LEAN EQUIPMENT INSTALLATION – POTENTIALS OF USING TAKT PLANNING

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1 BACKGROUND

Takt Planning is a Lean Construction method, which is based on Takt time and Takt area and is used in construction projects. The results show a stable and continuous workflow on site leaded by the Takt time with high transparency of achieved goals. This method shows the time potentials in the end of a construction project by using buffers. These time potentials could be used by the equipment installation of a production line.

2 DEFINITIONS AND FOUNDATIONS

2.1 Definition of Lean Equipment

Lean Construction is the adaption of the Lean Principles named by Womack, J. & Jones, D. (1996) to construction. They analyzed production processes but the building of production lines was not part of the methodic approach in production. In construction, the products are immobile and the value adding process by machines and workers is flowing. Keitel (2008) describes construction and equipment installation as a ''transient single piece production''.

2.2 Challenges in the normal Equipment Process

Having more than one general contractor (SE-Partner) is common in equipment installation. These companies are normally not connected to each other nor are they aligning their time and work planning. And space for transportation and storing is lacking.

2.3 Status quo in the Installation Process

The equipment installation of highly automated production lines is repetitive work. It is possible to have up to 600 robots if al the different stations are considered. Due to the fact that the workers in installation are well educated and specialized, the use and coordination of their knowledge is important to save expensive labor hours and time in the construction process.

3 THE REAL CASE STUDY PROJECT

3.1 Research Method

The research method is based on a real case study. The strategy, which is used for construction projects, is also used for the implementation. The potentials and the results are in the stage of pre-realization planning and the research is based on the estimated and planned effects of applying the three-level method.

3.2 Project Description

The relevant car-manufacture made a very late decision to change the product line. The changes, especially in the BIW production facility, were massive. A Greenfield project was decided for the

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new production facility. The project is comprised of a design and a realization phase. An execution phase of three years is required, but for the relevant project only 24 months were left. The project was awarded to four different SE Partners, each responsible to complete a different section. The work split caused several interfaces between the four SE Partners, they depend on the working schedule and completion of each other. The project faces two major problems: there is no way to optimize the mechanical and electrical installation sub-phases significantly and there is no efficient method in BIW planning to synchronize the installation.

3.3 Case Study Result

After every SE-Partner did the first Takt Planning for himself, the Takt schedules were connected and aligned. The Takt Planning was made in 5 steps: List all activities and state their duration, divide layout into smaller workable sections, calculate the days per activity and area, divide activities into daily tasks and color code, populate timing plan with a pact schedule. A potential of 23,2% of the total installation time of one specific contractor could be used for delays, interfaces and an early start of commissioning, shown in figure 1. The results of the case study are:

1. There is a methodical way to optimize time in equipment installation.
2. The transparent and location based time schedule gives all contractors the possibility to verify their time scheduling with the overall project.

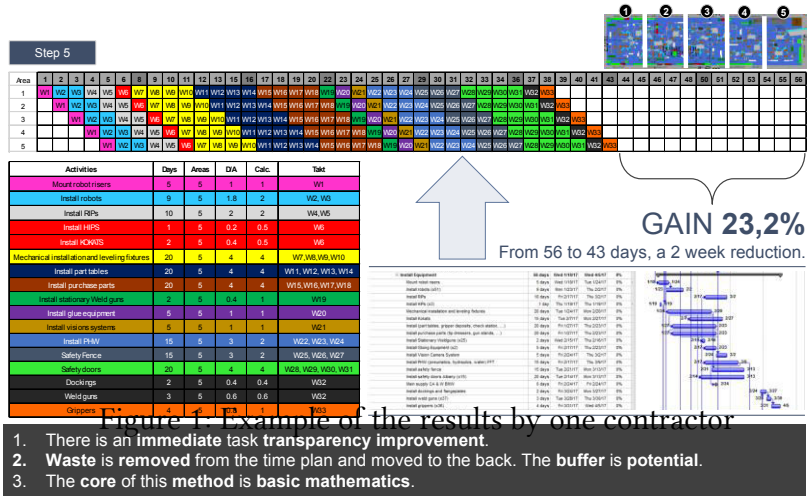

Figure 1: Example of the results by one contractor

There are more soft advantages coming with this approach, like the early identification of bottlenecks between the contactors. It is easy to track and control the work and to react quicker, with a high level of communication and transparency.

4 Conclusions

The results are estimated and planned but not yet realized, the equipment installation is still in process. The potentials shown by the method and the opportunity for time savings in installation projects have to be quantified by the Takt Control. They should be analyzed to get specific data and KPIs for Takt Planning and Takt Control in equipment installation. The method should be implemented in projects even earlier then the realization phase. The major results are equal to the potentials of Takt Planning, the time buffers are verifiable in installation for equipment. For the client a transparent value stream shows a lot of potentials in reducing variances, interphases and increasing flow.