

NON DESTRUCTIVE TESTING – A STATE OF ART

Introduction :

Non-destructive testing as the name suggests involves conducting a test to estimate a particular parameter of the tested media without causing any destruction to the media tested. Tests on concrete are discussed in this paper. Partial destructive tests are also kept out of the discussion for obvious reasons. Looking back to the history of NDT it would probably begin in early 20th century, when tests on concrete surface were conducted to determine the soundness of the concrete. The first being the sound test, where concrete was tapped by a harder material and the sound generated was assessed. Similar to the test that our coconut vendor does to decide if the coconut is pure water bearing or with some amount of coconut. The technique of tapping concrete member to determine its integrity is a direct test used from the time concrete is in use. As development took place, apart from soundness, the need to evaluate other properties also gained importance. With the need came the related research. Rebound test, pull out test are the basic tests that were direct development of this need to understand concrete better. Correlations to establish a relationship between rebound number and strength of concrete was evolved. All early tests were related to strength parameters only. So we have Ultra pulse velocity correlated to strength and grade of concrete. With the advent of various construction methods, higher grade of concrete and speed of construction, the needs also changed. The needs included assessment of concrete to be able to evolve properties strength, integrity and durability parameter. Changes in design philosophy included durability criterion, so testing also evolved to determine durability parameters. Assessment of porosity, permeability etc all falls under a method to address this necessity. With the advent of computers, numerical analysis technique also improved. Equations that could not be solved prior to computers, now solutions to such equations became easy to evolve. Also growth in our understanding on various physical properties and principles helped in development of these testing techniques. Behaviour of waves in various mediums and its propagation probably is most used technology today in NDT. Also use of nuclear scatter helped evaluate properties related to material properties like density. Integration of various technologies and techniques today made it possible to imagine an application and evolve a test to determine this property. Today the growth of NDT is basically dependent on development in communication, computers, physics and related technologies. Remote control of projects and structures to behave in appropriate manner to counter the impact of the excitation is not so far from reality. These constitute what is the realm of intelligent structures. The bridge toll station shall be provided with data remotely based on inputs from weather monitoring stations, strains developed in critical elements, wave force, wind speeds, vibrations generated by particular vehicle, etc all this can provide inputs to control flow and loads to be accepted on the

bridge. A scenario where in the bridge is closed for traffic as the wind speed is too high and gale conditions exists is a reality today.