Structural Health Monitoring (SHM)
Prof. Srinivasan Chandrasekaran
Department of Ocean Engineering
Indian Institute of Technology, Madras

Lecture – 32
Damage identification by visual Inspection method – Part 2

Let us pick up certain important issues.

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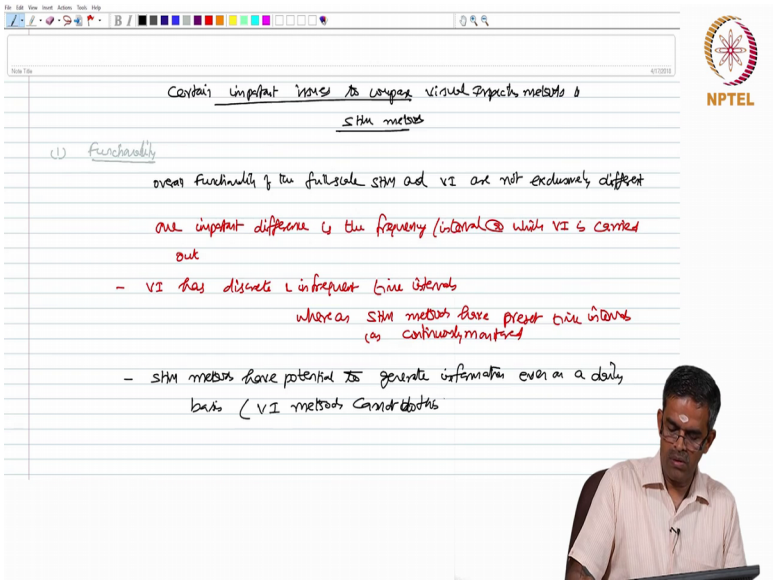

The one which we discussed earlier were general issues, certain important issues to compare visual inspection methods and structural health monitoring methods. Let us say to take some critical issues and compare them. The first issue which requires comparison is functionality.

If you look at in real sense, overall functionality of the full scale SHM and visual inspection are not exclusively different. But, one important difference is the frequency or the interval at which visual inspection is carried out.

Visual inspections have discrete and infrequent time intervals. Whereas, structural health monitoring methods have preset time intervals or they may be continuous monitoring continuously.

So, therefore, structural health monitoring methods have potential to generate information even on a daily basis. Visual inspection methods cannot do this.

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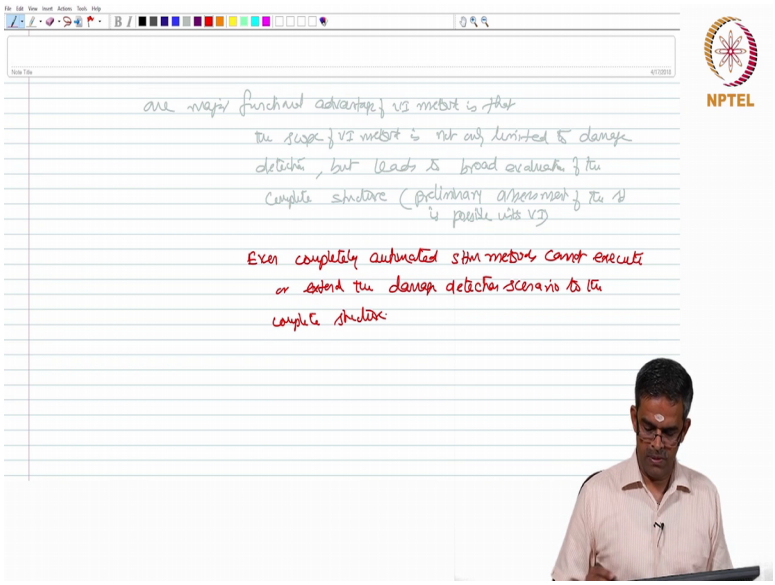

But interestingly, one major functional advantage of visual inspection method is that the scope of visual inspection method is not only limited to damage detection.

But it also leads to broad evaluation of the complete structure; that is a preliminary assessment of the structure is possible with visual inspection. But interestingly, even completely automated SHM methods cannot you execute or extend the damage detection scenario to the complete structure.

So, as far as the functionality is concerned, there are some pros and cons of using visual inspection methods in comparison to the standard conventional structural health monitoring methods. Further let us talk about the second issue which is the cost.

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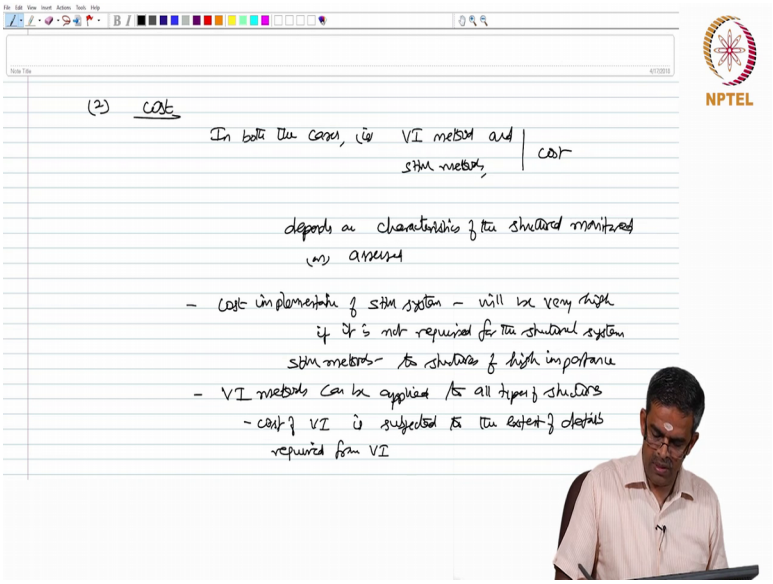

In both the cases that is visual inspection method and structural health monitoring method, cost essentially depends on the characters of the structured analyst monitor or I should say assessed. However, cost implementation of SHM system will be very high; if it is not required for the structural system. It means SHM methods are applicable generate structures of high importance; I mean all structures cannot be and need not be monitored.

Because, it is very very expensive, it is prohibitively high. Whereas, visual inspection methods can be applied to all types of structures; cost of visual inspection is subjected to the extent of details required from the visual inspection.

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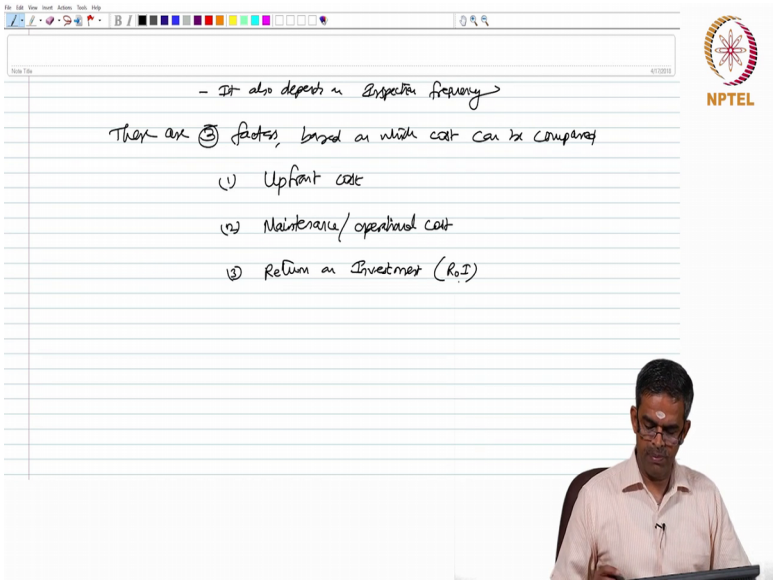

It also depends on the inspection frequency. There are three factors based on which cost can be compared. One is the upfront cost; second is the maintenance cost. I should also say operational cost; third could be the return on investment. Let us now compare and contrast both the methods based on these parameters and see how do they argue upon.

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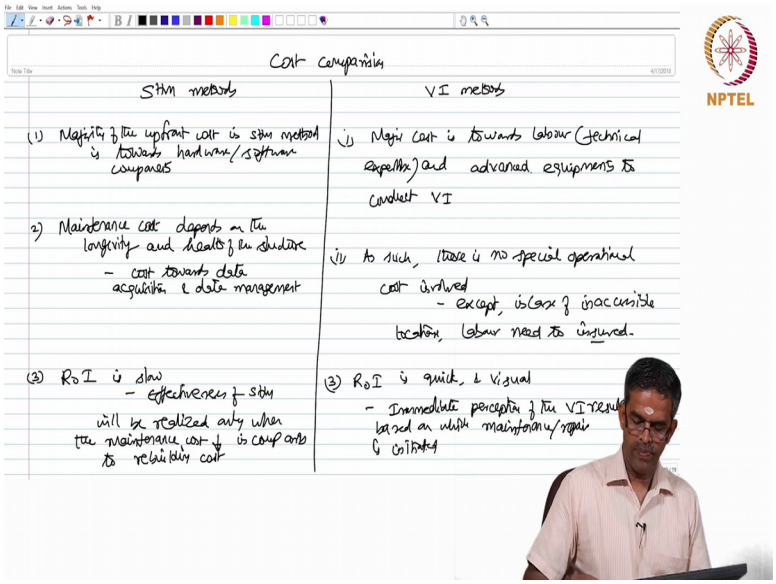

Let us talk about structural health monitoring methods on the left hand side and Visual Inspection methods on the right hand side. We are comparing the cost, I should say here cost comparison.

Firstly, majority of the upfront cost in SHM method is towards hardware and software components; that is the first issue here. In this case the major cost is towards labour. I should say even technical expertise of the labour and use of advanced equipments equipments to conduct visual inspection.

The second issue here is maintenance cost depends on the longevity and health of the structure. That is the cost is essentially towards data acquisition and data management. In this case as such there is no special operational cost involved except in case of in accessible locations like offshore structures, the labour need to be insured that may be slightly a marginal increase in operational cost when we do it for special kinds of structures.

The third point could be the return on investment is slow in case of SHM. This is due to the fact that the effectiveness of SHM will be realized only when the maintenance cost goes down in comparison to rebuilding cost. In this case the return on investment is quick and visual. This is due to the fact that there is an immediate perception of the VI results based on which maintenance or repair is initiated.

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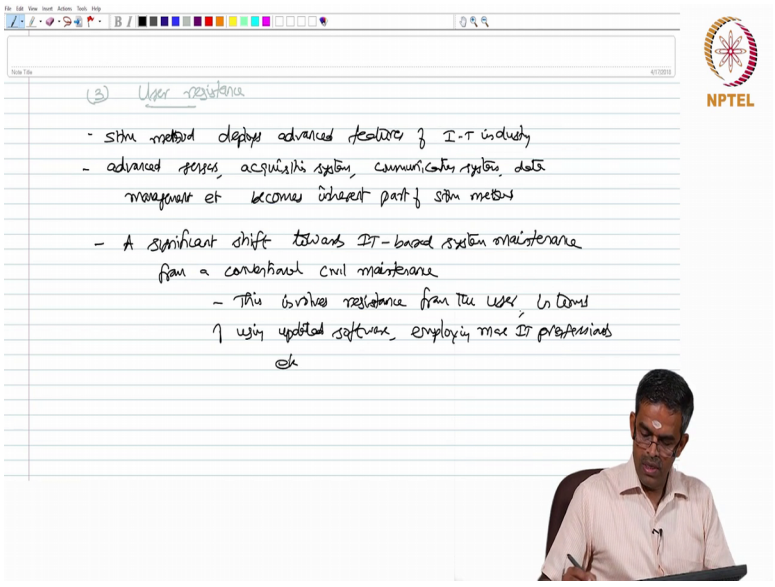

The third point based on which the visual inspection and SHM can be compared is user resistance. It is very important to note that SHM method deploys advanced features of IT industry ok; advanced sensors, acquisition systems, communication systems, data management etcetera becomes inherent part of SHM method.

Therefore, it is important that there will be a significant shift towards IT based system maintenance from a conventional civil maintenance. So, this involves resistance from the user in terms of using updated software, employing more IT professional's etcetera.

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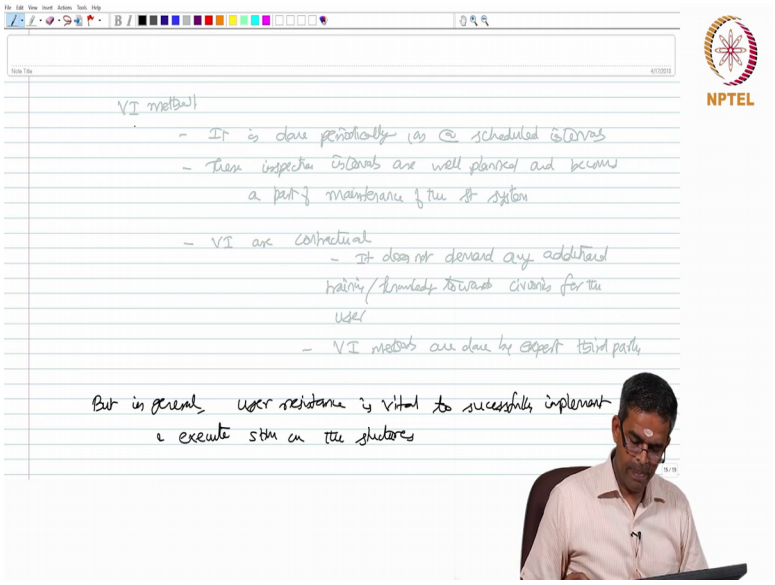

On the other hand, if a compare visual inspection method, it is actually done periodically or at schedule intervals. These periods of inspection intervals or well planned and becomes a part of the technical maintenance of the structural system. More or less visual inspection are contractual.

It means it does not demand any additional training or knowledge towards civionics for the user because usually visual inspection methods are done by expert third party. But in general, user resistance is vital and important to successfully implement and execute SHM on the structures. So, one cannot ignore; similarly, the user resistance in case of any one of the methods.

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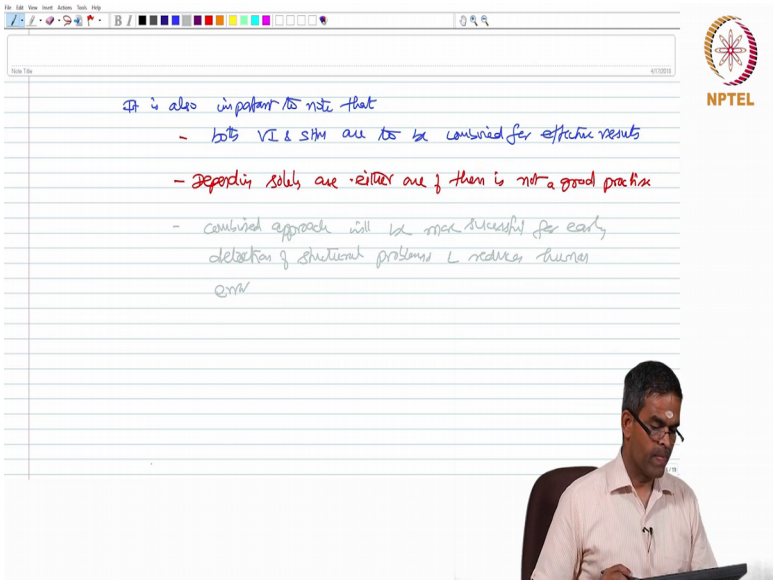

Further, it is also important to note both visual inspection and SHM methods are to be combined for effective results. Depending solely on one on either one of them is not good; it is not a good practice. Combined approach will be more successful for early detection of structural problems and reduces human error.

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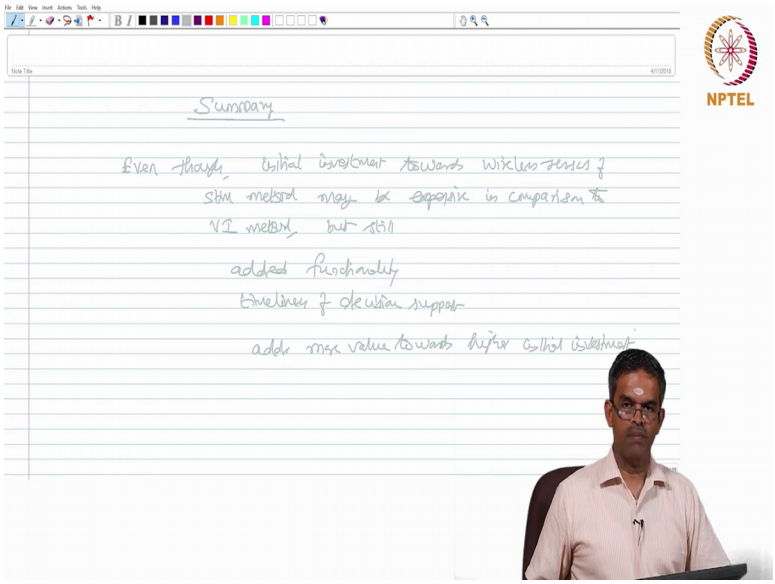

Further as a summary, let us have the statement even though; initial investment towards wireless sensors of SHM method may be expensive in comparison to visual inspection

method. But still, added functionality and timeliness of decision support, adds more value towards higher initial investment.

So, that is the final statement we have in comparison between visual inspection methods and conventional structural health monitoring methods used for damage identification in structures.

Thank you very much and bye.