

Numerical Modeling of Prestressed Concrete Cylinder Pipe (PCCP)

ABSTRACT:

Among the failure causes of PCCP, wire breakage is one of the key factors that weaken PCCP structural integrity. According to the experience of Washington Suburban Sanitary Commission (WSSC), it is generally believed that the PCCP will fail if it has about 100 wire breaks in the middle, or 40 wires breaks at the pipe ends. In this research, structural analysis is conducted to investigate the relationship of PCCP structural integrity with the number and location of broken wires. Since PCCP pipes are different in diameter, material properties, working pressure, buried depth, etc., it is necessary to carry out structural analysis of PCCP to check whether the pipe is in good condition or not. Then, decisions regarding repair, rehabilitation or replacement can be made based on the results of analysis. This research presents structural analyses of PCCP with gradual wire breaks. The effect of different number of wire breaks on the structural integrity of the PCCP is analyzed and its characteristics are concluded. In the Finite Element Model used in this paper, the internal pressure, gravity of soil, and pipe are considered as loading conditions. The structural details such as concrete core, steel cylinder, prestressing wires are simulated to reflect the structural performance.

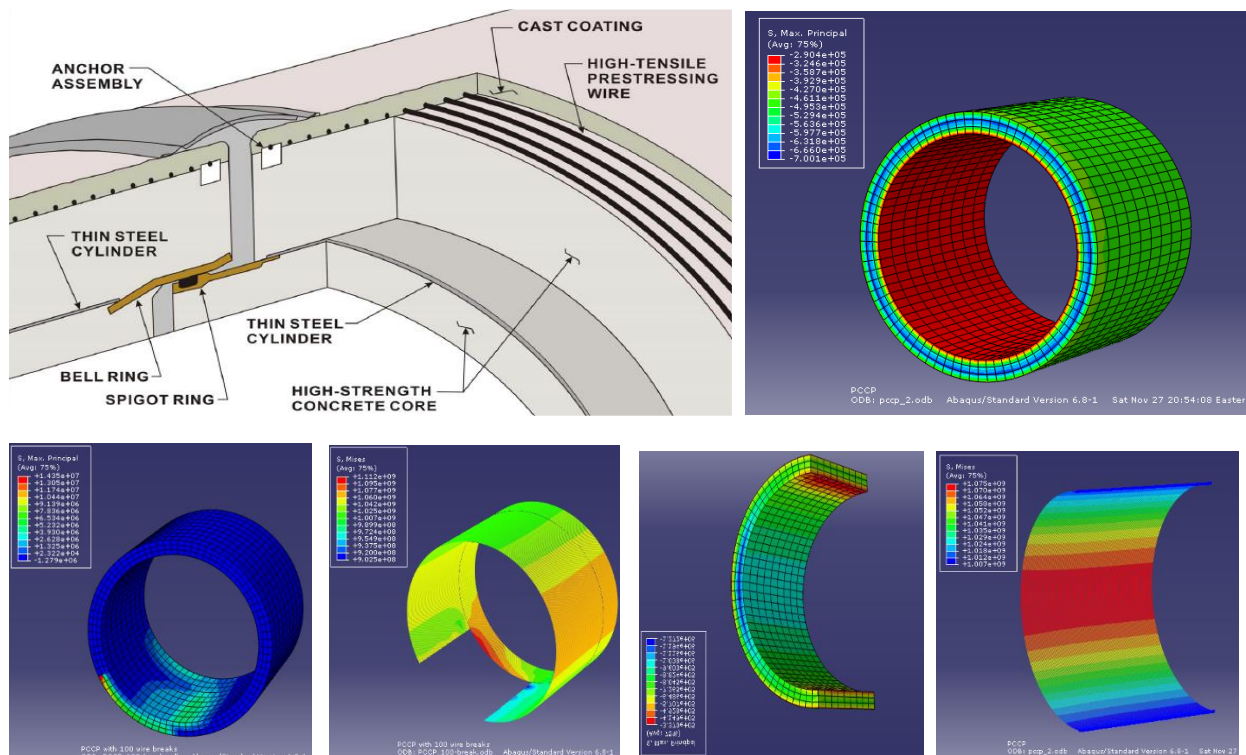


Figure 1: Numerical Modeling of Prestressed Concrete Cylinder Pipe

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