CS477696

QA/QC Workflow for Construction with Laser Scanning and BIM using Cintoo Cloud and BIM 360

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Learning Objectives

- Introduction to the Cintoo Platform
- Learn how upload your BIM Models
- Learn how to compare your as-built scan data to your BIM Models
- Learn how to document issues in Cintoo Cloud
- Learn how to push issues to BIM 360, create PDF report or export BCF format for use in Revit and Navisworks for Scan-to-BIM workflows.
- Learn how to provide access to laser scan data in mesh or point cloud format for efficient desktop-based Scan & BIM modeling or clash detection.

Description

BIM and terrestrial laser scanning have been well received within construction for the unparalleled accuracy delivered during the planning and development process. For VDC and BIM managers, the ability to accurately plan projects to scale, time and budget is just one of many benefits. Having the ability to compare the scanned as-built to BIM models doesn't only prove its worth in the initial planning stages of a build, but also in quality assurance throughout a project's lifespan. Cintoo has embedded its unique point cloud-to-mesh technology into Cintoo Cloud, a platform connected to BIM 360, to allow this QA/QC workflow. Learn from current Cintoo Cloud and BIM 360 users who has been successfully using this collaborative workflow on various jobs recently for a more efficient project coordination. Learn how Cintoo Cloud can also provide access to laser scan data in mesh or point cloud format to team members at home or at the office for efficient Scan & BIM modeling or clash detection.

Speaker(s)

Dominique Pouliquen is one of the co-founders of Cintoo, a company with offices in France and USA developing Cintoo Cloud, a Reality Data Management and Collaboration platform for the Digital Twin Industries. He is the CEO of Cintoo US Inc. and is based in Miami, Florida. He runs the Product Management and the Business Development for the company. Before co-founding Cintoo, Dominique held several positions including product management and business development at Autodesk in the Reality Solutions / ReCap team. Dominique joined Autodesk in 2008 through the acquisition of REALVIZ, a company that he co-founded and managed as the

CEO for 10 years. REALVIZ photogrammetry technology was successfully integrated into several Autodesk products, including 123D Catch®, Autodesk ReCap® and Autodesk Memento. Dominique holds a Master's in Engineering from Ecole Superieure d'Electronique de l'Ouest in Angers, France.

Rob Rasnic is the Sales Director of Cintoo US Inc. and is based in St. Louis, Missouri. Rob has over 25 years experience in the AEC industry space. Before joining Cintoo, Rob held various positions in the market as VP of AEC with Measure, a drone services firm based out of Washington DC focused on data collection workflows within the AEC marketplace. Prior to that Rob spent 16 years at Autodesk with various roles ranging from Channel Manager to Sr. Industry Solutions Manager within the Autodesk Industry Strategy and Marketing group. He also was a product specialists with Infraworks focused on customer workflows and adoption. Rob holds a BS degree in Forestry from the University of Missouri-Columbia.

Introduction to the Cintoo Platform

Cintoo Cloud is a cloud-based Reality Data management and collaboration platform. By transforming large point cloud data into 3D meshes, the data is now shareable, collaborative, and distributable with clients, contractors and your own teams.

The point cloud data can then be manipulated in 3D by anyone equipped with a standard laptop and a WebGL browser. Cintoo Cloud is available on Microsoft Azure or Amazon Web Services, or can be deployed on private data centers behind secured firewalls.

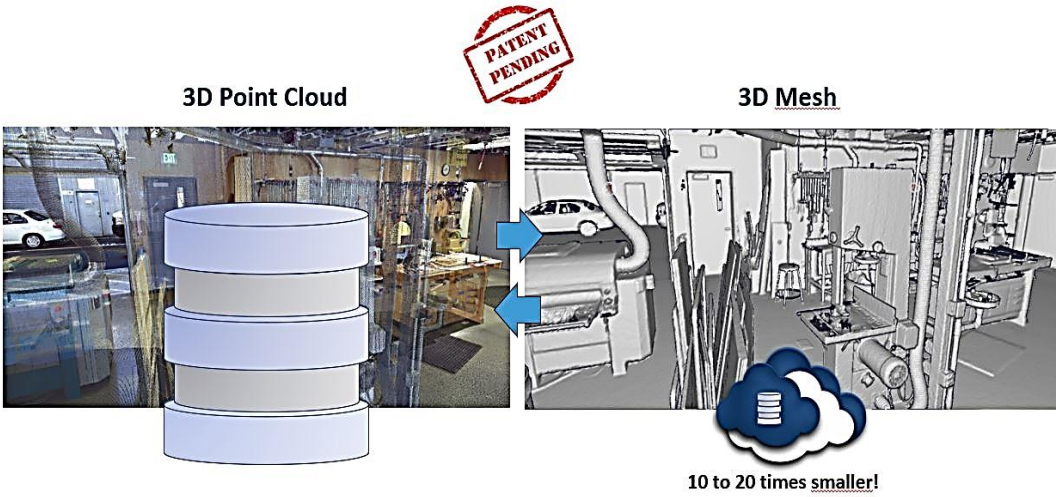
Cintoo Connect is a Windows client that connects desktops to Cintoo Cloud. From desktop to cloud, it is used for scan project translation into Cintoo Reality Data and for fast upload to Cintoo Cloud. From cloud to desktop, Cintoo Connect will download Cintoo Reality Data and inversely translate it into point cloud data for consumption by most CAD software.

Core Technology

Cintoo has developed a unique point cloud-to-surface, surface-to point cloud technology (US patent pending). This translation keeps the project structure (scanning position, panoramic views), has no limit in terms of project size, and does not compromise the survey-grade accuracy of the source data. By translating to surfaces, laser scan panoramas are not only viewed as images with depth, but as 3D models as well.

With this new type of Reality Data, the upload and download times and the need for storage space are reduced since this surface-based Reality Data is 10 to 20 times lighter than the source point cloud!

Cintoo can also revert surfaces back into point clouds with the same accuracy as the original point cloud source file that was uploaded. Cintoo Reality Data will first be downloaded and then be transformed back into Autodesk ReCap RCP format for consumption by Autodesk AutoCAD, Revit, Navisworks, or in E57 format for use in any other CAD and Scan-to-BIM software.



3D POINT CLOUD TO MESH

Hardware & Software Agnostic

Registration of the source laser scans can happen in any point cloud software. Cintoo Connect will then import these structured scan projects using E57, Autodesk RCP or Faro FLS / LSPROJ format. Once processed and translated in Cintoo format, the project is then uploaded to Cintoo Cloud. E57 and RCP / RCS formats are available as export formats when reverting Reality Data back into point cloud format.

BIM Platform Interoperability

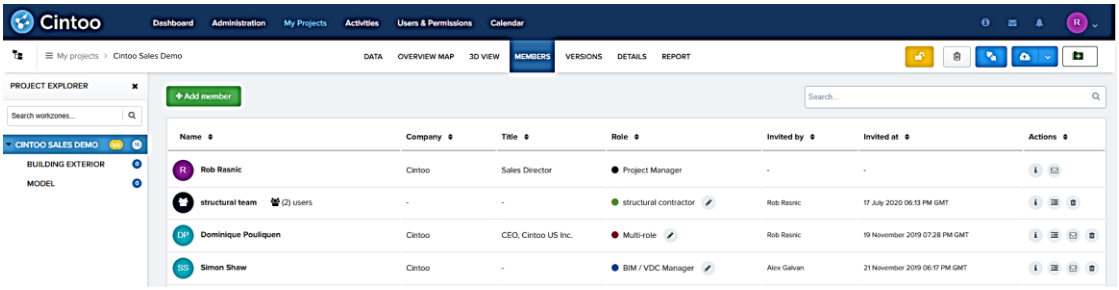
BIM 360 interoperability extends the scan and BIM capabilities by enabling you to push RVT, NWD, 3D DWG, and IFC from BIM 360 Docs to Cintoo Cloud and compare these models with scan data.

Issues and notes created in Cintoo via the Visual Analysis tools can also be pushed directly back into BIM 360 Docs to compliment your QA/QC processes and allow BIM 360 to be used as your single source of truth for issue tracking and resolution.

BIM 360 INTEROPERABILITY

Access Control & User Management

Create different levels of access (owners/editors/visitors) for different types of project collaborators based on your project requirement, or the user's level of technological complexity. You can control the access rights of each member of the project, and what areas of the projects they can access. Assign members with different levels of permission - from full access for your internal team, to restricted or, viewing only access for contractors or clients, depending on what you want them to be able to do in the project.

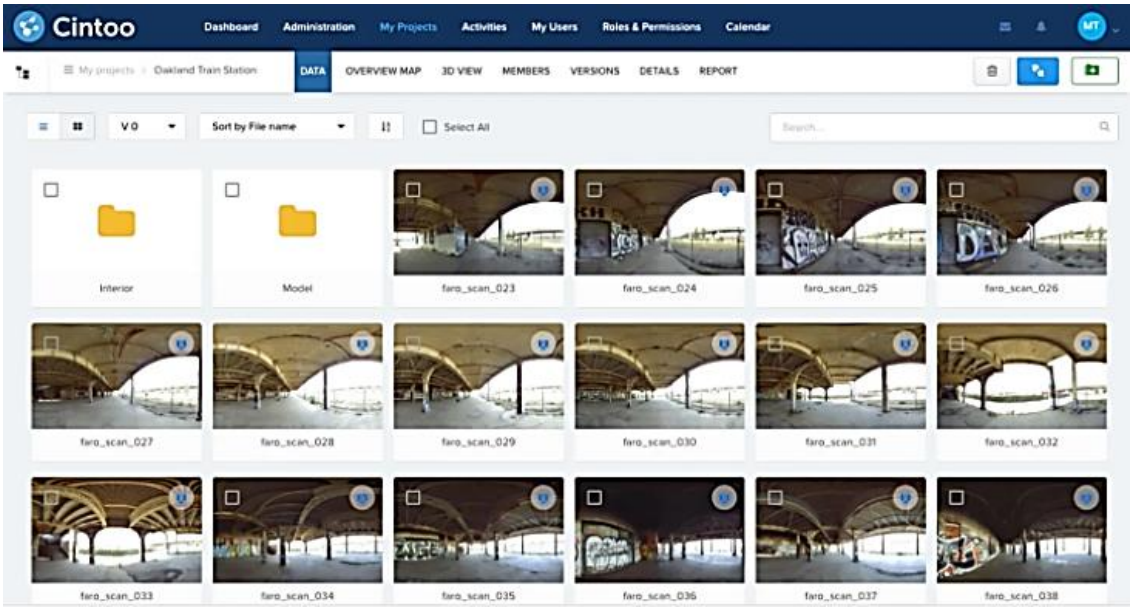


USER ROLES AND PERMISSIONS

Data Management

Use Cintoo Cloud to upload and download laser scans and CAD models. Organize scan data into different work zones and create crops. Then export a single scan, crop, work zone, or whole data set as a point cloud or unified mesh.

View your current projects and share them with an unlimited number of clients, suppliers, or team members. Give different people access to certain projects or even specific work zones. Assign different users with specific roles and permissions to manage what they are allowed to do within the project.

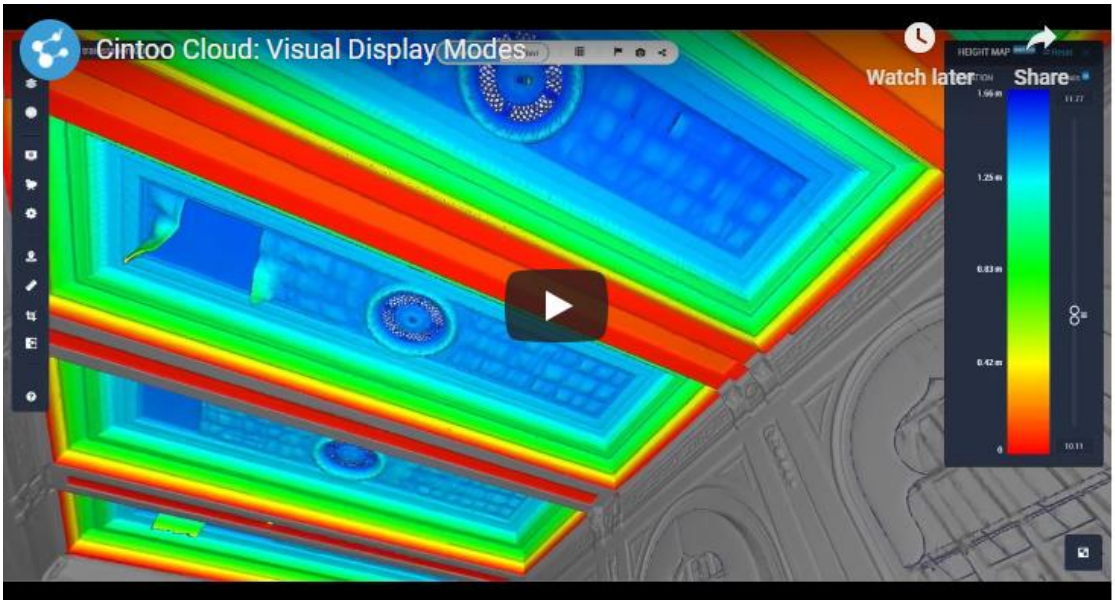


MANAGE YOUR SCAN DATA

Viewing

Cintoo Cloud has integrated visual display modes in RGB, Intensity, X-Ray, Height Map, Surface, and 2D Panoramic that bring a new viewing experience and reveal a granular level of detail in your laser scans.

Back face culling and occlusion management tools enable you to see through the walls, floors, or ceilings without the need to clip the point cloud.

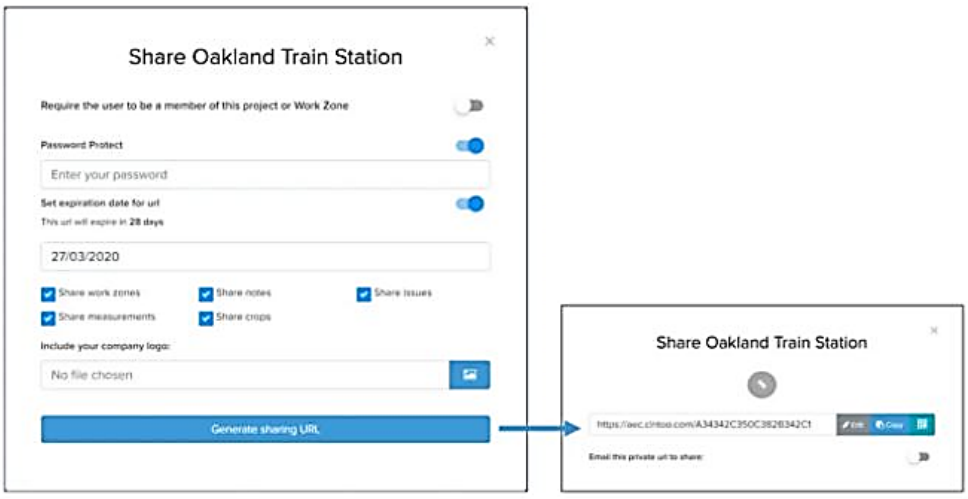


VISUAL DISPLAY OPTIONS: CLICK IMAGE TO PLAY VIDEO

Sharing & Collaboration

Cintoo Cloud is a collaboration platform to manage, store, and share all your laser scan projects. You can assign a person or your entire team to work on a project.

All project members can share any project with other collaborators by inviting them to the project as Team Members (login / password required) or by sending an URL to access the Shared Viewer. The Shared Viewer provides a very easy navigation experience and can be embedded in a web page.

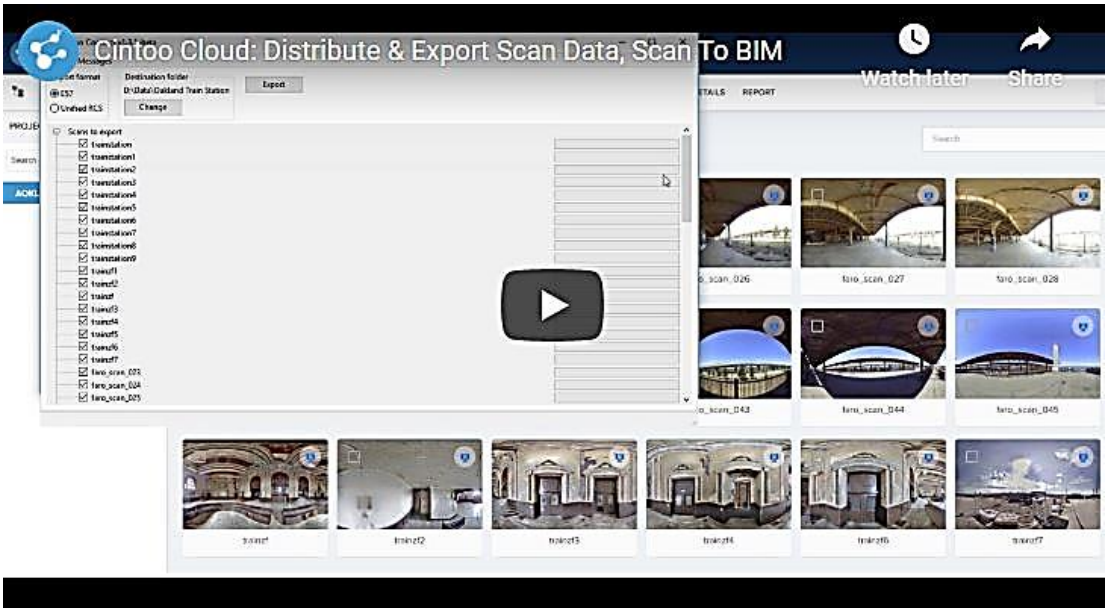


SHARED VIEWER

Distribute & Export Scan Data

A set of scans, work zones, or your full project can be downloaded from Cintoo Cloud and reverse-transformed back into point clouds, either as a structured E57 file (keeping the structure of the scan project with the vantage points, the depth maps, the panoramic images and the point cloud), or as a unified RCP/RCS file. Unified Meshes can also be computed in the cloud from crops (sections, rooms, equipment...) and downloaded from Cintoo Cloud in OBJ, FBX or STL format.

For Scan-to-BIM operations, Cintoo Cloud is the solution to distribute your scan data over the cloud to whoever needs to access it.

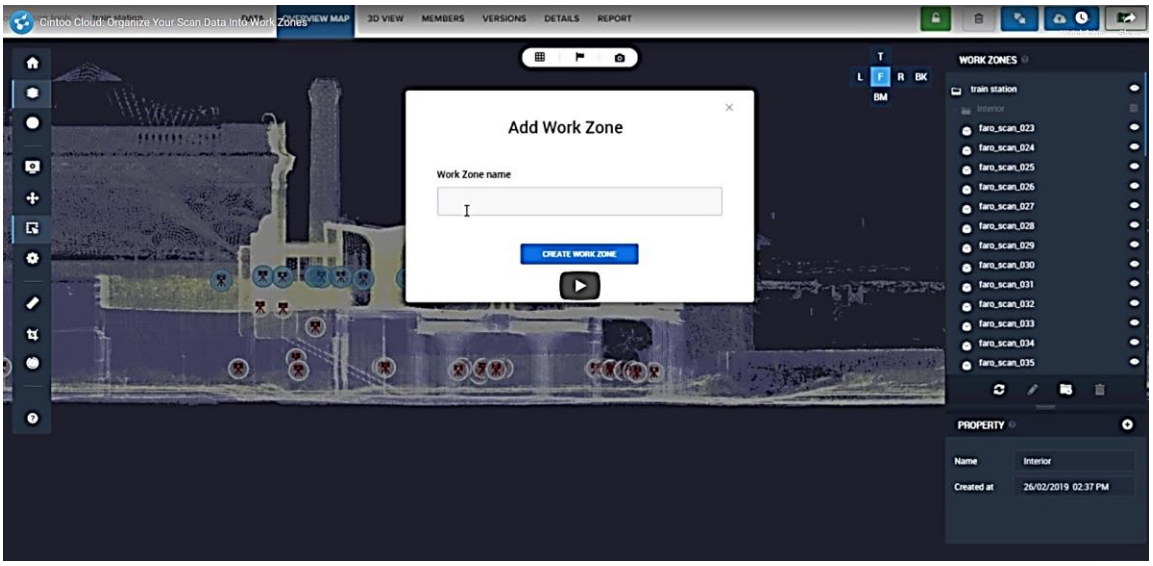


EXPORT YOUR SCAN DATA: CLICK IMAGE TO PLAY VIDEO

Workzones

Laser scans that are spread over the entire project can be organized in floors, regions, or rooms. By assigning them to Work Zones and sub-Work Zones in Cintoo Cloud. Access to these Work Zones can be managed for each Team Member separately. CAD and BIM model can also be uploaded in their dedicated Work Zone(s), making it easier to display or to be selected for comparison and QA/QC.

Assigning scans to separate Work Zones makes it easier to download and distribute the scan data. It allows to limit the size of the point cloud to be displayed in the desktop CAD software.



CREATING WORKZONES TO ORGANIZE YOUR DATA: CLICK IMAGE TO PLAY VIDEO

Slice/Crop

Advanced cropping features allow you to select the slices of scan data that will help for modeling or to get 2D plans.

Cropping can be performed on the X, Y, or Z axes separately or cumulatively. Crops can be saved, edited, and exported into either a Unified Mesh in OBJ, FBX or STL format or as a point cloud in Unified RCP/RCS format for consumption in your favorite CAD software.

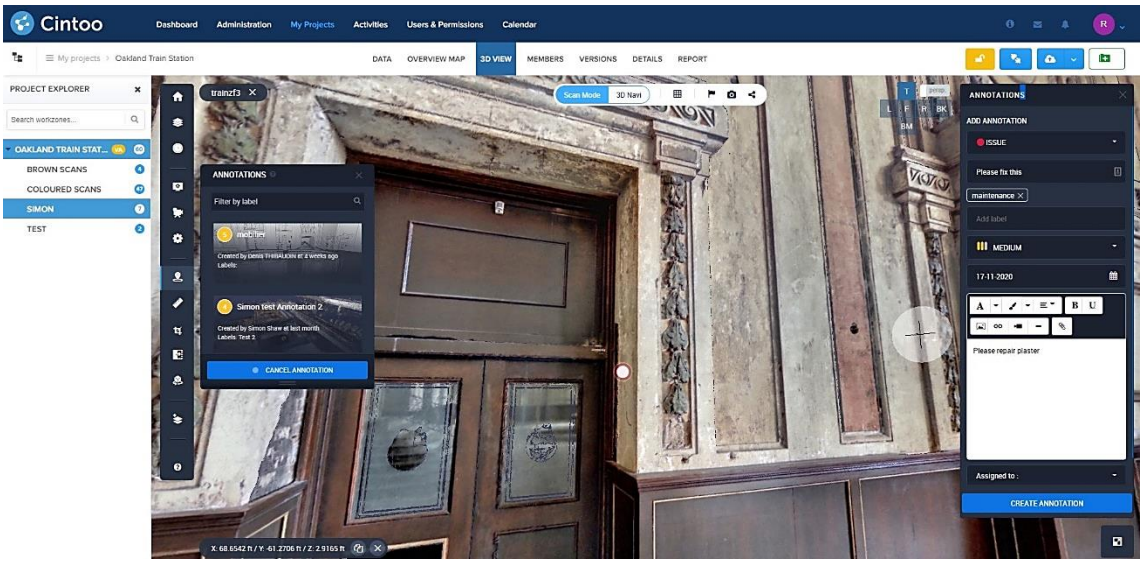
CROPPING DATA: CLICK IMAGE TO PLAY VIDEO

Measuring & Annotations

Point to point measurements can be performed with great accuracy in Cintoo Cloud, where our unique Surface display mode allows you to pick the exact 3D points needed for those measurements.

Annotations can also be added, that are notes, private notes or issues. Those annotations can be enriched with metadata such as text, photo, video, URL or PDF. Private notes and issues can be assigned to Team Members.

Measurements and annotations can be exported in a PDF report. Issues can also be exported in BCF (BIM Collaboration Format) file to be used in your favorite issue tracking platform.



MEASURE & ANNOTATION TOOLS

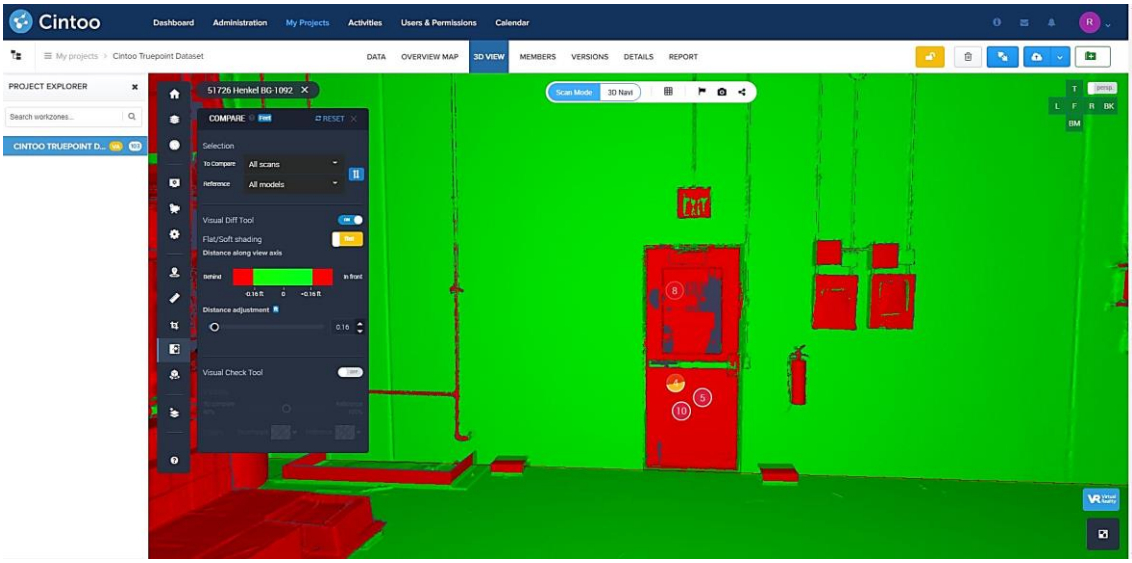
Scan-Model / Scan-scan Comparison

BIM models can be uploaded from your disk to Cintoo Cloud in IFC format or pulled from Autodesk BIM 360 Docs in as Revit, Navisworks, or IFC files.

If the scans and the BIM model are not in the same coordinate system, Cintoo Cloud provides an alignment tool for this purpose.

Scans and BIM can then be visually compared to detect issues in a QA/QC process. Those issues can be documented and exported as BCF files for virtual coordination and project review.

The same comparison tool can also be used to compare two sets of scans and monitor progress.



VISUAL ANALYSIS

Unified Mesh / Mesh Export

You can unify the high-resolution meshes coming from selected scans in a photo-textured 3D mesh, leveraging the power of cloud computing. This Cintoo Unified Mesh can be created from up to 100 scans with a user-defined mesh density, and exported in OBJ, FBX, or STL format. Ideal for desktop modeling and clash detection, Unified Meshes retain the original point cloud's 3D coordinate system, are smaller in size than the source point cloud, and remove the ambiguity of identifying surfaces or objects from disconnected 3D points.

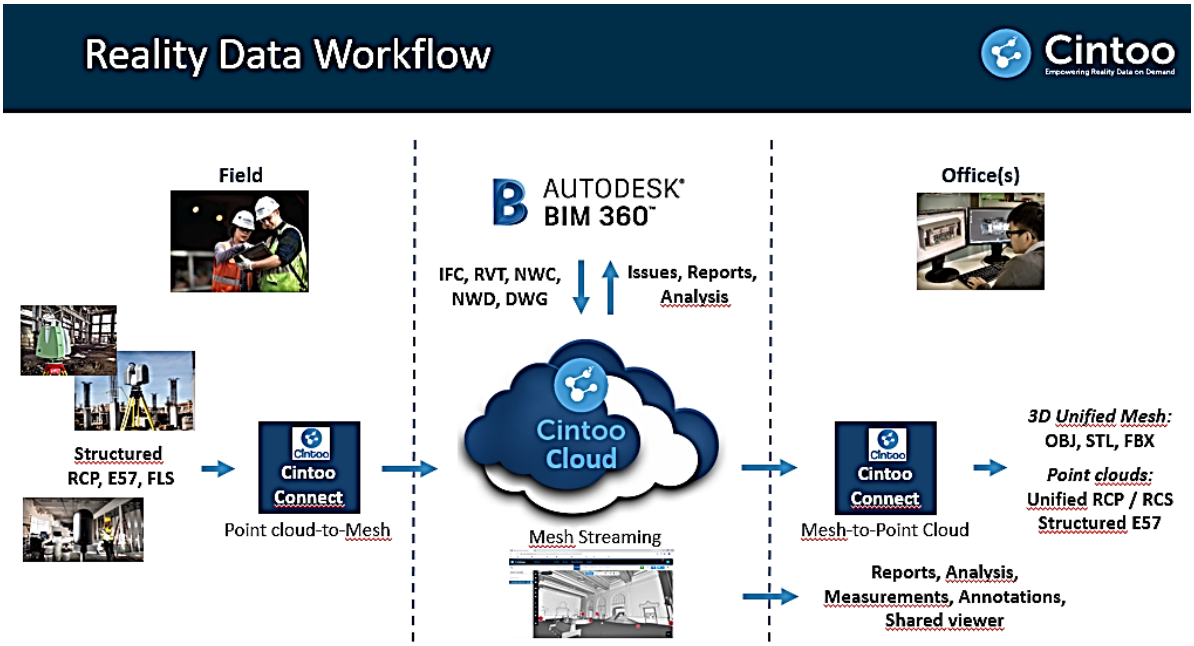
UNIFIED MESH EXPORT

Reality Data Workflow

Below is an example of a typical reality capture workflow using the Cintoo platform. To summarize you will take the structured scan data after it has been registered with your software of choice and then use Cintoo Connect to locally on your computer to compress the data from a point cloud to a mesh which is then uploaded to Cintoo Cloud for fast mesh streaming.

Once in Cintoo Cloud you can then organize and manage your scan data and invite team members with specified roles and permission to perform measurements, download/upload scans, and create notes, issues, reports and visual analysis.

You may also connect to BIM 360 to download 3D models and push issues created in Cintoo back to your BIM 360 project.



CINTOO REALITY CAPTURE WORKFLOW

Uploading your BIM Models

After you have uploaded your scans to your project, you will now need to upload your BIM models into Cintoo. We recommend that you create a New Workzone and name it “Models” or another term of your choosing.

For best results you will need to ensure that the scan data and the BIM models are referencing the same coordinate system. This is typically done during the scan registration process before uploading the scan data.

Register Cintoo with BIM 360 (Requires VA Unlock)

Cintoo Cloud is now available in the **Autodesk App Store:** https://apps.autodesk.com/en

Companies that have **more than 100 users of BIM 360** are automatically enrolled in the APIs / Integrations in BIM 360 and can directly follow these instructions below.

Companies with **less than 100 users of BIM 360**, please send an email to bim360appsactivations@autodesk.com with your BIM 360 Account ID or an Account Admin’s email address to enable the APIs / Integrations, then follow these instructions as well.

Go to your BIM 360 Account Admin. (Figure 1)

Select ‘APPS’

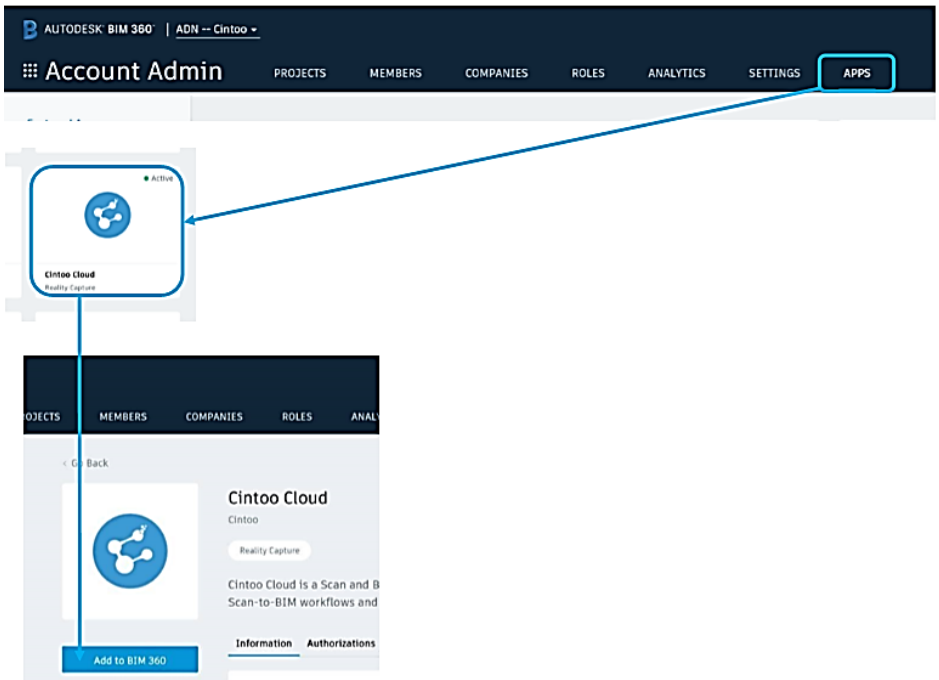


FIGURE 1: BIM 360 APPS UNDER ACCOUNT ADMIN ROLE

Look for Cintoo Cloud app.

Click on ‘Add to BIM 360’.

Click on ‘Authorize’. (Figure 2)

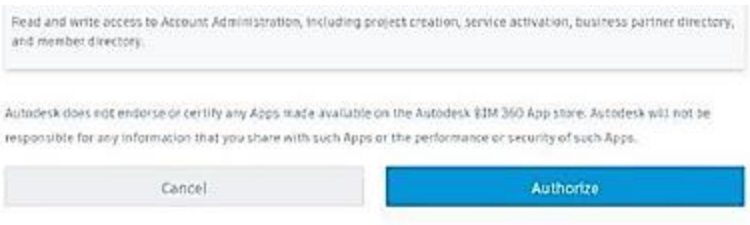


FIG. 2: CLICK ON BIM 360 “AUTHORIZE” BUTTON

Uploading BIM Models

In Cintoo Cloud, select the project in which you want to upload a BIM model.

Create a dedicated Work Zone to host this BIM model. (Figure 3)

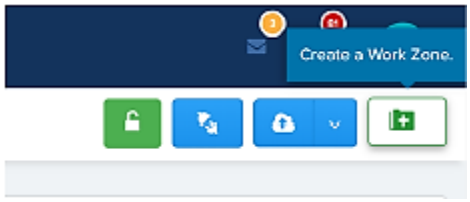


FIGURE 3: CREATE WORKZONE

In this Work Zone, click on ‘Upload Models’. (Figure 4)

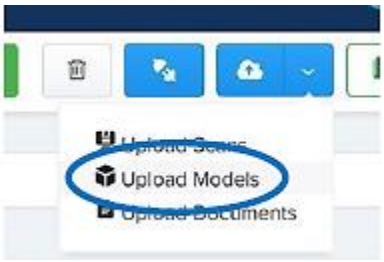
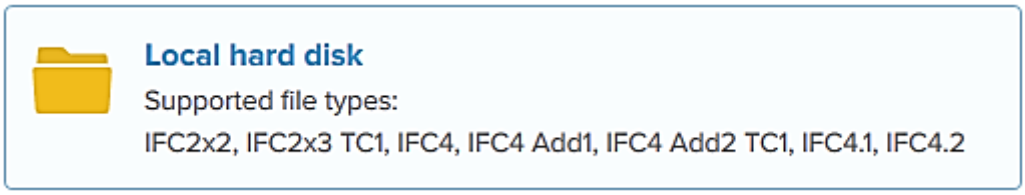


FIGURE 4: UPLOAD MODELS

A new dialogue box will now open:

By Selecting



Upload IFC models from your disk.
When exporting IFCs from Revit, go to Revit's Advanced Settings:

- Make sure to use "*Active Shared Coordinates*"
- Make sure to "*Include IFCSITE elevation in the site local placement origin*".
- Make sure to select the right_ Level of Detail_ for the work that you need to do.

By Selecting

- Select 'BIM 360' as the source for your 3D data.
- Login to your BIM 360 account. Select your Hub and your project.
- Select your folder and model. Supported file types are: **RVT, NWD, NWC, IFC and 3D DWG, JT** data only.
- Some transformations are performed in BIM 360 using Forge APIs.
- When selecting a Revit file, you will be asked to select the positioning option between 'Shared Coordinates' and 'Origin to Origin': (Figure 5)

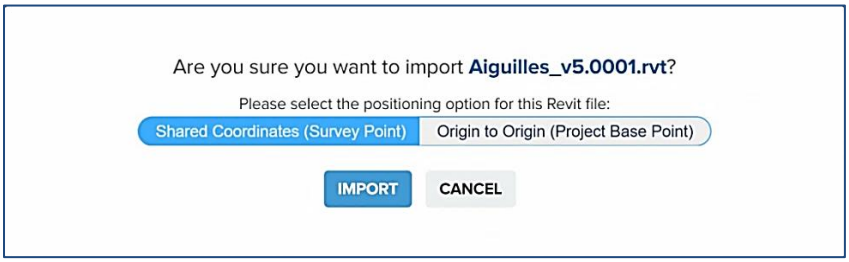


FIGURE 5: SELECTING REVIT COORDINATE SYSTEM

You will be notified by email once the selected model is ready for viewing in Cintoo Cloud.

Comparing your as-built scan data to your BIM Models

Now that you have successfully uploaded your scans and BIM models into Cintoo Cloud, we can now perform a scan vs. BIM model analysis to help you better understand where we can identify issues based on the tolerances that we set.

This will better prepare us for the following steps of identifying and creating issues which can then be assigned and propogate our issue tracking platforms (in this case BIM 360) to adhere to our QA/QC processes.

Using the Comparison Tool

In the Project Explorer on the left, select the project at the root or the Work Zone that contains the data sets that you want to compare. Your selections in the Comparison Tool will be limited to the Work Zone and sub-Work Zones selected in the Project Explorer.

Click on the ‘Comparison tools’.

In ‘Selection’, select: (see Figure 6)

The set of scans (or ‘All Scans’) that you want ‘To Compare’ to a reference.

And the BIM model (or ‘All Models) that will be used as ‘Reference’.

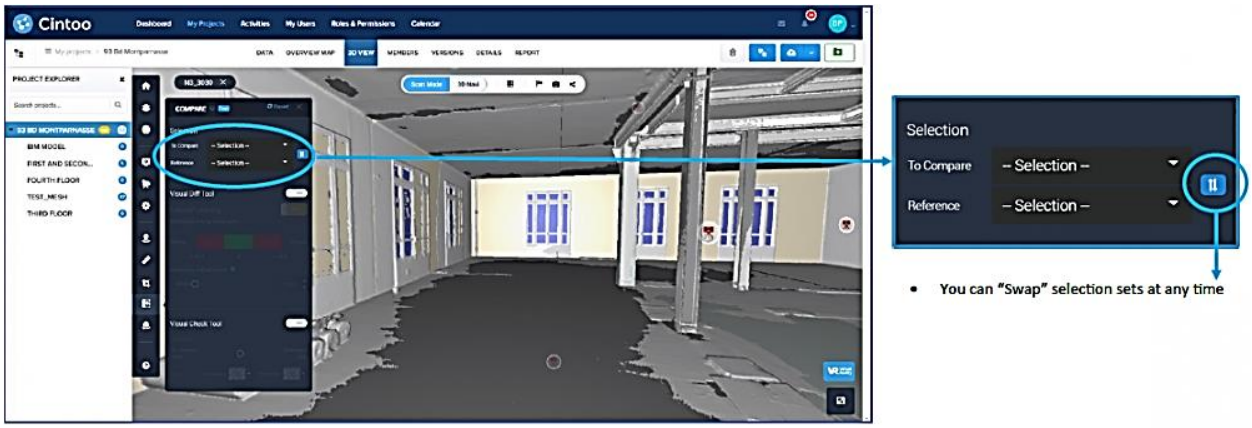
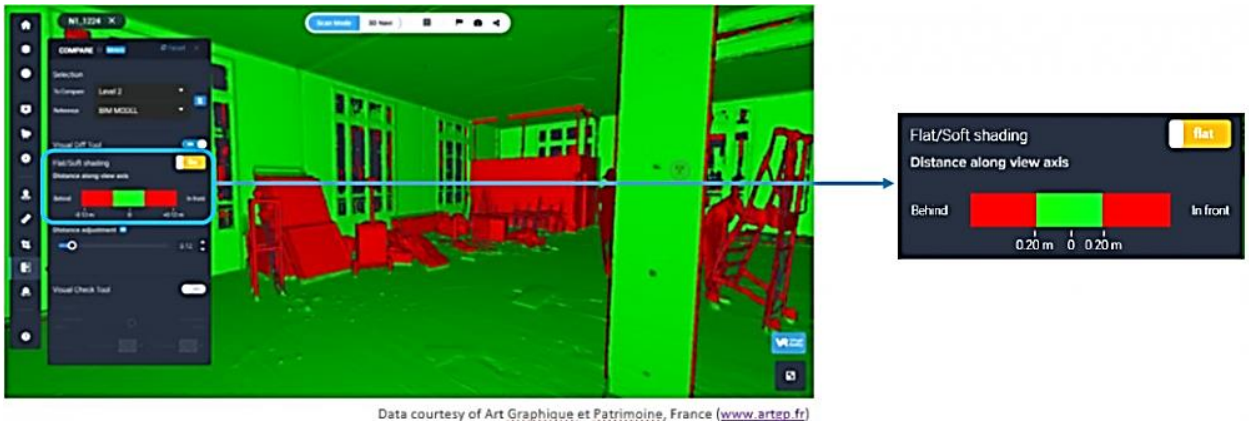


FIGURE 6: SELECTING COMPARISON SCANS AND MODELS

Using the Comparison Tool – Visual Difference Tool

With the Visual Diff tool, a heat map will be generated that highlights the difference between your data sets (either Scan / BIM, BIM / Scan or Scan / Scan).

The default view is bi-color.(Figure 7)



FIGURES 7: SHADING VALUES

You can select either the metric or the imperial system. (Figure 8)

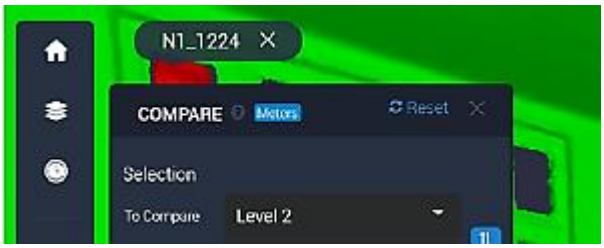


FIGURE 8: SELECTING UNITS OF MEASURE

You can then adjust the tolerance by using the slider or by typing a value. (Figure 9)

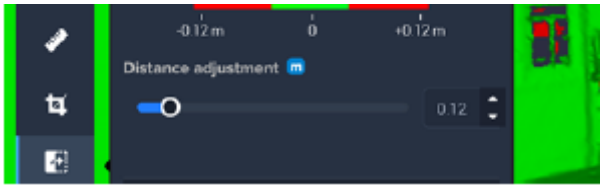


FIGURE 9: TOLERANCE ADJUSTMENT

You can change to display setting to a gradient one by selecting ‘soft’. (Figure 10)

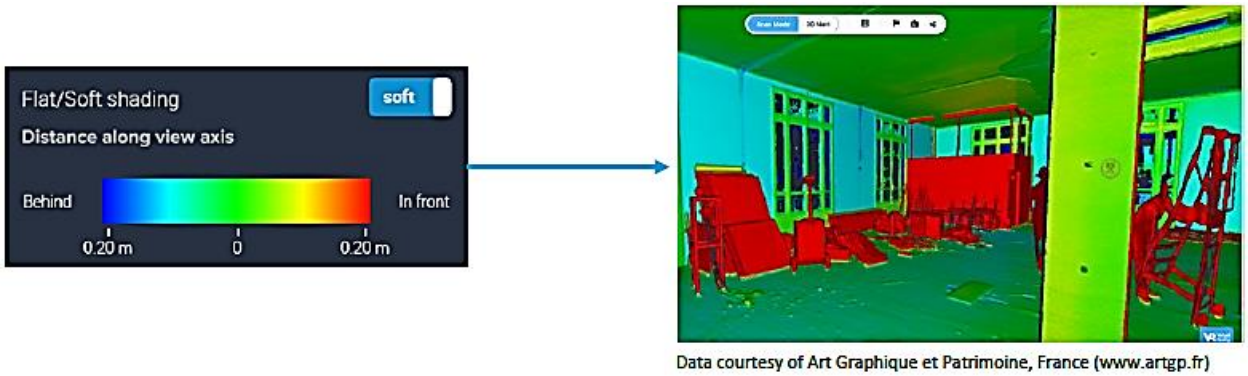


FIGURE 10: SELECTING SOFT SHADING

The Visual Diff Tool will colorize either the mesh or the BIM model/ scan data based on which information is in front, superimposed, or behind the other one, in the viewer’s line of sight. In this example of scan vs. BIM, the scan data is colorized. (Figure 11)

- Everything red is in front of the BIM model at the distance higher than the one given in the ‘distance adjustment’.
- Everything green means that the scan data and the BIM model are within the range of the ‘distance adjustment’.
- Everything blue is behind the BIM model at a distance higher than the ‘distance adjustment’ value.

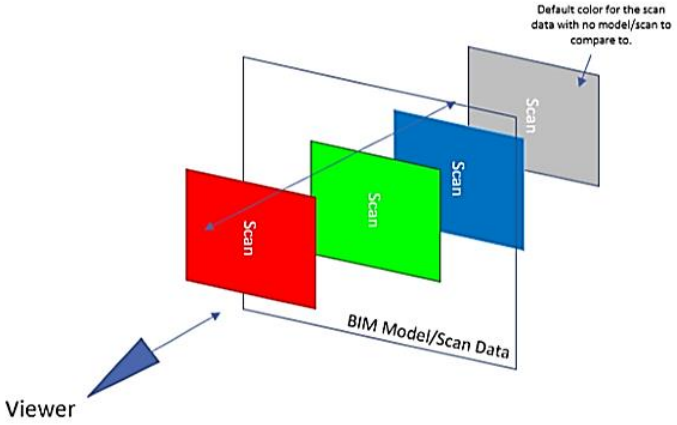


FIGURE 11: COLORIZATION MATRIX

Using the Comparison Tool – Visual Check Tool

With the Visual Check tool, you have the flexibity to select the display mode for your scans between 3D RGB and 3D Surface. (Figure 12)

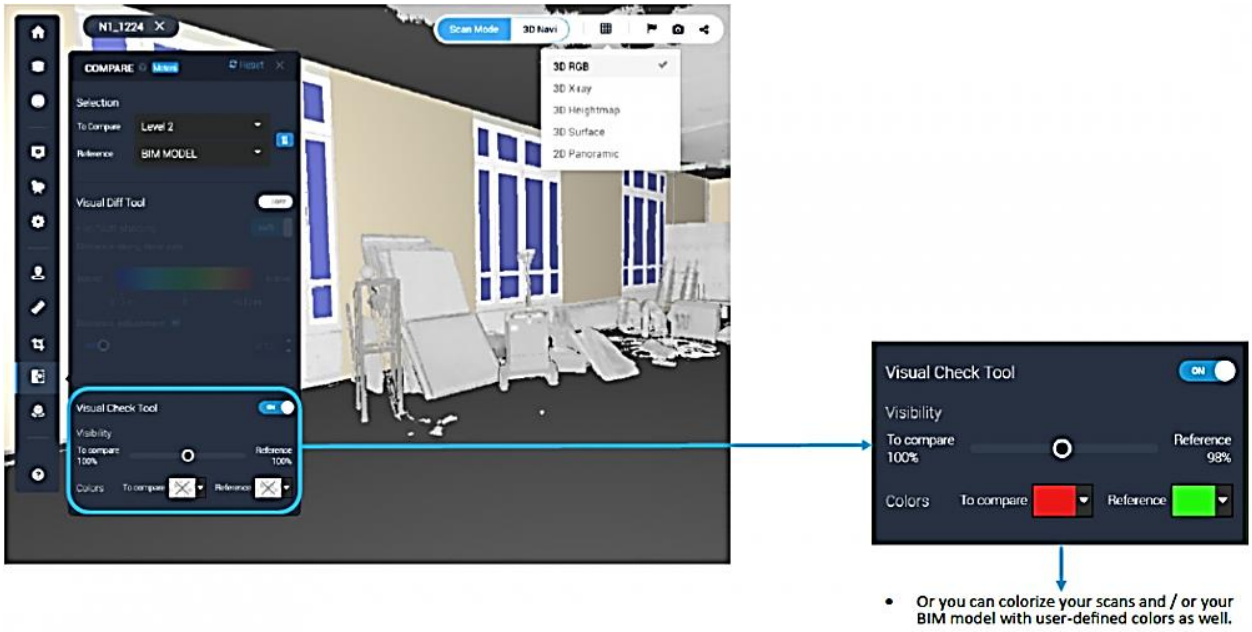


FIGURE 12: VISUAL CHECK TOOL SETTINGS

With the Visual Check tool, you use the transparency slider to compare your data sets. (Figure 13)

FIGURE 13: TRANSPARENCY SLIDER EFFECTS

Creating Issues and push to BIM 360 Issue

Now we will go thru the process of creating an issue in Cintoo Cloud. Once an issue has been created we will push that issue directly into BIM 360 as a BIM 360 Issue for for further follow up.

Creating an issue

Now that we are using our Visual Analyis tool to compare the as-built scan data to the BIM Model, we would like to create an issue and assign it to someone on the project team.

First let's identify the location of where we would like to create the issue. To do this we will zoom into the area of question and click on the "Annotations" button

This will open up a panel and we will click on "Add Annotation" (Figure 14)

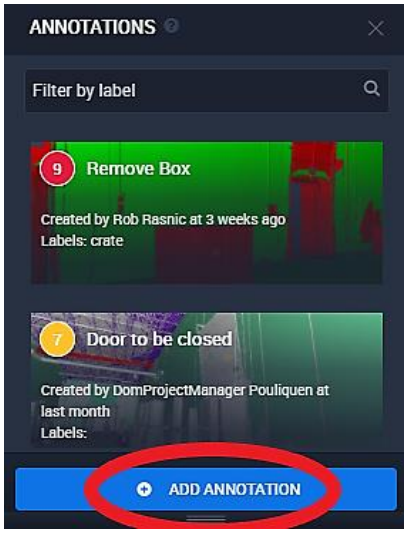


FIGURE 14: ADDING ANNOTATIONS

You will now select a point and the "Annotations" dialogue box will appear.

From here you will change the Annotation type form a Note to an Issue and fill out the appropriate fields such as: (Figure 15)

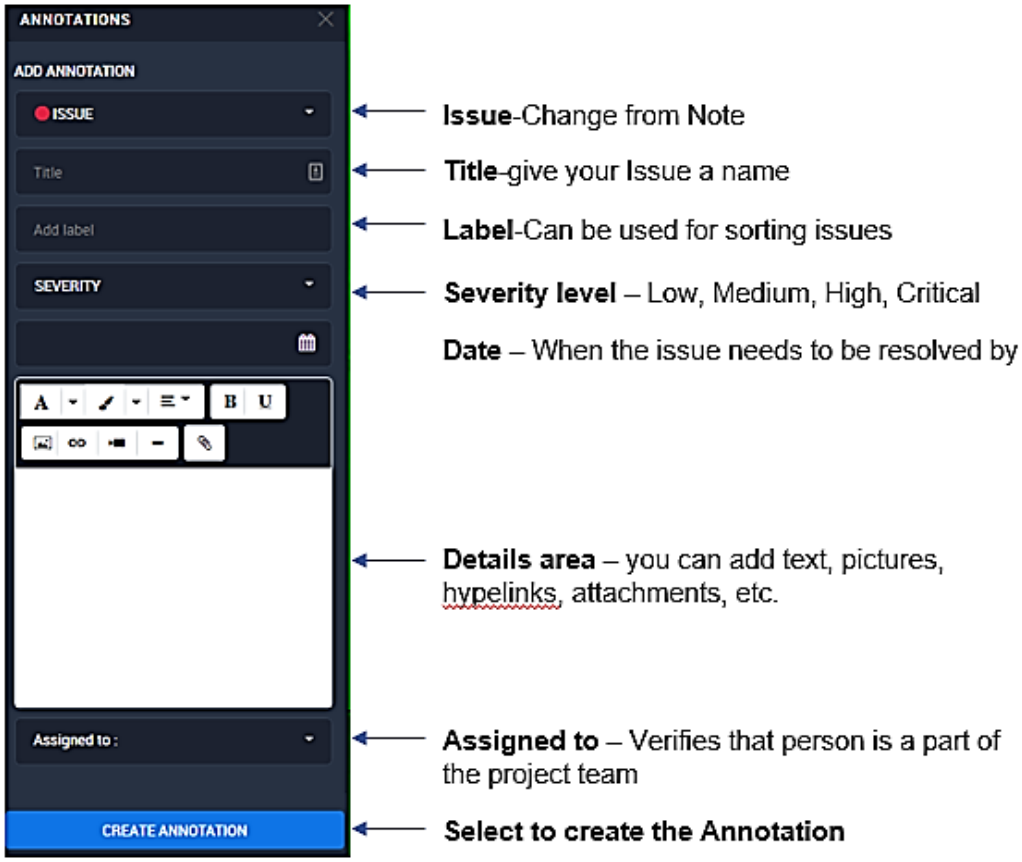


FIGURE 15: ANNOTATION SETTINGS

Pushing issues to BIM 360 Issue, exporting BCF file, or PDF Report

Now that we have created our issue we will now focus on different ways that we can export that information so we can integrate with your QA/QC process or collaborate with other team members.

Using the Reports tool

By using the **Report** tool, we can now view all Issues, Measurements and Notes that we have created in Cintoo. We can further drill down to find the data we are looking at by selecting the filters for Labels, Users, and Activities as shown below: (Figure 16)

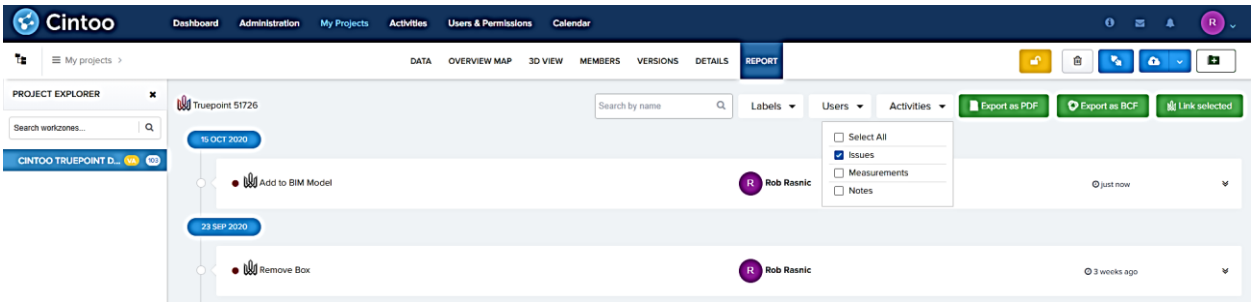


FIGURE 16: THE REPORT PAGE

Pushing to BIM 360

We can export to BIM 360 as a BIM 360 issue by:

- Select the **Reports** tab: (Figure 17)

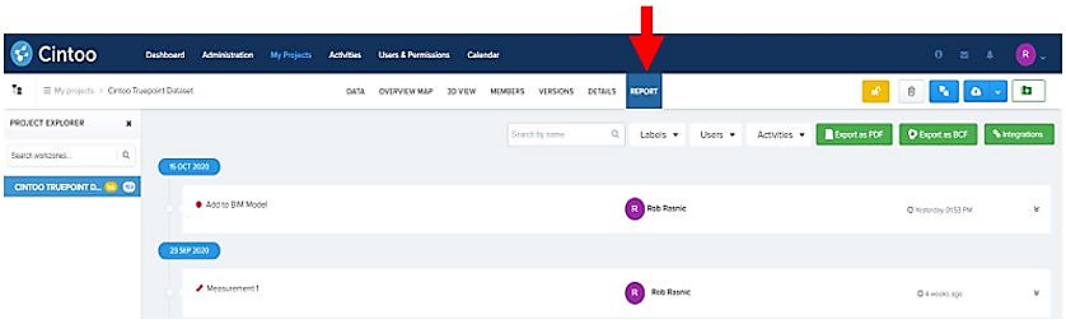


FIGURE 17: REPORTS TAB

- Select **Integrations** (Figure 18)

FIGURE 18: INTEGRATIONS

- Select **Link Project** under Autodesk logo (Figure 19)

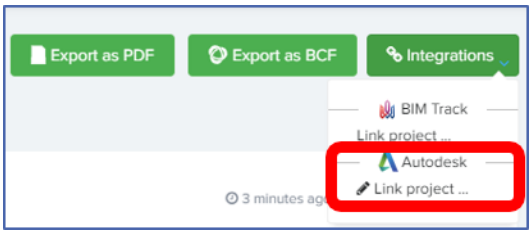


FIGURE 19: SELECT AUTODESK PROJECT

- Select your Hub and Project in BIM 360 (Figure 20)

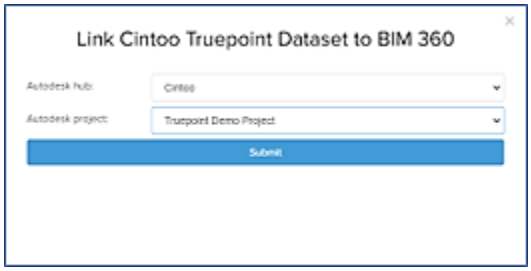


FIGURE 20: SELECT HUB AND PROJECT

- Click on Autodesk icon to push to BIM 360: (Figure 21)
  - Icon will flash until it becomes solid indicating it has pushed
  - You can click on the icon by the issue to go to the selected issue inside of BIM 360 Docs
  - You can click on the BIM 360 Project on top left to go to ALL issues inside of BIM 360 Docs

FIGURE 21: PUSHING ISSUE TO BIM 360

- Click on the **Description** – Issue Link in Autodesk BIM 360 to take you back into Cintoo with the same view and 3D orientation that the issue was created at for further analysis. (Figure 22)
    - Note: User must have role and permissions set in Cintoo Cloud to view the issue.

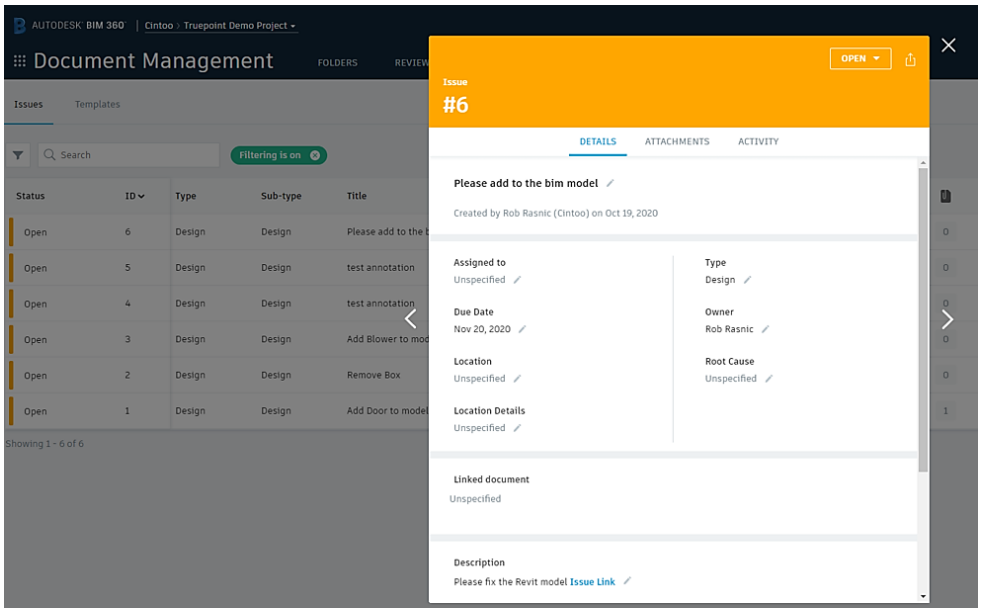


FIGURE 22: SELECT "ISSUE LINK" TO VIEW IN CINTOO CLOUD

Exporting to BCF file

We can export a .bcf file which can then be utilized by Autodesk software by using Autodesk partner plug-ins such as BIM Track, etc. To do this we simply go to the **Reports** tab and filter down to the issues we would like to export and click on the "**Export as BCF**". (Figure 23)

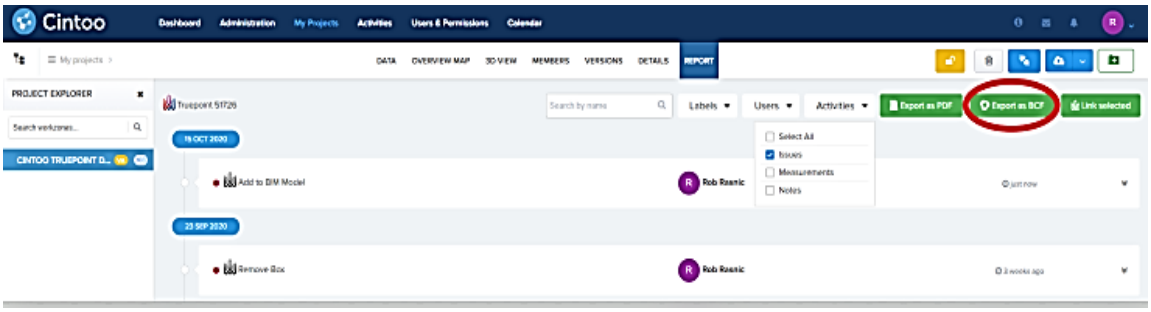


FIGURE 23: EXPORTING BCF FILE

This will export out the .bcf file which you can import into your .bcf supported application.

Exporting to PDF report

We can export a pdf report that we can share with other project shareholders. This pdf file has hyperlinks to Cintoo Cloud that will take the viewer back to the exact location in the Cintoo application for further review (assuming they have proper role and permission for the project).

To do this we simply go to the **Reports** tab and filter down to the issues we would like to export and click on the "**Export as PDF**". (Figure 24)

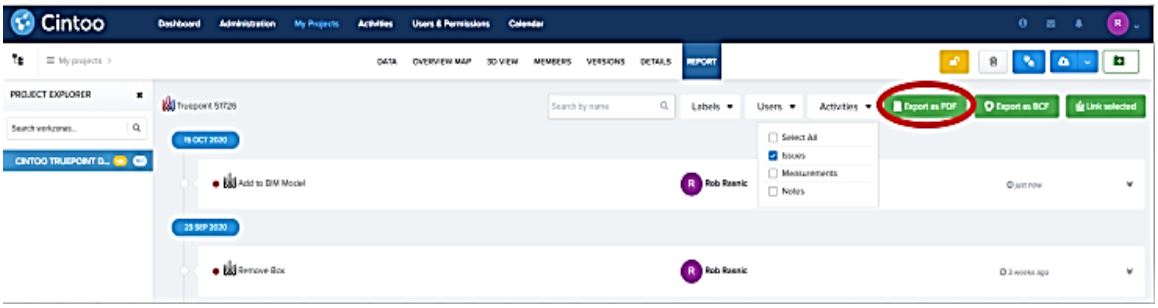


FIGURE 24: EXPORTING A PDF FILE

This will export out the pdf file to email or share with others. Here is an example of what the report contains: (Figure 25)


Cintoo

Cintoo Truepoint Dataset

Exported by Rob Rasnic
Date: 15 October 2020 06:10 PM GMT

Cintoo Truepoint Dataset Report			
Work Zone Name:	Cintoo Truepoint Dataset	Work Zone location:	48.827026, 2.388973
Scan count:	103	Creation Date:	14 May 2020 04:43 PM GMT
Created by:	Rob Rasnic	Last Update:	14 May 2020 04:43 PM GMT

Note	Private Note	Issues	Measurement
0	0	2	0

Issues

9 Remove Box

Created by:	Rob Rasnic
Created at:	23 September 2020 05:59 PM GMT
Due date:	
Severity:	High
Assigned to:	Alex Galvan
Status:	Open
Position: (x, y, z) (ft-us)	1028.0405, 108.4741, 103.6021
Labels:	crate

Description: https://cintoo.com/

10 Add to BIM Model

Created by:	Rob Rasnic
Created at:	15 October 2020 05:42 PM GMT

FIGURE 25: SAMPLE PDF FILE

Providing access to laser scan data in mesh or point cloud format for efficient desktop-based Scan & BIM modeling or clash detection

Here we will show you how to extract your data as either a point cloud or a mesh so you can complete you Scan & BIM modeling or you can use in Navisworks (or others) for your clash detection in your QA/QC processes.

In either case you will most likely want to start out with cropping your area of interest so that your data has a much smaller file size since it is limited to the area you are cropping.

The cropping tool is shown in the below link to a short video: (Figure 26)

FIGURE 26: CLICK ON IMAGE TO LAUNCH VIDEO

Exporting as a Point Cloud

Once you have created your crop you can now export this out as a point cloud. Simply open up the crop tool and select the crop you created. From here you will click on the **Export** button to start the process of exporting the point cloud. (Figure 27)

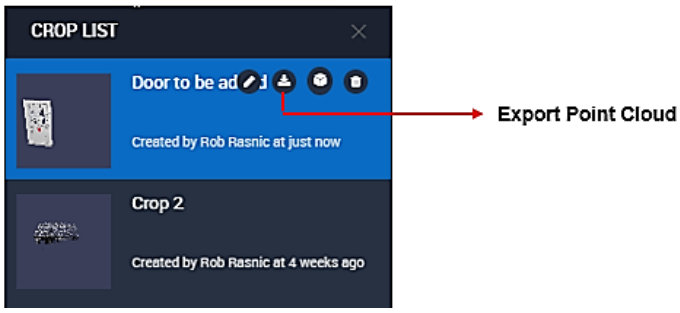


FIGURE 27: HOW TO EXPORT POINT CLOUD

This will in turn open up Cintoo Connect where the user will select the file type (.rcp/.rcs preferred) and location of where to store the file. (Figure 28)

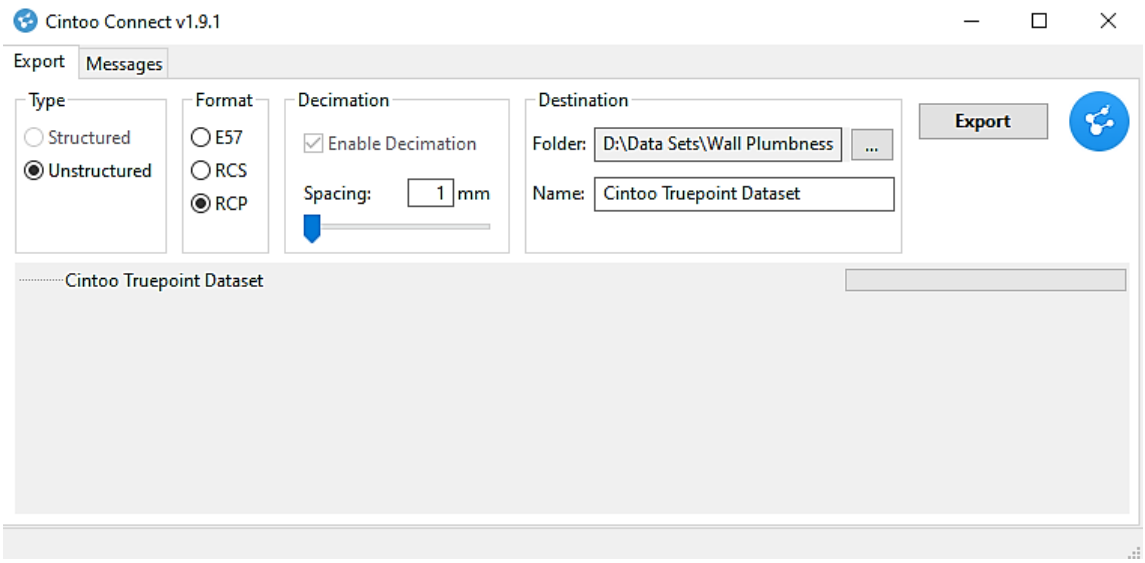


FIGURE 28: DOWNLOADING POINT FILE USING CINTOO CONNECT

This process will transform the mesh from Cintoo Cloud back to its source point cloud with no loss of data integrity on the users local machine. Please note the user will have to have the correct permission on the project to perform this function.

Exporting as a Unified Mesh

Step 1:
Click on 'Create Mesh' for the selected crop to open the 'Create a Mesh' window. (Figure 29)

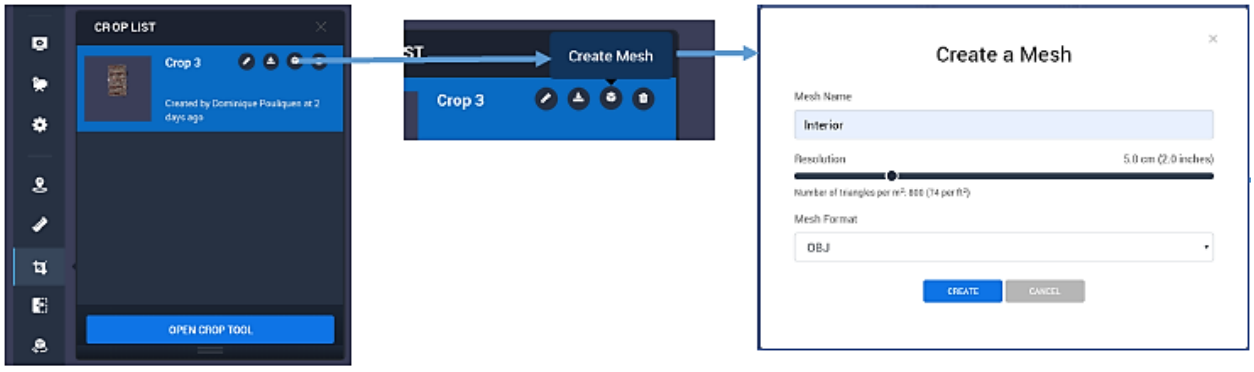


FIGURE 29: MESH DIALOGUE BOX

Select the resolution (or density) from 0.2 cm (1/10 inch) to 20 cm (7.9 inches).

- This is the minimum distance between two vertices.
- Be careful when selecting the resolution

Select the export format: OBJ, FBX, STL

- OBJ: Photo-textures included
- FBX: Photo-textures included, lighter than OBJ
- STL: Geometry only

Step 2:

After some time, you will receive an email to inform you that your mesh is ready for download: (Figure 30)

- You can then download directly using the first URL.
- Or go your project in Cintoo Cloud to download it as well. Save your crop.

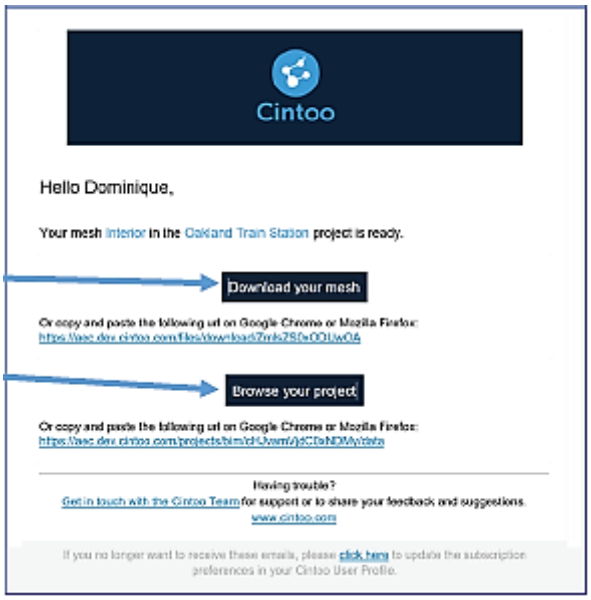


FIGURE 30: EMAIL MESH IS COMPLETE

Step 3:

To download the unified mesh from Cintoo Cloud, go to your project or Work Zone and select ‘DATA’.

Click on the download icon at the right of each unified mesh to download it. (Figure 31)

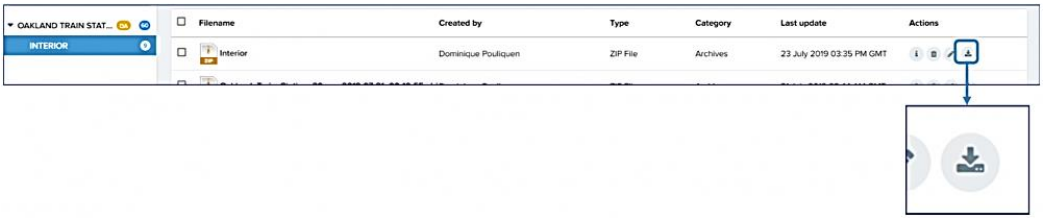


FIGURE 31: DOWNLOADING FROM THE DATA TAB

Or select the file and click on ‘Download Files’ at the bottom of the page: (Figure 32)

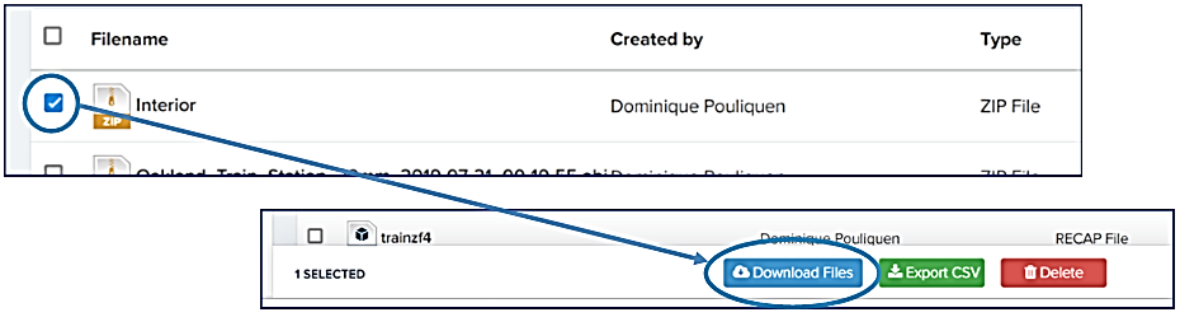


FIGURE 32: DOWNLOADING FROM BOTTOM OF DATA PANEL

For more information on uses cases & examples of unified meshes, please click on the picture below:

	Use Cases		
	Floors, Walls, Ceilings…	Equipment, Machinery, MEP, Trusses…	Ornate Architecture, Cultural Heritage, Historic BIM
# of scans per area covered	Low to Medium	Medium to high	Very high
Mesh Resolution	Low (1 to 2 inches / 2.5 to 5 cm)	Medium (1/2 inch to 1 inch / 1 cm to 2.5 cm)	High (1/10 to ½ inch / 0.2 cm to 1 cm)
Typical use case	Visualization, VR/AR, Retrofits, BIM modeling, FFL Reports…	Retrofit, Layout, Clearance check, Simulation, Clash detection…	3D Printing, Reverse engineering, Molding, Animation, Rendering, Virtual Production…
Workflow and mesh format	Autodesk Inventor, Navisworks, Revit or 3dsMax: FBX / OBJ Siemens NX : STL BrisCAD : OBJ Sketchup, Rhino: OBJ Geomagic, Poyworks: STL …		

CLICK ON IMAGE TO GO TO WEB PAGE WITH MORE INFORMATION

Unified Meshes in Navisworks and Revit

Importing Cintoo Cloud’s Unified Meshes in Autodesk Navisworks and Revit is possible, although you have to be careful about the size of the mesh that is being generated.

- Low mesh resolution (1 to 2 inches / 2.5 to 5 cm) will be preferred for building interiors, walls, ceilings, floors…
- Medium mesh resolution (1/2 inch to 1 inch / 1 cm to 2.5 cm) will be preferred for point cloud sections and slices, building structure (beams) or indoor equipment.

The proposed workflow is the following:

- Generate a Unified Mesh in Cintoo Cloud, selecting FBX as a file format.
- Import this FBX file in Navisworks.
    - Colors are kept.
- Export a NWC or NWD from Navisworks, that will reference this mesh.
    - This will have the effect of reducing the size of the mesh.
- Import this NWC or NWD file in Revit.
    - Colors will be lost when displaying the mesh in Revit.

Detailed workflow:

- Download your Unified Mesh in FBX format from Cintoo Cloud.
- Make sure that the FBX file and the texture maps and materials are all in the same folder (default setting from Cintoo Cloud).

Import this FBX file in Navisworks using the 'Append' tool: (Figure 33)

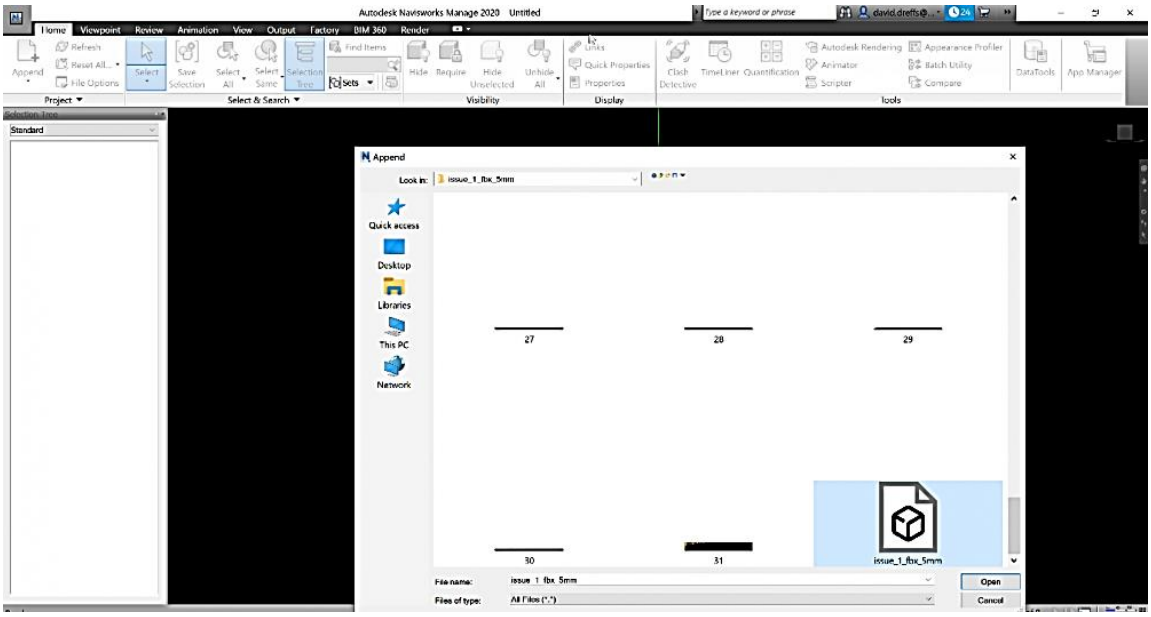


FIGURE 33: NAVISWORKS APPEND TOOL

The Unified Mesh is then displayed in Navisworks with its colors: (Figure 34)

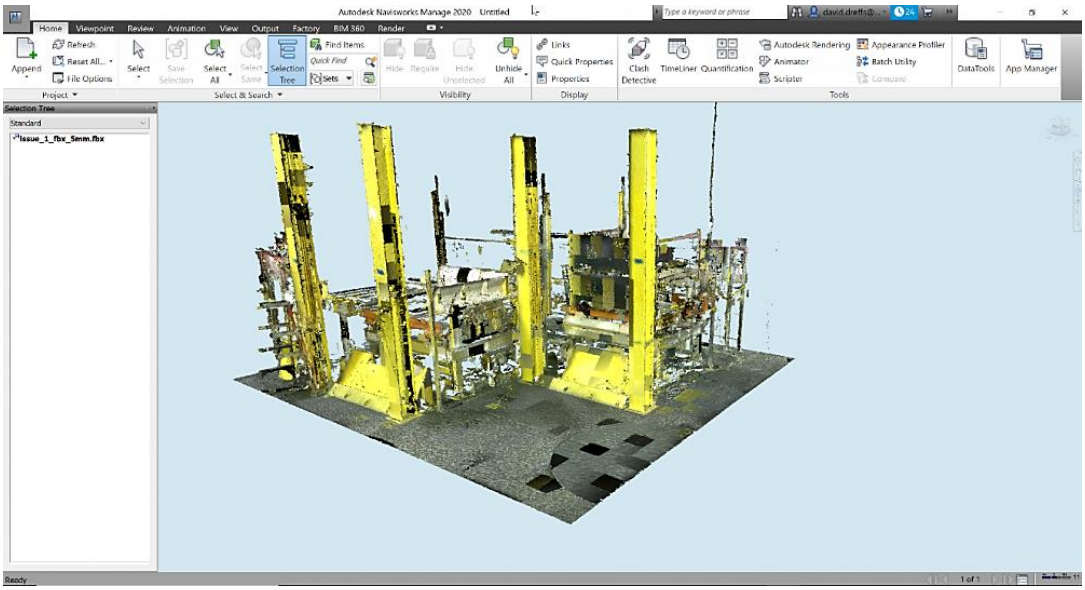


FIGURE 34: NAVISWORKS COLORIZED MESH EXPORTED FROM CINTOO

Publish from Navisworks using .nwc or .nwd as a file format: (Figure 35)

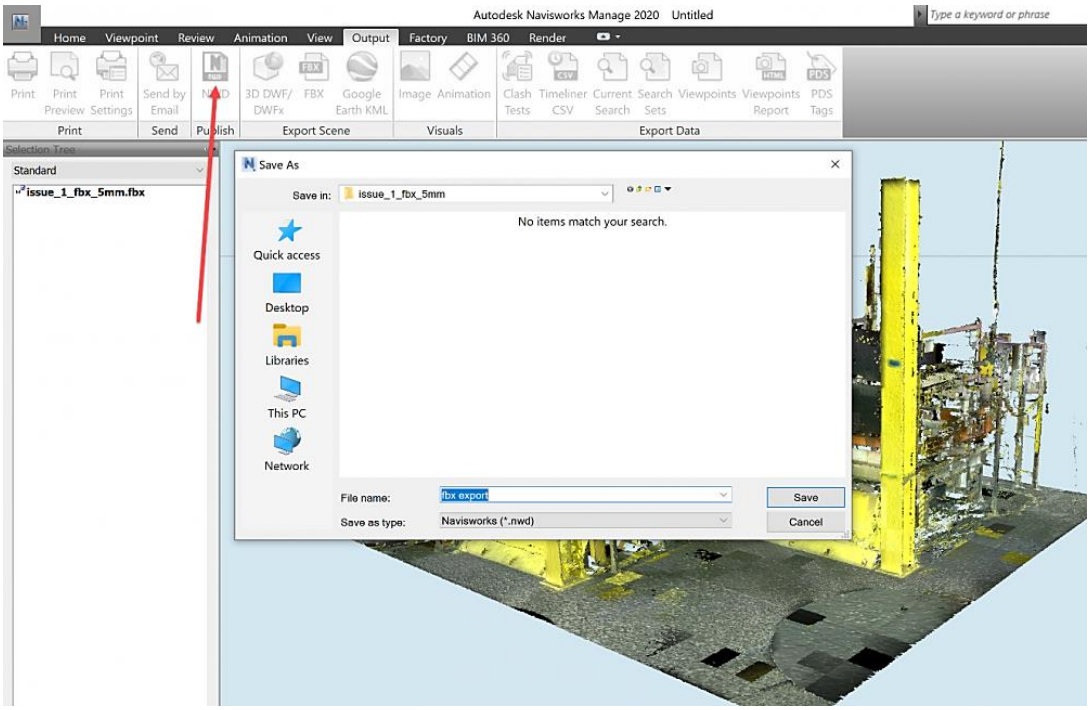


FIGURE 35: PUBLISH MESH AS .NWC FROM NAVISORKS

Import the NWC or NWD model in Revit using Coordination Model > Add: (Figure 36)

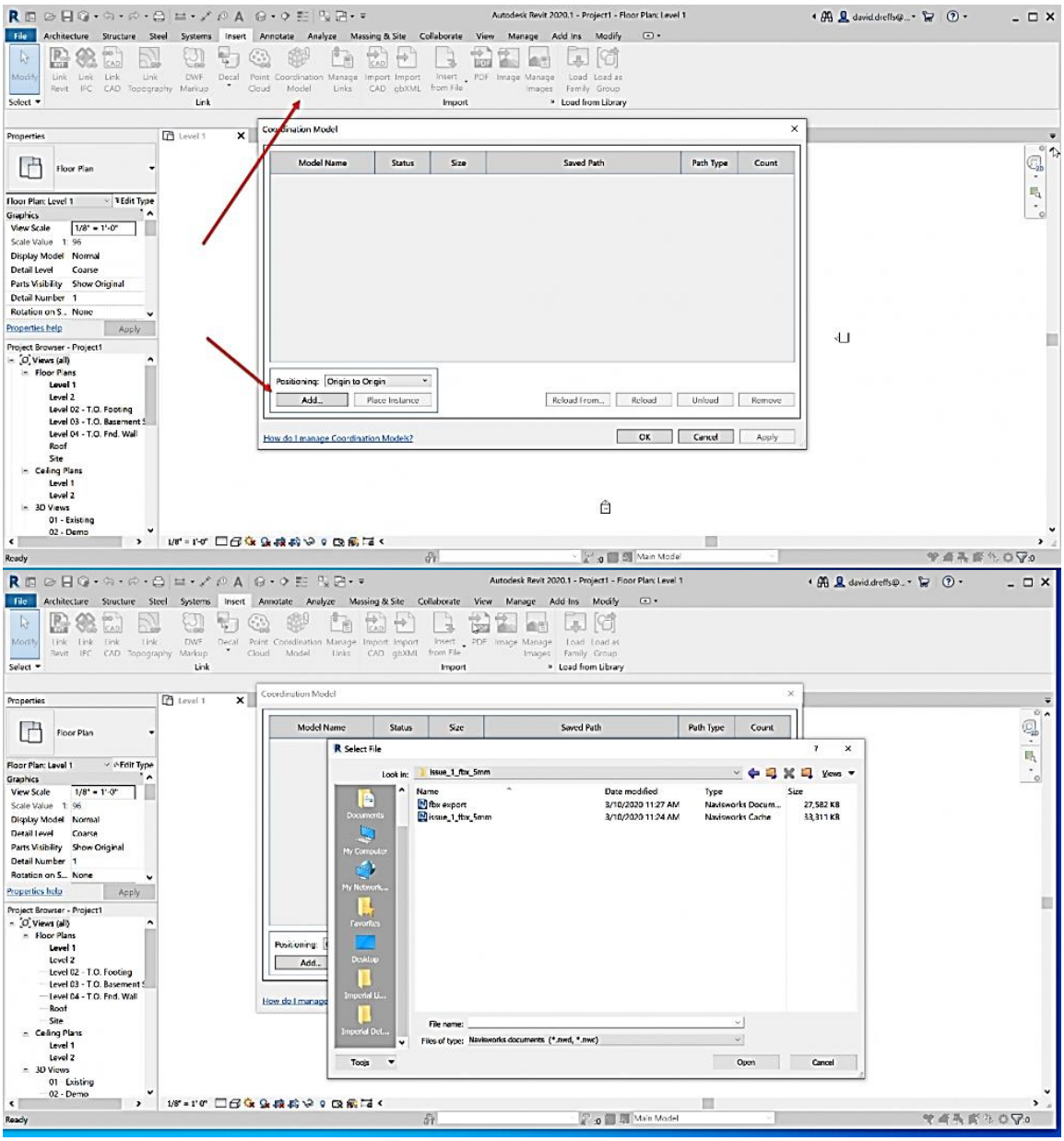


FIGURE 36: IMPORTING NWC FROM NAVISWORKS

The Unified Mesh will be displayed in Revit without the source colors: (Figure 37)

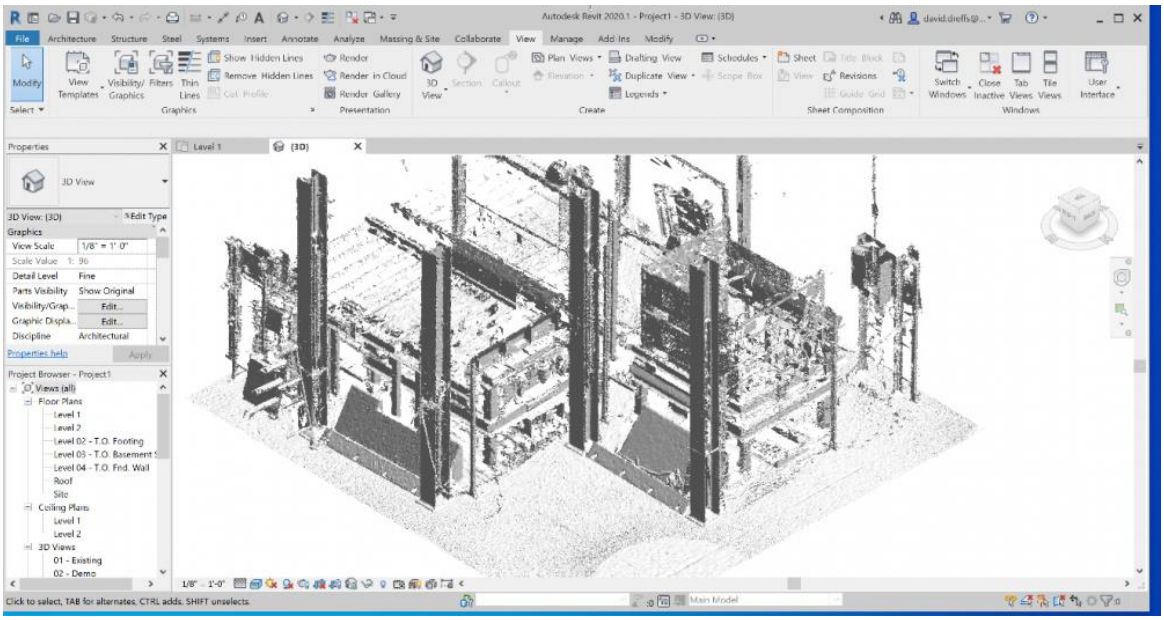


FIGURE 37: MESH .NWC FROM NAVISWORKS (NO SOURCE COLORS)

Summary:

I hope you have found this class informative and helpful. As laser scanning is becoming more prevalent in today's environment, we need to adopt cloud based workflows for collaborating, sharing and distributing this heavy data in cloud enabled workflows.

Only by democratizing the use of this highly valuable data can we get greater insight into the project and use it throughout the entire project lifecycle.

If you have further questions, please feel free to contact us at contact@cintoo.com.