# Application of Industrial Digital Technologies
## Augmented Reality

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# Virtual and augmented reality

- Virtual Reality (VR)
  - Computer generated simulation of a 3D image or environment
  - Interacted with in a seemingly real or physical way

- Augmented Reality (AR)
  - Interactive experience of real-world environment
  - Objects enhanced by computer-generated perceptual information

# Application of AR to the steel and metals sector

- Vuforia suite from PTC has been chosen as the platform to investigate four areas

- Remote Assistance – Vuforia Chalk

  - Video calls with annotations anchored to image

- Enhanced Training Using AR – Vuforia Expert Capture

  - Training material delivered via smart glasses or mobile devices (text, videos, drawings)

  - Data and animations can be superimposed onto items of plant equipment

- Enhanced Data Presentation to Operator – Vuforia Studio

  - Targeted information in operator's line of sight via smart glasses technology

  - Information can be linked directly to what the operator is looking at

- Promotional Experiences – Vuforia Studio

  - Delivery of tours/videos 'attached' to equipment

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# Remote Assistance – Vuforia Chalk

- Vuforia Chalk helps factory operations, service, and other teams to quickly access support and expertise

- People seeking guidance use Chalk to share their live environment with remote experts

- Annotations can be drawn on the screen to help resolve problems

- Uses real-time 3D environment mapping to help annotations stick to objects in the physical world

- Can be used on phones, tablets and desktops

- Limited functionality with smart glasses

- Potentially reduces the need to travel to remote sites



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# Work Instructions – Vuforia Capture

- Capture work procedures from an expert's point of view using HoloLens or RealWear devices

- Expert records video of how they perform a task with commentary as required

- Procedure broken down into steps

- Finished experience can be viewed on any compatible device (headsets, tablets, phones) although all features are not (currently) available on all devices
    - Location tracking only on HoloLens
    - Confirmation and pass/fail inputs only available on phones and tablets

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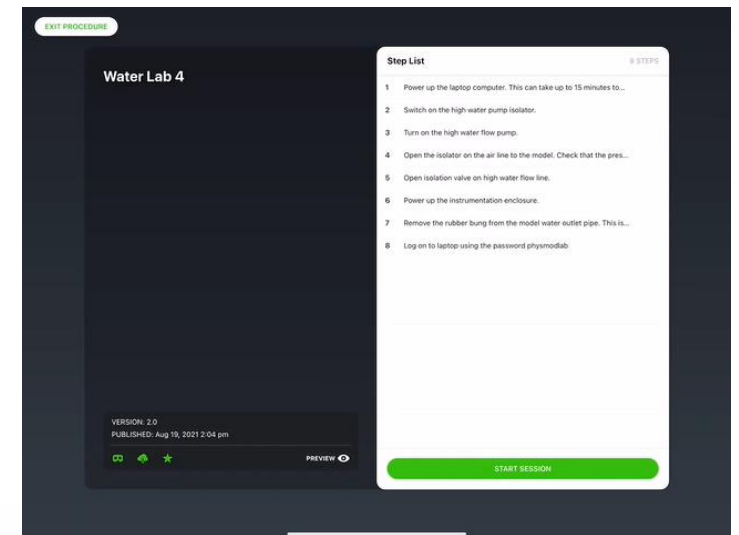**PRISM**

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# Viewing Capture on Other Devices

- Finished experience automatically formatted for range of devices
- No location markers but all other information available
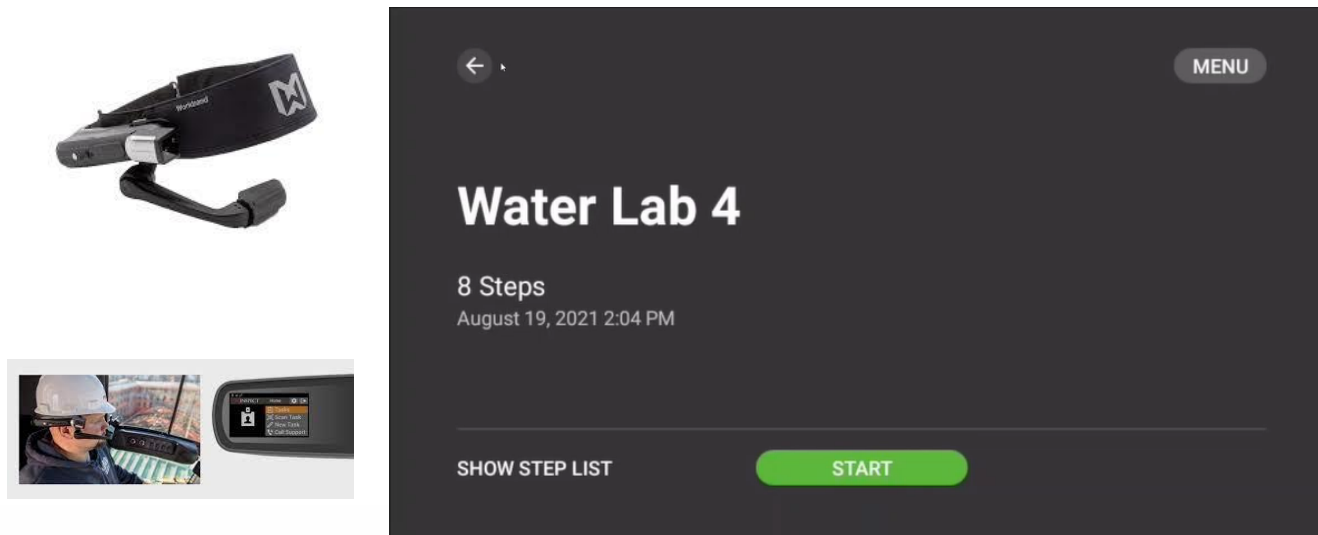

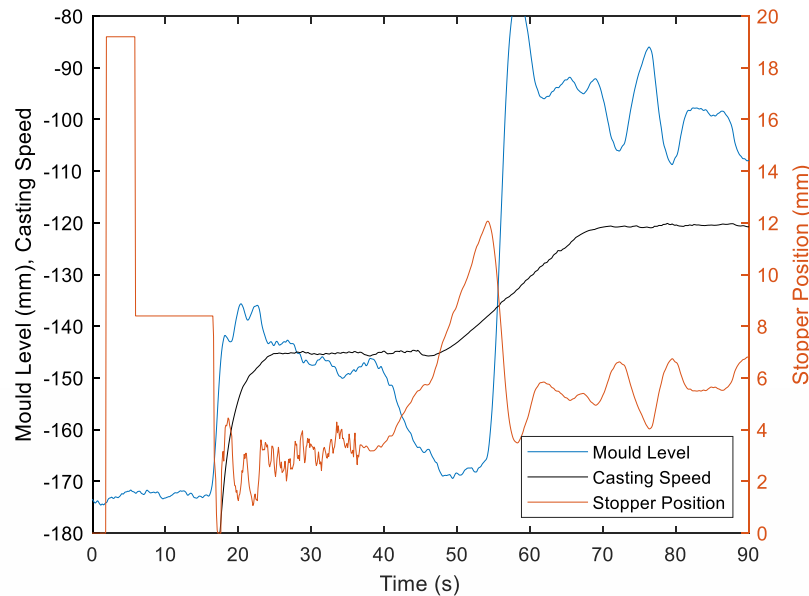Smart Glasses


Tablet

# Vuforia Studio

- Vuforia Studio enables the rapid creation of impactful AR experiences from existing assets:
  - 3D CAD data
  - Animated sequences
  - Internet of Things (IoT) data from ThingWorx

- CAD models, videos, drawings and real time process data can be added to an operator's live view of the world

- Demonstrators being developed for:
  - Pilot plant data displays on smart glasses
  - Walkaround experiences for pilot plant
  - Virtual tours for laboratory areas

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# Real time data display on NPP

- Display live data to operator via smart glasses
- Data always available in sight-line
- Hands free to allow other operations



- Pilot plant cast on 15 July 2021
- Data displayed on Vuzix smart glasses
- Data transmitted via ThingWorx IIoT platform and Vuforia Studio

# Model targets

- Use CAD models to detect items of interest

- Various tests using CAD model of NPP ladle

- Ladle is detected by software and can be used to display relevant information

- In these cases, the model is superimposed on the live view and other data can be selected
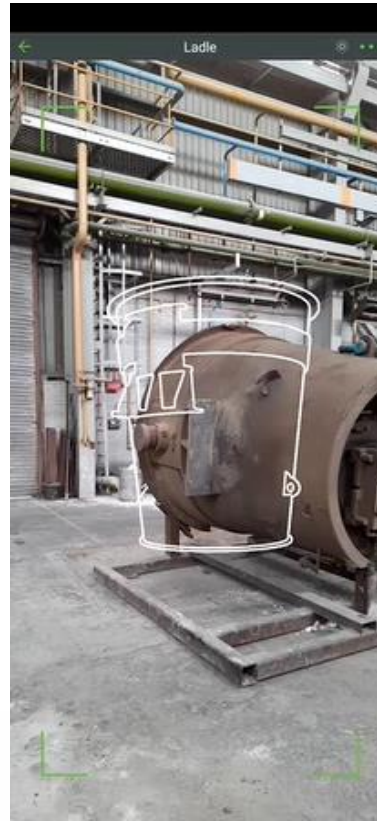
# Area targets

- Allow 3D scan of an area to be used

- Area scanned using LIDAR on iPad

- Anchor augmentations to 3D model

- Demo shown running on tablet
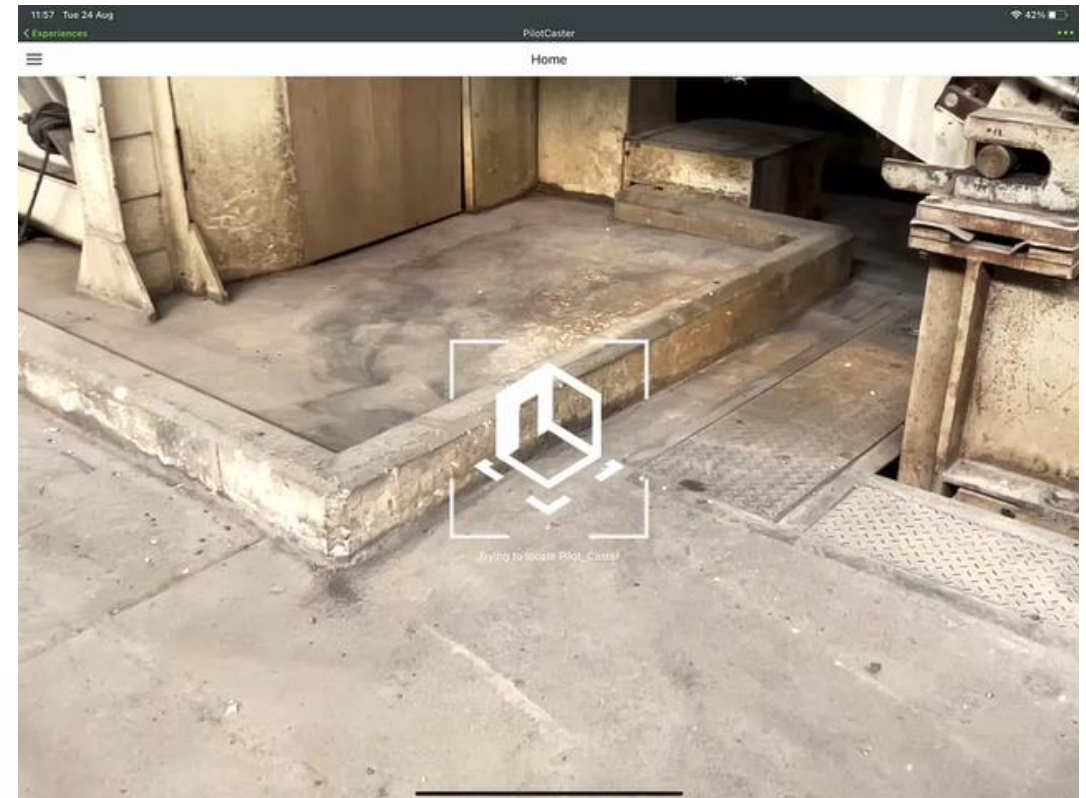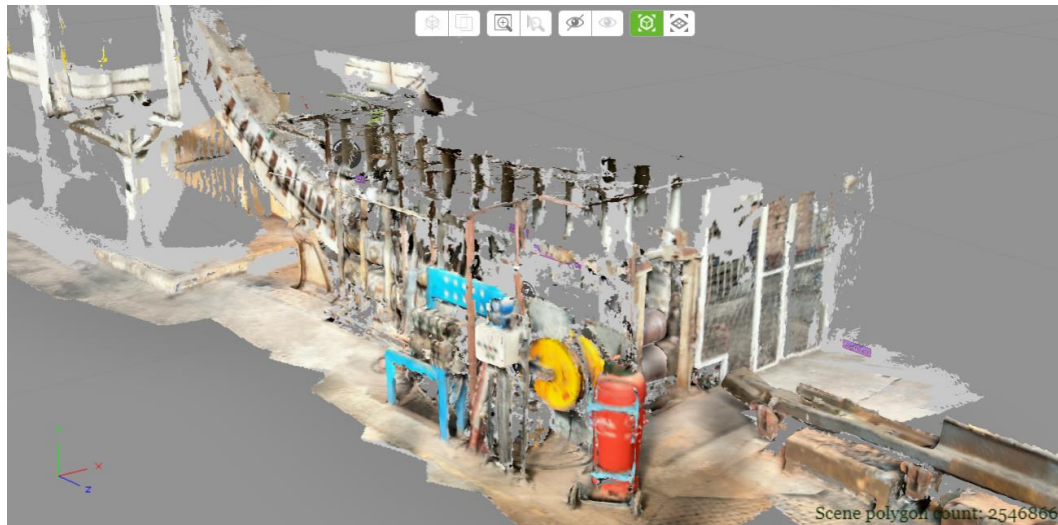
# Augmented reality tours

- Can use Studio to develop AR tours of labs, etc.

- Use area target of area to anchor videos and data

- Example uses HoloLens for immersive experience

- Aim to include videos of Institute experts and other material



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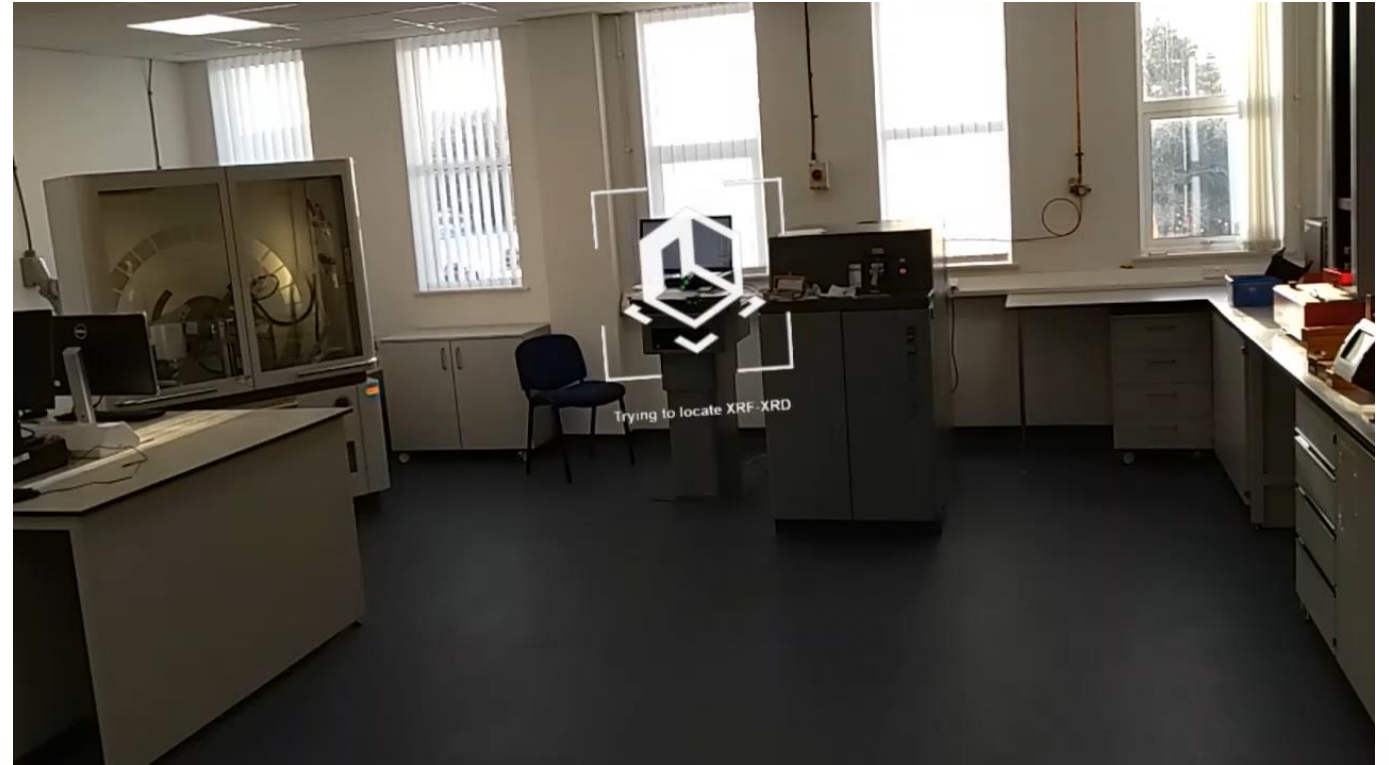
# Mobile experience

- In Studio, need separate experiences for 2D, 3D and mobile experiences

- Area tracking to determine location available on mobile devices

- Videos and data shown in 2D overlay

- Area tracking not available on 2D eyewear (e.g. RealWear)

# Virtual reality experience

- Series of photos on iPad stitched together

- Matterport software

- Demo shown running on PC

- VR headset would allow true immersive VR experience

- Allows virtual tours from remote locations, e.g.on Institute website



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# Conclusions

- Vuforia Studio suite is available at the Institute – Chalk, Capture, Studio

- Vuforia Chalk
  - Useful tool for getting advice and assistance
  - Need to get people using it, particularly when working away

- Vuforia Capture
  - Capture knowledge of experts into step-by-step-procedures
  - Looking at applications in Materials Characterisation Centre and NPP

- Vuforia Studio
  - Show information superimposed on views including real time data
  - Aid for operators of equipment – hands free, targeted information
  - Promotional material