

INTISARI

Di dunia industri penggunaan sistem perpipaan sudah sangat luas, misalkan di industri minyak, gas, pembangkit listrik tenaga uap dan lain-lain. Namun agar jaringan perpipaan berfungsi sesuai dengan apa yang kita inginkan maka perlu diperhatikan beberapa standar keamanan yang sudah ditentukan dan mampu menahan beban-beban yang bekerja, baik itu beban statik maupun dinamik. Maka dari itu sistem perpipaan yang telah didesain harus dianalisis terlebih dahulu dan dipastikan aman dalam penyaluran fluida. Penelitian ini dilakukan dengan tujuan melakukan analisis tegangan, defleksi, dan pemeriksaan kebocoran *flange*.

Untuk menganalisis tegangan, defleksi dan pemeriksaan kebocoran *flange* pada pipa jalur *suction feed water takuma boiler* milik PT.SUPARMA dilakukan dengan cara memodelkan sistem perpipaan menggunakan perangkat lunak CAESAR II Versi 7.00. Dengan memasukkan beban-beban instalasi yang ada seperti beban statik dan beban dinamik. Dimana beban statik meliputi beban berat, tekanan, dan temperature, serta beban dinamik meliputi beban angin dan beban gempa. Kemudian dilakukan analisis tegangan, defleksi, dan pemeriksaan kebocoran *flange*.

Hasil analisis tegangan, defleksi, dan pemeriksaan kebocoran *flange* pada sistem instalasi pipa jalur *suction feed water takuma boiler* milik PT.SUPARMA tidak mengalami *over stress*. Tegangan terbesar terjadi pada load case 11 (OCC) dengan rasio 52,1 % di nodal 430. Defleksi maksimal pada sumbu X (Dx) di node 460 sebesar 1,1515 inch, sumbu Y (Dy) di node 459 sebesar 1,1196 inch, sumbu Z (Dz) di node 138 sebesar -0,6249 inch dan melebihi defleksi maksimal yang diizinkan sebesar 0,244 inch. Tidak terjadi kebocoran *flange* pada pipa jalur *suction feed water takuma boiler* milik PT.SUPARMA, rasio terbesar terdapat pada node 760 load case 2 (OPE) sebesar 73,06 % diantara ke 22 *flange* lainnya. Data yang didapatkan setelah modifikasi menunjukkan tidak ada *over stress* dengan rasio tegangan sebesar 57,2743 % pada load case 9 (EXP) di node 465. Nilai defleksi tidak ada lagi yang melebihi nilai defleksi yang diizinkan dengan defleksi maksimal di sumbu X (Dx) di node 478 sebesar 0,2355 inch, sumbu Y (Dy) di node 140 sebesar -0,2415 inch, sumbu Z (Dz) di node 98 sebesar -0,2435 inch. Dan pada *flange* tidak terjadi kebocoran namun mengalami sedikit kenaikan sebesar 90,12 % pada load case 760.

Kata Kunci : *software CAESAR II Versi 7.00, Sistem perpipaan, Tegangan, Defleksi, pemeriksaan kebocoran flange.*

ABSTRACT

In the industrial world the use of piping systems is very wide, such as in the oil industry, gas, steam power plants and others. The piping network will match with what we want and it needs to be addressed some predetermined security standards and able to withstand the loads that work both static and dynamic loads. So the piping system that has been designed must be analyzed first and ensured safe in the distribution of fluid. This research was conducted with the aim of doing analysis of stress, deflection, and check of flange leakage.

To analyze the stress, deflection and check of flange leakage in the pipeline of suction feed water takuma boiler owned by PT.SUPARMA. This is done by modeling the piping system using CAESAR II Version 7.00 software. By inputting the load of installation that exist such as static load and dynamic load. Static load including weight load, pressure, and temperature, dynamic load consists of wind load and seismic load. Then analyzed stress, deflection, and check of flange leakage.

Result of stress analysis, deflection, and check of flange leakage in the installation system of pipeline of suction feed water takuma boiler owned by PT.SUPARMA not experiencing over stress. The largest stress occurs in load case 11 (OCC) with a ratio of 52.1% at node 430. Maximal deflection on axis of X (Dx) at node 460 is 1.1515 inch, axis of Y (Dy) at node 459 is 1.1196 inch, axis of Z (Dz) at node 138 is -0.6249 inch And exceeds the maximum deflection which is allowed that is equal to 0.244 inch. There is no flange leak of pipeline of suction feed water takuma boiler owned by PT.SUPARMA, the largest ratio of node 760 load case 2 (OPE) is 73.06% among the 22 other flanges, it needs to be modified. And the data that obtained after modification is still not experiencing over stress with a stress ratio of 57.2443% in case load 9 (EXP) at node 465. After modifying the deflection value, nothing is greater than the allowable deflection value with maximal deflection on the axis of X (Dx) at node 478 is 0.2355 inch, the axis of Y (Dy) at node 140 is -0.22415 inch, axis of Z (Dz) in node 98 is -0.22435 inch. And on the flange does not occur leakage but have a slight increase of 90,12% at load case 760.

Keywords: software CAESAR II Version 7.00, Piping system, Stress, Deflection, check of flange leakage.