

# **The research and application on on-line non-destructive testing and evaluation technology for large-scale pressure equipment**

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Large-scale pressure equipment such as boilers, pressure vessels and pressure pipes are widely used in power plants, petroleum and chemical plants. In order to ensure their long-term safe operation, a large number of online non-destructive testing and evaluation techniques are required. Damage modes of pressure equipment include corrosion thinning, environmental cracking, material cracking and mechanical damage. The final manifestation is the wall thickness reduction of the pressure equipment shell and the surface cracking and internal damage caused by stress. The strength of the pressure equipment shell is reduced, resulting in leakage or explosion failure. Therefore, the core problem of realizing the non-stop testing of large pressure equipment is how to quickly detect the corrosion of the shell and the surface crack and internal damage of the weld with the anti-corrosion layer under the condition of partial removal of the insulation layer. This paper reviews the results of the research and application of online non-destructive testing technology for large-scale pressure equipment developed by the authors over 20 years. These technologies include acoustic emission testing techniques crack of initiation and propagation of crack, surface crack eddy current testing techniques based on complex planes, metal magnetic memory testing techniques for stress concentration, magnetic flux leakage testing techniques for corrosion of pressure equipment shells, pulse eddy current testing technology of corrosion under insulation layers and magnetostrictive ultrasonic guided wave testing technology with insulated pipeline.