Advanced Logistic Systems – Theory and Practice, Vol. 16, No. 1 (2022), pp. 63-68.
https://doi.org/10.32971/als.2022.006

INFLUENCING THE PRODUCTION SYSTEM BY LOGISTICS AND HANDLING COMPONENTS

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Abstract: One area of logistics is material handling. When handling material, it is important to ensure the movement of material between workplaces. What to do if the movement is not smooth and the workplace has downtime. Here is one way to find out the causes of these downtimes. The aim of the study was to find out the facts such as the current state of load of cranes in the production hall, to map the activities of cranes and to find out the time required to wait for the crane at individual workplaces. The main goal of the study is to standardize selected activities in order to evaluate the current situation in material handling and analyze the causes of inefficient and lost times. The study was divided into two stages. The first stage involves measuring the load of cranes 1 and 2, and in the second stage we determine the waiting time for the crane at individual workplaces.

Keywords: *Handling equipment, Transport, Working day image*

1. INTRODUCTION

Part of the logistics is to ensure the movement of material in the production system. The supply must be such as to avoid downtime and delay the production process. Within the monitored production, there were complaints from employees about production downtime due to delays in the supply of material. For these reasons, a case study was created focusing on the issue of utilization of handling equipment (two gantry cranes) in the production system when supplying workplaces. It is a manufacturing company that manufactures large engineering units, so a large percentage of parts must be handled by crane. Welding workplaces, machining, inspection, pressing and gluing are located in the monitored part of production [1, 2].

2. STAGE I.

This stage involved performing time analyzes when handling the material with cranes. The load of both cranes is analyzed in detail using pictures of the working day (shift). The working day (shift) image is a method of determining time consumption, which is based on continuous observation of all working time consumption in a shift. The measurement took place during the entire shift (i. e. 8 hours) and for 5 days [3].

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The measurement aimed to capture times for:

- Crane movement with the product.
- Crane movement with jig.
- Crane movement without load.
- Clamping / unclamping / positioning (hook lowering + clamping + hook winding).
- Lost times (no work).
- Lost times (waiting for the second crane, failures, breaks and other unforeseeable causes [13, 14]).

In order to determine the weak points of production, in addition to the classic values recorded when measuring the time intensity, the occurrence of cranes in the relevant segments of the hall was also monitored. These segments are marked with numbers I. - VI. (Fig. 1).

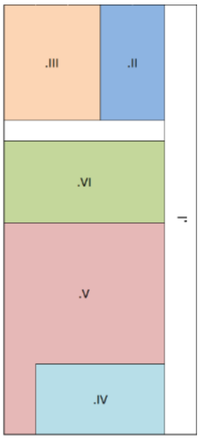

Figure 1. Distribution of monitored production

From the time frames of the day in terms of monitoring the share of individual activities, the following facts were found for both cranes. The crane spends the least time moving with the jig Almost identical crane travel times with or without product [10].

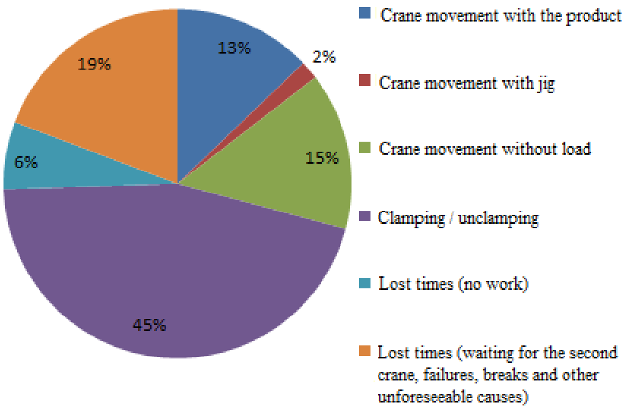

Figure 2. Crane 1 - activity breakdown

The most time is spent on the clamping or positioning operation of individual products The waiting time for work is significantly longer for crane 2 Other loss times include a relatively high value - dragging a break for lunch and a snack, loss times caused by a crane failure or mutual interference of both cranes are minimal (Fig. 2 and 3).

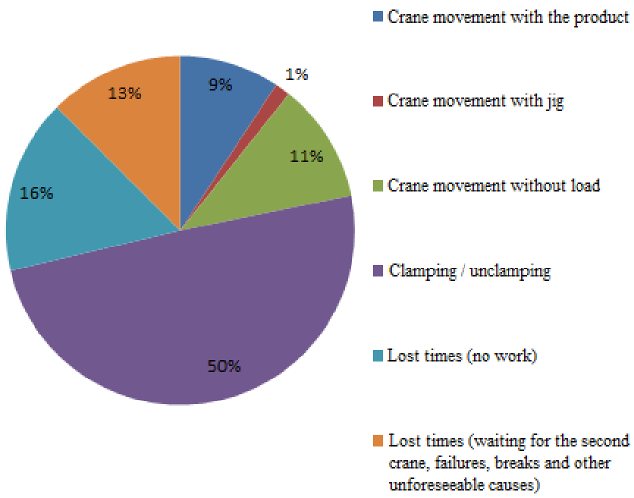

Figure 3. Crane 2 - activity breakdown

The following facts were found for the crane from the time frame of the day in terms of monitoring the place of movement in individual segments (Figure 4 and 5).

- Each crane moved in its part of the production hall for the most time of the shift - crane 1 in the area of segment V and crane 2 in segments II. to IV.
- A partial collision occurred in the area of segment I.
- The cranes hardly entered the other segments at all [4, 7].

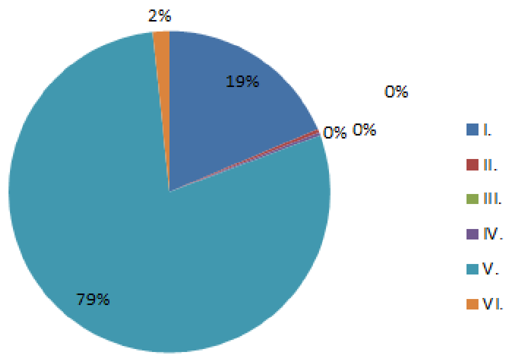

Figure 4. Crane 1 – segmentation

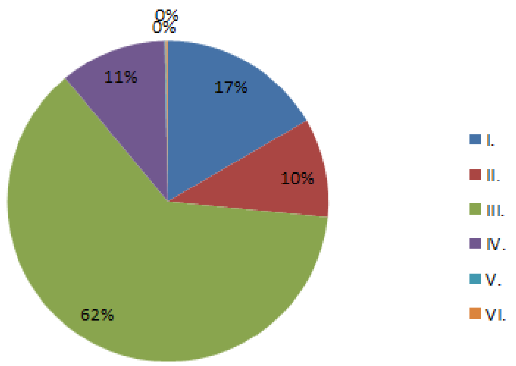

Figure 5. Crane 2 - segmentation

3. STAGE II.

This stage included the performance of time analyzes at individual workplaces in order to determine, in particular, inefficient times and loss times caused by waiting for the crane. Due to the high time required to perform measurements at all workplaces, the measurements were carried out using our own working day image. This picture is taken by the worker himself. It usually only records lost times and their causes. The measurement took place over two calendar weeks, i.e. for 10 days [5]. The main shortcomings were found in segment II, where an average of 8:40 minutes were expected during the entire period, and in segment V, where several separate workplaces are located and 4 workplaces were expected from 6 out of 12 minutes (maximum to 17:15 minutes). However, if we compared the time image of the crane day and the time image of the worker (workplace), there was no overlap of lost times [9, 11].

4. CONCLUSION

Finally, the speeds of the individual travels of both cranes were measured. It is clear from the measurement data that both cranes have a significant share of the shift time in clamping the products. Clamping in our sense means lowering the hook, the actual clamping (tying) and winding the hook. In some cases, this activity accounts for up to 50% of the total shift time, and therefore this activity should be a topic for optimization. In connection with the measurement of the travel speeds of cranes, it is possible to influence the share of this operation within the shift by increasing the speed at which the hook moves in the vertical direction. We believe that this technological change is feasible by replacing or modifying one of the crane power units. Furthermore, it is clear from the measurement that the crane 1 is busier than the crane 2. From other data obtained during the measurement, the occurrence of individual cranes on the respective segments of the hall can be traced. Crane 1 most often moves in segment V. and crane 2 most often in segment III., And it is the workplaces in these segments that should be given increased attention (e.g. add rotating cranes to some workplaces so that workers can handle the parts themselves). This fact is also confirmed by measurements from the second stage [6, 8]. At this stage, the measurements took place over 10 working days.

The main shortcomings were identified in segments II. and V. When comparing the time image of the crane day and the time image of the worker (workplace), the lost times did not overlap.

Acknowledgments

This article was created by the implementation of the grant projects: APVV-17-0258 Digital engineering elements application in innovation and optimization of production flows. APVV-19-0418 Intelligent solutions to enhance business innovation capability in the process of transforming them into smart businesses. VEGA 1/0438/20 Interaction of digital technologies to support software and hardware communication of the advanced production system platform. KEGA 001TUKE-4/2020 Modernizing Industrial Engineering education to Develop Existing Training Program Skills in a Specialized Laboratory. VEGA 1/0508/22 „Innovative and digital technologies in manufacturing and logistics processes and system".

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