Human Factors Engineering
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Lecture - 53
Recommended Shift Work Schedules

Today we will discuss human factors principles and design of shift work.

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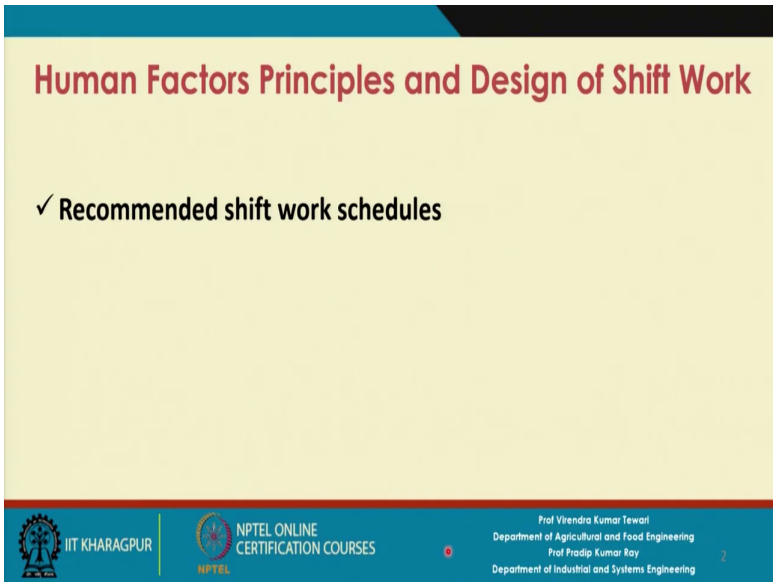

I have mentioned the typical work schedules for the day time work that cannot be applicable for the night time work

Many companies have actually implemented the special type of the shift work schedules.

Today we will be discussing recommended work schedules.

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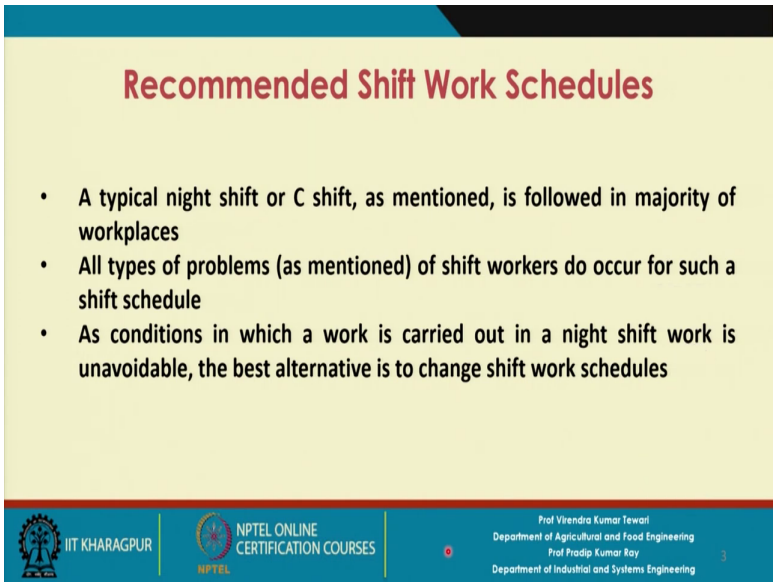

One thing many companies have understood is that daytime work schedule is not suitable for night time work. Initially, this understanding was not there. That is why the same kind of the work schedule was proposed or being used for the night time work.

You will find that may be 20 to 30% of the workforce were becoming sick and unhealthy. All types of problems (as mentioned) of shift workers do occur for such a shift schedule. As conditions in which a work is carried out in a night shift work is unavoidable; the best alternative is to change shift work schedules.

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We will come to know three types of the special types of work schedules. We will come to know what are the advantage of each special type of schedule, what are the characteristic features and why this special type of shift schedule we will have the minimum disturbing effect on diagonal cycle.

We will design the shift work schedule in such a way that there is minimum negative effect on the diagonal cycle. So, you have to constantly validate your model at the individual level.

Out of many special shift work schedules recommended, three types of work schedules are proposed, validated and adopted.

For validation, there are some experimentations you have to do and once you start implementing then regularly you get the feedback information from the workers, operators who are directly affected and then only you can conclude that whether the validation is followed by adoption and ultimately it is to be adopted. An adoption in the sense that maintaining the health maintaining the fitness and the physical work capacity.

Many European countries like Germany or Scandinavian countries they have adopted these conditions. The 3 specific reasons are as follow:

One- there will be if you adopt this particular special kind of shift schedule at your workplace, there will be minimum negative effect on health work capacity and fitness.

Two- minimum negative effect on performance.

Three- there will be maximum level of adoption by shift works.

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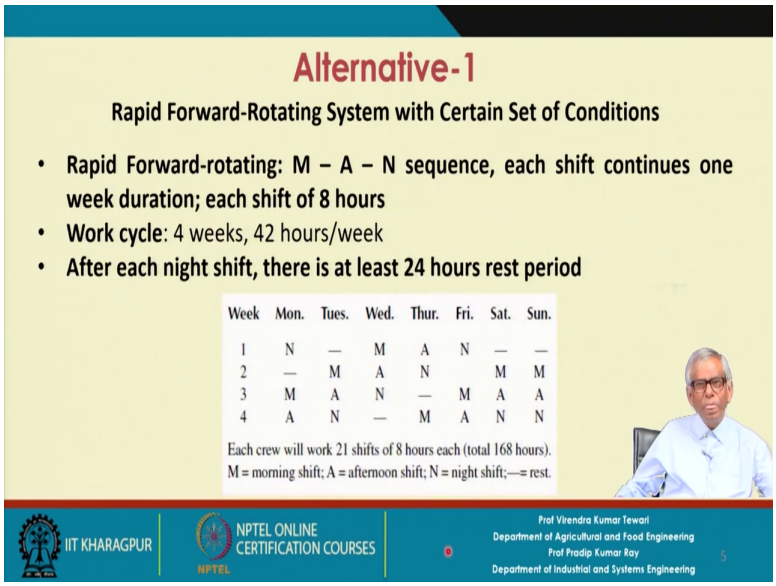

Now we have 3 alternatives.

You have to go for experimentation and decide which one is applicable under what conditions and you will adopt that alternative which will ensure the minimum changes in the existing system. As soon as you try to implement a new system certain change you have to make. There is a cost associated with it and this cost is referred to a systemic cost-essentially cost of implementation. You have a different system; now you have to assess that if I adopt a particular alternative, there should be minimum number of changes against a particular alternative.

Alternative one is referred to as rapid forward rotating system. For example, when you talk about the shift schedule; morning followed by afternoon followed by night and it is forward rotating and first rapid means, there is a work cycle, now if suppose the cycle completes within 4 weeks then it is referred to as the rapid forward rotating system.

In certain cases, you change the system and you come back to the initial state say after 8 weeks. It is referred to as the slow forward rotating system.

In certain cases we will find that the person is working for the next 5 or 6 days on the night shift and it may happen that the next shift he is asked to join in the evening shift it's very difficult for him or her to adapt.

After night shift, the next shift should be the morning shift; and once the night shift and morning shift is over, the next shift should be afternoon shift. If this rule is violated then it will cause a serious negative effect on diagonal cycle.

If this effect continues for long time, the person is more likely to becomes sick because of the wrong design of the shift schedule. So, in rapid forward rotating the cycle repeats from morning followed by afternoon, evening and night shift.

This is the sequence and you have to follow this sequence and should be for one week.

When you go for ergonomic designing of a work system all extreme cases you have to first identify.

Rapid Forward-rotating: M – A – N sequence, each shift continues one week duration; each shift of 8 hours.

Work cycle: 4 weeks, 42 hours/week.

After each night shift, there is at least 24 hours rest period.

Week	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Sun.
1	N	—	M	A	N	—	—
2	—	M	A	N		M	M
3	M	A	N	—	M	A	A
4	A	N	—	M	A	N	N

Each crew will work 21 shifts of 8 hours each (total 168 hours).
M = morning shift; A = afternoon shift; N = night shift;—= rest.

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This is one special type schedule the shift schedule. Workers are mostly adjusted to daytime schedule and this is the characteristic of a day type schedule and certain conditions like 3 consecutive night shifts (in week 4 followed by week 1) unavoidable.

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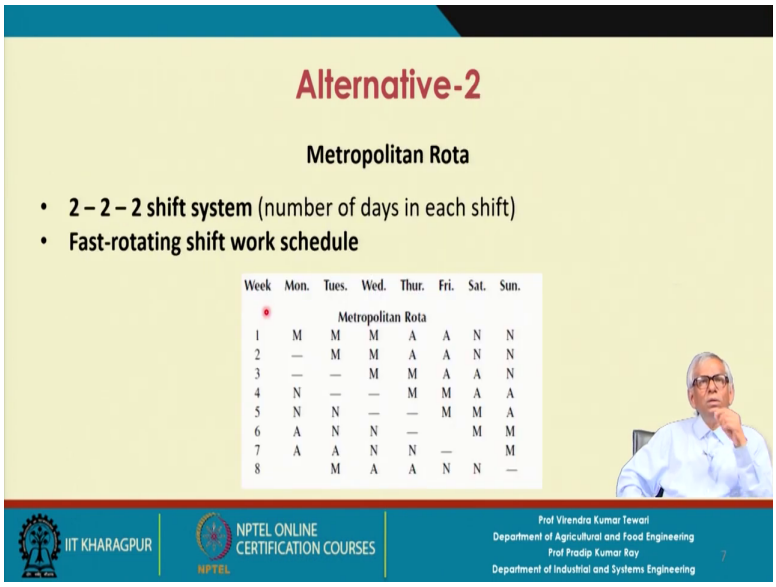

Second alternative is called Metropolitan Rota. This is 2-2-2 shift system; that means, suppose you start with and is a fast-rotating shift work schedule, you start with week-1. There will be two consecutive morning shifts followed by two consecutive afternoon shifts and two consecutive night shifts. Then there is a rest day that is the Monday. The

second week starts with Monday and Monday is a rest day again. For better understanding refer to the table given below:

The cycle repeats the same pattern repeats after 8 weeks. So, many times it is also referred to as a slow rotating schedule.

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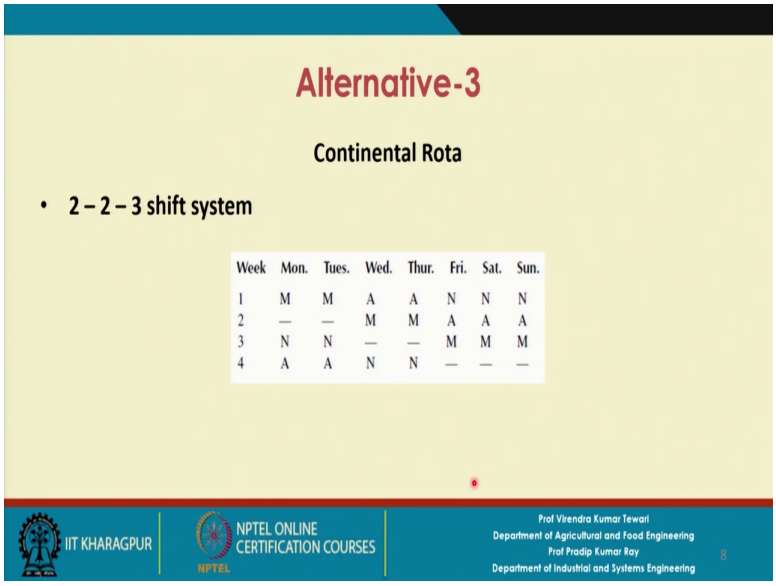

There is another special kind of shift schedule that is 2-2-3 shift systems called as continental rota. Suppose you start with the morning shift. Two consecutive mornings followed by two consecutive afternoon and three consecutive nights shift and then the next one will be morning.

Then in next week there is two consecutive mornings shifts followed by three consecutive afternoon and two night shifts.

Week	Mon.	Tues.	Wed.	Thur.	Fri.	Sat.	Sun.
1	M	M	A	A	N	N	N
2	—	—	M	M	A	A	A
3	N	N	—	—	M	M	M
4	A	A	N	N	—	—	—

Cycle is basically of 4 weeks. So, every after 4 weeks the cycle repeats.

Three consecutive holidays is there. For fourth week which may also affect your level of acclimatization.

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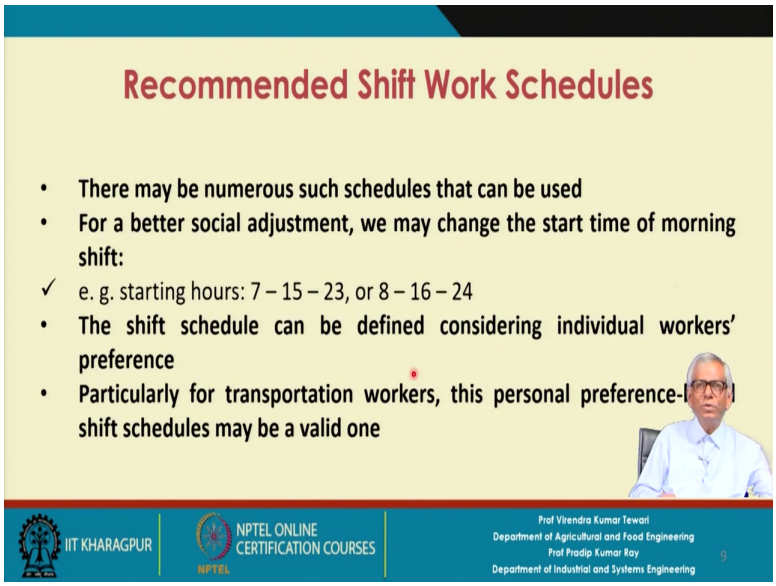

There may be numerous such schedules that can be used. For a better social adjustment, we may change the start time of morning shift: e. g. starting hours: 7 – 15 – 23, or 8 – 16 – 24. The shift schedule can be defined considering individual workers' preference. Particularly for transportation workers, this personal preference-based shift schedules may be a valid one.

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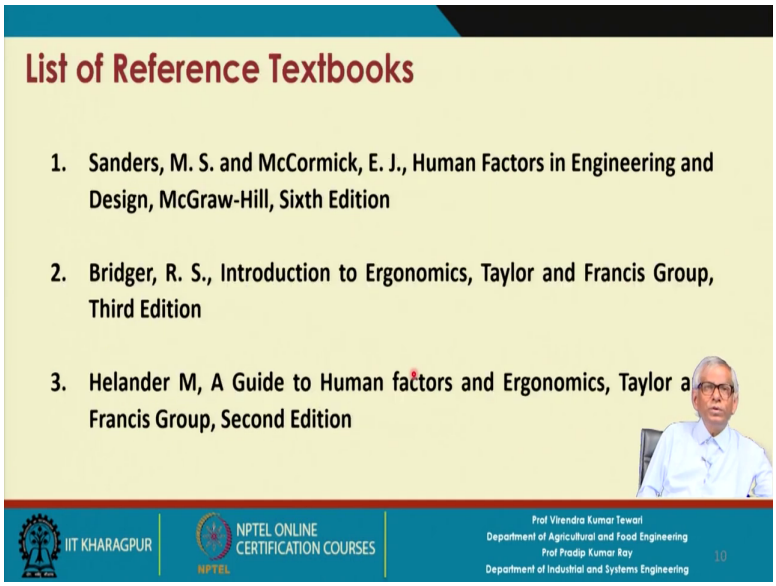

All the important issues related to shift work design ergonomically have been covered in these three lecture sessions.

Point number 1- what kind of problems you might face if you do not the propose the special type of the shift schedule for your workers for at your workplace for different kinds of jobs?

Point number 2 - while you design the shift schedule you have to be first very particular about the selection of the jobs because all sorts of jobs cannot be carried out or cannot be scheduled during night time.

And point number 3- you have to assess the existing shift schedule.

How is the performance of a person working in a night shift, working in day shift? The performance may be varying in some cases and you will find for certain individuals the performance may remain constant.

But those are very special cases and you try to identify their characteristic features and try to update your data. For example, say the 500 is persons working, 50 persons or 100 persons are most suitable for carrying out work during night time. Ultimately, you have to identify them and then you check their performance.