Structural Reliability
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Lecture –03
Introduction (Part - 03)

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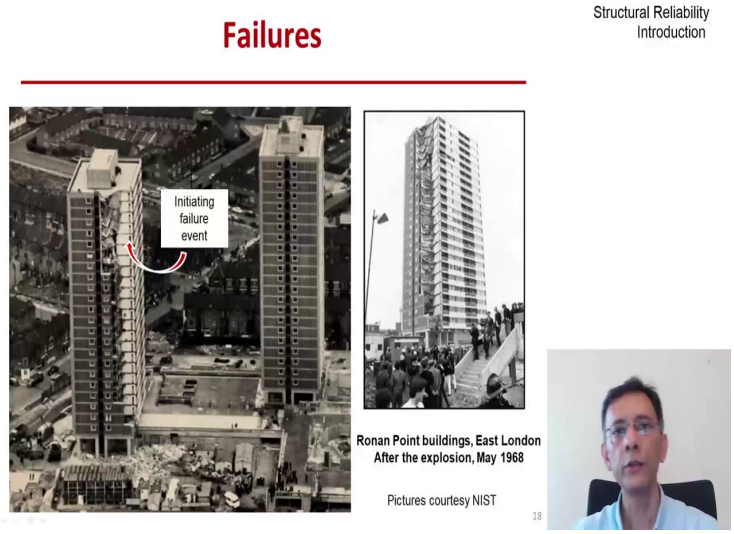

You see on your screen the Ronan Point buildings these were 22-story tall apartment buildings in East London completed in 1968 with 5 apartments per floor they promised efficient and affordable urban housing. It was a precast construction rather new at that time and chosen due to ease and speed of construction. So, every element the walls the floors the staircases they were precast and each floor was supported directly by the walls in the lower stores.

And the pallets were lifted by crane the wall and floor systems were fitted together through slots and were bolted and the connections were filled with dry packed mortar. So, in essence the structure was like a house of cards and with no redundancy for load redistribution in the event of a local failure and which is unfortunately which became very clear just two months after opening on the morning of 16th of may 1968 when a lady on the 18th floor was trying to make some tea for herself and there was a gas explosion.

And the explosion blew out the outer panel on the 18th floor and the loss of that single bearing wall caused the progressive collapse of floors 19 through 20 to above in that corner and then a second collapse occurred when that falling debris caused collapse of floor 17 through ground below. So, you can see that the entire southeast corner of the building is sheared off four people died but the investigating team concluded that the explosion was small and they estimated that the pressure was less than 10 psi.

And one of the reasons they cited was the lady who lit the fire did not suffer in hearing damage. So, the buildings were demolished in 1984. But this event brought into sharp focus the idea of progressive collapse and then led to many positive changes in the design and construction practices for structures.

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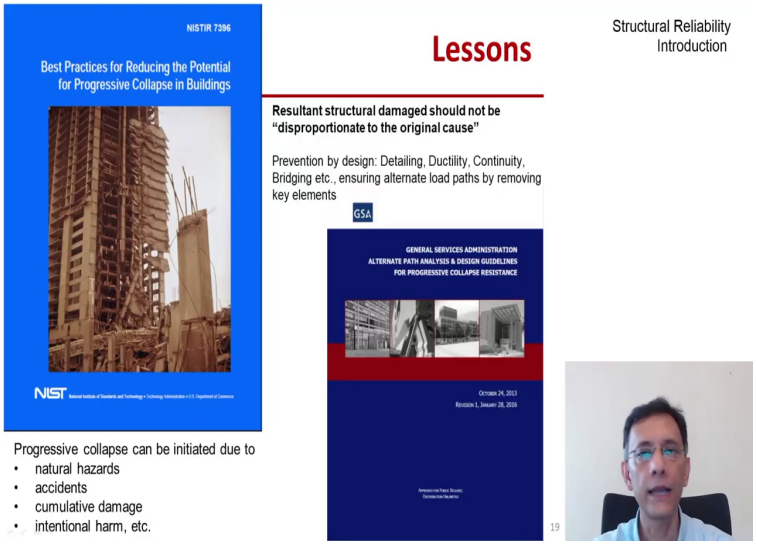

So, now we understand that progressive collapse can be initiated not only by accidents like the kind we saw but can be through natural hazards like earthquakes. By cumulative damage like a member fracture caused by fatigue crack growth also intentional harm. And so, although this sort of accidental load is not explicitly considered in all industries they are in the nuclear and offshore industries.

For example for buildings most modern design codes these days now ensure progressive collapse prevention by providing rules on detailing, on ductility, on continuity, bridging and looking for

alternate load parts by removing key load-bearing members. So, to code the euro codes the structures must withstand abnormal events without being damaged to an extent disproportionate to the original cause.