An Investigation of WAG Reciprocating Compressor High Vibration Problem at Dulang-A Platform, off-shore Kerteh, 2006

The WAG Compressor high vibration problem was investigated. Based from the Modal analysis and Finite element analysis on the WAG Compressor, the extended deck and the compressor skid had generated unexpected lower natural frequencies and mode shapes in the operating region of the WAG Compressor. In conclusion, these problems are classified as a combination of structural dynamic weakness and stiffness-controlled situation.

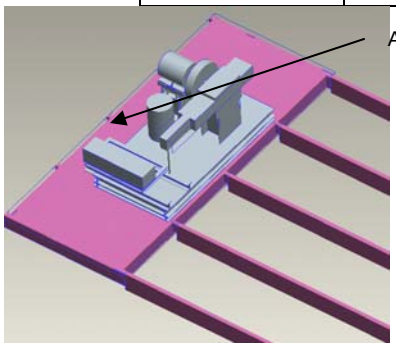
ODS analysis revealed the movements of the WAG Compressor mainly due to its flexible extended deck and skid. Although, observation of the WAG Compressor operation shape showed large deflection mainly on the compressor; but compressor deflection is the secondary effect caused by the extended deck and skid movement. These secondary effects had cause damage on WAG Compressor internal components leading to its failure.

From Modal analysis, it indicates a number of natural frequencies close to the running frequency of 16.4Hz. These unexpected lower modes were generated by the flexibility of the extended deck and skid. Modeling the WAG Compressor, its extended deck and skid using Finite Element Analysis had successfully revealed all the modes of vibration and established a correlation with the Modal analysis results. The results summary is as shown below.

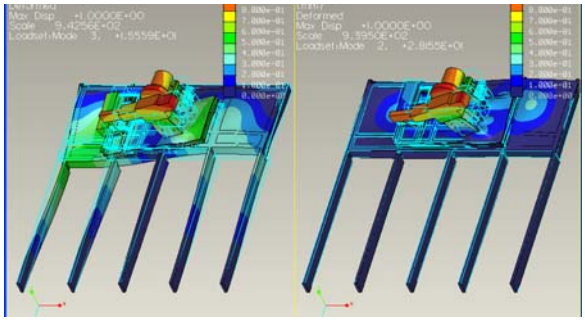
Based from the Structural Dynamic Modification Procedure using FEA, MDT-Q2 strongly recommend rectify/strengthen the extended deck and skidding using additional C-Channels and poles to shift the extended deck lower natural frequencies and its mode shape. The recommended stiffening is calculated as per the Structural Dynamic Modification 3 using FEA.

Summary of Modal Analysis Results for WAG Compressor

Mode Shape	FRF Modal (Hz)	FEA Modal (Hz)	SDM 3 (Hz)
1	11.5	11.3	-
2	13.1	13.4	23.3
3	14.6	15.5	28.1
4	30.8	35.7	40.9



Additional poles to be tie-up to the existing vertical



Natural Frequency of Mode 2 shifted from 15.5Hz to 28.1Hz

Tel: +6012.282.5817 Fax: +6012.210.4991 Email: info@mdt-quadrant2.com.my