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DETERMINATION OF BURST PRESSURE FOR DEFECTED PIPES

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ABSTRACT

Every year oil companies experience defects in pipes mainly due to corrosion, which results in metal losses. These defects appear in different forms and shapes along longitudinal, transverse and inclined axes depending on the corrosion pattern. These metal losses defects changes the way these pipes interact under given operational environment. One of the most critical parameter, which gets altered due to these defects, is the 'Burst Pressure'. A priori estimate of the burst pressure under different size and type of defects is necessary to determine the remaining life of the pipe. Hence, the aim of this study is to develop a testing procedure for defected pipelines. The paper main objective is to design and perform burst test on artificially defected pipes. The test specimen consists of the pipe segment, end flanges, and machined defects. Following the design of the test specimen, the test procedure is to be defined and tested.

Keywords: burst test, burst pressure, defected pipes.

INTRODUCTION

Every year, petroleum companies experiences defects in pipes mainly due to corrosion, which results in metal losses. These defects appear in different forms and shapes along longitudinal, transverse and inclined axes depending on the corrosion pattern. These metal losses defects changes the way these pipes interact under given operational environment. One of the most critical parameter, which gets altered due to these defects, is the 'Burst Pressure'. A priori estimate of the burst pressure under different size and type of defects is necessary to determine the remaining life of the pipe. Hence, the aim of this study is to design and perform burst test on artificially defected pipes (mainly corrosion metal loss defects). By this we are going to optimize our integrity assessment; which will be reflected immediately to our repairs and the cost of such repairs will be optimized as well. Burst pressure of defected pipes has been studied extensively over the past 30 years (Kiefner, 1990; Chouchaoui, 1996; Netto, 2007; Belachew, 2011; Hosseini, 2013; Abdalla Filho, 2014). Toward achieving the goals set for this study, it is required to do mechanical characterization for the tested materials. Following the material characterization, the study proceeded to prepare for the burst test. The test specimen consists of the pipe segment, end flanges, and machined defects. Following the design of the test specimen, the test procedure is to be defined and tested.

BURST TEST

Each test specimen consists of 1.8 meter long pipe welded to 50 mm thick flanges made from carbon steel (see Figure 1 next page). Two holes were drilled on one flange to provide the fittings for the pump hose and the pressure sensor. Another pressure senor is installed on the second flange to be used as a backup and to ensure the accurate reading of the pressure. The defects were machined at the center of the pipe.

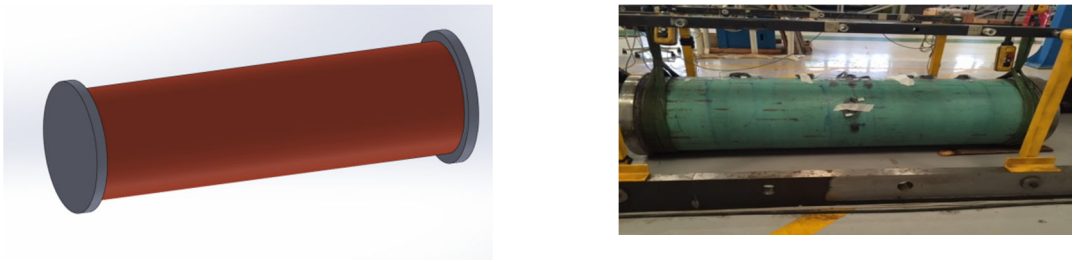
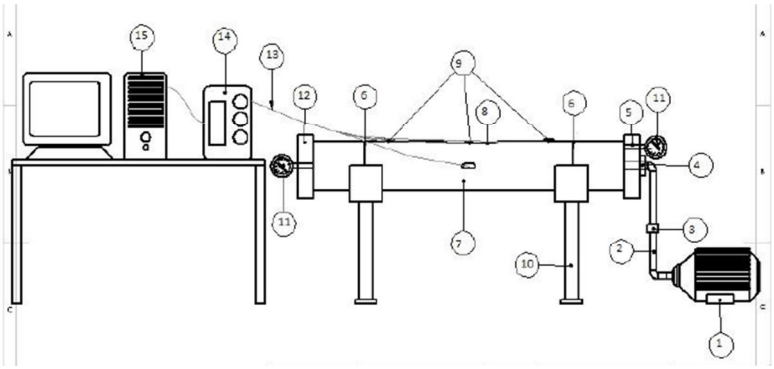


Fig. 1 - The schematic and actual burst test specimen

Figure 2 below shows the schematic diagram of the test assembly. The test setup mainly consists of test specimen, hydraulic pressure pump, strain and pressure gauges, and data logger. It must be noted that strain gauges are used only in selected tests.



1) Hydraulic Pump
2) Pipe Connection
3) One way valve
4) Coupling
5) Pump End Flange
6) Welded Section
7) Steel Pipe
8) Defect
9) Strain Gauges
10) Stands
11) Pressure Gauges
12) Rear End Flange
13) Electrical Wiring
14) Data Logger
15) PC

Fig. 2 - Burst test setup

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