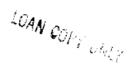
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UNIVERSITY OF CALIFORNIA, SAN DIEGO

Residual Strength and Grout Repair of Dented
Offshore Tubular Bracing



A thesis submitted in partial satisfaction of the requirements for the degree of Master of Science in Engineering Sciences (Structural Engineering)

bу

Troy E. Gillum

Committee in charge:

Professor James M. Ricles, Chair Professor Frieder Seible Professor David Benson

ABSTRACT OF THE THESIS

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Professor James M. Ricles, Chair

Thirteen steel tubular braces of various diameter to thickness (D/t) ratio were tested to examine the effect of dent damage on their residual strength and to assess the effectiveness of internal grout and grouted steel clamp repair The braces were subjected to either direct axial loading or techniques. combined axial and bending loads through an applied load with an end eccentricity of 20% of the specimen diameter. The thirteen specimens were tested in five series, including: the testing of non-damaged specimens subjected to combined loads; dent damaged specimens subjected to direct axial or combined loads; internal grout repaired damaged specimens subjected to combined loads; and a grouted steel clamp repaired specimen subjected to combined loads. These tests allowed a direct evaluation by a comparison of the The direct axial tests showed a pronounced loss of ultimate test results. The strength was further reduced for specimens subjected to the strength. The degradation of ultimate strength occurred due to a combined loading. rapid growth of the dent, leading to a plastic hinging in the dented section. Both repair techniques reinstated each specimen's ultimate strength to the strength by arresting dent growth. original non-damaged ultimate Modification of existing damage strength equations and development of new ones were found to reasonably assess the residual strength. Nonlinear finite element analysis also showed promising results in predicting specimen behavior.

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