

## ABSTRAK

Penelitian ini dilatarbelakangi oleh getaran pompa tipe sentrifugal *cooling water* P9114B yang mengalami getaran berlebih saat beroperasi. Hal ini dapat menyebabkan performa pompa menurun. Untuk menghindari terjadinya pompa mengalami *trip* sewaktu-waktu, maka perlu dilakukan analisis sinyal getaran. Penelitian ini bertujuan untuk mengetahui kondisi pompa dan menganalisis sinyal getaran untuk mengetahui penyebab kerusakan pada pompa sentrifugal P9114B yang ada di *Plant Chlor Alkali*. Metode yang digunakan untuk analisis penelitian ini adalah metode FFT (*Fast Fourier Transform*). Pengukuran getaran dilakukan dengan menggunakan alat ukur *VibXpert II* yang berdasarkan ISO 10816-3 dengan arah pengukuran 3 titik (*horizontal, vertical* dan *axial*). Pada penelitian ini parameter pengambilan data getaran meliputi nilai *overall velocity (RMS)*, Spektrum FFT dan sudut fasa. Hasil pengukuran menunjukkan nilai *overall velocity* getaran tertinggi pada titik *Inboard* pompa dengan arah *horizontal* sebesar 5.16 mm/s. Nilai vibrasi tersebut menunjukkan pompa sudah berada pada kategori *Danger*. Dari Spektrum sinyal getaran menunjukkan dominan frekuensi pada harmonik 1X, 2X dan 6X putaran kerja. Pengukuran *phase* dilakukan pada titik *inboard* pada arah *radial* diperoleh nilai beda fasa sebesar  $180^0$ . Dari hasil analisis spektrum disimpulkan pompa sentrifugal P9114B mengalami kerusakan *misalignment parallel* dan *Blade Pass Frequency (BPF)* dan kavitasi. Setelah dilakukan perbaikan pada pompa P9114B terjadi penurunan nilai vibrasi pompa yang sebelumnya 5,16 mm/s turun menjadi 1,78 mm/s. Berdasarkan ISO 10816-3 dengan klasifikasi pompa dalam fondasi *rigid*, memiliki daya 114 kW dengan *size medium*, disimpulkan pompa dalam kondisi *Satisfactory*.

**Kata Kunci:** Pompa Sentrifugal, *Cooling Water*, Getaran, *ISO-10816-3*, *Fast Fourier Transform*, *Misalignment* Dan *Blade Pass Frequency*

## **ABSTRACT**

*The background of this research is the vibration of the centrifugal cooling water pump type P9114B which experiences excessive vibration during operation. This can cause decreased pump performance. To prevent the pump from experiencing a trip at any time, it is necessary to analyze the vibration signal. This study aims to determine the condition of the pump and analyze the vibration signal to determine the cause of damage to the P9114B centrifugal pump in the Chlor Alkali Plant. The method used for the analysis of this research is the FFT (Fast Fourier Transform) method. Vibration measurements were carried out using a VibXpert II measuring instrument based on ISO 10816-3 with 3 point measurement directions (horizontal, vertical and axial). In this research, the parameters of vibration data collection include the value of overall velocity (RMS), FFT spectrum and phase angle. The measurement results show the highest overall vibration velocity value at the pump inboard point with a horizontal direction of 5.16 mm/s. The vibration value indicates that the pump is already in the Danger category. From the vibration signal spectrum, it shows the dominant frequency in the 1X, 2X and 6X harmonics of the working cycle. Phase measurements were carried out at the inboard point in the radial direction and obtained a phase difference value of 180°. From the results of the spectrum analysis, it was concluded that the P9114B centrifugal pump was damaged by parallel misalignment and Blade Pass Frequency (BPF) and cavitation. After repairs were made to the P9114B pump, the vibration value of the pump decreased, which was previously 5.16 mm/s, down to 1.78 mm/s. Based on ISO 10816-3 with the classification of the pump in a rigid foundation, having a power of 114 kW with a medium size, it is concluded that the pump is in a satisfactory condition.*

**Keywords:** *Centrifugal Pump, Cooling Water, Vibration, ISO-10816-3, Fast Fourier Transform, Misalignment And Blade Pass Frequency*