

IMPLEMENTING TAKT PRODUCTION IN RENOVATION PROJECTS

Jenni Sahlberg Site Engineer YIT Finland Ltd jenni.sahlberg@yit.fi Joonas Lehtovaara Doctoral Candidate Aalto University joonas.lehtovaara@aalto.fi Olli Seppänen Associate Professor Aalto University olli.seppanen@aalto.fi



AGENDA

- Introduction
- Research design
- Literature review
- Process model
- Implementation
- Discussion & Conclusions



INTRODUCTION

- The unique features of renovation projects make production control challenging
- The specific suitability and benefits of takt production in renovation projects have not been studied widely
- A design science study that examines the suitability of takt production in renovation projects
- The findings imply that takt production can benefit renovation projects



RESEARCH DESIGN

Design science research

Research questions:

- Is takt production suitable for renovation projects?
- If yes, what restrictions, preconditions and benefits are associated with the method?

1) Problem statement	 Find a practical issue or an interesting opportunity to adapt known practices to new contexts 	
2) Diagnosis	 Obtain understanding of the problem from a practical and theoretical perspective (literature & interviews) 	
3) Solution-forming	• Develop a solution (literature & interviews)	
4) Implementation and development	Implement the solution and test how it worksDevelop the solution based on the results	
5) Analysis and discussion of the results	 Analysis of theoretical contribution Analysis of practical contribution 	

Figure 1. The structure of the research



LITERATURE REVIEW – TAKT PRODUCTION

- Three different takt production methods were studied:
 - Takt Planning and Takt Control (TPTC) (e.g., Binninger et al. 2017)
 - Takt Time Planning (TTP) (e.g., Frandson et al. 2013)
 - Ship Cabin Refurbishment (Heinonen and Seppänen 2016)
- There are various documented cases but not too many from renovation projects



LITERATURE REVIEW – RENOVATION PROJECTS

- Special work tasks, including e.g. demolition, abatement, preservation and conservation require particular professional knowledge
- The current condition and operating systems of an existing asset need to be fully understood and researched
- Future occupants often define the schedule and the sequence of renovation



SOLUTION – PROCESS MODEL

- Macro-norm-micro approach of TPTC supported with collaborative tools
- Macro-level standardization: work tasks split in three separate phases with different takt time and takt area

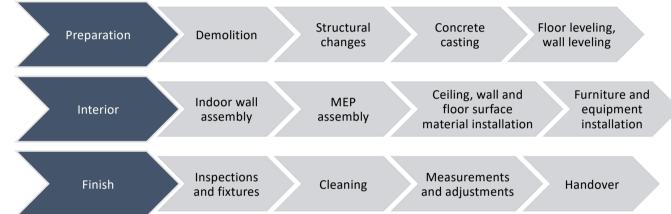


Figure 2. Three-phase takt production in renovation projects



IMPLEMENTATION – CASE PROJECT

- 20 000 sqm office building (1994)
- Full interior & MEP renovation
- Risks included
 - Unaccomplished design
 - Unexposed structures
 - A short production planning time
 - A customer-defined overall duration
- Implementation in two office floors
- Four ~780 sqm takt areas / floor
- Takt time 5 days

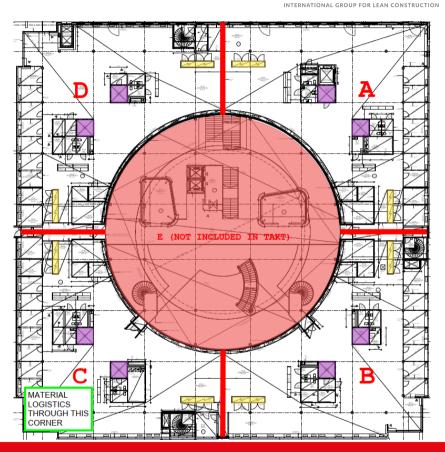
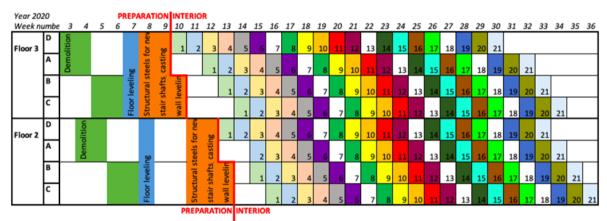


Figure 3. The takt area division of the case project



IMPLEMENTATION – TAKT SCHEDULE

- The preliminary takt plan was planned by the general contractor
- The MEP contractor participated in detailed planning through several comment rounds and LPS meetings
- Other contractors agreed the plan and resources in contract negotiations

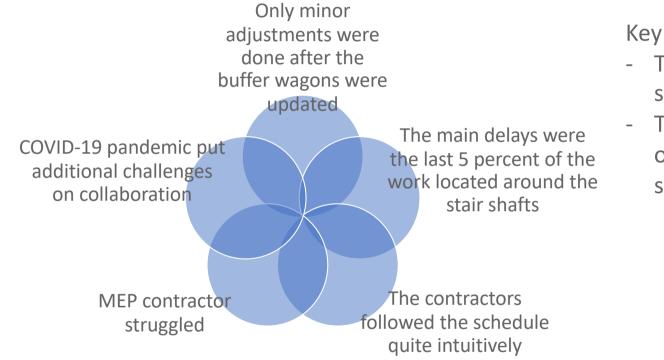


Wagons (MEP tasks marked with colors: electric, plumbing,	ventilation, sprinkler)
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1	Walls 1/2	Cable trays		12	Carpets
2	Other gypsum parts	Cable pipes		13	BUFFER
3	Walls 2/2	Cabling, lights	Vent. changes, inner line	14	Ceiling, panels for technical components, window frame taping
4		Cabling, corridor	Warming pipes, inner line	15	Indoor wall systems, frames of convector covers, sprinkler nozzlers
5	Sprinkler modifications	Cabling, corridor	Cooling pipes, inner line	16	Fibre line connections
6	Sprinkler modifications	Cabling, walls	Pressure test, pipes	17	Doors, moulding El. + vent. furnituring, ceiling
7	BUFFER			18	BUFFER
8	Plastering, base paint	El.sockets above ceiling	Warming pipes, outer line	19	Convector covers EL furnituring, walls
9	Ventilation		Cooling pipes, outer line	20	Furniture, equipment
10	Ceiling, frame	Electric centers	Pressure test, pipes	21	Ceiling, acoustic panels
11		Lighting	Convectors		

Figure 4. The final takt plan of the case project

IMPLEMENTATION – KEY RESULTS





Key results of the interviews:

- Three-phase model was supported
- The level of participation of the partners was supported



DISCUSSION & CONCLUSIONS

Takt production can be a suitable method for renovation projects, even if the prerequisites are not fully accomplished. Phasing of the production was seen as effective in managing deviations that are common in renovation projects. Future research possibilities: takt production in different kind of renovation projects, focusing also on less repetitive production that includes more renovation specific work phases.



THANK YOU!

Jenni Sahlberg

Site Engineer YIT Finland Ltd jenni.sahlberg@yit.fi Joonas Lehtovaara Doctoral Candidate

Aalto University joonas.lehtovaara@aalto.fi Olli Seppänen Associate Professor Aalto University olli.seppanen@aalto.fi