

Building construction

Location: Helsinki Metropolitan
Area, Finland

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Tomi Pitkäranta, FLOW TECHNOLOGIES



BUILDING CONSTRUCTION

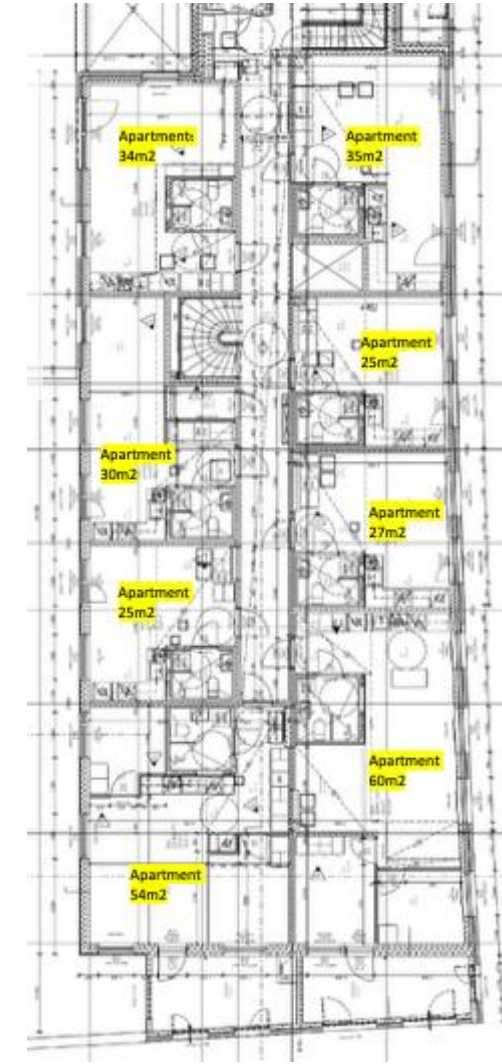
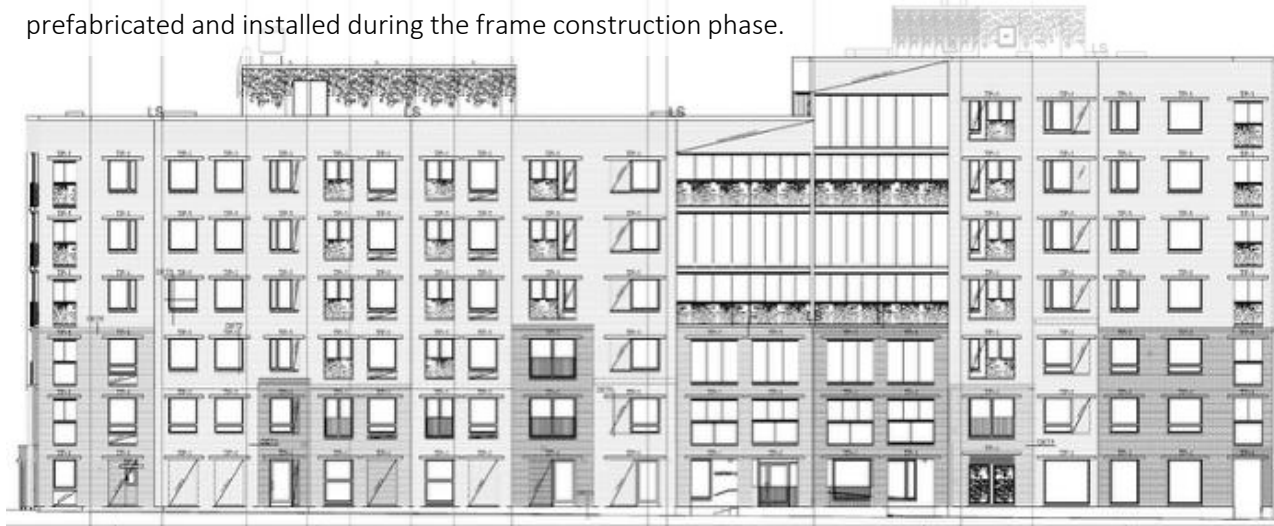
Overview: To test and demonstrate how BEEYONDERS technology improves productivity, health & safety and worker well-being at the building construction sites.

Here the technology includes:

1. Autonomous flight of **drones** within the building without GPS coverage and with low visibility conditions (e.g. at night).
2. Automated **scan of the building progress** by the drones and subsequent update of the DT.
3. Use of **exoskeletons**, connected with the DT, for simplifying and reducing the perceived physical effort required to carry out repetitive tasks.
4. Use of **wearables & sensors** for collecting data from workers related to safety, health and wellbeing, and subsequent update of the DT.

Pilot site introduction: Postiaukio – New residential building

Building has 6 to 7 floors and includes in total 99 apartments and two business premises. The building is built from prefabricated concrete slabs and walls which are installed with on-site tower crane. Additionally, the bathrooms are prefabricated and installed during the frame construction phase.



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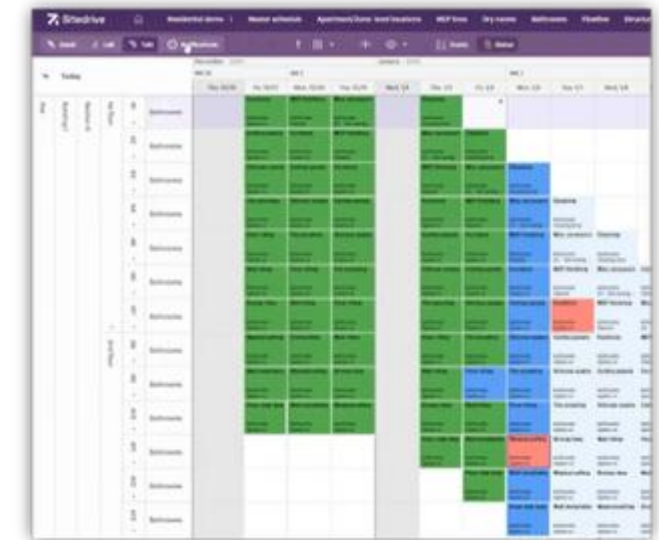
Site management (AS-IS): The pilot sites apply high-standard lean construction methods for production management. Thanks to this it has been possible to demonstrate how the BEEYONDERS technology assists in solving the root causes and brings added benefits to the fast-paced construction production management.

Weekly (with management)

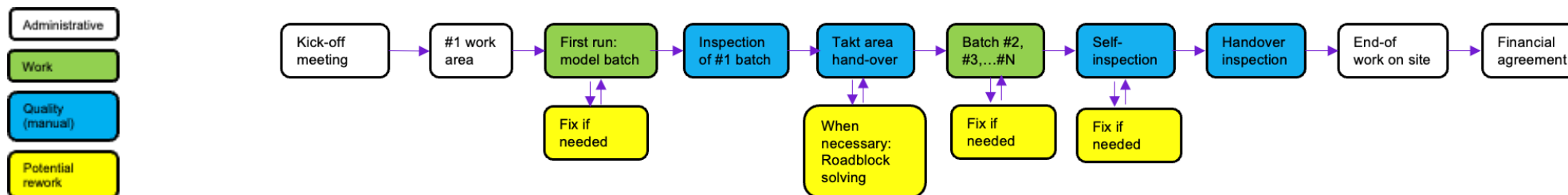
- Scheduling situation - are we on track?
- Work packages for the coming week - what to do next
- Logistics - what deliveries are coming in
- Quality & safety at work
- Improvement measures for deviations

Daily (with teams)

- Work packages or tasks to be carried out
- Conditions for starting work
- Workload & mood
- Measures to overcome possible obstacles



Subcontractor / worker crew operating process:



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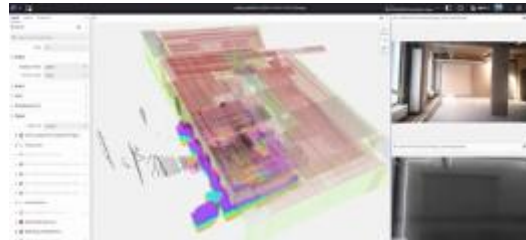
BEEYONDERS Technologies

Exoskeletons & wearable smart suit



- Lifting and hauling
- Above-head/shoulder installations

Drones (indoor scans)



- Progress & quality scans
- Safety monitoring

Indoor positioning system



- Location-tracking

Sensors (indoor conditions)



- Working conditions

BUILDING CONSTRUCTION

DEMONSTRATION RESULTS

Exoskeletons & wearable smart suit

IMPACT:

Assistive

Safety: Analysis of the validation tests demonstrated **50% reduction in ergonomic risks** for manual handling tasks when using the exoskeleton.

Productivity: The device provided a **22.5% reduction in measured muscle stress**. This physical relief directly translates to an estimated **20% increase in worker productivity**.

Well-being & Industry appeal: Use of advanced technology significantly increases worker satisfaction and well-being. This was particularly true for younger workers, who see it as a modernization of the industry, and for older workers, who appreciate the physical support that extends their ability to perform tasks comfortably.

Drones (indoor scans)

Automation

Productivity & Quality: By replacing tedious manual inspections, the drone and BIM updating service frees up **4 to 8 hours per week for each site manager**. This allows them to focus on higher-value tasks such as planning, coordination, and proactive problem-solving.

Safety: The drone's ability to scan the entire site, including hard-to-reach or potentially hazardous areas, provides a more comprehensive overview of site conditions.

Indoor positioning system

Automation

Safety: Indoor positioning systems enable the creation of "digital barriers" and geofencing around hazardous areas. If a worker approaches a restricted zone without the proper authorization or PPE, the system can trigger an alert.

Productivity: Directing the workers to correct working locations and automatically verifying that the required construction materials have been delivered to installation locations facilitates smooth construction production.

Sensors (indoor conditions)

Automation

Safety: Environmental sensors monitoring dust particles help identify and manage zones with potentially harmful air quality, protecting workers from respiratory hazards.

Productivity & Quality: The data from environmental sensors proved highly valuable. IoT-based monitoring of temperature and humidity was identified as a key factor in optimizing concrete curing. In Nordic climates, controlling these variables can reduce drying times from 12-24 weeks to 8-12 weeks, which represents an approximate 10% reduction in the total duration of an average residential project.