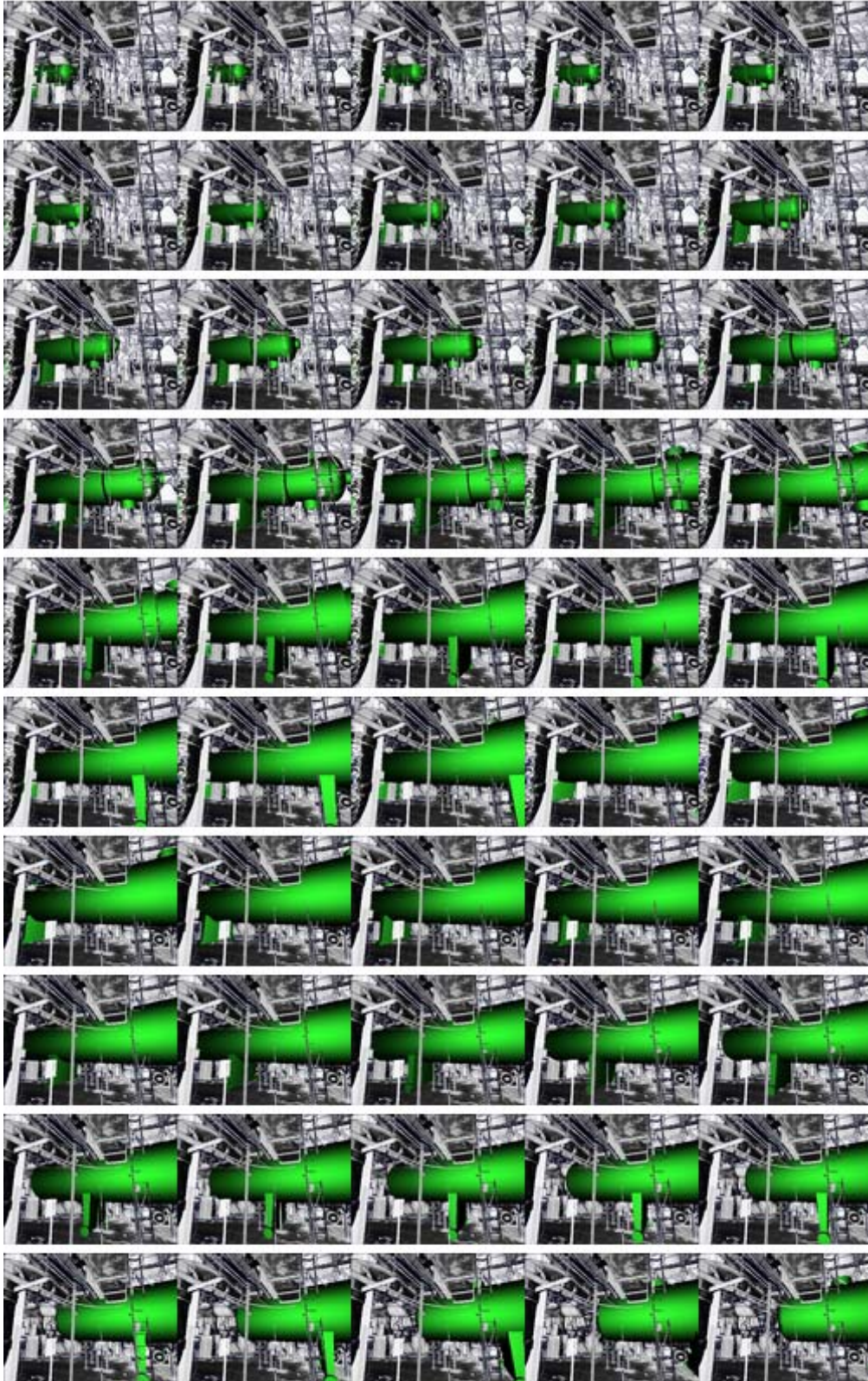# EQUIPMENT REMOVAL AND INSTALLATION PROCESS USING LASER SCANNING TECHNOLOGY

LASER SCANNING TECHNOLOGY PROVIDES A VERY EFFECTIVE TOOL TO SUPPORT COMPLEX RIGGING PLANNING AND EXECUTION

# EQUIPMENT REMOVAL & INSTALLATION PROCESS USING LASER SCANNING TECHNOLOGY

Laser scanning technology provides a very accurate as-built representation of the facility. CSA's PanoMap/LSSM technology provides an effective and user-friendly access to scan data.

PanoMap/LSSM integrates with Plant/CMS to provide a realistic 3D simulation of the equipment removal/installation process. The system creates a dimensionally accurate visual representation of the rigging process.
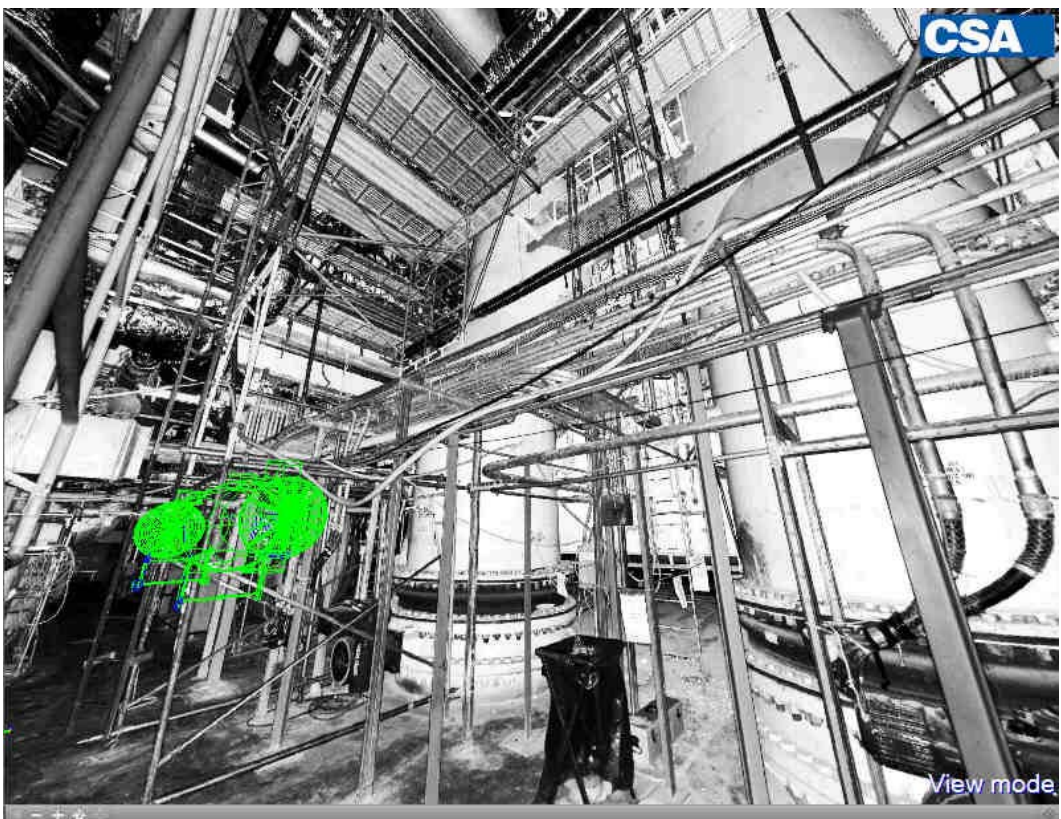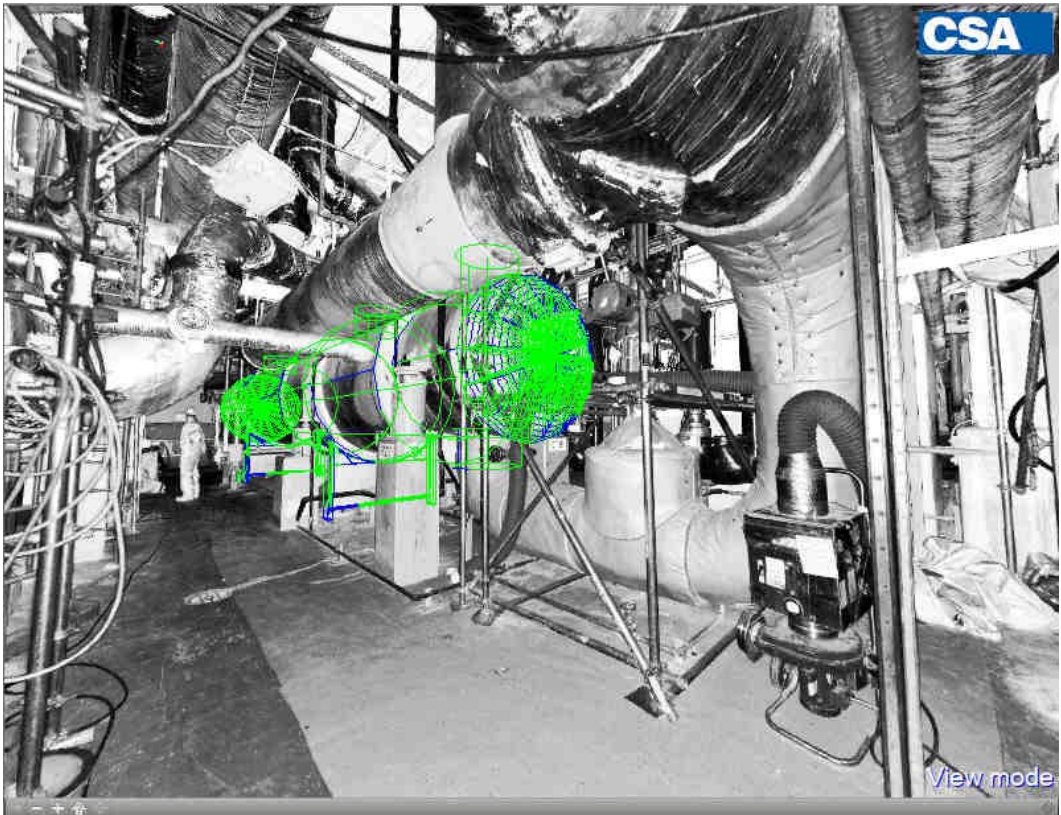
OVERVIEW OF THE IMPLEMENTATION PROCESS AND RESULTS

1. **Removal Path Area is Scanned and PanoMap/LSSM Database is Created**

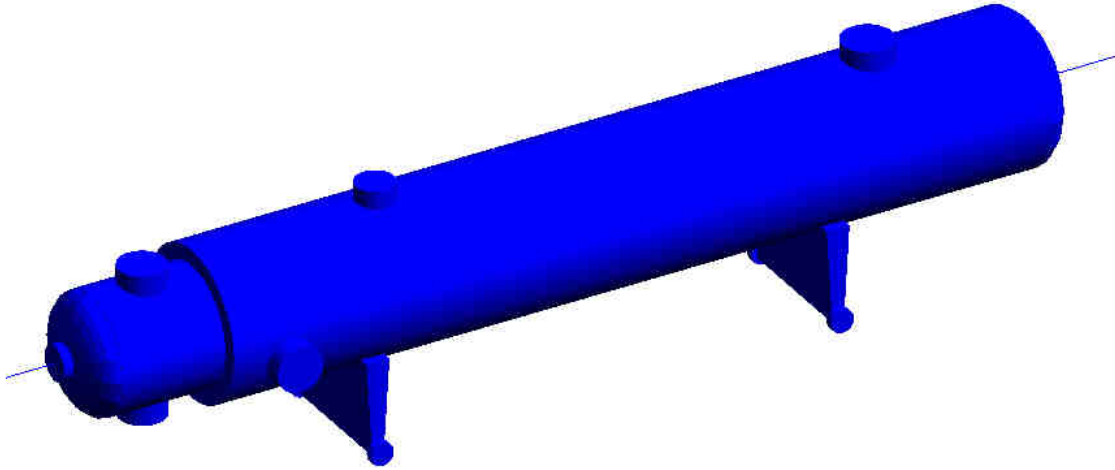   The user has access to review and measure components within the rigging path.
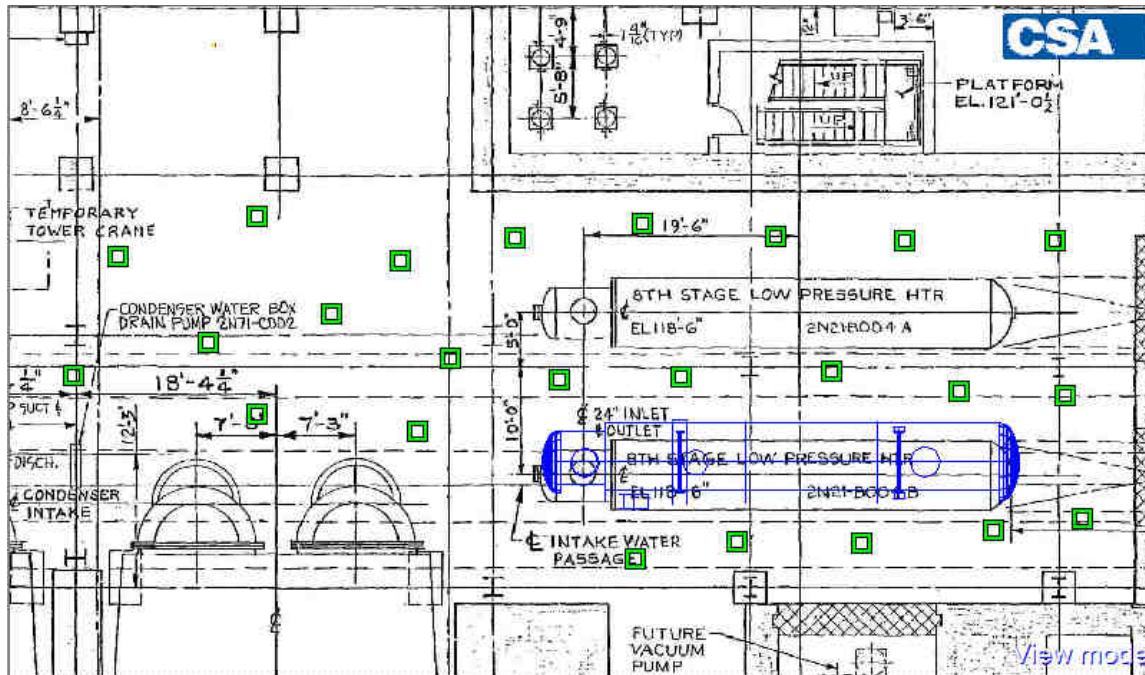
Scanning Keyplan with Location of Scans

Examples of Scans within the Removal Path

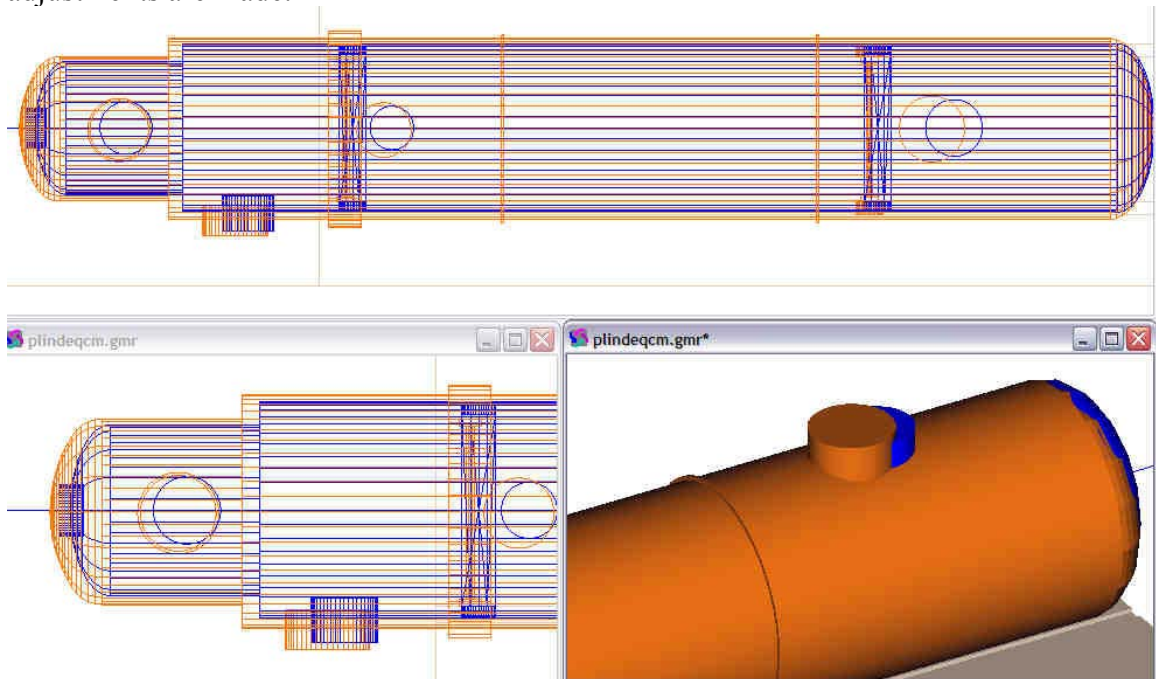## 2. Equipment to be Removed

The equipment to be removed is modeled from existing drawings.

Example

3. Equipment to be Removed – Verification

The equipment to be removed is verified against the scans. The correction and adjustments are made.

**Comparison Between the Equipment Model from
Drawings and Adjustments from Scans**
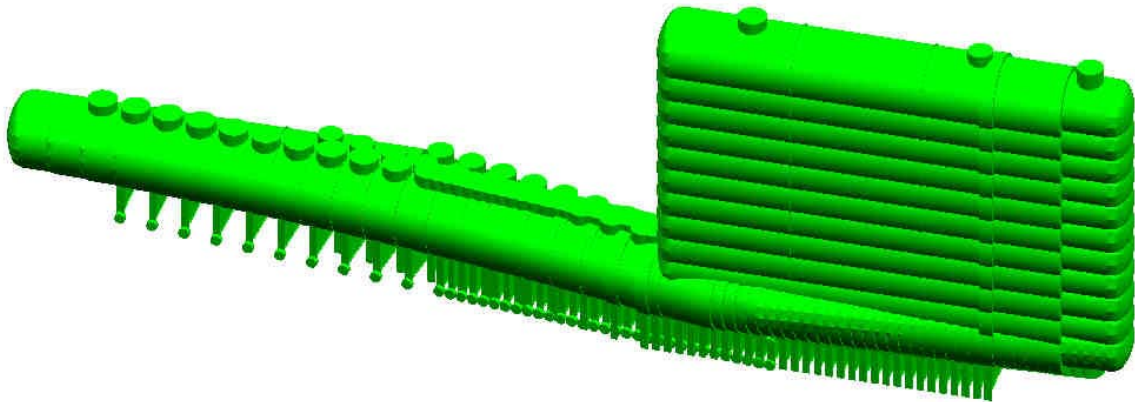
4. **New Equipment 3D Model**

   If the new equipment is different from the one being replaced, the 3D model of the new equipment is made.

5. **Rigging Structure**

   The 3D model of the rigging components is modeled. The 3D rigging model will be merged within the scans.
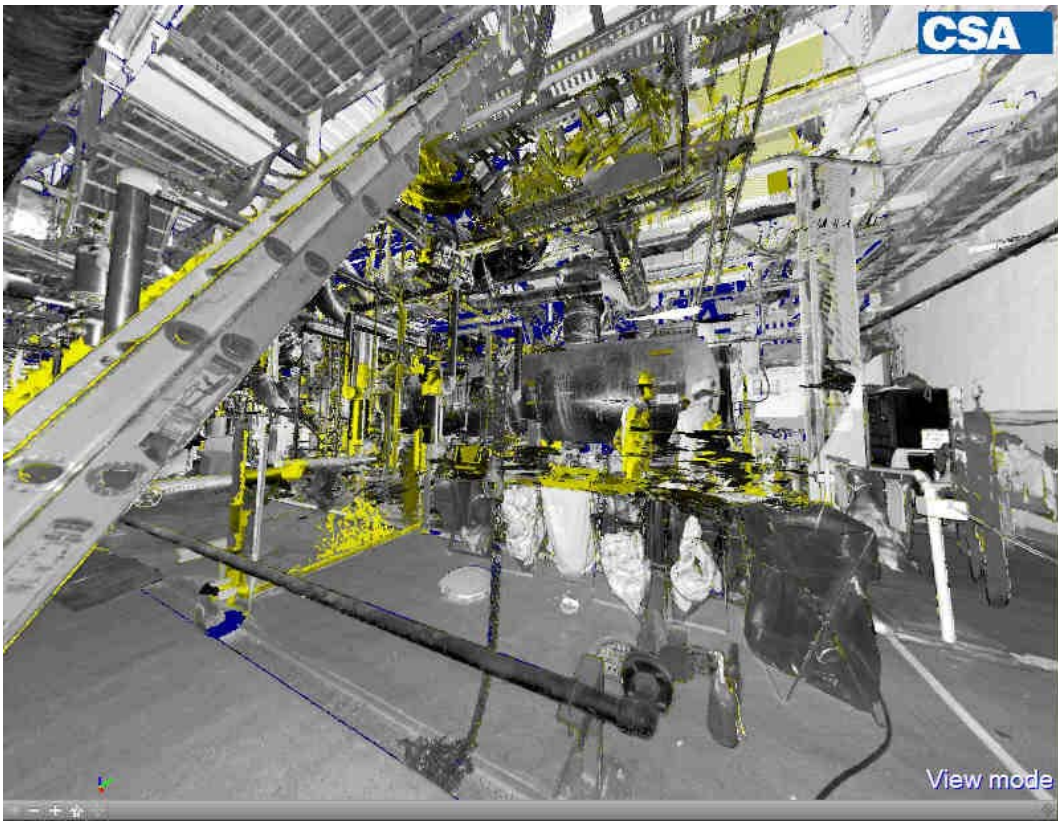
6. **Removal Path**

   Equipment movement is simulated through the designed removal path.

Example of the Removal Sequence

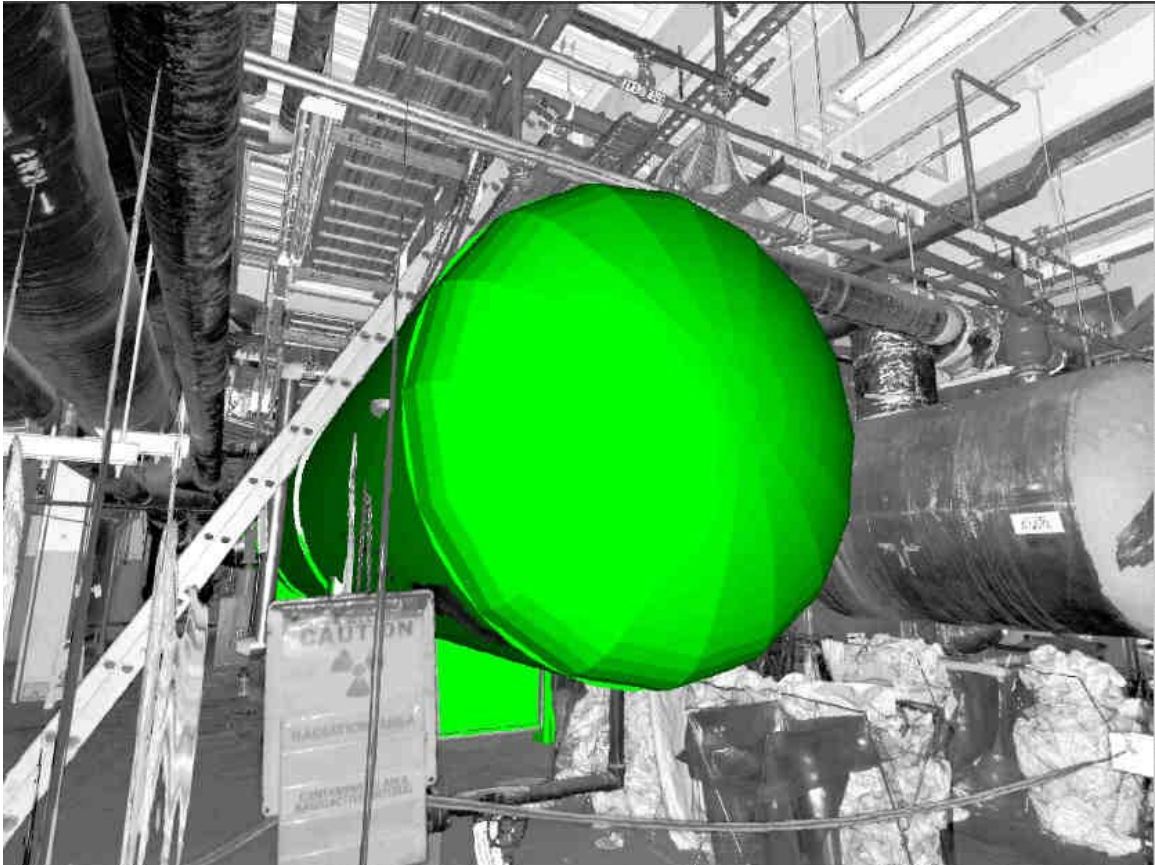7. **Scanned Equipment Removal from the Scans**

   The scanned equipment to be removed is eliminated from the scans and applicable scans are reprocessed.

Examples of the Equipment Removed from the Scans

8. Equipment Replacement within Scans

The equipment to be removed is replaced within scans with the 3D version of the equipment.

Example of 3D Equipment Merged within Scans

9. Scans with Merged Equipment Simulation Sequence

The simulated equipment path is merged within scans and a new set of scans is generated representing the merged equipment simulation sequence. These scans can be reviewed within PanoMap. The removal path sequence can be reviewed and adjustments to the path can be made. Based on these adjustments, some of the steps will need to be reprocessed.
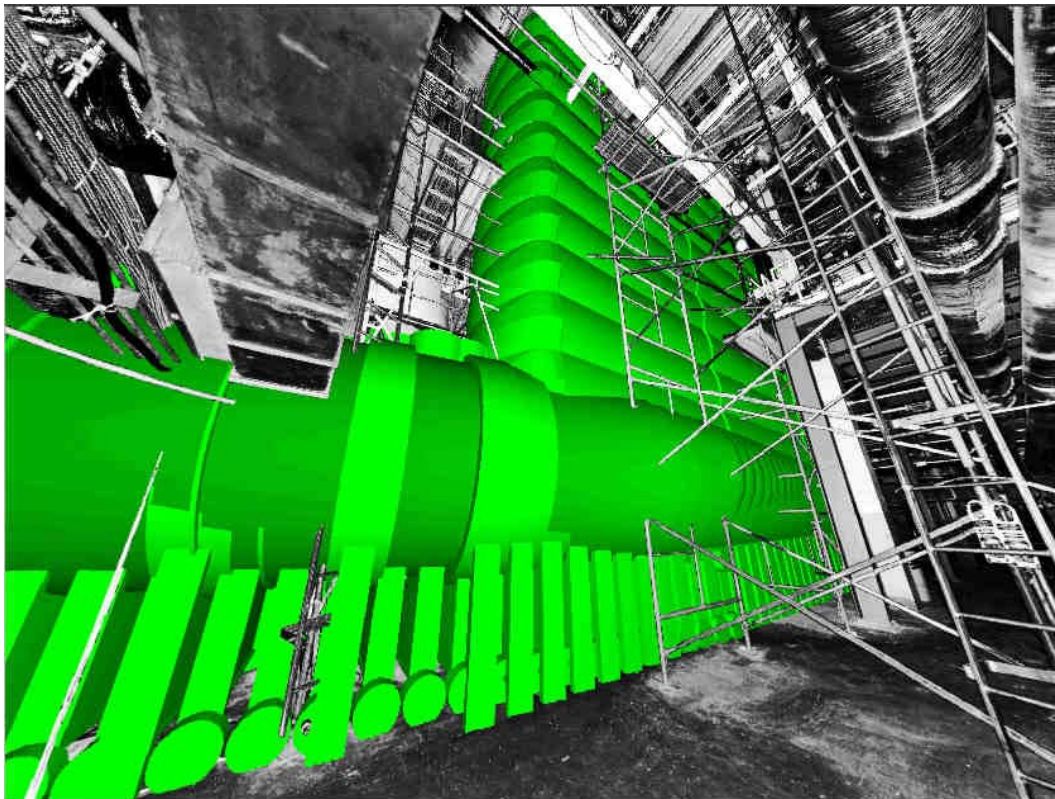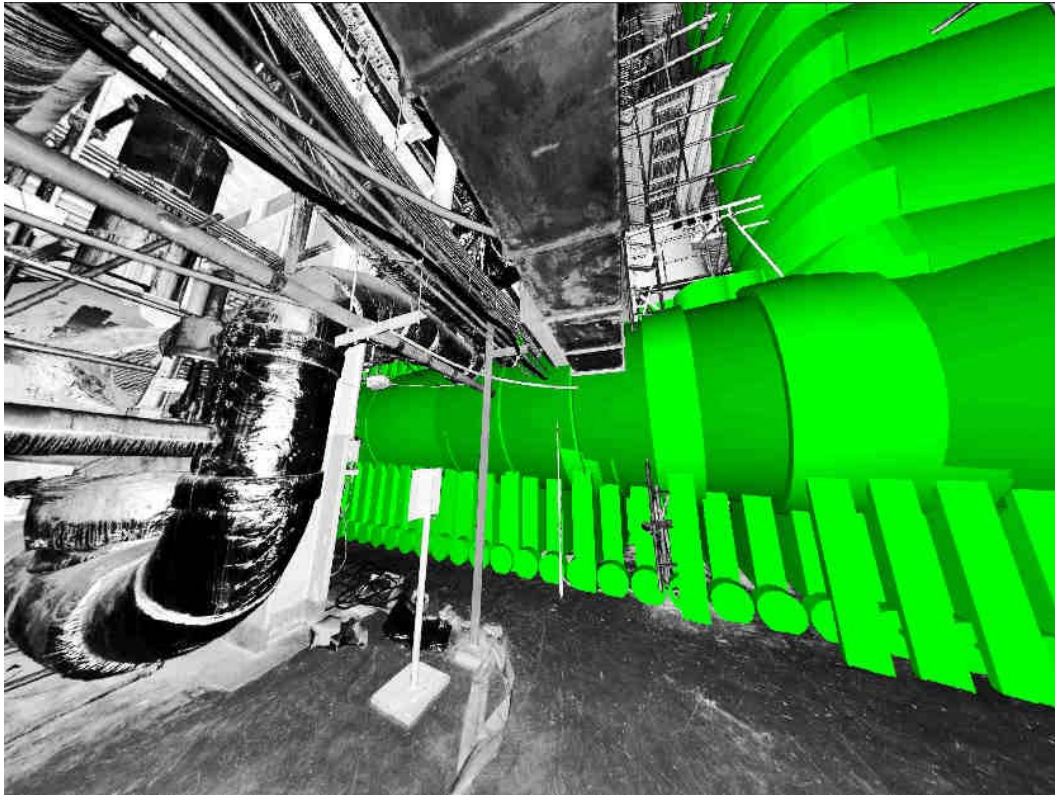
**Equipment Removal Path Sequence
Merged within the Scans**

10. Interference Checking Process

The laser scans within the removal sequence are reprocessed to show the interferences between the moved equipment and the plant background. The interferences are colored in red within the scans.

The user can review these scans and:

- Adjust the removal sequence, or
- Plan for removal of the interfering components

Example of Interferences within a Removal Sequence
(Interferences Are Marked in Red)
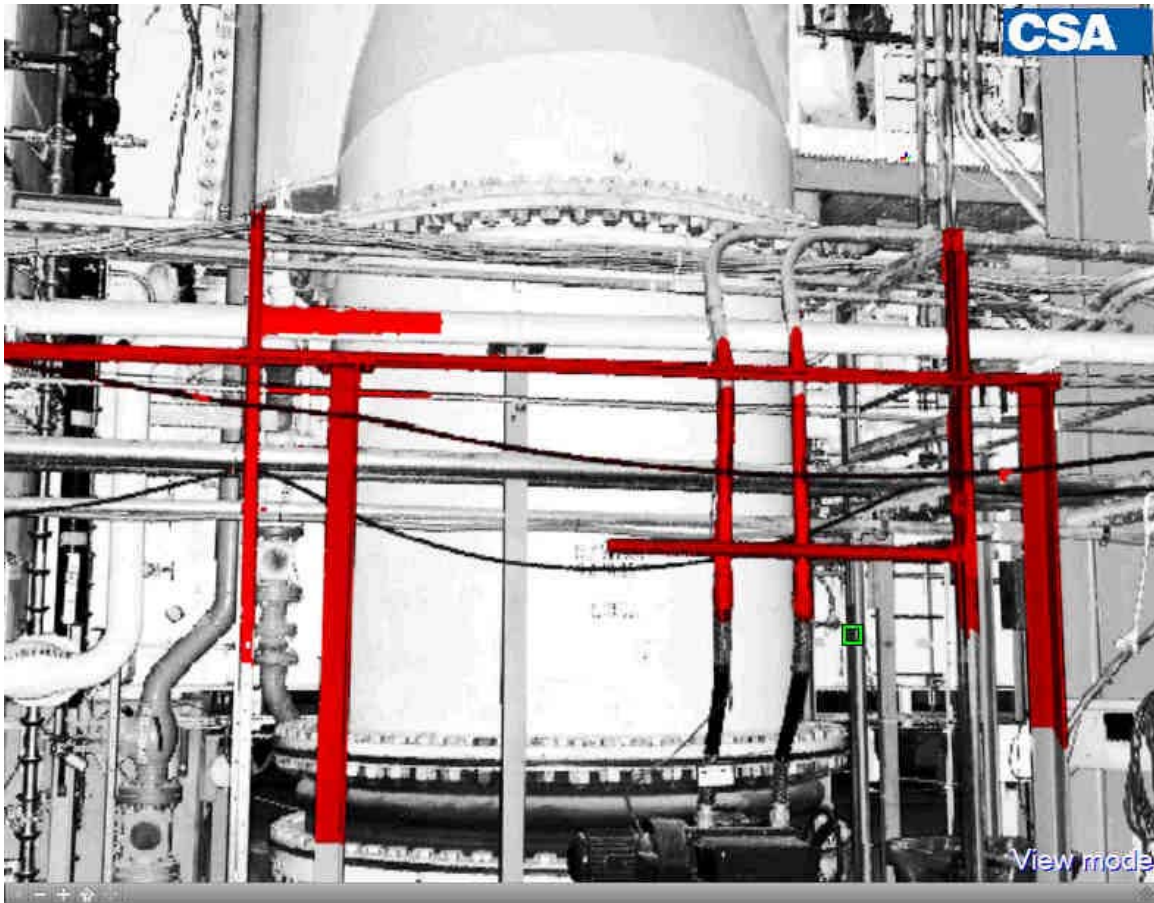
Example of Interferences within a Removal Sequence
(Interferences Are Marked in Red)

11. Creation of the Removal Sequence Movie

PanoMap/LSSM together with Plant/CMS can be used to create a simulation movie of the removal process.

The simulation movie is controlled by two trajectories:

- Equipment removal sequence – this also includes the movement of rigging equipment
- User location and viewing trajectories

These two trajectories are merged to provide the desired simulation effect. The equipment rigging sequence is controlled and manipulated within Plant/CMS.

The user can control the density of the generated steps. The user location viewing is controlled within PanoMap/LSSM. This also includes the integration with 3D simulation steps. The viewing is based on scanner location positions, since this provides 100% of an unambiguous view of scan coverage. The movie is produced in .AVI format.

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BENEFITS:

This process provides major benefits for the planning and execution of major rigging activities. The benefits would include:

- ♦ **Dose reduction**
  - Accurate as-built representation of the rigging area
  - Decreased time for data collection
  - More reliable data than manual field measurements
  - Faster execution with minimal errors
  - Reduced unforeseen problems

- ♦ **Improved design and planning of the rigging process**

- ♦ **Visual tool for training of support personnel for the rigging operations**

- ♦ **User-friendly review process for the rigging sequence**

- ♦ **Reduction of time during execution**

- ♦ **Predictable and reliable construction process**

Overall, this process can provide significant improvement of the rigging planning activities with major cost and dosage reduction benefits.

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