A Study of Trapezoidal Thread for Thin-Wall Tube Application

T.Kritsana, B.Thawatchai, P.Teeratas
Defence Technology Institute, Nonthaburi, Thailand
(E-mail: kritsana.t@dti.or.th, thawatchai.b@dti.or.th, teeratas.p@dti.or.th)

S.Sittha
Defence Technology Institute, Nonthaburi, Thailand
*(*Corresponding Author, E-mail: sittha.s@dti.or.th)*

ABSTRACT: This article is aim to studied the trapezoidal thread for thin-wall tube application. The thin-wall tube in this studied have different inner diameter namely 117.4 (model 1), 116.4 (model 2) and 113.9 (model 3) mm respectively. In this studied, trapezoidal thread was study on 2D models by finite element method which was created according to DIN 103-1 (1977_04). After that, work piece was created to use in the experiment.

The results from finite element studied found that, the damaged was not occur in 116.4 and 113.9 mm inner diameter of thin-wall tube because stress distribution was occur only inside surface of thin-wall tube and gradually reduce before to outside surface while the tress distribution in 117.4 mm inner diameter of thin-wall tube was occur from inside to outside surface which resulting to damaged to thin-wall tube. And the results from experiment shown that, the result from experiment was consistent with finite element studied.

1 GENERAL INSTRUCTIONS

In one big work piece may come from assembly of any small work piece. The assembly process has an influence to combine and hold different small work piece to one big work piece. The assembly process begins by bring any small work piece and hold on by different mounting methods. The mounting methods are varieties of way to hold on parts of work piece together**.** For the thin-wall tube application, thread lock type is widely used in mounting method because it is easy to build and lower cost structure. [1]

The main factor of thread design for used in many application are strength and ability to holding part together. From the previous study, the main parameters to consider in thread design are threads depth, taper shape and taper length. [2] These parameters all contribute to thread performance from design process. If design is done poorly, it will result in damage of work piece.

Finite element analysis is available to use in a variety formats. The problem in this study causes from contract between 2 pieces of material. The appropriate of variety of finite element analysis in this study is the explicit dynamic finite element analysis. With this variety gives the analysis results more closely and accurately. However, disadvantage of the variety is that it takes a lot of time to analyze the problem so it is inappropriate to use because there is not much time for analysis so in this study we use the static dynamic finite element analysis to analyze the problem. The advantage of analysis variety is use a little time to analysis the problem so it is appropriate to use in the problem which not have a lot of time to analysis. But the result of static dynamic finite element analysis is less accurate than explicit dynamic finite element analysis.

In this study trapezoidal thread was study on 3 different work pieces which associate with production process by finite element method and the experiment was create for confirm the results from finite element method.

2 FINITE ELEMENT METHOD AND EXPERIMENT DESIGN

2.1 *Finite element method*

Analytical methods using by finite element begins by bringing attention to the problem domain and dividing into subsets (element) as show in figure 1. Then, consider each element by creating the equation of each element. The equation created is in accordance with differential equation of the problem. Afterwards, compound the equation of each element and incarnate to large equation system. After that, determine the boundary condition into the equation and analyze the problem.

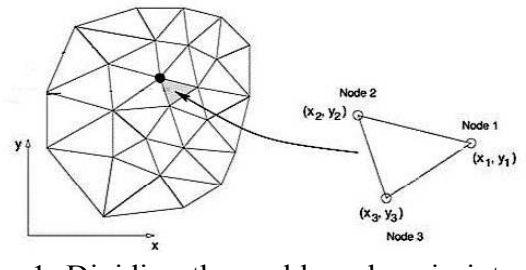

Figure 1. Dividing the problem domain into sub element to create the equation