**Structural Reliability**
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**Lecture –85**
**History Definition and Scope (Part - 03)**

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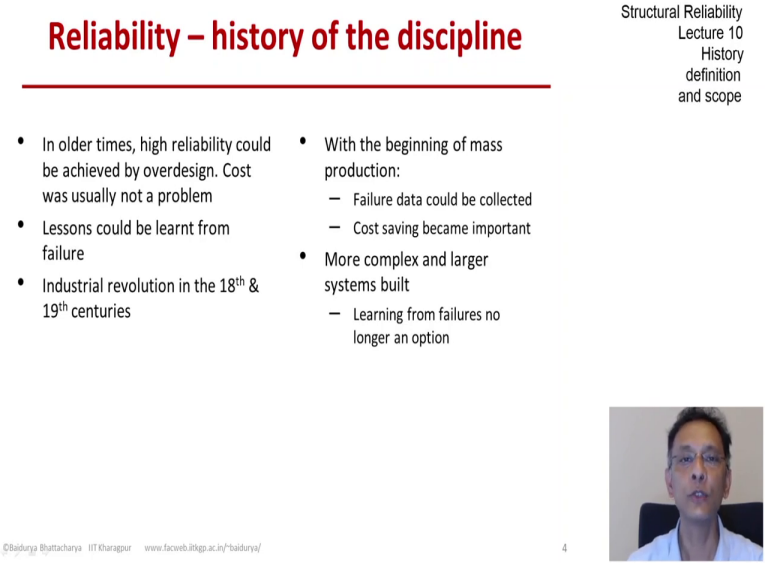


Although the term reliability is intuitively understood by builders producers manufacturers in all ages past or present. The need to study the subject formally gains momentum with industrialization with mass production and in particular the events of the Second World War because in older times a high reliability could simply be achieved by over design. It would cost more but in most instances the owner did not mine so much.

And because the pace of innovation was slow lessons could be learned from failure that started to change with the industrial revolution in the 18th and 19th centuries and with the beginning of mass production when many, many copies of the same item could be built or manufactured. Failure data could be collected in good numbers cost saving per unit became important and also more and more complex and larger systems started to get built to the point that learning from failures.

Because the failure consequences could be so high that no longer remained an option. In fact we saw some of the hints of these issues when we discussed in the very beginning of this course the some of the noted failures the Ronan point collapse, the comet crashes some of the teething problems with the lithium ion batteries they all come under similar situations.

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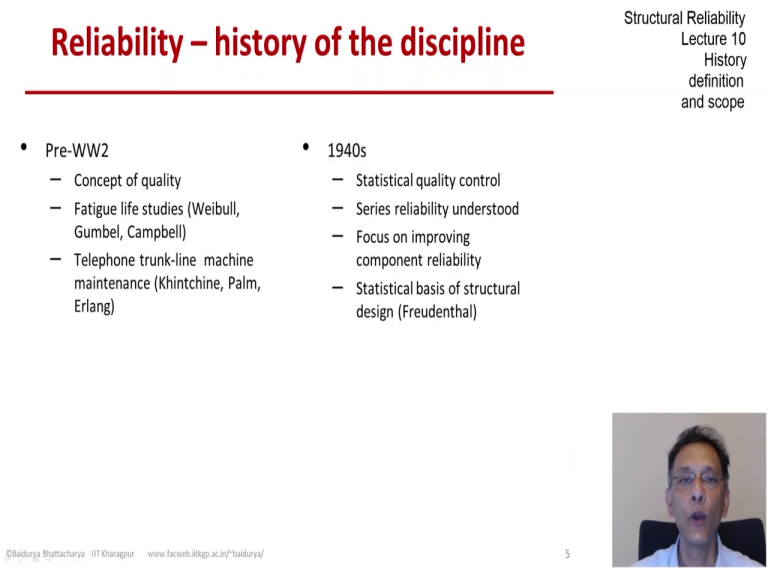


Looking at the history of the subject in the early parts of the 20th century we do see the concepts of quality coming up more and more studies of fatigue life of telephone equipment maintenance which were known to be affected by randomness by famous pioneers that we read about today. And that led to more formal studies during the Second World War formal studies of quality, a formal understanding of system reliability as a series configuration to the point of improving component reliability to improve serious system reliability.

Those were driven by the military industry but while that was happening in the area of civil engineering and structural engineering in particular notably professor Alfred Fryden thought he understood the role of uncertainty and what you call ignorance we will see in the next slide as one of the drivers of a probability based measure a probability based approach to the safety of structures which later we started calling structural reliability.

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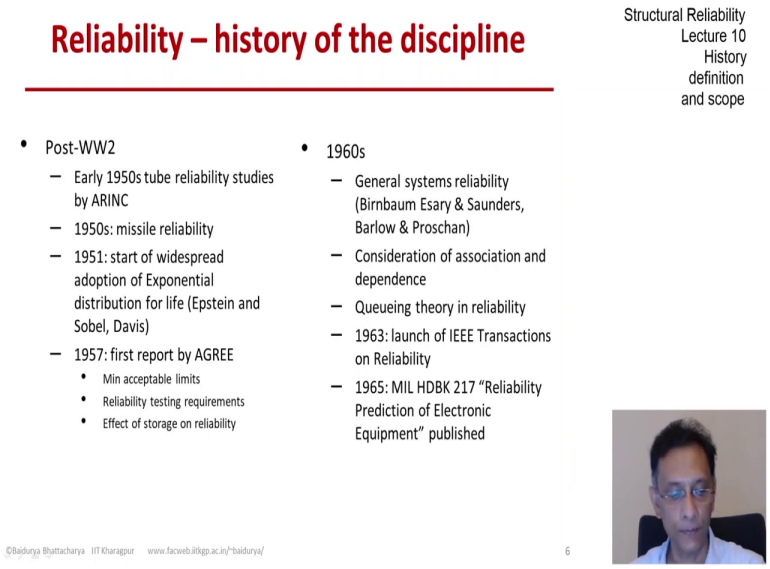


So, after the war the development of the subject continued to be driven by various stakeholders notably the military, the aviation industry, and the electronic industry. In the 60's we see tackling of more complex topics which as you see in the in the 50's the exponential distribution was the standard for life distribution that changed in the 60's there were studies of dependence association advanced topics such as queuing theory in reliability a much better understanding of systems reliability of various types of systems.

And we see our publications the launch of the IEEE transactions on reliability and the Mil Handbook 217 in 1960.

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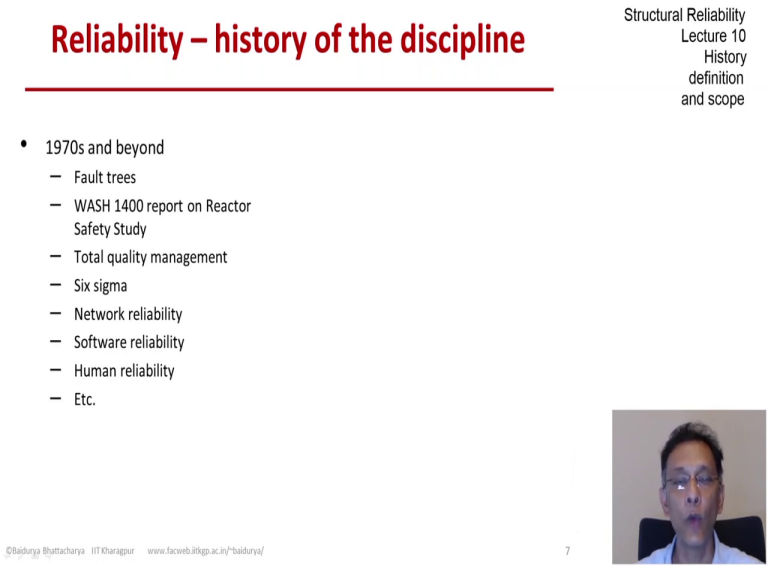


The subject continued to develop through the 1970's and beyond the WASH 1400 study on reactor safety was a watershed event and subsequently the more modern concepts of total quality six sigma based quality assurance network reliability, software reliability and human reliability they are all now studied as part of theory of reliability.