Working with Point Clouds in the SSI Solution

SSIWSC 2024
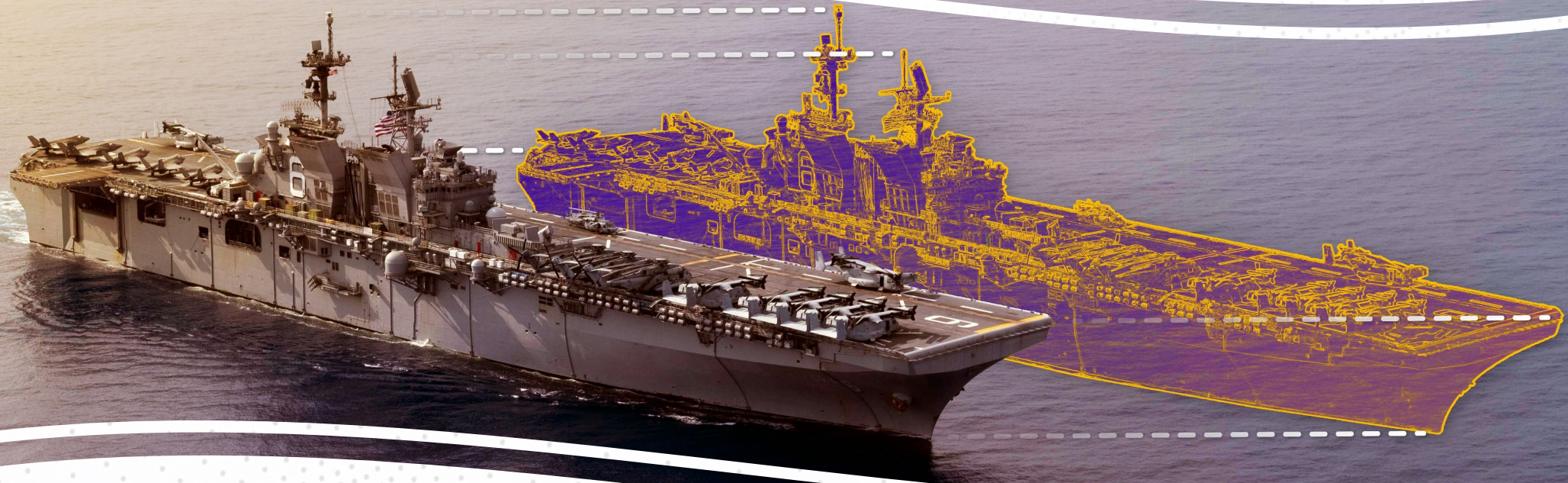Design. Build. Maintain. Connect.

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Ideal Digital Twins

Ideally, vessels would be built exactly as they were designed, and the digital twin would match exactly what's in the water.

Actual Digital "Twins"

Designs without 3D data, how do you know what's actually there?

How do you start a digital twin for a design without any 3D data?

Equipment in the spec/design isn't what gets installed.

Changes found/made on the fly without notification.

Design changes don't get to production in time.

Stuff happens…

Challenge

- **CHALLENGE -**

  How do you efficiently/effectively capture/migrate the physical reality into your digital twin?

- **SOLUTION -**

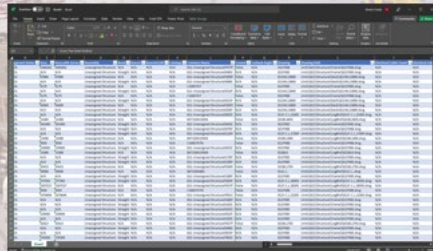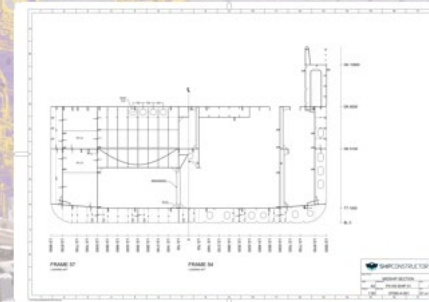 Reality Capture with 3D Scanning and Autodesk ReCap.
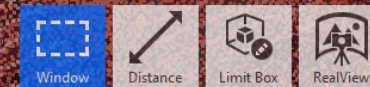
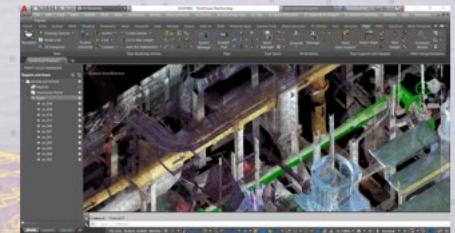# Completing the Digital Twin

Models

Data

Drawings

Reality Capture

Uses for Reality Capture (Point Clouds)

- Document the As-Built state

- Validate/Compare model data against the as-built configuration for QA checking

- Ship component checks

- Aid with operational documentation

- Capture spaces prior to repair/refit work to reduce vessel down time

- Provide a basis for new design

- Scan data can be stored in the PLM to complete the digital twin
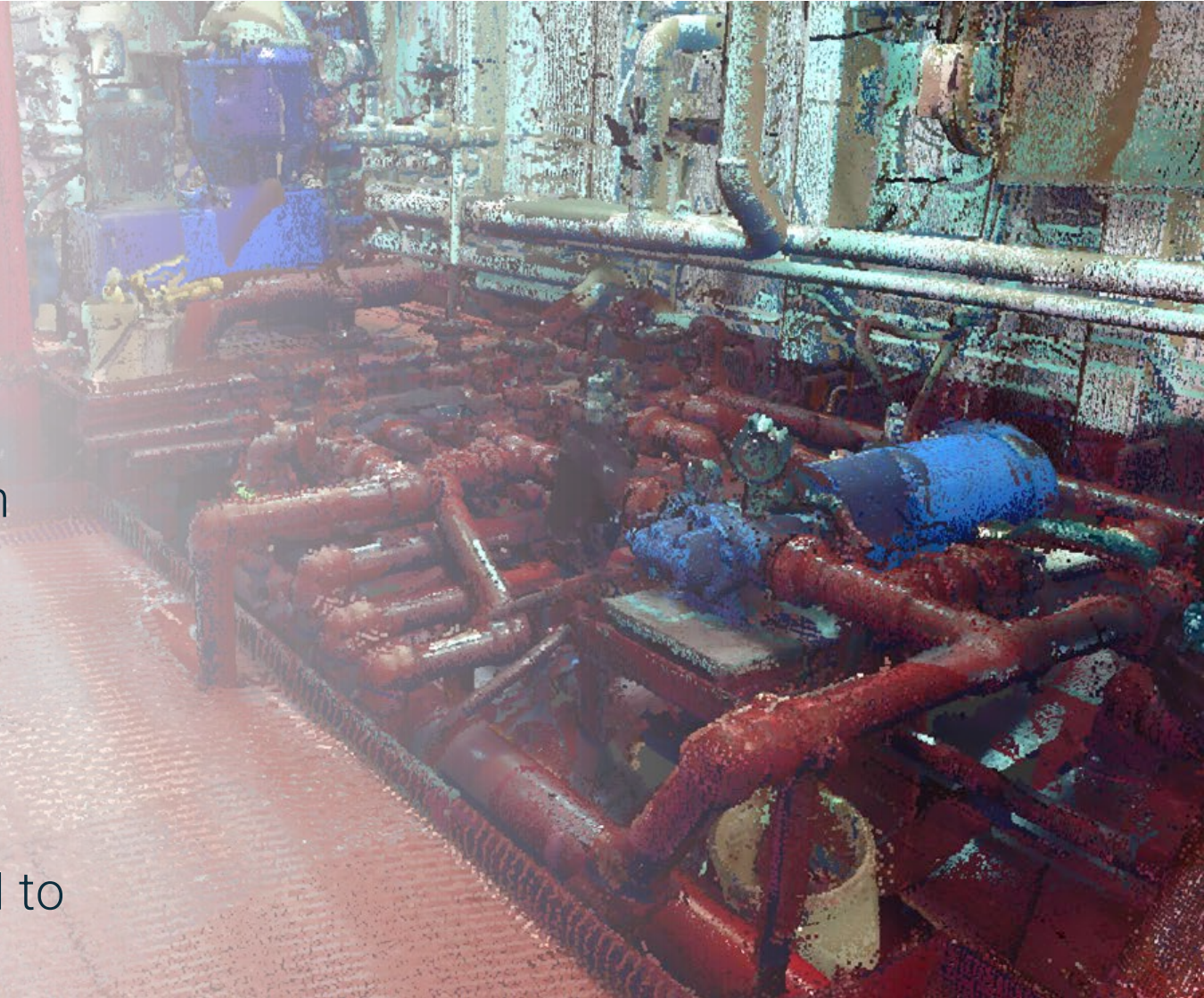
Creating 3D Scans

- First you must create the 3D scans

- Typically done in one of two ways:

    - Tripod mounted laser scanners (typically called Structured Data)

    - Handheld portable scanners (typically called Unstructured Data)

- Are Pros/Cons to each approach

Working with 3D Scans

- Autodesk ReCap and ReCap Pro are great tools for working with the 3D scans

- This includes:

    - Stitching multiple scans together to make point clouds

    - Deleting unneeded points and optimizing the project

    - Using Scan Locations, Scan Regions and View States to organize the project to make it more efficient

    - Adding dimensions and annotations to help with design work
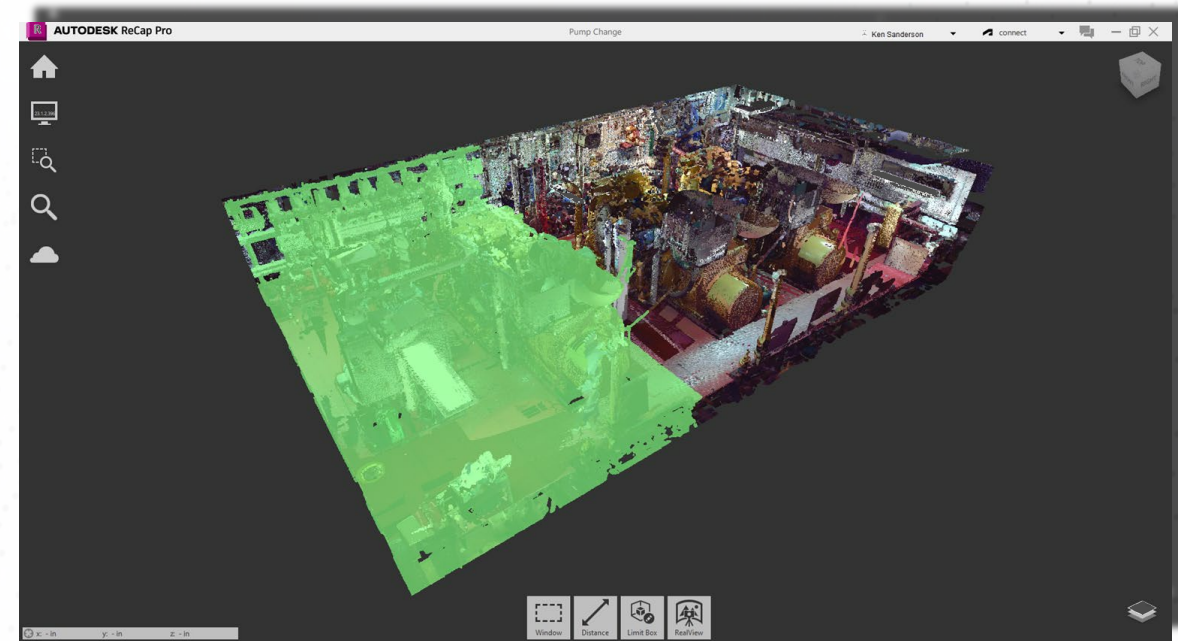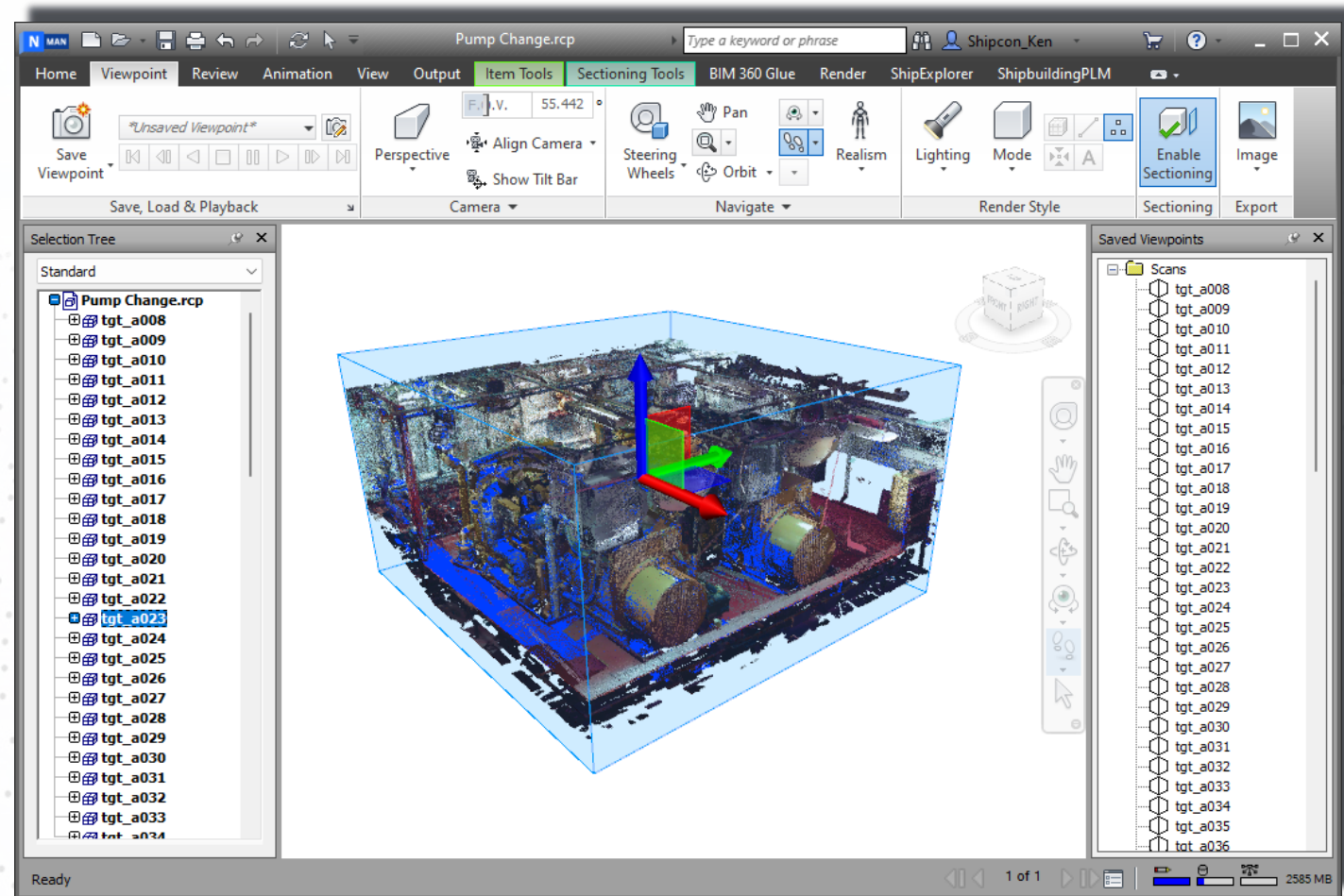
Reusing Point Clouds

- Point clouds can be referenced into ShipConstructor models

- Selecting the point clouds allows you to:

    - Crop the cloud

    - Use Scan Regions like Layers

    - Use AutoCAD OSNAPs specifically for point clouds

    - Extract intersecting edges and centerlines as lines

    - Extract 2D geometry along any section plane

- These all make it easy to use the point cloud as a reference to model over top of
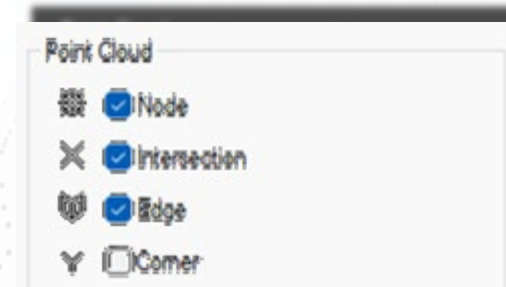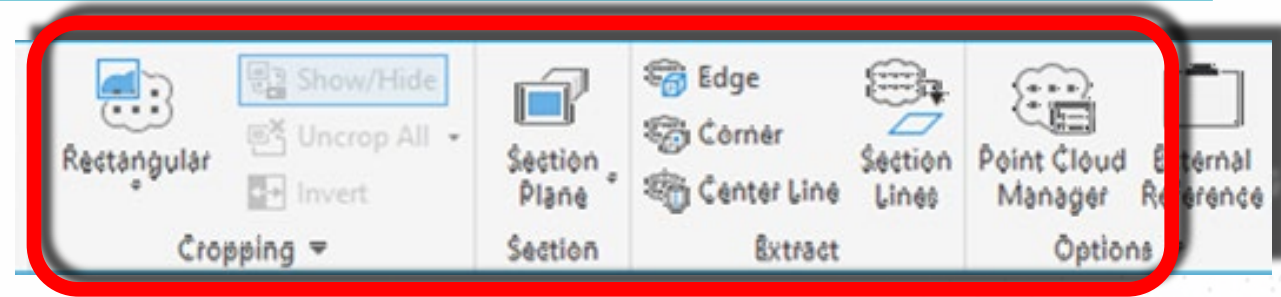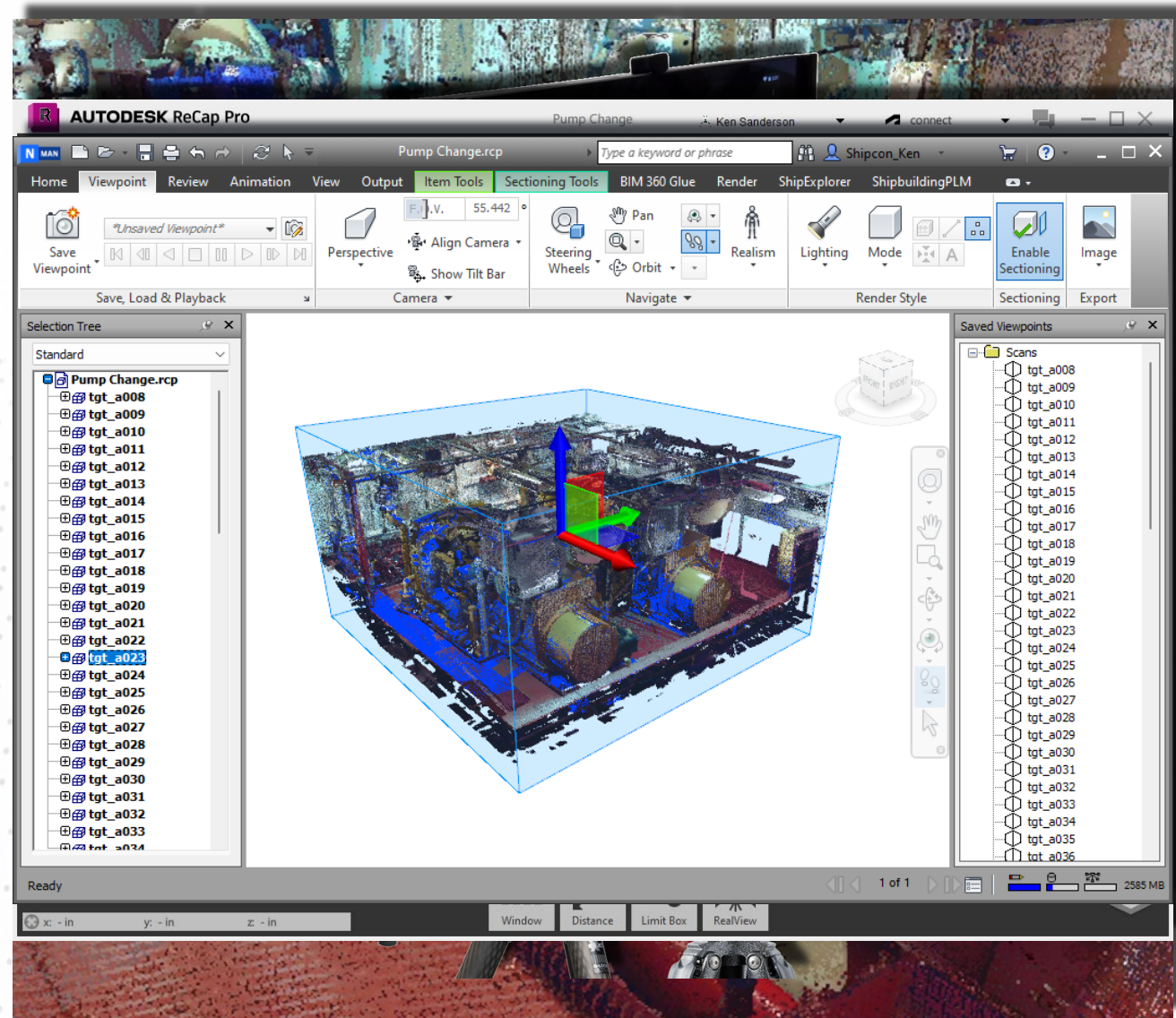
Reusing Point Clouds

- Point clouds can be Appended/Merged into ShipExplorer models as well.

- The Project Scan Locations will be visible in the Selection Tree and as Saved Viewpoints.

- You can select individual Project Scan Locations or the entire point cloud and hide them, change their color and/or transparency, move them and make other edits if needed.

Summary

- We talked about some of the benefits points clouds can provide.

- We talked about creating point clouds and the two major types of 3D scans.

- We demonstrated how ReCap & ReCap Pro can be used to organize & optimize Point Clouds to make them easier to use.

- We discussed how Point Clouds can be used in ShipConstructor and ShipExplorer.

Thank you for your time