ABSTRACT

PT. PALMA PROGRESS SHIPYARD has some building berth used for joint blocks erection. In this process still using two mobile cranes each with 50 tons SWL and 30 tons SWL lifting capacity. Lifting by using two cranes has a long time preparation require, in addition it has a difficulty level between the two crane synchronisation. This process requires precise calculations to determine the position of center of gravity of the block that will lift and angle of the sling hook. This reason of using by two mobile cranes which have the high risk level. Therefore we need a type of gantry cranes lifting tool that have a design in accordance with the requirements and conditions of the building berth and have fixed installation for long time periods.

Parameters that need to be considered in the design of Gantry Crane is: a span of the girder, lifting capacity and speed of the planned motion. The design is focused to get a design that still have the requirements in terms of maximum stress values (σ), maximum deflection (δ) and minimum frequency (f). Where apart from the results of manual calculations, these values are also obtained through analysis software FEM (Finite Element Method) by inserting the input as a parameter analyzer.

After doing the calculations manually or use software aids FEM can be concluded that the maximum stresses occurs on the construction of the largest at leg is 64.5 N/mm², maximum deflection occurs at girder construction of 11.7 mm, and the minimum frequency occurs in endcarriage construction is 3.85 Hz from the allowable frequency of 2.5 Hz. The design of gantry cranes with 120 tons lifting capacity and 30 meters span of girder which has a weight about 172.2 tonnes with box construction size 2400 x 1200 mm for the girder, 1200 x 900 mm for the leg, and 1000 x 600 mm for endcarriage construction and overall reinforced by a stiffener 100 x 100 x 10 mm size of construction is expected to be realized by the shipyard to increase productivity and to compete in the era of globalization

Keywords: Gantry Crane, Stress (σ), Deflection (δ), Frequency (f), and Construction Weight.