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LIFTING MACHINE PERFORMANCE CRITERIA DUE TO DYNAMIC EFFECTS CRITERII

Asist. drd. ing. Diana ANGHELACHE
"Dunarea de Jos" University of Galati

ABSTRACT

Cranes are used in very different conditions of exploitation which leads to a big variation of the effective duration of functioning and of the state of loading the mechanisms or of the metallic construction. The choosing of the cranes for montage works are made starting from the comparison of the technical , functional parameters to the montage characteristics of the prefabricated elements for which many options may result (depending on the number of the analysed cranes).
For analyzing each installation for lifting, some criteria are taken into consideration (productivity, the safety of exploitation and comfort) which have been developed in the present work.

1. Foreword

Dynamic effects noticed as result of movement way irregularity, during starting or braking the lifting, descending, translating or spinning. These effects take place vertically by structure elastic oscillations. Translating and spinning starting or braking horizontal inertia have inessential dynamic effects, calculated without considering increasing dynamic coefficients. To analyze each lifting machine consider following efficiency criteria:
-Productivity criterion-cyclic time (t), lifting height (h), action radius (R) and lifting speed (v) as indicators;
-Safety criterion;
-Comfort criterion;

2. Productivity

Productivity stands for the machine work ability to perform certain task on time, in real life conditions, for acertain technology.

Crane productivity calculation:

$$P_e = \frac{60}{t} \cdot Q_n \cdot k_q \cdot k_t \quad \text{(t/k)} \qquad (1)$$

P_e - productivity (t/h);

Q_n - operated weight (t);

t - cyclic time;

k_q - crane intensive use coefficient (considering operated weight);

k_T - crane extensive use (considering time).

k_q and k_T Their values are determined used the following relations:

a)crane intensive use coefficient (considering operated weight):

$$k_q = \frac{k_{r1} \cdot g_1 + k_{r2} \cdot g_2 + ... + k_{rn} \cdot g_n}{g_1 + g_2 + ... + g_n} \qquad (2)$$

$k_{ri} = \frac{g_i}{Q_n}$ - crane use coefficient

in order to mount each piece weighting gi g_i;

Q_n - crane lifting ability at minimum range (minimum action radius)
b) considering crane behavior supervising experience (table no.1) and planned breaks, crane extensive using coefficient (kT) calculation can be made.

Table 1

Break name	Break percentage considering 480 min shift time	
	Tower cranes	Cranes on tires
Maintenanc, technical check up	8	10
Gas and oil, fueling	-	2
Crane dis placement - necalata - calata	-	3 5
Shift changing breaks	3	3
Lunch breaks	3	3
Technical personnel breaks	6	6
Total	20	$\frac{27}{29}$
K_T^* coefficient value	0,80	$\frac{0,73}{0,71}$

*) k decreases 5% during night shifts

3. Work Safety

Crane use conforms to specific acts and regulations. Internal company rules according to specific work place and technological process are also considered.

Lifting machines importance in production activity and essential particularities making them different from other machines determined the authority to consider extreme danger of using them and to create a law enforcement institution (ISCIR), authorized to watch the safe use of lifting machines and equipments.

Vertical and horizontal transportation of hooked weights, movements of the crane and operated weight (when technical specifications allow that), hooked operated weight using an elastic element (cable and hook device), higher weight centre compared to other vehicles (instability situations) are the most important particularities of lifting machines.

4. Comfort Criterion

Comfort consists in all material conditions creating a proper work environment that leads to increased productivity. The most important comfort conditions are: ant vibrating insulation of the command post, thermo insulated command compartment, ergonomic design of the command devices, safe access to the command post and good operating view.

The operator and the command post are the most important work factors concerning productivity. Human body receives the vibrations transmitted to the command post, mainly those body parts touching the lifting equipment vibrating elements. Mechanical vibrations transmitted to human body have a negative complex impact on human health (pathological effects, disturbed work process, even operator work ability loosing).

5. Conclusion

Increased mounting work volume requirements reflect to the number and structure of lifting machines and equipments. A better management of number-capacity-time relation is required. That leads to a better productivity considering mounting rhythm and technological mounting processes, considering balanced quality and quantity factors.

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