

## INTISARI

*Crude Oil Booster Pump No.D*, memiliki frekuensi operasi 60 Hz, mengalami anomali vibrasi tinggi. Setelah dilakukan pengukuran vibrasi dan *trending* data vibrasi selama 6 bulan berturut-turut pada pompa tersebut, sebuah spektrum dominan di *Fast Fourier Transform (FFT)* muncul amplitudo *peak* getaran tinggi kategori *unacceptable* (ISO 10816-1-1995) dengan frekuensi sebesar 69 Hz. Untuk memastikan dari mana frekuensi 69 Hz muncul yang merupakan frekuensi resonansi, dilakukan pengujian berikutnya yaitu melakukan *bump test*. Hasil *bump test* menunjukkan frekuensi 69 Hz berasal dari pipa *inlet/outlet*. Tujuan penelitian ini adalah melakukan analisa elemen hingga pada pipa *inlet/Outlet* untuk mengetahui frekuensi karakteristik dari pipa *inlet/outlet* dan untuk memberikan rekomendasi perbaikan pada pipa *inlet/outlet Crude Oil Booster Pump No. D*. Metode penelitian dilakukan dengan FEA software CAESAR II. Adapun hasil dari FEA tersebut adalah didapat karakteristik frekuensi baru yang mode getarnya sudah bergeser jauh dari pompa sesuai dengan rekomendasi HIS 9.6.4.4. dengan memodifikasi model sistem perpipaan pada sisi *outlet* melalui penambahan kekakuan. Dengan terpenuhinya rekomendasi HIS 9.6.4.4 tersebut maka dapat disimpulkan bahwa dengan penambahan kekakuan (*pipe support*) yang tepat akan mengatasi resonansi pipa *inlet/outlet*.

**Kata kunci:** frekuensi, resonansi, CAESAR II, pipa, pompa

## ABSTRACT

Crude Oil Booster Pump No. D, has an operating frequency 60Hz, severed an anomaly with amplitude high vibration. After conducting vibration measurement and trending historical vibration data for 6 months in a row on the pump, a dominan spectrum in Fast Fourier Transform (FFT) was found with severity level unaccpetable refers to ISO 1086-1-1995 with frequency 69 Hz. To make sure the anomaly frequency/resonance frequency 69 Hz coming from, the next step was to conduct bump test. Bump test result showed that frequency 69 Hz coming from inlet/outlet pipe. The objectives of this research are to conduct finite element analysis on inlet/outlet pipe to know the characteristic frequency of inlet/outlet pipe and to give recommendation against the problem on inlet/outlet pipe due to resonance. The research methodology is by conducting FEA with CAESAR II. through the FEA in CAESAR II , the result is the new characteristic frequency with mode shape has been dispatched far away from branching of outlet pipe of Booster Pumps as recommended by HIS 9.6.4.4 by modifying the new model of outlet pipe of Booster pumps with increasing stiffness. By fulfilling the recommendation of HIS 9.6.4.4, so it can be concluded that by increasing the correct and effective pipe support could prevent resonance inlet/outlet pipe.

**Keywords:** frequency, resonance, CAESAR II, pipes, pumps