Ergonomics Research Techniques

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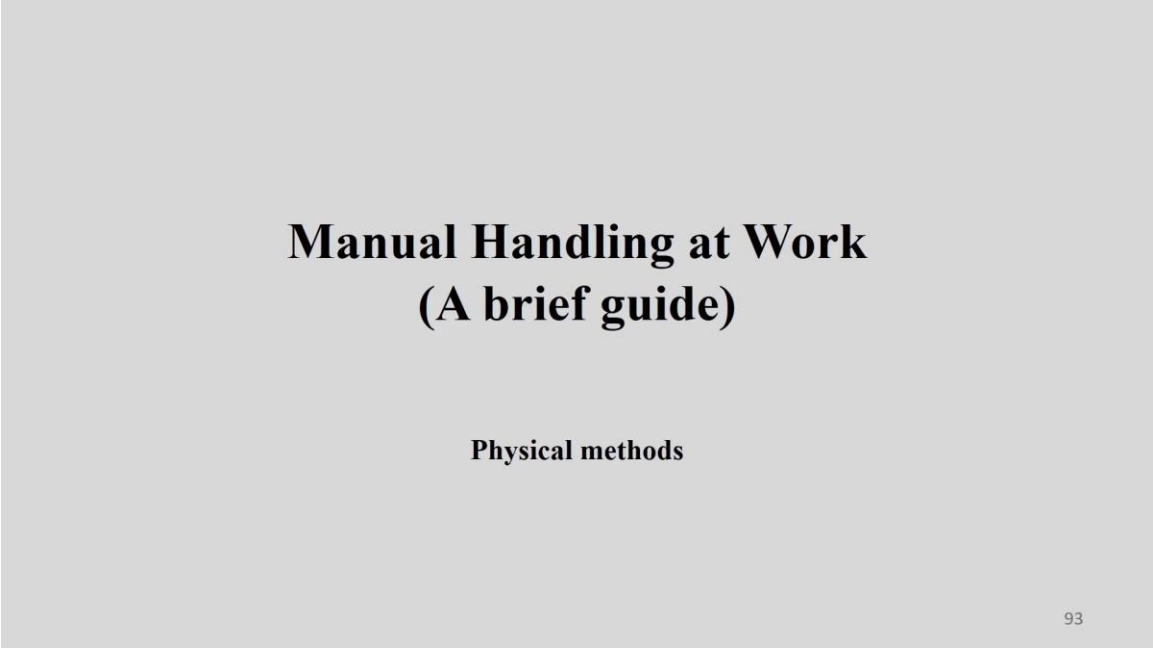
Week – 03

Lecture - 12

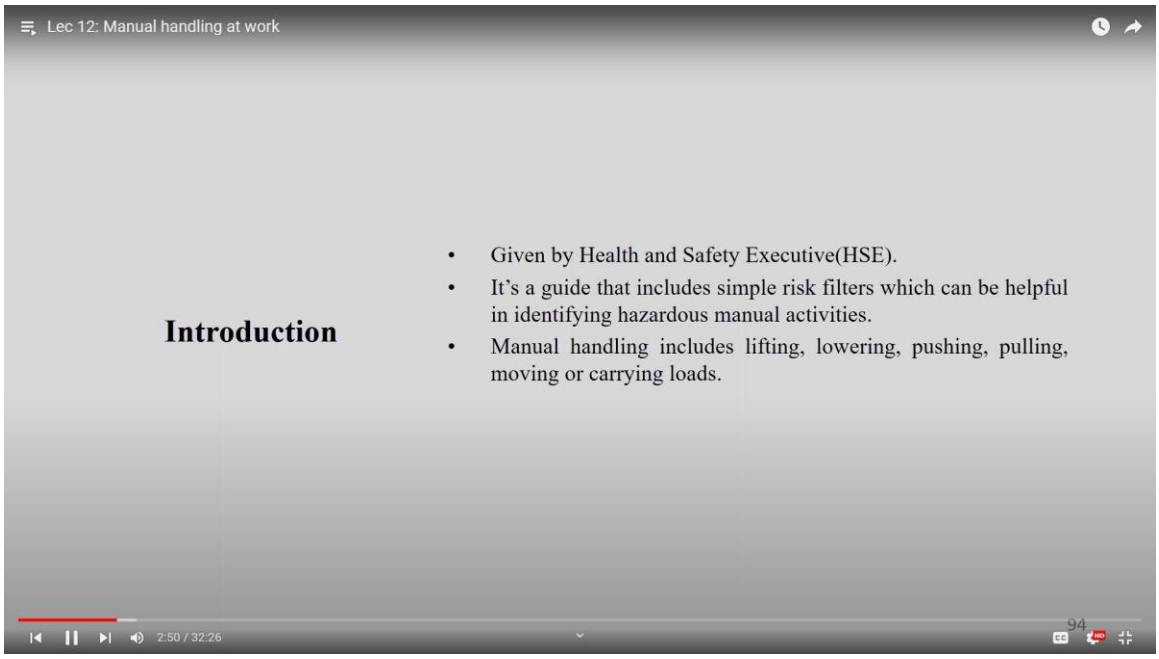
Lec 12: Manual handling at work



Welcome back. So for the past few days, we were talking about some tool which talks about manual material handling. So we discussed about NIOSH, we discussed about manual activity handling assessment chart, and all. So today, we will talk about one specific guideline which is being used by HSE for any kind of manual handling, okay, manual handling at any workplace. So manual handling, I mean to say some kind of load that people are handling at the workspace or workplace. So some small brief guideline and this type of guideline is very useful while designing the particular work environment or workplace.

So using this small guideline, you can have some kind of basic idea that how this is good and what is good for the human who is going to operate over here or what are the, if

there is no conditions beyond those factors, how we can minimize the risk. So using this guideline, we can definitely design the better workplace for manual material handling. So let us understand the basic concept of it.

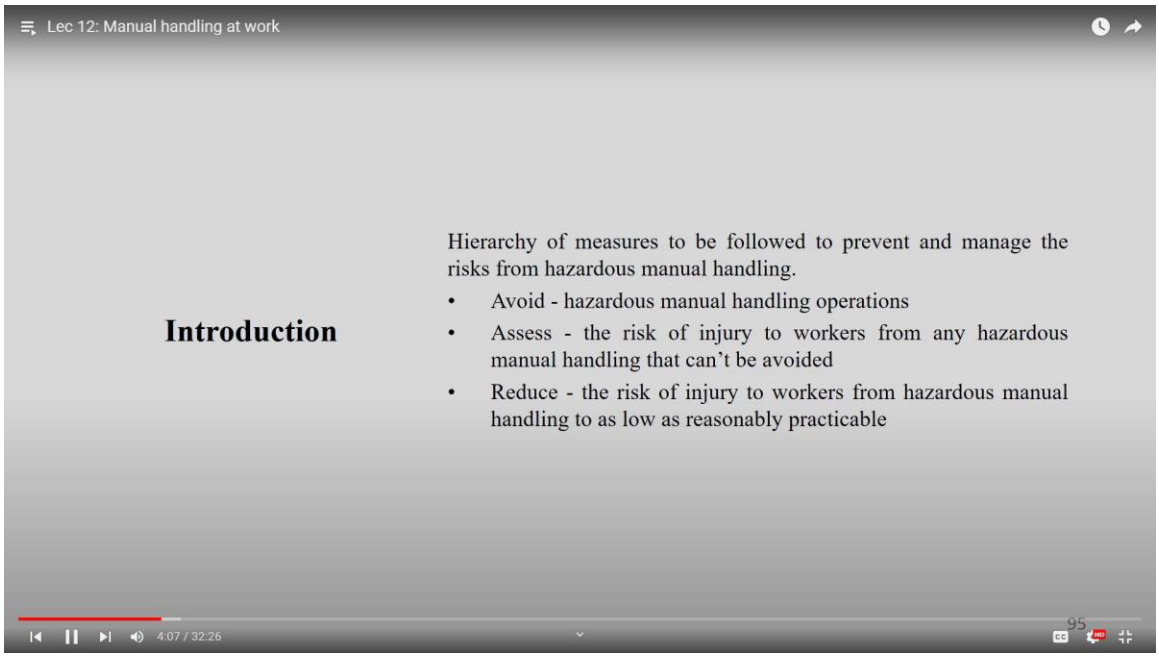


So it is as I mentioned, it is given by HSE Health and Safety Executive.

So it is a guide, it is not very specific some calculation or indexing or nothing. It is some kind of guideline. So it is a guide that includes simple risk filters. So it is going to give you some small, small filters and if your workstation is being designed through using those filters, you will be in risk-free zone. So some simple risk filters which can be helpful in identifying hazardous manual activity.

So manual handling includes over here, so MSE that we discussed earlier, they are only, we talked about load carrying, load lifting and team handling. But here we will be talking about lifting, lowering, pushing, pulling, moving, and carrying load. So, so many varieties. For the NIOSH lifting equation also you will see it is going to talk about only lifting and lowering. MSE talks about lifting, carrying and your team handling operation for any manual material things.

But here we will be getting a brief guideline about lifting, lowering, pushing, pulling, moving, or carrying any kind of load. So this is very useful method or tool to introduce in any workstation design where you are doing any kind of manual material handling.



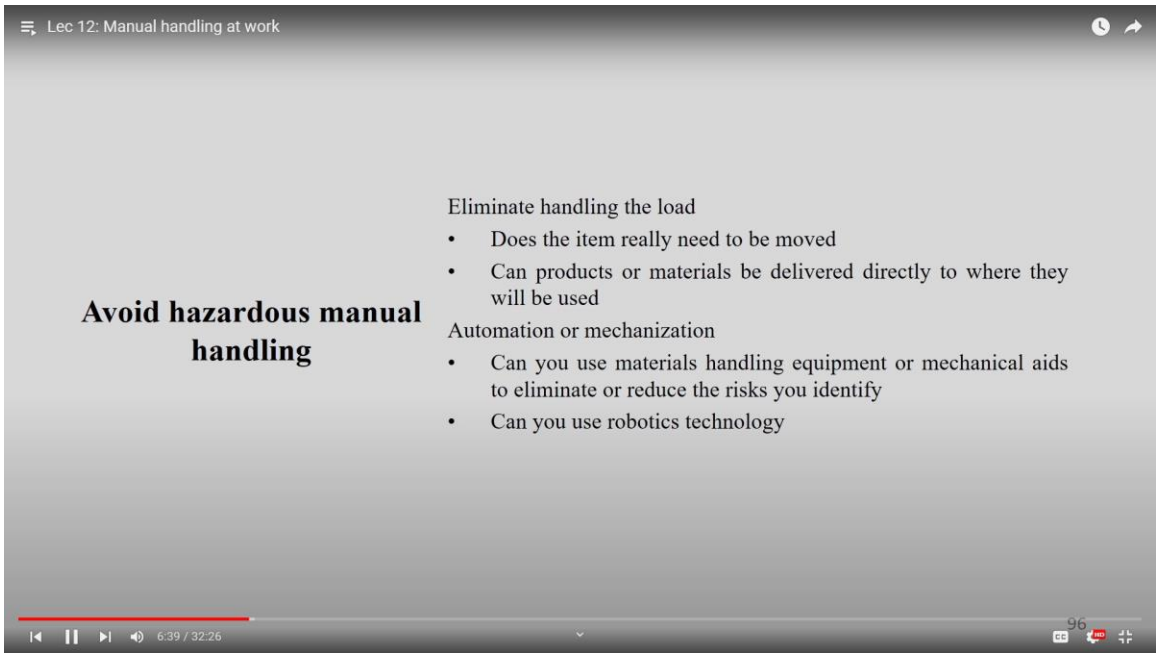
So hierarchy of measures to be followed to prevent and manage the risks from hazardous manual handling. So there we will be doing three major activities. First is avoid, what we need to avoid? We need to avoid the hazardous manual handling operation.

So we have to identify what is hazardous manual activity and we have to avoid it. Second is to assess, what we are going to assess. We are going to assess the risk of injury to workers from any hazardous manual handling that cannot be avoided. So first we are trying to avoid any kind of manual handling. Now if there is a situation that we cannot avoid manual material handling, there we need to assess what is the risk of injury is there. So that is the second.

And third is reduction or reduce. What you are going to reduce? You are going to reduce the risk of injury to workers from hazardous manual handling to as low as reasonably practicable. Here this is very important. As low as, as much as possible you will be doing, but you cannot compromise the productivity which is the major goal of any ergonomics intervention. So if your productivity goes down, then definitely employer will not accept any such intervention So you have to see the operator's point that you need to save them from any kind of risk or any kind of hazard.

However, you have to also take care that you cannot compromise the productivity. So these are the three major action that we will be discussing in this particular guideline. First, you need to avoid as much as possible. If you cannot avoid, then assess the risk. Once you assess the risk, you try to minimize it as much as possible without hampering the productivity.

So these are the three things you are going to learn.

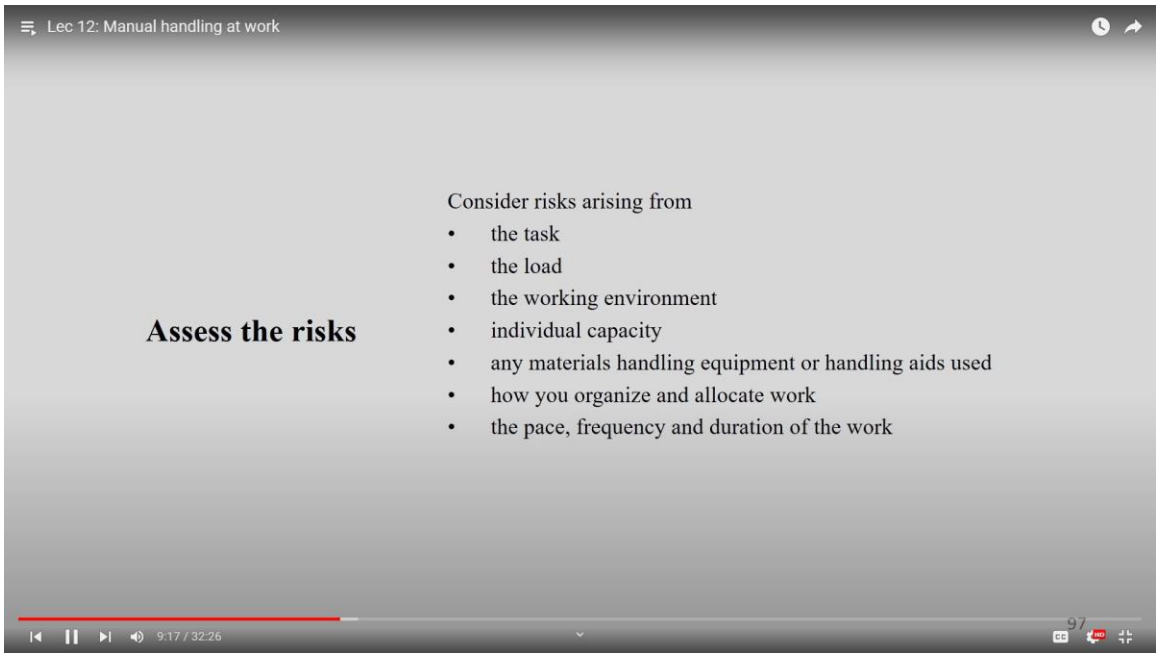


So how we are going to avoid the hazardous manual handling at any workplace or workstation, So first is to eliminate the handling load if possible. So how does the item really need to be moved? So you need to check. So these questions, these are like of, kind of scrutiny questions. So you need to check, does the item where you are doing the manual handling, so you need to check does this particular item really need to be moved. Can products or materials be delivered directly where these particular things are going to be used? So is there any necessity to handle the load or not? So first you need to assess that.

If you find the answer is no, that there is yes, it is possible that without handling also you can manage the situation, then just eliminate that. The next part is automation or mechanization. What you are going to see? Can you see materials handling equipment or mechanical aids to eliminate or reduce the risk that you are going to identify? So is it possible that here in that particular position or in that particular situation or in particular workorstation, you can introduce some kind of mechanical aid so that direct manual handling is not there. Can you use any kind of robotic technology or not? So you need to check. If it is, the answer is yes, please introduce it.

So these are the steps that you are going to follow to avoid the hazardous manual handling in a particular workstation. Now once you see yes, this is possible, then problem is solved. So you no longer is, the things is not going to bother you, so you are done. But in some cases, both the things are not possible. It is not possible to avoid or eliminate any manual material handling.

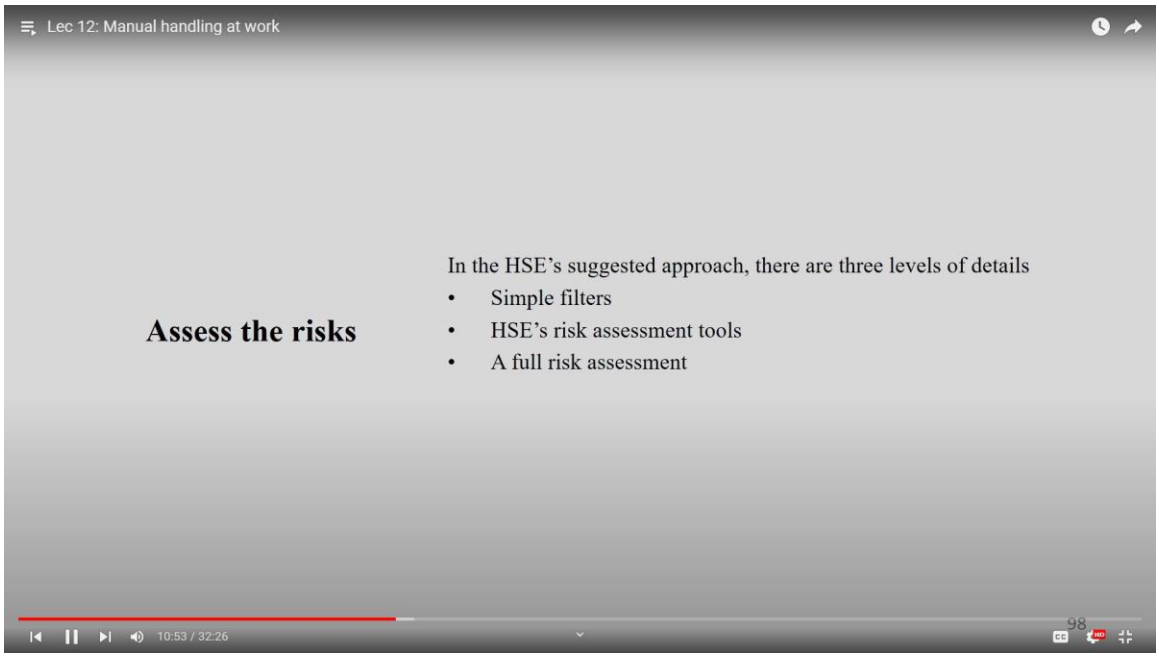
Also, it is not possible that you to introduce any kind of mechanization or use of robotic technology over there. So what? The human has to do the job.



In that case what you have to do? You have to avoid it, right? How you are going, you have to assess it, assess the risk. Now how you are going to do that? So consider the risks arising from where? So you are going to find out the causal factor of the risk at the task, at that particular load, the working environment, individual capacity, any materials handling equipment or handling aids that is going to be used, how you organize and allocate the work, the pace, frequency, and duration of work. So which one? Which one is causing the risk? So you have to find out it, you have to assess it.

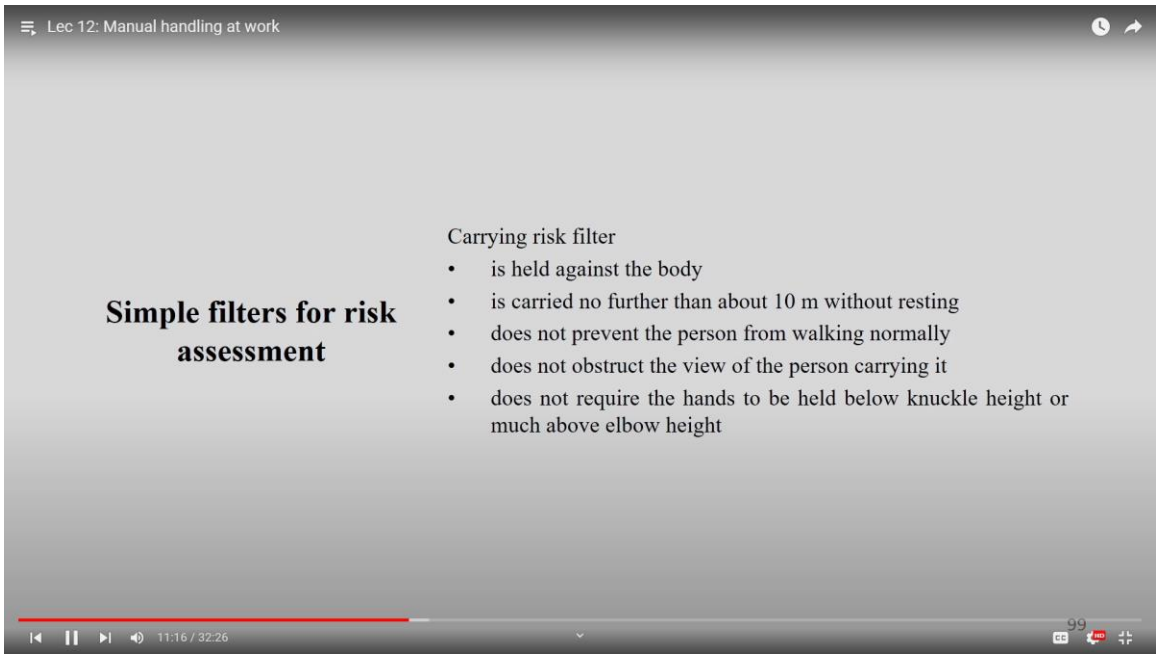
It may happen that one of the factor is present, maybe only task is present or only load is present like risk from load. Maybe something related to only with the work environment. Only maybe the individual capacity, the person himself or herself is not in a position to do the job. However, the other person may definitely can do the job.

So work rotation. Or it may happen that any combination of these factors are present. It may happen that any one of the causal factor is there or in combination. That you have to find out as the part of assess the risk.



Now next is in HSE suggested approach there are three levels of detail. One is simple filter, another is HSE risk assessment tool and the third is a full risk assessment.

Now depending on the availability of the resources, depending on the intervention type, you can choose any one of them to assess the risk. Now when I am talking about simple risk, so we have three process, right? Simple filter, then risk assessment tool and the full risk assessment.



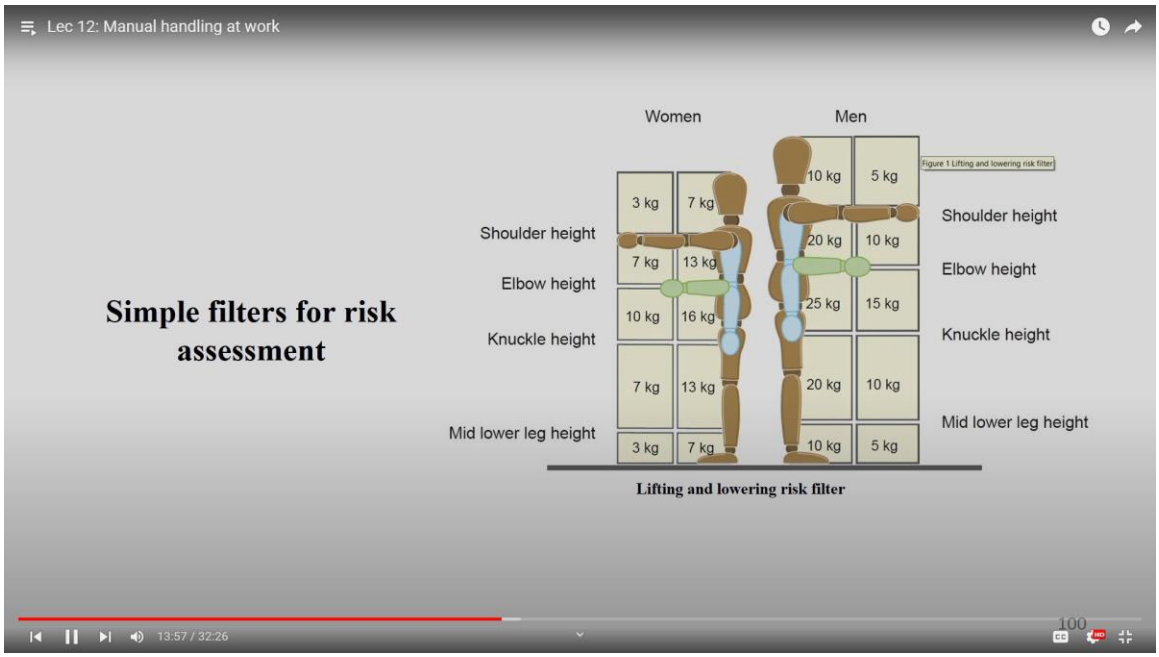
So let us discuss one by one. First is simple filters for risk assessment. Now what filters you are going to do? While carrying the risk filters, you have to find out is if that particular product or particular material is held against the body.

So are you holding it like this and walking? Is carried no further than 10 meters without resting. So 10 meters you are walking but without any break or without any rest. Does not prevent the person from walking normally. So while doing that, while carrying that particular material, the person is not walking properly. Maybe there is some restriction in walking.

So is it like this? Does not obstruct the view of the person's carrying while carrying it. So the load height should not be that more than your eye height so that you are not in a position to look in front of what is there. You cannot see the path. So is it present? It should not also require the hands to be held below the knuckle height or much above the elbow height. So the positioning of your arm, because you are holding it.

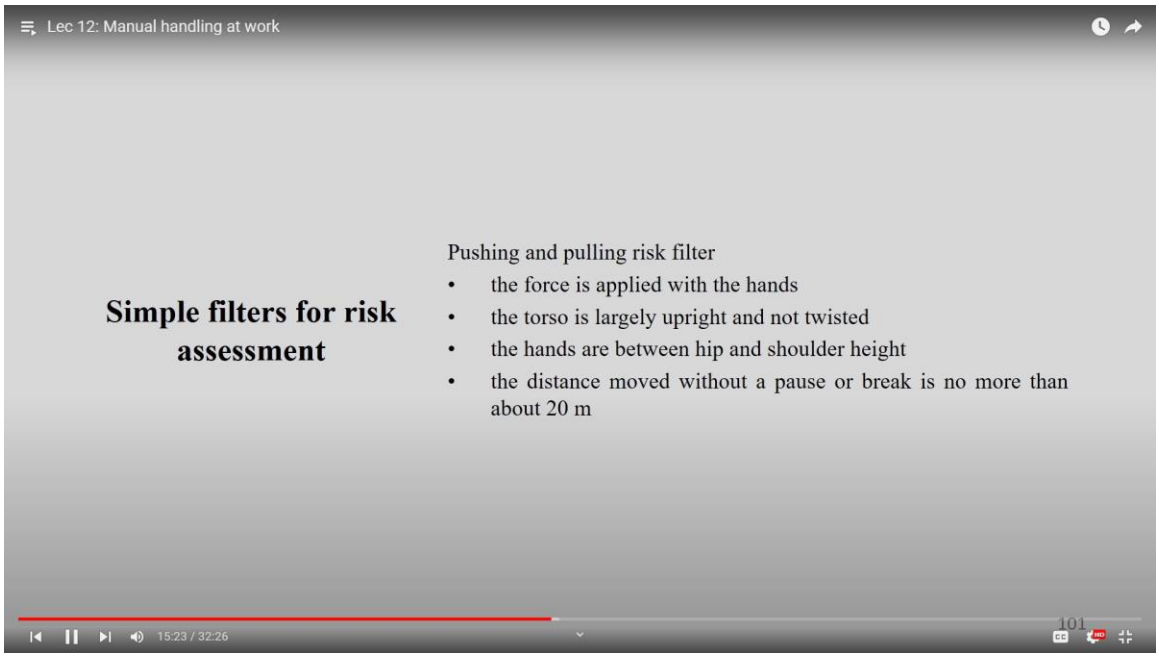
So it should not happen that you are holding any load very below, of your knuckle height, okay? So then definitely you are going to bend to hold the object or it should not happen that it is beyond your elbow height. If it is so, then you have to raise your shoulder. So those conditions you need to avoid. So if you are going to find the causal factors from that, what are the simple, barrier or filter you have to see? You have to see while carrying none of the things should be present, okay? How do you do? You have to design the place in that way so that these things are not present. So the person is doing the job, but these factors are not present.

If these factors are not present, then it becomes easy for the operator to go ahead with the work.



Now next filter is your lowering or lifting any job. So at what height? So this is the definition, this is for women if somebody, some female worker is there and if some male worker is there. So for lifting and lowering, what is the weight should be there. So if the person is, your upper arm is aligned with your body and your lower arm is in horizontal location, so in this position, you can see the amount of weight is comparatively more than if you are holding it in this position.

So this is a simple guideline that at shoulder height, at elbow height, at knuckle height or at the mid lower leg height, what should be your, the weight for women? So these are the list of the women and this is the list for the men. So you can use this filter to find out what weight he or she should carry or for the lowering or lifting job.



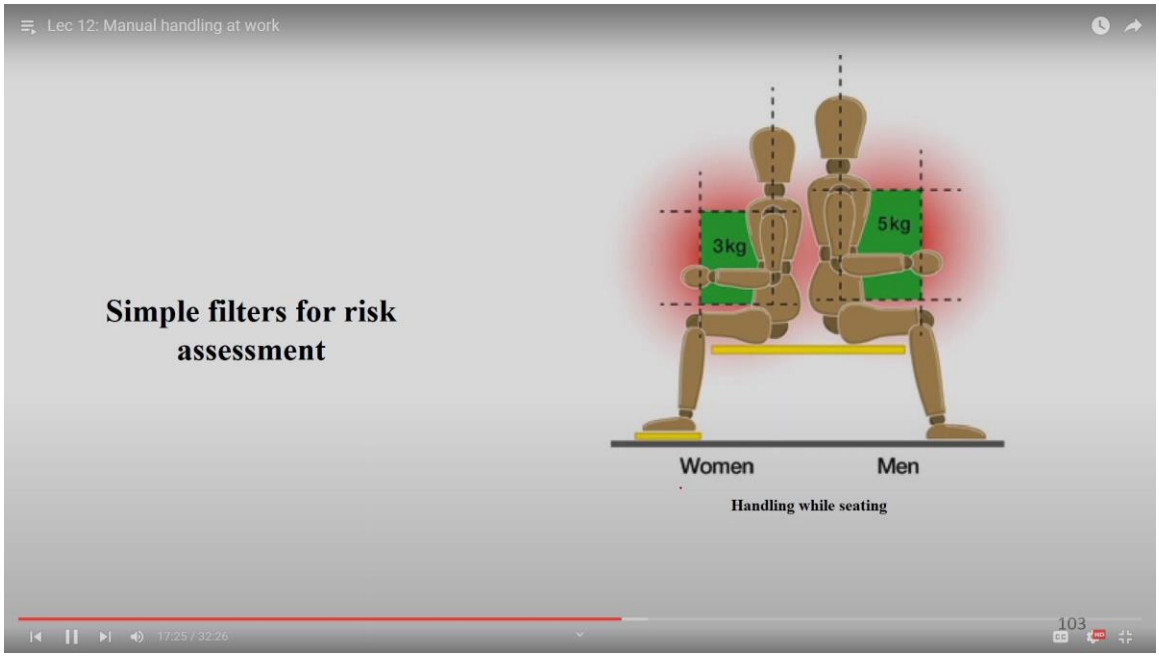
Moving to the next part that is the pushing and pulling. So first one was for carrying. This was for lifting and lowering and this is for your pushing or pulling.

What you need to see? The torso is applied with the hand, the force. The force is applied with the hand, the torso is largely upright and not twisted, the hands are between hip and shoulder height, the distance moved without a pause or break is no more than about 20 meters. So if you are doing any pulling or pushing job, these four filters, these four filters you have to give. If you cannot give these four filters, if any one of them is present, definitely the person is exposed to certain amount of risk. So you cannot avoid the material handling, pulling, pushing, you cannot avoid, the person has to do.

However, you are ensuring that while doing the pulling and pushing, the person is not exposed to any such risk. If person is getting exposed to any one of such risk, you have to think how you do redesign the workspace, work environment so that these risks are, you can avoid these risks, or eliminate these risks. So that is the simple filter for pulling and pushing.

Now moving, so this is the example that how you can do the pull, push, this is simple way, this is very acceptable posture. So you can do this pulling, this pulling, this, sorry, pushing, pushing, this possible way you can do the things, then it will be easy for someone to do the job.

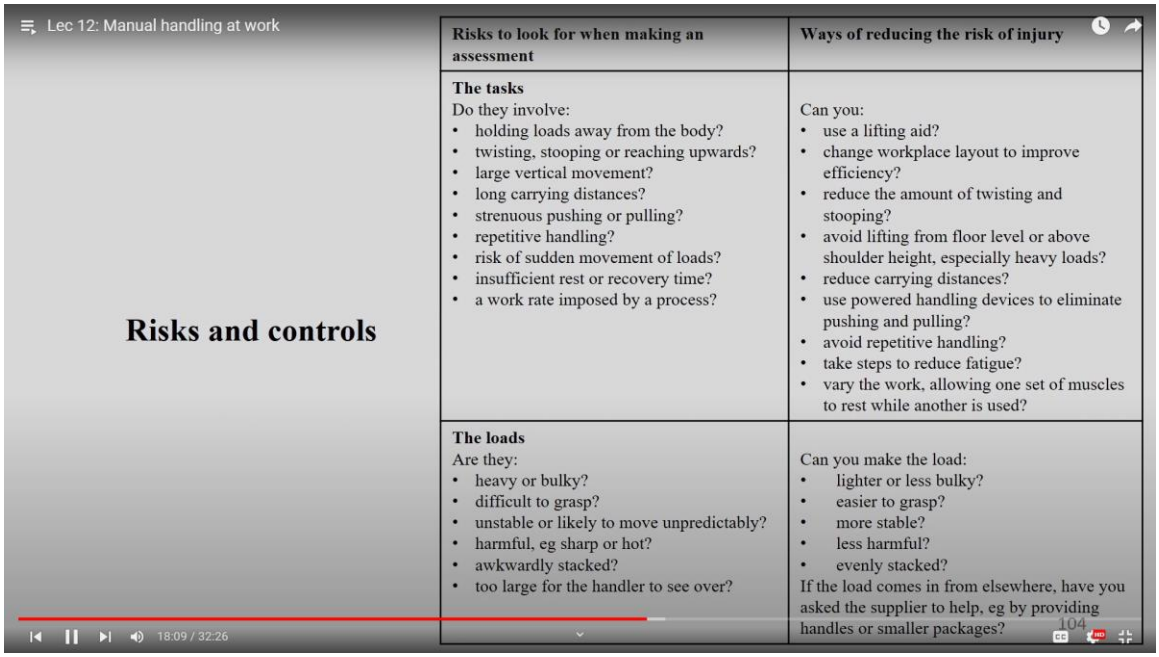
So this is acceptable. So acceptable pull and push postures.



Now this is for your, if you are handling some kind of load while sitting the job. So here again for women, it is there and for men, it is there. So you can see the load weight is

very different depending on the gender. So this is one of the factor that you can give as a filter while handling the material in a sitting condition.

Now once you have all those things what you have to do, you have to find out the risk and control.



Risks to look for when making an assessment	Ways of reducing the risk of injury
The tasks Do they involve: • holding loads away from the body? • twisting, stooping or reaching upwards? • large vertical movement? • long carrying distances? • strenuous pushing or pulling? • repetitive handling? • risk of sudden movement of loads? • insufficient rest or recovery time? • a work rate imposed by a process?	Can you: • use a lifting aid? • change workplace layout to improve efficiency? • reduce the amount of twisting and stooping? • avoid lifting from floor level or above shoulder height, especially heavy loads? • reduce carrying distances? • use powered handling devices to eliminate pushing and pulling? • avoid repetitive handling? • take steps to reduce fatigue? • vary the work, allowing one set of muscles to rest while another is used?
The loads Are they: • heavy or bulky? • difficult to grasp? • unstable or likely to move unpredictably? • harmful, eg sharp or hot? • awkwardly stacked? • too large for the handler to see over?	Can you make the load: • lighter or less bulky? • easier to grasp? • more stable? • less harmful? • evenly stacked? If the load comes in from elsewhere, have you asked the supplier to help, eg by providing handles or smaller packages?

So what we are going to do over here, we will read all these factors and we will try to understand how the design intervention can be introduced while doing this risk assessment and controlling. So risk to look for when making an assessment. So maybe the task, do they involve holding the loads away from the body? You are questioning.

So you are trying to assess it. Twisting, stooping, or reaching upward, large vertical movement, long carrying distance, strainers pushing or pulling, repetitive handling, risk of sudden movement or load, insufficient rest or recovery time, a work rate imposed by a process. So you are going to ask these questions by yourself, look from your observation as well as the input from the workers or operators and the supervisors or managers, whoever is available at the workplace. So if such things are available then you need to think, suppose I will just give an example. So holding the load away from the body. So you are holding the load away from your body.

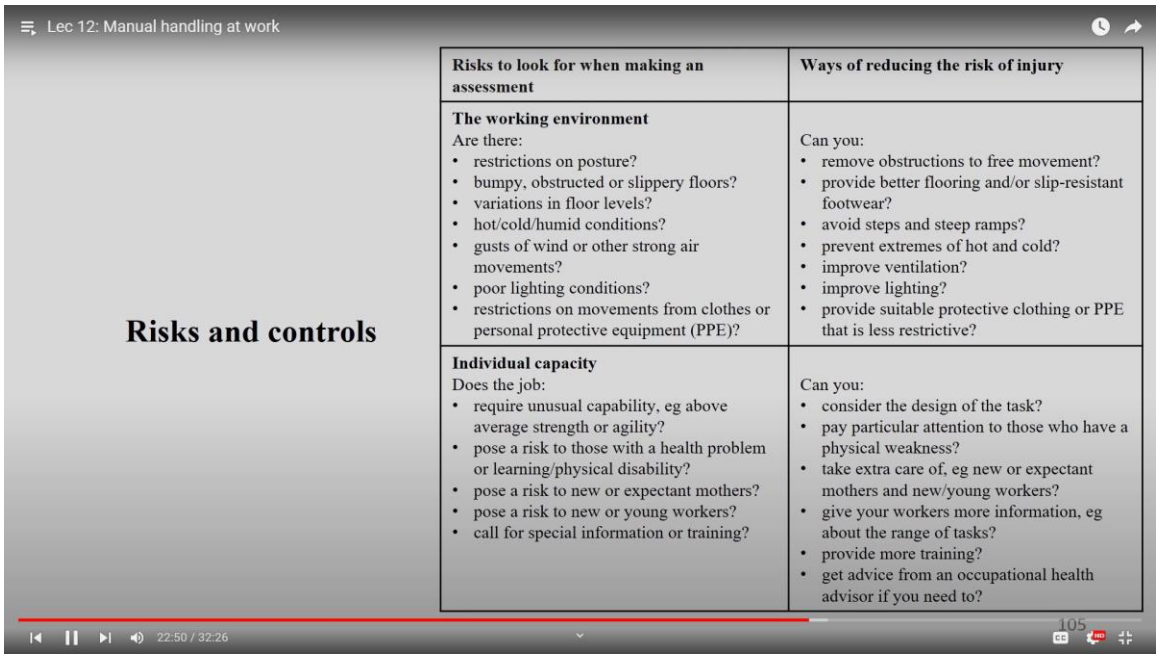
So you need to see while holding that particular load, you are occupying that posture. How you can do the changes in design so that the load can come closer to a body. You cannot avoid the manual handling, right? So that you are not going to. However, you are

trying to see what kind of equipment changes or what kind of structure, layout you can do changes so that load is coming towards body, not going away from your body.

So these are some indications. For this, this is all about task. So maybe the problem may happen with the task. Maybe it is with the load itself. So you need to check is that particular load what the person is going to handle is heavy or it is bulky, difficult to grasp, unstable or likely to move unpredictably, harmful, for example, may be sharp or very hot or very cold, awkwardly stacked, too large for handle or to see over.

So maybe you cannot see like this. Is there anything like this? If so, how you can do the changes? So in any kind of any industrial condition, it is not possible that all of them will present. Maybe one or two factors will present and which will cause lot of problem, a lot of productivity issue. So what you have to do is you have to find out which factor it is and then look at the situation and try to see how you can solve it. So maybe only heavy or bulky. So how you can reduce the size or reduce the weight?

So if you reduce the weight, then again you have to see what is the kind of manpower cost it is and then how you can you without compromising the productivity, how you can handle the situation. Now if this is so, then answers are lying here, okay? So if it is heavy or bulky, lighter or less bulky, maybe difficult to grasp, then easier to grasp, how can you make it? If it is unstable, then how can you make it more stable? So these all questions will arise and you have to take decision and then you have to see the feasibility of design intervention based on such cases. So these are the observation findings and this is how you are going to control those observed problems or observed issues. So the first one was for task, second one was for load.



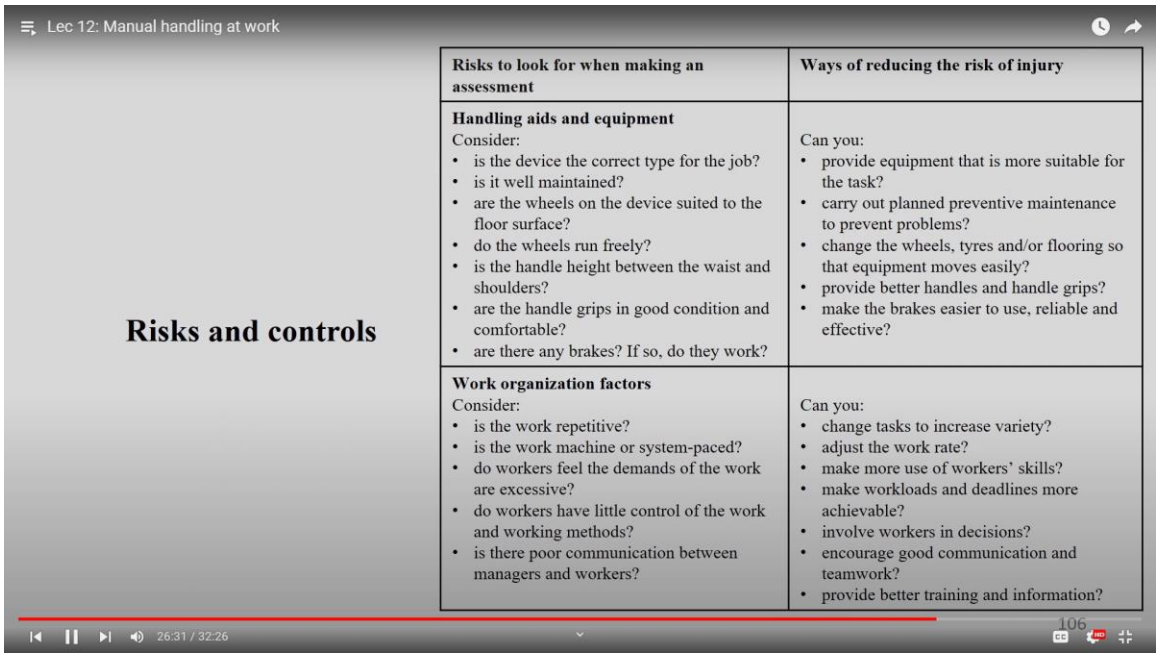
Then next one is for your working environment. What exactly you are looking for? You are looking for restriction on posture. So if doing that particular job, so handling that particular material, is it restricted? Is this particular manual handling causing the restriction of your posture? Maybe you know you cannot move your neck or maybe you cannot move your hand or maybe you need to put in a forward bending posture. So what it is? If it is like that, then what you have to do? That you have to remove the obstruction, whatever is there to free your movement. So bumpy or obstructed or slippery floors are there or not, variation in floor levels are not, hot, cold, humid conditions are present or not, what all the things.

So maybe you need to check for your PPE. So sometimes it happen while doing such kind of job, you are wearing a PPE and that PPE itself is causing a problem. So how do you design, redesign that particular PPE? So this way you can talk about the working environment. The next factor is individual capacity. It is very, very important and this is very tricky to actually address. So require unusual capability, for example above average strength or agility.

So you need to be very alert for certain cases. Maybe you need lot of muscle power because we are talking about manual material handling, So those cases, how do you do that? So while doing or designing that particular thing, you have to consider that this is the way how you are going to handle the object, okay? Pose a risk to those with a health problem or learning or physical disability. Somebody may have some kind of learning and physical disability, for them maybe this particular job is not possible to carry out. So you have to take care of the recruitment process. So to whom you are giving this particular job.

Pose a risk to a new or expectant mother. You have to take care of your physical health. If somebody is pregnant, maybe you will not be able to allow her to do that particular job. So call for special information or training. Maybe everyone can do it, but before handling that thing, you need to do give some kind of specific training so that they can do the job in a right way. So all these individual things, this is very, very important and definitely human resource department always handle this kind of things.

Also floor managers, supervisors, they take care of these kind of decisions. So if you work very closely with them, probably you will be able to give better solution and improved productivity condition. So this is the way how you are controlling those risks.



Now coming to handling aids and equipment, you have to consider is the device the correct type of the job for the job or not? Maybe you have some forklift for lifting some kind of load, but is that particular, there are varieties of forklift. So is that particular type is suitable for that particular lifting or not? You have to find out that.

So maybe some kind of mechanical aid is available with you to handle the job, but still there is a problem. Why? The equipment itself is not correct choice. So you have to find out that. Is it well maintained? Maybe it is there, but it is not well maintained, so it is not functioning.

So you need to see that. Are the wheels on the devices, whatever is available suited to the floor surface or not? Okay, so you have to check. So maybe in a slippery floor, what type of wheels? Where is, you need more gripping. However, the equipment that you are using to transport or handling the things may not have that kind of gripping and it may cause some kind of accidents. So you have to check what is the condition.

If it is not maintained properly, maybe very old wheels. So which lost their grips over the period of time. So do you need to change them or not? Do you need to do the maintenance of this particular equipment or not? Are there any breaks? Suppose you are walking, pushing something with a particular cart and there is some obstacle, you need to break it. So is it available or not? Or you need to control it manually. So what is the kind of condition with those kind of scenario and about that particular equipment? You need to answer them. Work organization factor which is very important because you know when you are talking about ergonomics, we are talking about human factors, human interaction.

So organization always comes into picture. So is the work is repetitive or not? Because if it is, you are doing it continuously, then definitely there is a chance to neglect some point or maybe there is a monotony or maybe there is due to repetition, the overuse of some group of muscles. So is the work machine or system is in a paced condition? So if it is, you are doing it very hurry, in a hurry condition, then maybe there is a chance of accident. But if you are doing it in a particular pace, definitely you are getting a time to understand, recognize the situation, react on the situation and doing the job. So cognitive process is in place, physical capacity is also in place. In those cases, it is less hazardous, but if it is not, time is not, is a constraint, in that case maybe you are going to get some kind of difficulties.

So do workers have little control of job or working method? So is like, is it just controlled by somebody? Suppose in an assembly line something is happening. So if the speed of the conveyor belt is not under the control of the operator, then maybe there is the speed of that particular load handling is depending on the speed of the conveyor belt. If it is not possible to control, maybe there can be some kind of accidents. So how do we have control over it? So what is the kind of mechanism available towards this? So you need to get answer and have to screen the process accordingly. Again I am repeating one point over here, all these varieties of points will not be present in a single workstation or workspace.

Maybe one or two of them will present and that is your intervention. So it is not that, it is expected that any workspace is not so hazardous, then if it is so hazardous the person will not be able to work there. However, there will be some condition which is hazardous, you have to identify only that. So you do not expect that when you are going to assess the workstation, you will get three or four such condition. No, maybe hardly one or two.

So that is the kind of expectation you should have. So this is the way how you use this particular guideline to evaluate your workstation and accordingly, you can do the control measures. So this is all about manual handling guideline given by HSE. Fine? Thank you.