

DIGITAL ENGINEERING DEVELOPMENT AND USES

Document no.: NA

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1. Digital Twin for Site Inductions

A Digital Twin has been created federating different models produced by different parties: Designers models, point clouds from our drone surveys, logistics drawings, to return an up-to-date depiction of the conditions on site. This has been linked with SharePoint, where the H&S team owns a list of risks relevant to the site current condition. This list is linked with the BIM model, creating Hazard Boxes which are manually located in the model in its required position. These boxes, when clicked on, return the data that they contain, including a live link to SharePoint where the relevant risk information is available: risk description, risk mitigation, and also any pictures or videos that are deemed useful to illustrate the particular risk (pictures from site, links to relevant legislation or industry or project documentation, Youtube videos, etc. With this live link to Sharepoint, the H&S Team can update the Hazard Information, keeping the digital twin automatically up to date.

Classification: Public

Digital Twins

H&S Hazards – Site Induction – Live Link – Sharepoint & BIM Models:



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2. Support to in-house SMSTS Training

A collection of videos has been put together from our site models to illustrate typical scenarios to be worked on our SMSTS training sessions. These scenarios describe: from site walkaround and what good looks like, to working in deep excavations, at height, interface with mobile plant, etc.

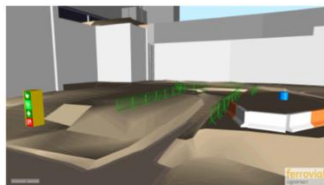
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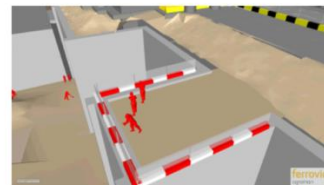
H&S - SMSTS Training - BIM Models - Videos:



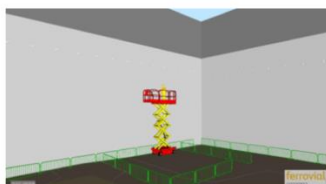
01 Welcome to your site



04 Deep Excavation



06 Operatives WAH



07 Mobile Plant



08 Crane – Lifting Cage

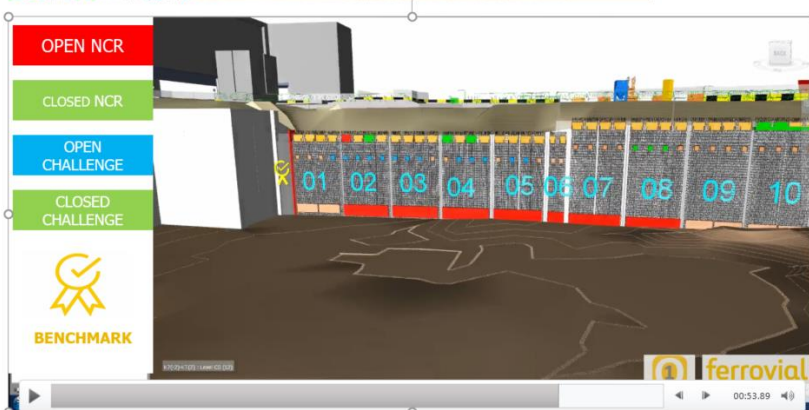
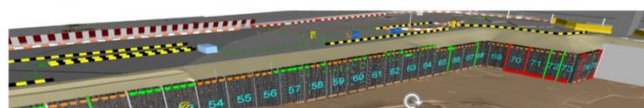
3. Digital Twin for Quality Records

A similar Digital Twin has been put together for the Quality Team, where the lists on SharePoint are used to record all raised Non-Conformance Reports so these can be displayed, and all related graphical and non-graphical data can be interrogated on the 3D model. This enables a more truthful representation of the occurrences on site, identification of trends, monitoring of progress per areas, etc.

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Quality – NCRs + Benchmarks – QA Linked to BIM Models:



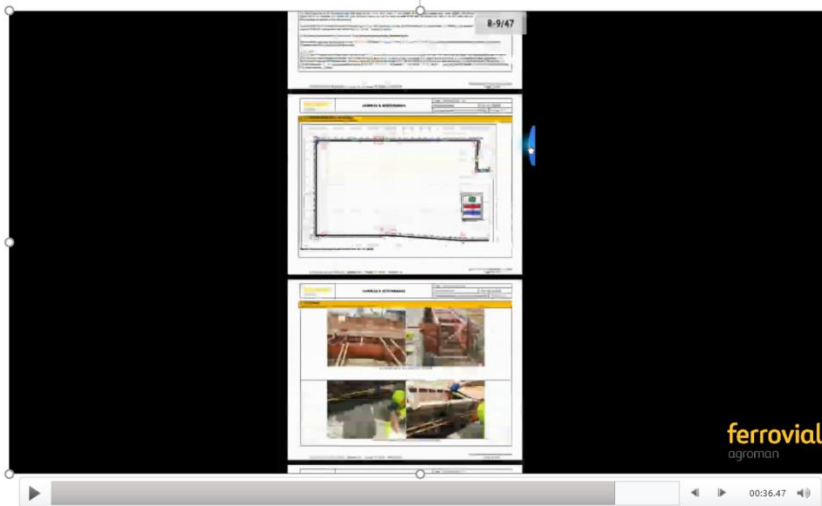
4. Quality Benchmark documentation accessed via QR codes on site

The model described above also contains all the Benchmarks carried out on the elements on site. In addition, the information on those benchmarks is accessible on site via scanning the QR codes included in the stickers installed in every "first-of-a-kind" element. This QR code is a link to our Document Management System, where the user, by entering their log-in details, can access the relevant Benchmark Paperwork, which includes all signatures, pictures, and most important processes followed to carry out the works (Inspections and Test Plans, Materials Data Sheets, drawings). This innovation came up from a client requirement to identify all benchmarks with physical tags on site. The QR code and link to the actual documentation were added by FAUK in order to add value to this particular client requirement, making it more useful for our site team.

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Quality – Benchmarks – QR Codes - Viewpoint:



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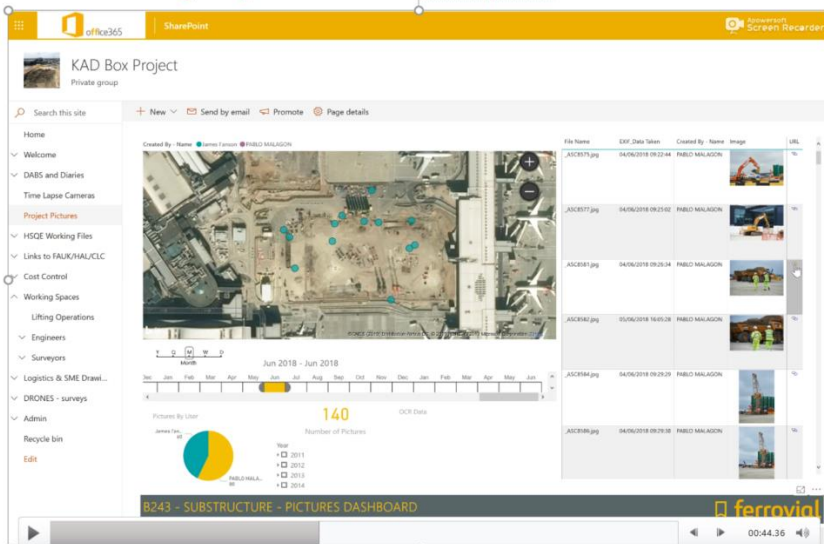
5. Georeferencing of Project Pictures

As most of the engineers currently use smart phones, if they have the location option enabled on their phones when taking pictures on site, we can use this metadata to locate where the pictures have been taken with up to 0.5m accuracy with latest mobile phones dual GPS system (5m with older ones). This system uses different Microsoft based platforms, such as SharePoint, Power BI and Microsoft Bing Maps (Microsoft's version of "Google Maps") to illustrate the actual locations. These systems allow a lot more than that, they allow to filter pictures by location, but also by date, by author and even by OCR Data – this is, the software can read text captured within the pictures and return the set of pictures that display a specific text.

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Georeferencing Project Pictures – Sharepoint + Power BI + OCR Data:



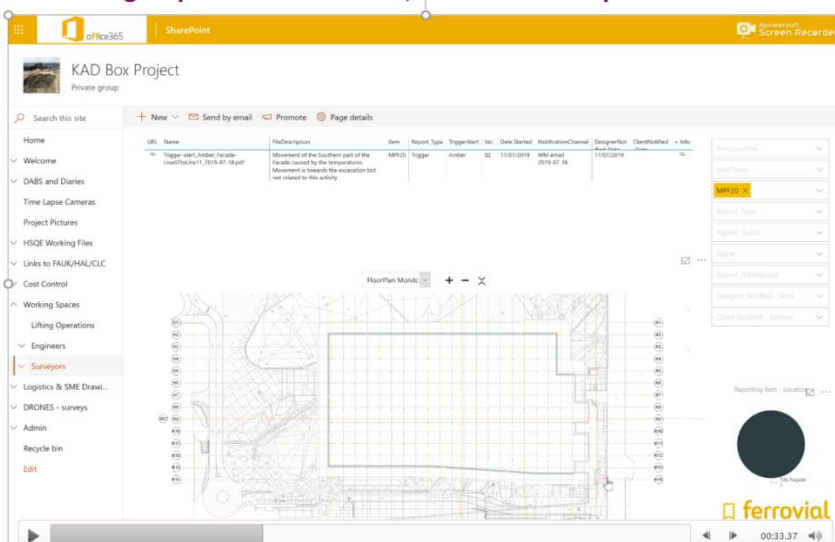
6. Monitoring Reports

Joining the use of SharePoint, Microsoft Flow, Synoptic Panel and Power BI, we have created an intuitive display to the monitoring data base. The system represents the location of all the monitoring equipment installed on site and surrounding infrastructure. By selecting one element on the drawing, the system brings up all the reports that have been produced in reference to this particular element / monitoring point. In addition, the system enables us to interrogate if these reports notify trigger levels (red, amber, green), if these have been shared with third parties (designers, client) and their current status (open, closed). The original intent was centralizing and organizing all the monitoring documentation that is produced in a project. The second part of it is easing storage, access and navigation of all information related to particular elements when needed, avoiding having to scan through several documents to work out where the relevant information sits.

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Monitoring Reports – Documents, Metadata & Graphical Data:



7. Matterport

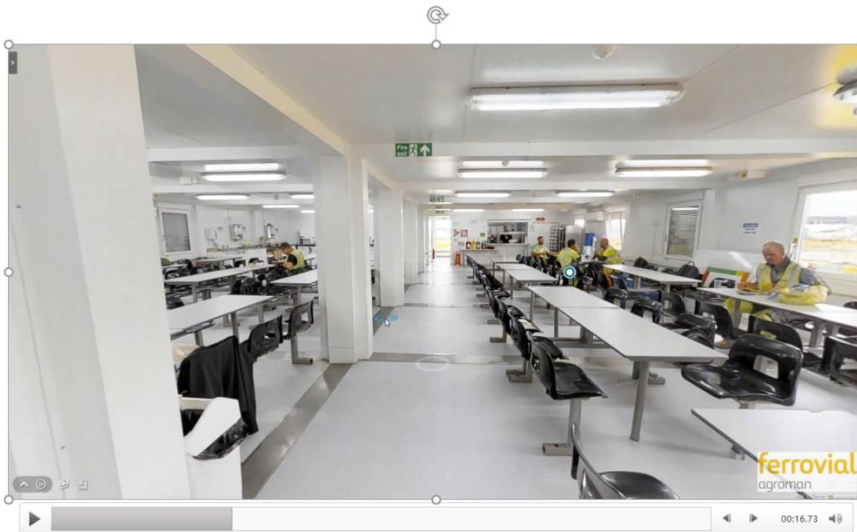
We are trialing Matterport surveys at our staff canteen to understand its capabilities in terms of graphical representation, accuracy in measurements, and navigation capabilities. The aim is to understand if this can be implemented in our follow-on demolitions project, again linked to a list of rooms stored on SharePoint. The model allows measuring, as well as tagging intelligent information to the elements contained in the space model generated in Matterport. Shared links can also be generated and embedded in Sharepoint via an "iframe".

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Matterport – Testing – Canteen – Star of Ferrovial:

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*** END OF THE PLAN ***