TECHNICAL TAKT PLANNING AND TAKT CONTROL IN CONSTRUCTION

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1 BACKGROUND

Takt time is increasingly being used to structure construction work. Takt defines the unit of time within which a unit of production must be produced (supply rate) in order to match the rate at which the product is needed by the customer (demand rate). Takt Time is a design parameter used in a production setting. The approaches used in different parts of the world an conceptualizations of Takt Time appear to differ from one another. An approach for collaborative Takt Planning of non-repetitive work is developed and piloted in the course of delivering a small project.

2 HISTORY OF DESCRIBES APPROACH

The principle of Takt is not new in the German construction industry, however it was only used for the purposes of planning. Kaiser (2013) describes an approach, which is based on a takted system for operational execution and includes the method Takt Planning and Takt Control. The idea of takting work as part of Lean Construction seeks to raise value-creating activities across the entire process chain of equal duration. This idea in combination with a short control of the processes has been implemented in Germany in the last 10 years. This approach was further developed at KIT (Dlouhy et al. 2016).

3 THEORETICAL FORMULATION OF TAKT PLANNING AND TAKT CONTROL IN CONSTRUCTION

3.1 Takt Time in Manufacturing vs Takt Time in Construction

The idea of the Lean Construction methods of Takt Planning and Takt Control is to bring the processes necessary for creating value into a uniform flow. As a uniformity and 100% consistency can never be achieves in practice, the system is adjusted to the uniform Takt given. The more fine-grained a takt selected, the higher the level of uniformity and the level of control over the system. Takt in manufacturing is normally defined in seconds or minutes. Kaiser recommends a weekly Takt for the construction sector (Kaiser 2013, p. 113).

3.2 The technical Takt Planning and Takt Control method

Takt Planning: The method developed at KIT is based on Kaiser's approach and persists 12 steps.

1. Define functional working areas
2. Define the priority of the different areas from the perspective of the client
3. Pick one functional area
4. Define SSU(s) for this functional area (SSU is the smallest repetitive part)
5. Define work packages for every SSU
6. Do the calculation of the amount of work for every step based on performance factors
7. Allocate detailed work steps to work packages

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8. Organisation of the SSUs into practical Takt areas and allocation of the Takt time
9. Takt levelling
10. Combine the work packages best for determined Takt time and Takt area
11. Do steps 3 to 6 for all functional areas
12. Prepare the takt schedule and determine milestones in order to costumer priority

Takt Control: has the goal of placing control at the place of value creation. Short-cycled (daily) meetings onsite, moderated by the construction manager, are considered particularly important (Peters 2009). The site is managed through standardized Takt Control Boards, which serve as a medium for visualization. To keep the employees motivated, they should be integrated in the problem-solving process. Key figures and effort values determined according to the Takt Control can be utilized in the Takt Planning of future projects with little effort.

3.3 Practical example – Firestation, Dingolfing Bavaria

The Takt approach was developed for building projects with clearly identifiable replicable elements. It is applied to all types of buildings from office to residential construction. The example project is the new construction of the fire department of an automobile production plant. The goal was it to complete the construction as quickly as possible to allow normal operations to resume. A timeline of 90.5 days was takted. The proceeding for the Takt Planning was based on the method described in chapter 3.2. During the functional analysis two separated areas, the first and the ground floors had been defined. On the first floor a Takt Time of 2.5 days was implemented, while 5 days was used on the ground floor. After the consideration of the 12 steps of the Takt Planning method, the Takt Plan was prepared.

Date / Takt Area	06.10.2014-08.10.2014	08.10.2014-10.10.2014	13.10.2014-15.10.2014	15.10.2014-17.10.2014	20.10.2014-22.10.2014	22.10.2014-24.10.2014	27.10.2014-29.10.2014	29.10.2014-31.10.2014	03.11.2014-05.11.2014	05.11.2014-07.11.2014	10.11.2014-12.11.2014	12.11.2014-14.11.2014	17.11.2014-19.11.2014	19.11.2014-21.11.2014	24.11.2014-26.11.2014	26.11.2014-28.11.2014	01.12.2014-03.12.2014	03.12.2014-05.12.2014	06.12.2014-08.12.2014
	KW 41/1	KW 41/2	KW 42/1	KW 42/2	KW 43/1	KW 43/2	KW 44/1	KW 44/2	KW 45/1	KW 45/2	KW 46/1	KW 46/2	KW 47/1	KW 47/2	KW 48/1	KW 48/2	KW 49/1	KW 49/2	KW 50/1
UF TA 1 relaxation room			W1	W2	W3	W4	empty	screed	empty	W5	W6	empty	empty	W7	W8	W9	empty	empty	cleaning
UF TA 1 shower			W1	W2	W0	W0	W3	screed	W0	W5	W6	W0	empty	empty	W8	W8	empty	empty	cleaning
UF TA 2 relaxation room				W1	W2	W3	W4	screed	empty	empty	W5	W6	empty	empty	W7	W8	W9	empty	cleaning
UF TA 3 relaxation room					W1	W2	W3	screed	W4	empty	empty	W5	W6	empty	empty	W7	W8	W9	cleaning
Hall						W1	W2	screed	empty	empty	empty	W3	W4	W5	empty	empty	W6	W7	cleaning
GF	W1	W1	empty	empty	empty	empty	W2	screed/W2	W3	W3	W4	W4	W5	W5	W6	W6	W7	W7	cleaning

Figure 1: Takt Plan DGF Fire Station (Authored by the Project Team)

4 CONCLUSIONS

The Takt Systems support transparency and stability by using objective data. The focus of technical Takt Planning and Takt Control is value for the customer while the relationship between Takt Time and Takt Areas define the speed of a project's execution. The method is called technical because it is based on performance factors and a mathematical approach.