

STRUCTURAL ASSESSMENT OF CIP TANKS

Mushir Khan

ABSTRACT

Maintenance management is often key to the ongoing operation of mechanical plant and consequently, this principle is well understood and often well implemented in the Mechanical Engineering discipline. In other fields, however, such as Infrastructure or Structural Engineering; with the possible exception of bridges and dams, maintenance management is often ill-defined or even totally neglected. This is possibly due to the long-term service life of these structures. In recent years, especially in the industrial sector and, in particular, in the minerals industry, the requirement for maintenance management has increased. This is reinforced by the legal responsibilities to inspect the structures for safe use, and from a financial perspective to protect the assets. In addition, with the higher demands placed on the current infrastructure arising from economic pressures, it is often not viable to replace these assets. It has thus become imperative to assess the existing structures for continued safe use and to establish the deterioration acceptance criteria. The acceptance criteria are established such that there is minimal risk of failure which would result in operational loss or even loss of life.

This paper presents a case study on a CIP (Carbon in Pulp) steel tank. The tank has been in operation for 20 years and is exhibiting signs of deterioration. The paper discusses the following:

- Data on the wall thickness measurements taken on the tank shell
- Statistical analysis to establish the deterioration pattern in relation to the varying design wall thicknesses
- A Finite Element Analysis of the tank to establish the effects of the observed deterioration
- Conclusions and recommendations regarding the acceptance criteria
- Proposed repair methodologies.

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