



Investigation in to the behavior of buckling and post buckling of the braces in jack case due to punch through of a jack up

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1. Introduction

As a very useful and movable tool for drilling operations of oil and gas industry in shallow water, jack-up units have been used widely for several decades. While originally designed for use in shallow waters, there is growing demand for their use in deeper waters and harsher environments. In general, a jack-up structure consists of a hull and three K-lattice legs resting on spudcan footings. Each leg has three chords. When the structure is towed to site and preloaded to the desirable penetration, the hull is then jacked up. During the preloading of a three leg unit, ballast water is gradually added to the preload tanks until the weight of the unit simultaneously loads the soil under the spudcans to a level equal to or exceeding anticipated spudcan loads for the design storm condition. During the preload process, increasing soil loading usually causes the legs to penetrate deeper until the bearing capacity of the soil becomes equal to or greater than the spudcan loads. The preload process is complete when the spudcans have penetrated to a soil stratum with a bearing capacity sufficient to support the fully preloaded weight of the unit without further penetration. One of the main potential problems during preloading is a sudden uncontrolled leg penetration which can apply forces to the unit exceeding those imposed by the design storm.

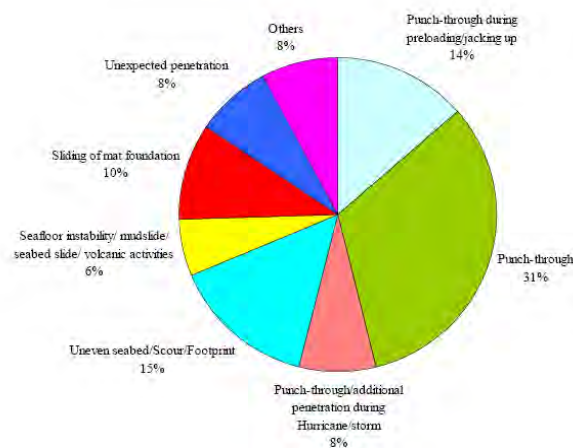


Fig 1. Case histories classified according to the cause of failure