, work sampling is just a kind of a little bit of a different way of looking at activity, sometimes productivity does not tell you the whole story, we will go a little more into that.

(Refer Slide Time: 5:13)



So, if you go into the details of work sampling, there are two methods to do work sampling. one is the tour-based approach the other is a crew-based approach. A tour-based approach, like what you saw just now, you are going through the whole site or particular specific areas, there are a mixed type of work happening, not in any specific type of work you are targeting, you are targeting the site as an overall project, and you are trying to look at activity level from the project point of view.

When you take a crew-based approach, you are looking at specific crew, it could be ducting work, it could be electrical work, it could be form work, you are saying look, I want to study a specific crew and see how they are, what are their activities. And for those crew, you will then be mainly observing it only at only you can do crew based on a specific crew or you can do say formwork crew across in many locations.

That depends, so we called it the crew-based approach, or the modified crew-based approach. Now there are many ways you can adapt work sampling, the basic concept is observation and some kind of data you are getting from observation, that many adaptations you can do will come to some of that, you know as we go through this session.

Now, when I am going to look at the site, let me take the tour-based approach first, I can do a tour-based approach, as I'm walking I can do a random approach, which is, what is generally suggested, I take data on a random basis or I can take data on a tour-based support on a

periodic basis, which means look, I will make an observation every five seconds or ten seconds, some kind of period is associated.

The only reason I am recommending a period-based approaches, when we or even you start with the periodic approaches when we say random based approach, people have difficulty in what is to be randomized. So, just as an initial step, people can try periodic, we will cover both of those. Now, when you do this sampling, you look at many issues, sample size, sample time, we will come, will address the concept of sampling also as we go through, but this becomes a very important aspect.

When you take a crew-based approach, now remember, I am looking at only a specific crew, again, the preferred approach is a random sample. but when we try and suggest random sampling to many of, you know the projects, they have a difficulty in doing random sampling, so we say, look, you do periodic sampling or you even start with a continuous sample, so that you get confidence in how to do random sampling. And we kind of cover what of this, all of this as we go in.

Now, once we do sampling, what we ultimately want to do, is to classify the work into these three categories which you have covered before, which is value-added, non-value added but necessary and non-value added. So, these would be the general categories, the most broadest categories you want to come out of a work sampling.

So, all of these approaches can do these classifications, this might look a little crowded but basically any of these approaches I would like to get this. And as at a very broad level, this is my main output, when we say obviously, this correlates to waste, correct? So, if I get a lot of value-added work, you know, and you know more the value-added, I am assuming my waste is less, I am assuming my waste is less. So, as I go, as I come out with my samples and I do my calculation, I want to see, I want to see where my activity levels are, if there is a large amount of non-value added, that means my waste is more.

This category is always a question mark because of many, I mean, it is not value-added, but necessary, how can you avoid it. These are discussions and debates we need to have in many ways to reduce this would be also good, and there are some ways we are able to do that.

(Refer Slide Time: 9:28)