

FEDERATION OF PILING SPECIALISTS

FPS Digital Progression Group Case Studies Guidance Note 4

Implementation of Digital Workflows

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Introduction

As an industry we have made significant progress in utilising digital tools and workflows to improve efficiency, consistency and accuracy of information flows.

Despite this progress there is room to further improve, including establishing guidelines for best practice and sharing lessons learned openly to ensure that the entire industry makes best use of the tools and knowledge available.

This paper includes details of the following case studies where digital workflows have been successfully implemented:

- Zutec with SCS at HS2 Euston Approach
- PowerApps within Expanded Geotechnical

Consideration of the current tools/workflow in use and specific benefits/drawbacks are presented for each case study, with commentary on the lessons and potential future directions provided in the summary.

Zutec with SCS at HS2

SCS (Skanska Costain Strabag JV) used a common data environment (CDE) solution known as Zutec to collect, store and share piling records on HS2. This is an online database with form-based entry allowing data to be collected in the field and then accessed and processed centrally. The screenshots below show examples of the field data collection form and online database views.

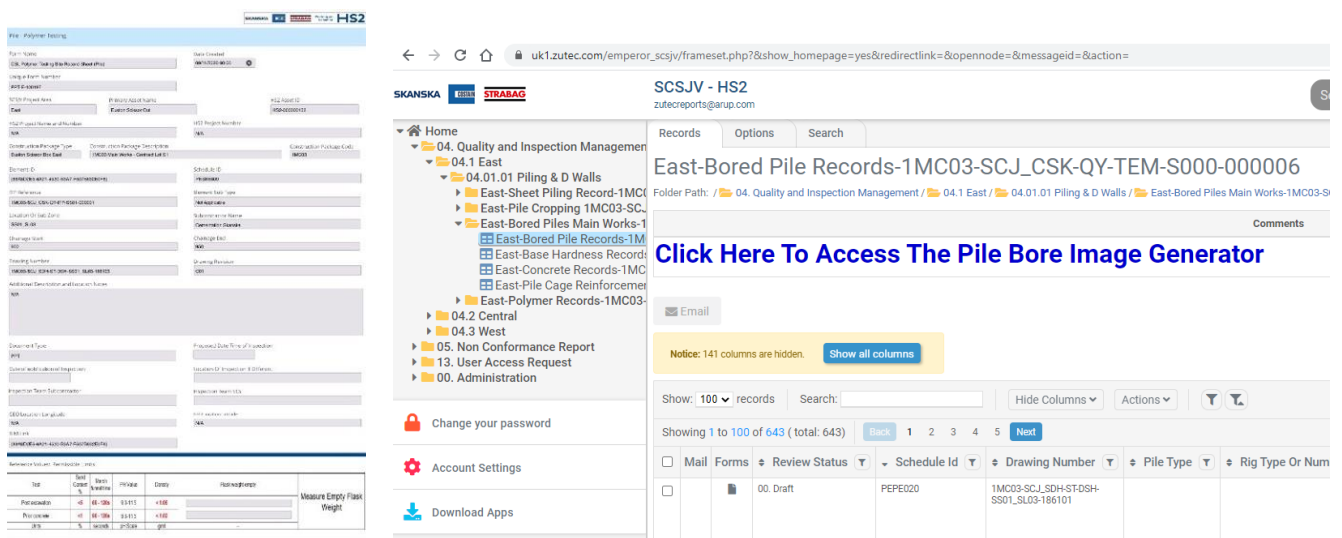


Figure 1 – Zutec field data collection form (left) and online database (right) screenshots

Zutec worked well as a central online storage location for piling data, with secure access provided to the database to a range of people and organisations across the project team, ensuring everyone had access to the latest data and avoiding duplication or data transfer issues from taking data offline. In

in addition, Zutec provided access to the underlying dataset via provision of an API style 'report connector', which allowed the development of a range of scripted tools and dashboards making use of the data. An example of a PowerBI dashboard presenting pile construction data from Zutec is shown below.

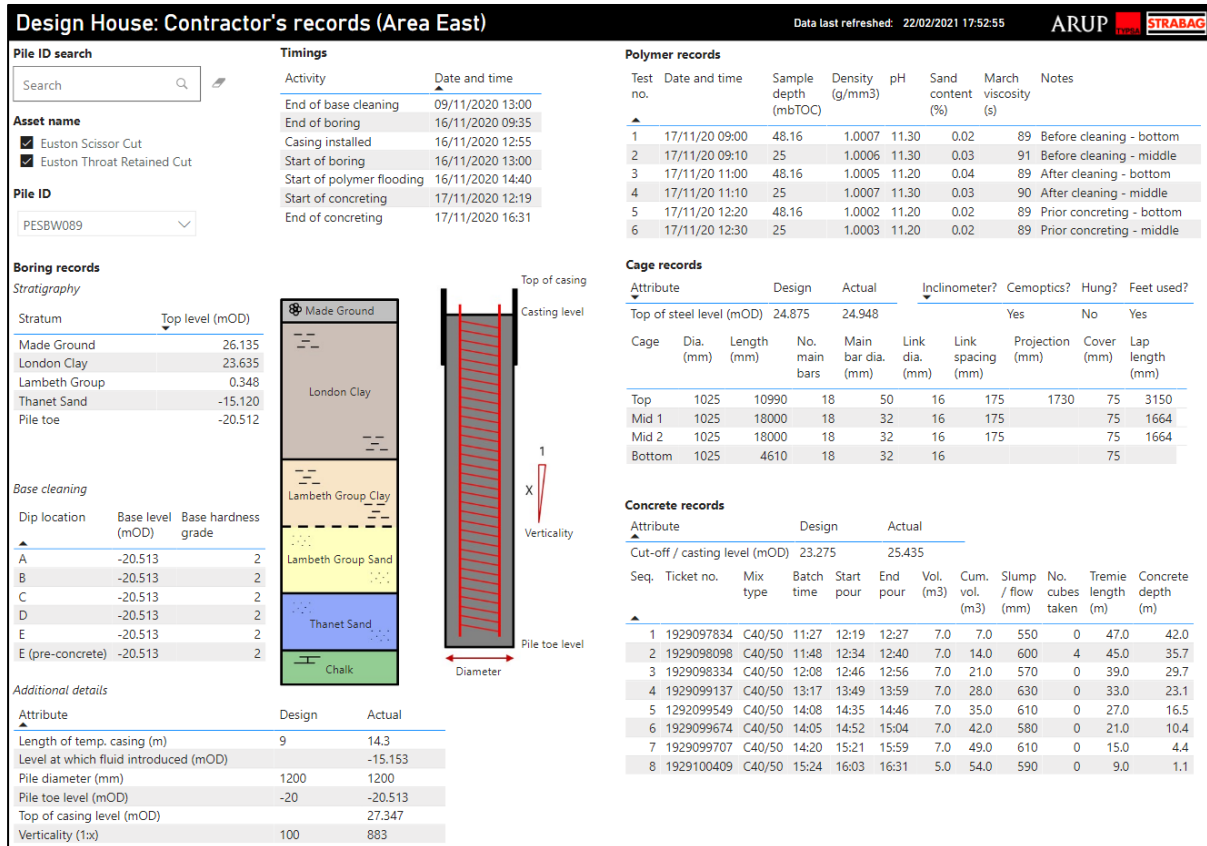


Figure 2 – PowerBI dashboard using data accessed through Zutec API

Issues encountered in the use of Zutec included:

- site based electronic forms not fully replacing paper-based data collection, resulting in time consuming and error prone transcription of data from paper records onto the Zutec system
- database not set up with relational sub-tables, with a single row of data being presented in the database for each pile, requiring duplication of columns e.g. for multiple concrete trucks

PowerApps within Expanded Geotechnical

Expanded Geotechnical's Piling Integrated Management System (PIMS) is the result of iterating through two previous "off the shelf" QA recording platforms. Typically moving onto a new platform was due to improved capability (such as cloud technology for example) and existing pain points.

PowerApps as a platform enabled us to create a bespoke solution, fully hosted in the cloud, enabling the below list of features:

- Smart Schedule Sync
- Collaborate cloud-based forms
- Diagrams
- Live activity feed
- Comments threads associated to specific piles
- In App approval process
- Auto report generation
- Expandable to integrate with other cloud-based APIs / systems

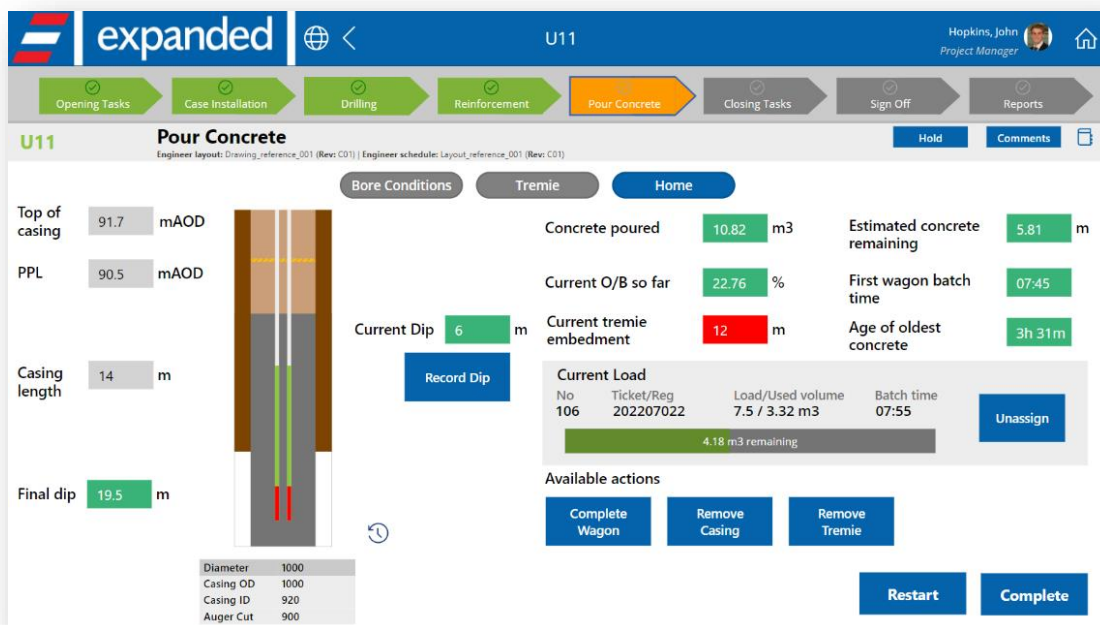


Figure 1 - Concreting Form for Rotary Bored Pile

Figure 1 demonstrates the following key features:

- Progress within each pile represented by the coloured process items in the top banner. Different users collaborate within each form, filling in the relevant sections as they are completed.
- Diagrams allow users to visualise where the casing, tremie and concrete levels are in relation to one another and the remaining concrete volume in the wagon

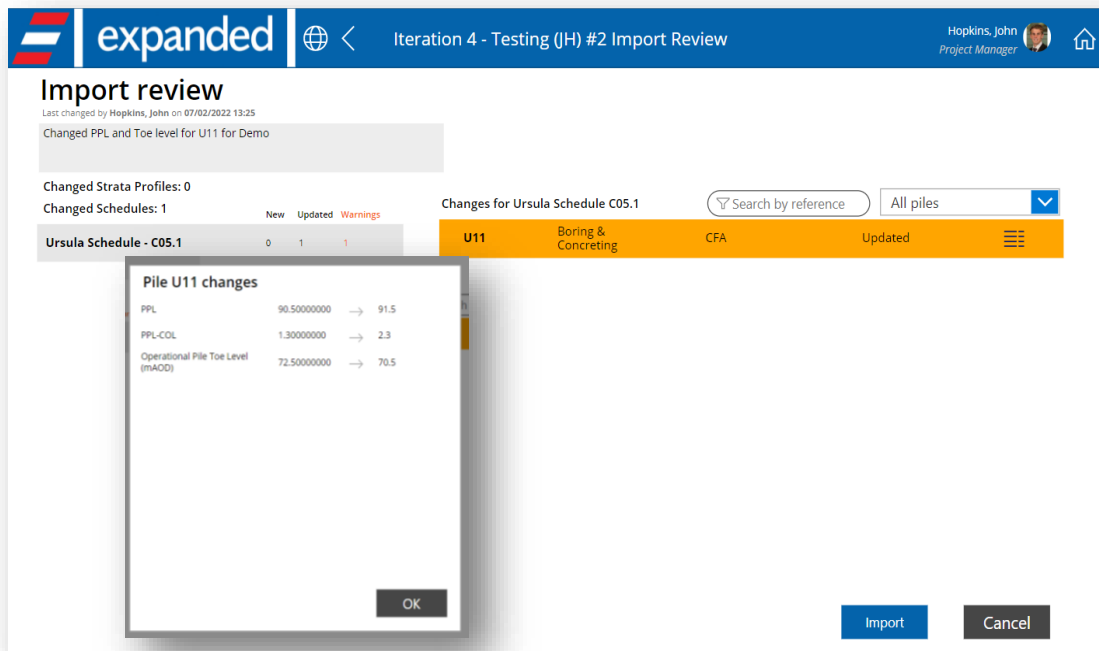


Figure 2 - Smart Schedule Sync - Import Review

Figure 2 demonstrates how schedule changes are highlighted and summarised for managers before committing them to construction issue. This ensures the desired changes have been captured as well as highlighting potential additional changes that potentially hadn't been highlighted via document management systems etc.

The biggest challenges have been:

- Uptake from workforce across the business. Naturally there is a spectrum of users and willingness to embrace change and use of technology. Appointing "Champions" as a first point of contact has helped in this area but it is still a journey to get everyone on board.
- Reliance on hardware and connectivity. For the problems that digital solutions solve we must acknowledge that paper solutions did not crash or lose connection. Therefore, ensuring spare tablets are available and ensuring good Wi-Fi availability if 4G connectivity is patchy in the area.

Summary and future directions

Based on current developments within the industry and lessons learned from recent projects including the case histories noted above, the recommendations outlined below are suggested as best practice for the industry to follow and develop further in the future:

- FPS schedule used as input in digital format
- User friendly form-based interface for site input
- Aim to provide additional functionality to previous methods of data capture. For example, automated ITP checks in real time and integration with other data sources (ie. access to concrete wagon information via supplier API).
- Data made available in standard format e.g. AGS piling data schema – shared/updated shortly after construction of each pile (within spec/project requirements) via cloud-based database/API/interactive dashboard where possible
- Automated report generation to prevent double handling of information. Also provide tools to draw attention to whether key parameters are within ITP tolerances

- Costs and development times need to be considered when working with IT teams and external developers. Our responsibilities as those within the industry are to provide the subject matter knowledge to connect the needs of the sites and business with the technical teams that can deliver the solutions.