CHAPTER 1

INTRODUCTION

1.0 BACKGROUND

The failure of pipelines can result in damage to the environment, injury to the public and high repair costs. Therefore, the accurate detection and characterization of defects in pipelines are of high interest, in particular to give a better understanding of possible failure modes and probabilities for a pipeline.

The technique to predict pipeline failure due to artificial mechanical damage is necessary to determine the defect tolerance for the pipeline design. Especially, it could be the inevitable technical information to assess the safety life of aging pipeline. Therefore, systematic investigation which deals with the damage and the failure of pipelines corresponding to varying boundary condition is needed.

It is generally known that the occurrence of artificial mechanical defects in pipeline reduces the strength of pipeline material. Thus, the development of analysis and/or experimental has been required to prevent failure accidents in advanced by predicting to the shape and location of artificial defects.

In consideration on steel pipes, defects may appear in both which inner and outer surfaces. The defect on outer surfaces of steel pipes occurred due to interaction between pipe materials with surrounding. The transporting medium or fluid in pipe

also can cause the generation of defects on its inner surface. Therefore, it is very important to analyses the failure of the pipe with multi layer or plane defects.

The objective of this project is to determine the burst pressure of detective and to analyse the effect of different planes defect on burst pressure. The parametric study will be performed to study the effect of defect sizes and geometries on burst pressure. The burst pressure will be determined using finite element analysis by applying the stress-modified critical strain model.

1.1 PROBLEM STATEMENT

The underground gas pipeline is often being an interested topic for people to do research on it. This is because when installing the pipelines, it is often subject to damage due to surrounding environment such as corrosion and third-party accident which called mechanical defects in this paper such as dents and gouges. Therefore, damage can present in pipeline for any situation. Thus, a proper engineering assessment is needed to determine whether pipelines are still safe to be in service and predict the failure situation.

1.2 OBJECTIVES

The objectives of this project are

1. To determine the burst pressure of detective pipe.
2. To analyse the effect of different planes defect on burst pressure.

1.3 SCOPES

The scopes of this project are

1. Specimen preparation – Smooth and Notched.
2. Tension test according to ASTM E8-2008 for smooth and notched specimens.

3. Spectrometer Analysis.
4. Development of failure model.
5. Structural Modeling – Model the pipe with multi-plane defects.
6. Analysis: Nonlinear FEA using MSC Patran/Marc software.