Abstract

In this research, three configurations of tower cranes were taken to study the structural performance of them by using Structural Analysis Program SAP2000. Different load cases were considered as followed: dead, live and wind loads and their combinations. The analysis results were presented in graphical forms in order to study the structural performance of the three configurations (tower crane type 1, 2 and 3). It was taken the variation of axial forces and displacements with height of tower crane, and variation of axial forces and deflections on jib's arm. The design of tower cranes components is done using Allowable Stress Design (ASD) according to American Institute for Steel Construction (AISC). From the variation of axial forces, displacement in x- and y- directions, deflection on jib's arm. It was noticed that tower crane (1) is have best configuration in comparison with the other two tower cranes (2) and (3).

المستخّلص

في هذا البحث، ثلاثة من نماذج الرافعات البرجيه أخذت لدراسة أدئها الإنشائي بإستعمال برنامج التحليل الإنشائي SAP2000 لحالات مختلفة من الأحمال (الأحمال الميتة, الحية ,أحمال الرياح وتراكيب الأحمال المزكورة).

نتائج التحليل وُضحت في رسومات تخطيطية لكي يُدرس الأداء الانشائي من النمازج الثلاثة (رافعه برجية نوع 1 ,2 و3). أُخذ إختلاف القوى المحورية مع إرتفاع الرافعات البرجيه، وإختلاف القوى المحورية والازاحات على ارتفاع الرافعه البرجية واختلاف القوى المحوريه والانحراف على طول الزراع. إستخدم في تصميم مكونات الابراج طريقة تصميم الإجهاد المسموح به (ASD) طبقا للمعهد الأمريكي للبناء الفولاذي (AISC).

من الاختلاف في القوى المحورية والإزاحة في اتجاه X والازاحه في اتجاه Y والانحراف على الذراع لوحظ أن تكوين رافعة البرج (1) افضل مقارنةً مع رافعة البرج (2) و(3).

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A	Area
P_U	Ultimate load
C_P	External pressure coefficieant
D	Depth
e	Eccentricity
F_b	Allowable shear stress
F_V	Allowable bearing stress
G	Rigidity factor
H_V	Heavy Load Range
H_{VR}	Stated Load moment Capacity of the Crane
K_d	Directionality factor
K_Z	Varies with height z above the ground level
K_{ZT}	Topographic factor
L	Length
L_e	Effective length
M_A	Moment applied to base by tower crane
M_O	Overturning moment
M_S	Restoring moment
M_U	Ultimate moment
N_b	Number of bolt
R_b	Bearing bolt
q_Z	Pressure resulting from winds
I.S	In-service
I.O.S	Out of service