INTISARI

PERANCANGAN BEJANA TEKAN HORIZONTAL BERBASIS KODE ASME VIII DIVISI I DAN SIMULASI KEKUATAN *SADDLE* DENGAN VARIASI JUMLAH *RIB*

Tugas akhir ini mengangkat materi mengenai perancangan bejana tekan horizontal *separator.* Bejana tekan dirancang berdasarkan *code* ASME VIII Div 1. Desain bejana tekan terdiri dari *pressurized part* meliputi *shell*, *head* dan *nozzle* serta *non pressurized part* yang terdiri dari *saddle,* dan *lifting lug*. Tugas akhir ini didasari pada saat menghitung bejana tekan menggunakan *code* ASME VIII Div 1, hasil yang didapatkan hanya berupa ketebalan *head, shell* dan *nozzle*. Selanjutnya dilakukan kajian analisa untuk mengetahui kekuatan sesungguhnya dari *saddle* bejana tekan horizontal dengan variasi jumlah *rib*. Tinjauan kekuatan *saddle* bejana tekan horizontal dengan variassi jumlah *rib* dilakukan terhadap variasi pembebanan yang diaplikasikan pada *nozzle gas inlet* dan *manhole* secara vertikal maupun horizontal. Dimensi ukuran dan ketebalan perolehan dari hitungan ASME VIII Div 1 digunakan untuk penggambaran detail 3D. Penggambaran detail 3D serta analisis kekuatan bejana tekan dilakukan dengan menggunakan *software autodesk inventor professional 2015*. Teori kegagalan yang dipilih adalah teori energi distorsi dimana *saddle* bejana tekan horizontal dinyatakan gagal apabila tegangan yang terjadi melebihi tegangan yang diijinkan material tersebut.

Dari perhitungan, didapatkan tebal *shell* yang dibutuhkan adalah 11,132 mm, tebal *head* yang dibutuhkan adalah 11,115 mm dan tebal nominal yang dipilih untuk *shell* dan *head* adalah 20 mm. Ukuran *nozzle* yang dipakai adalah diameter 24" *schedule* STD, diameter 4" *schedule* 160*,* diameter 2 " *schedule* XXS*,* diameter 8"*schedule 80* dan diameter 20" *schedule* XS yang masing-masing menggunakan *flange* dengan rating tekanan 150 lb. *Saddle* menggunakan ketebalan 10 mm dengan panjang 1270 mm sedangkan *wear plate* menggunakan ketebalan 12 mm dan *lifting lug* menggunakan ketebalan 50 mm sebanyak 2 buah.

Pada analisa tegangan *saddle* bejana tekan horizontal dengan variasi jumlah rib, dilakukan simulasi terhadap beban secara horizontal dan vertikal. Variasi beban eksentris secara horizontal dilakukan pada rentang 400 kN di setiap sisi sampai *saddle* bejana tekan tersebut gagal. *Saddle* mengalami kegagalan pada pembebanan 1600 kN. Analisis tegangan terhadap beban eksentris sescara vertikal dilakukan dari gaya 1600 kN di setiap sisi sampai bejana tekan tersebut gagal. *Part* yang diberi gaya beban adalah *nozzle gas inlet* dan *manhole. Saddle* mengalami kegagalan pada gaya 4000 kN.

Kata kunci : ASME VIII divisi 1, bejana tekan, *saddle,* simulasi variasi jumlah *rib*

ABSTRACT

HORIZONTAL PRESSURE VESSEL DESIGN BASED ON ASME VIII CODE DIVISION I AND SADDLE STRENGTH SIMULATION WITH VARIATION NUMBER OF RIBS

In this final project, the main topic is about designing horizontal separator pressure vessels. Pressure vessels are designed based on the code of ASME VIII Div 1. The design of pressure vessels consists of pressurized parts including shell, head and nozzle and non pressurized parts consisting of saddles and lifting lug. This final project is based on when calculating pressure vessels using ASME VIII Div 1 code, the results obtained are only in the form of head thickness, shell and nozzle. Then an analysis study was carried out to determine the actual strength of the horizontal pressure vessel saddle with the variation of the number of ribs. An overview of the saddle strength of a horizontal pressure vessel by varying the number of ribs is carried out on variations in loading applied to the inlet gas and manhole nozzles vertically and horizontally. The dimensions of the size and thickness of the calculation of ASME VIII Div 1 are used for drawing 3D details. 3D model detail as well as pressure vessel strength analysis were carried out using autodesk inventor professional software 2015. The failure theory chosen was the theory of distortion energy where the horizontal pressure vessel saddle was declared to fail if the stress exceeded the permissible material stresses.

From the calculation, the required shell thickness is 11.132 mm, the required head thickness is 11.115 mm and the nominal thickness chosen for the shell and head is 20 mm. The size of the nozzle used is a diameter of 24 "STD schedule, diameter 4" schedule 160, diameter 2 "XXS schedule, diameter 8" schedule 80 and diameter 20 "schedule XS, each of which uses a flange with a pressure rating of 150 lb. Saddle uses a thickness of 10 mm with a length of 1270 mm while the wear plate uses a thickness of 12 mm and a lifting lug using a thickness of 50 mm as much as 2 pieces.

In the analysis of horizontal pressure vessel saddle stress with variations in the number of ribs, the load is simulated horizontally and vertically. Horizontal eccentric load variations are carried out in the range of 400 kN in each side until the pressure vessel saddle fails. Saddle failed at loading 1600 kN. Vertical stress analysis of the eccentric load is carried out from the style of 1600 kN in each side until the pressure vessel fails. The part given the load force is the gas inlet and manhole nozzle. Saddle failed at 4000 kN.

Keywords: ASME VIII division 1, pressure vessel, saddle, simulation of variations in the number of ribs