



Bentley Descartes V8i

Advancing Information Modeling For Intelligent Infrastructure

Agenda

- Why would you need Bentley Descartes?
- What is Bentley Descartes?
 - Advanced Point Cloud Workflows
 - Advanced Terrain Modeling Workflows
 - Advanced Image Workflows
- Who uses Bentley Descartes?



Why Descartes? Because your work involves...

- Hybrid raster/vector workflows
 - Typical when working with older scanned plans
- Urban Modeling Scene Creation
 - Accurately apply Advanced Textures on your 3D model at low cost
- Working with Advanced Raster formats
 - Get access to new formats not supported in MicroStation



Why Descartes? Because your work involves...

- Extremely large terrain models (larger projects, citywide, regional, countrywide)
 - Create and display Scalable Terrain Models (STM)
 - Up to billions of points
 - High-resolution image draping
- Going beyond point cloud visualization
 - Advanced point cloud workflows



Bentley Descartes Value Proposition

Bentley Descartes...

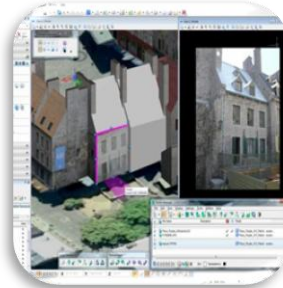
Advancing Information Modeling For
Intelligent Infrastructure



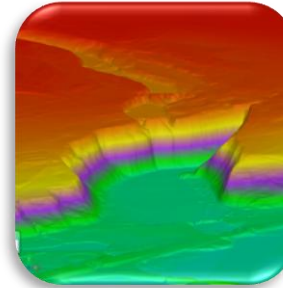
Image
Processing



Hybrid
Raster/Vector



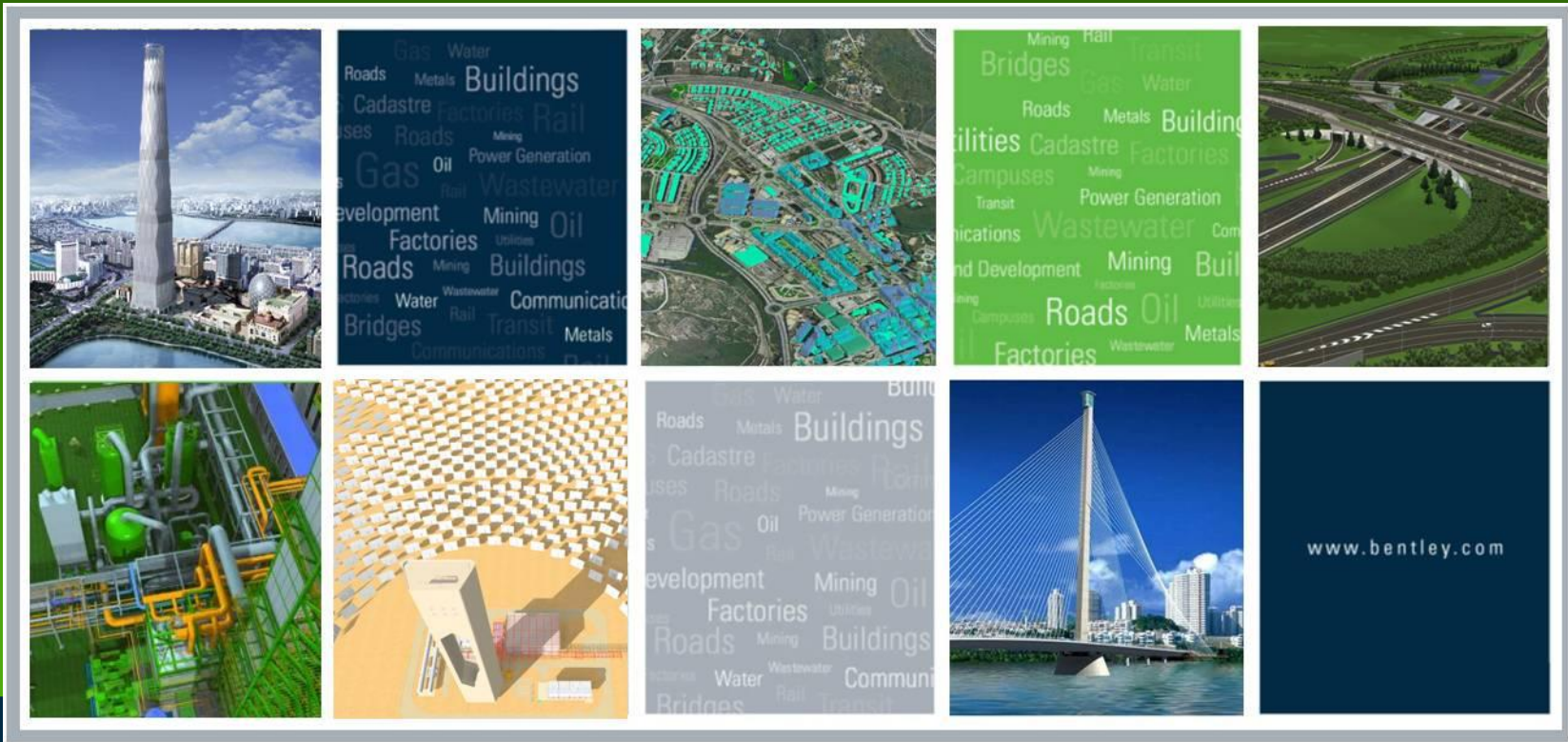
3D Modeling



Terrain
Modeling



Point Cloud
Processing



What is Bentley Descartes?

What is Bentley Descartes?

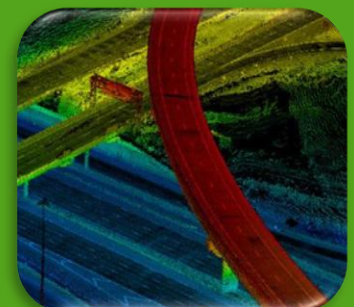
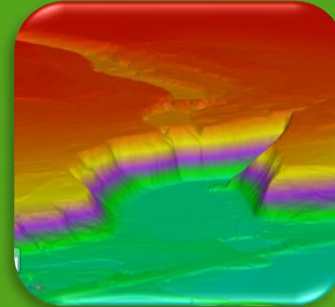
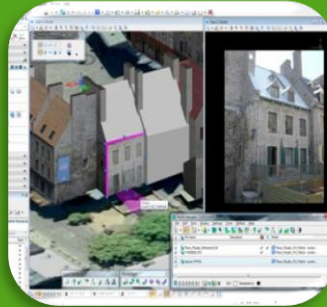
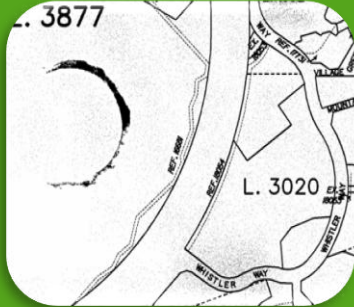
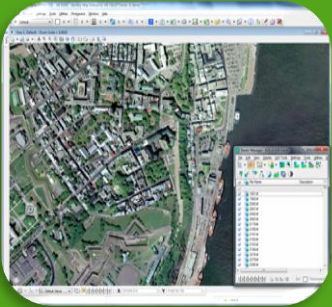


Image Processing

- Raster Geo-Referencing
- Advanced raster transformation (warping, register)
- Raster Scene Creation (merge tool)
- Persistent coordinate system transformation
- Raster Mosaic Creation
- Image filtering (Contrast Stretch, Density slicing, etc)
- Viewing Oracle Spatial Georaster
- Viewing Raster DEM and applying filter on Raster DEM

Hybrid Raster/Vector

- Binary Raster Editing (ala I/RAS B)
- Color Raster Editing
- Snap on raster content
- Raster to Vector conversion and Vector to Raster conversion
- Convert Raster Text to Vector Text

3D Modeling

- Advanced Texture Creation/Editing (e.g.: 3D building texture)

Terrain Modeling

- Create Scalable Terrain Model (STM)
- Billions of points DTM
- Display Scalable Terrain Model
- High-Resolution Draping of imagery on STM
- Export to MicroStation Terrain

Point Cloud Processing

- Point Cloud Classification Editing
- Point Cloud Line Draping
- Point Cloud Advanced Export
- Point Cloud Geometry Extraction
- Point Cloud Visual Explorer
- Point Cloud Smart Snap Mode

What's new in V8i (SELECTseries 3)

- Point Cloud Processing

- Point Cloud Classification Editing
- Point Cloud Line Draping
- Point Cloud Advanced Export
- Point Cloud Geometry Extraction
- Point Cloud Visual Explorer
- Point Cloud Smart Snap

- Scalable Terrain Model

- Create Scalable Terrain Model (STM)
- Billions of points DTM
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Advanced Point Cloud Workflows



Point Cloud Support in Descartes

- Bentley Descartes is now the value-added product for advanced point cloud workflows
- It enhances MicroStation, PowerDraft and many other applications with advanced point cloud capabilities
 - Line Draping
 - Classification Editing
 - Visual Explorer
 - Smart Snap
 - Tiled Export
 - Geometry Extraction

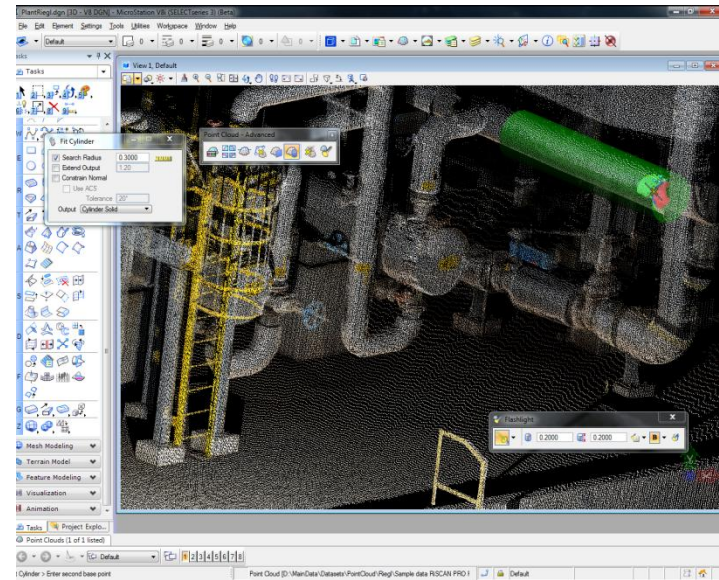
Plane and Cylinder extraction – Usage

- Extract planar elements to build geometries of features
- Extract planar elements to set ACS
- Extract Pipe centerline



Plane and Cylinder extraction

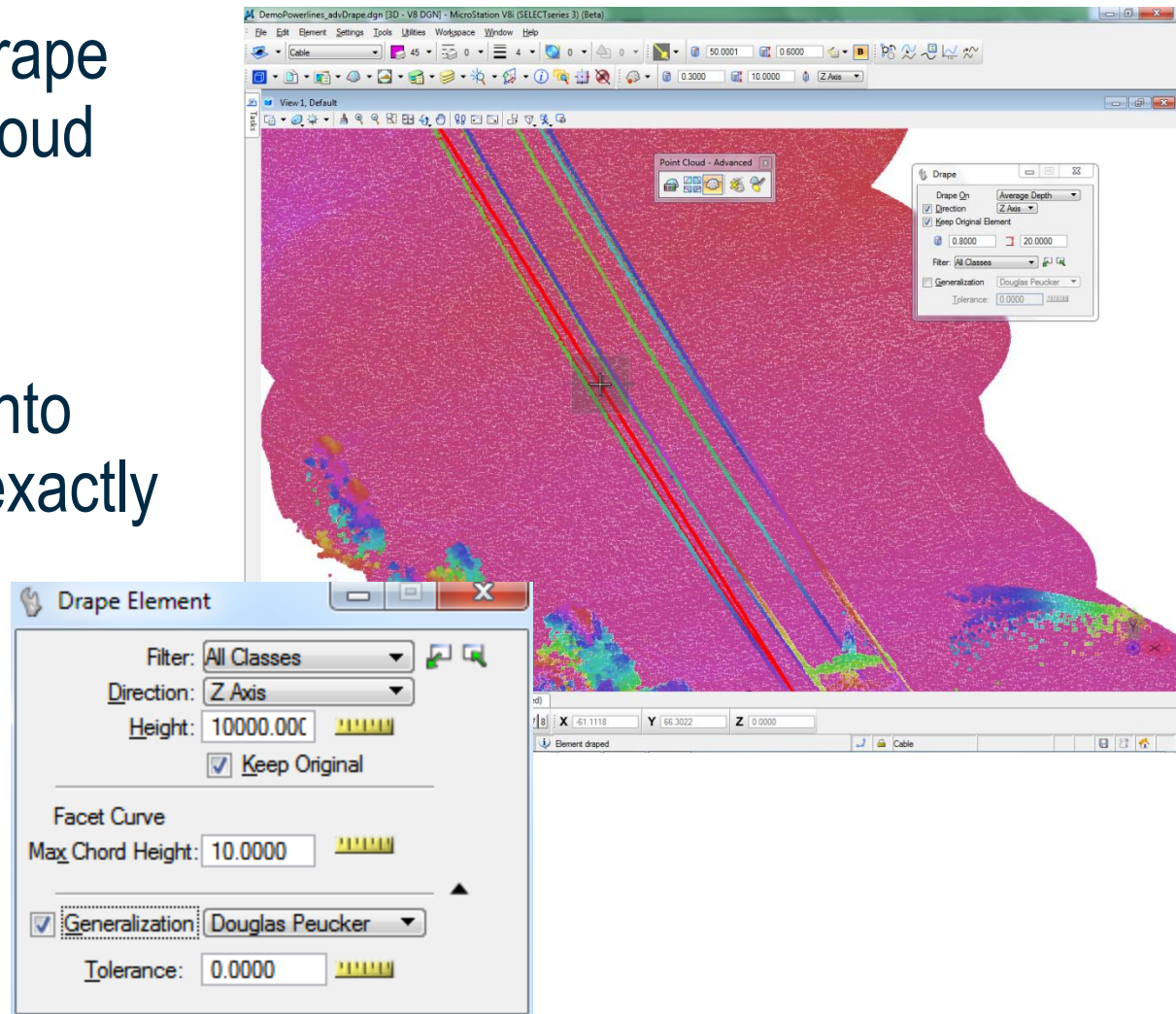
- Plane result
 - Planar 3D polygon (convex hull)
- Cylinder results
 - Cylinder shell
 - Cylinder centerline
 - Cylinder centerline and radius



Demonstration

Draping on Point Cloud

- Automatically drape lines on point cloud surface
- Convert line approximation into lines following exactly the point cloud surface.



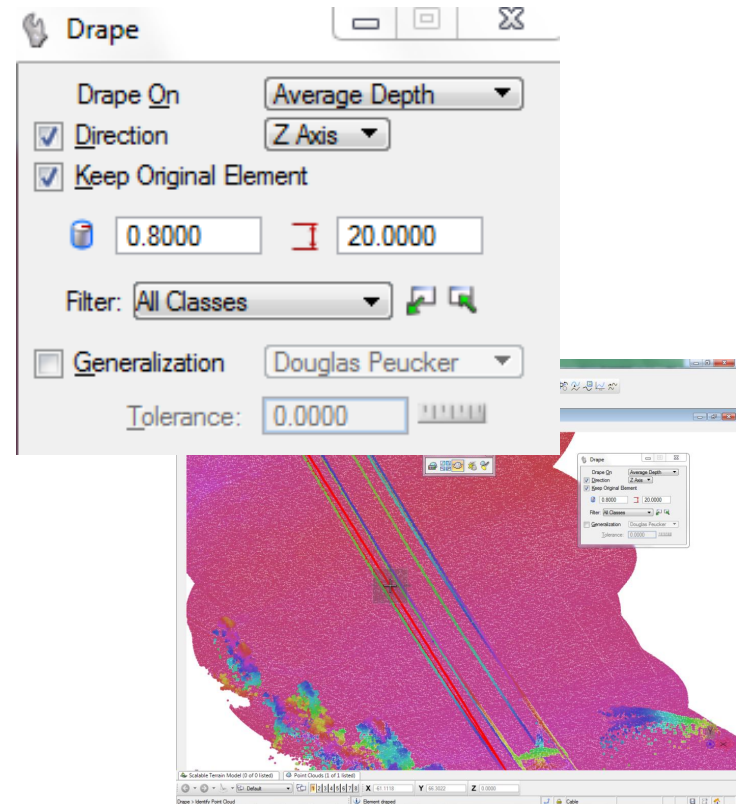
Benefits – Point Cloud Draping

- Enable semi-automated geometry extraction from point cloud
 - For example
 - Road profiles
 - Transmission line cables
 - Cross sections
- Enable analysis of the extracted vector data using any MicroStation based tools
- Create better terrain models by supporting the creation of break lines



Demo – Point Cloud Draping

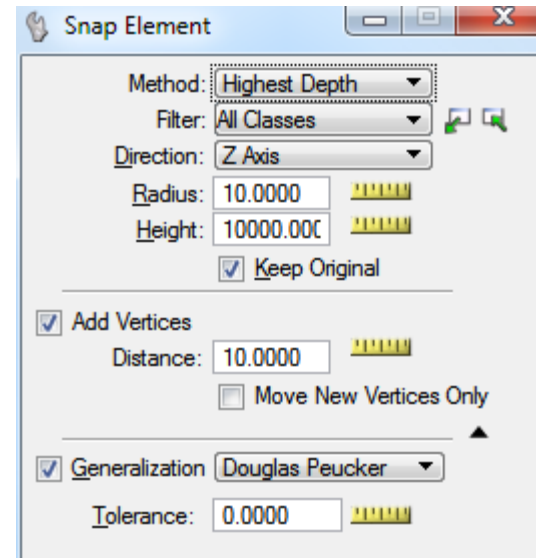
- Create line approximately aligned with transmission line cables
- Drape line on the point cloud



Demonstration

Point Cloud – Snap Element

- Similar to drape element
- Selects snap points based on snap settings
- Better selection of specified points
 - Highest
 - Lowest
 - Median
 - Etc

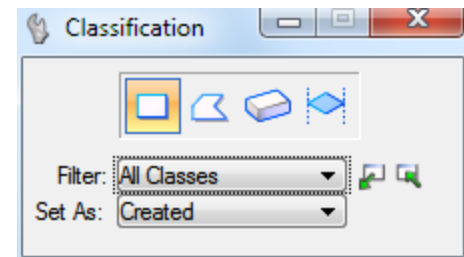


Classification Editing

- Automatically classified data has mistakes impacting break line extraction, terrain creation, shape extraction, etc.
- Hybrid/Retrofitting workflows need a way to structure point cloud parts
 - Isolating part of the assets
 - Ex: rail signalization, plant equipment
- Point clouds have noise
 - People, cars, land surveying hardware etc..
 - False points (ex: laser crossing windows)

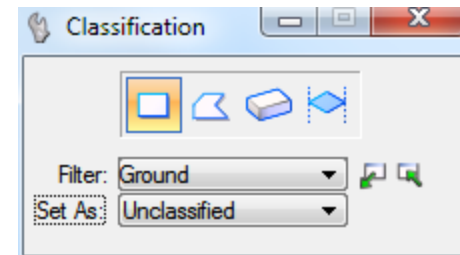
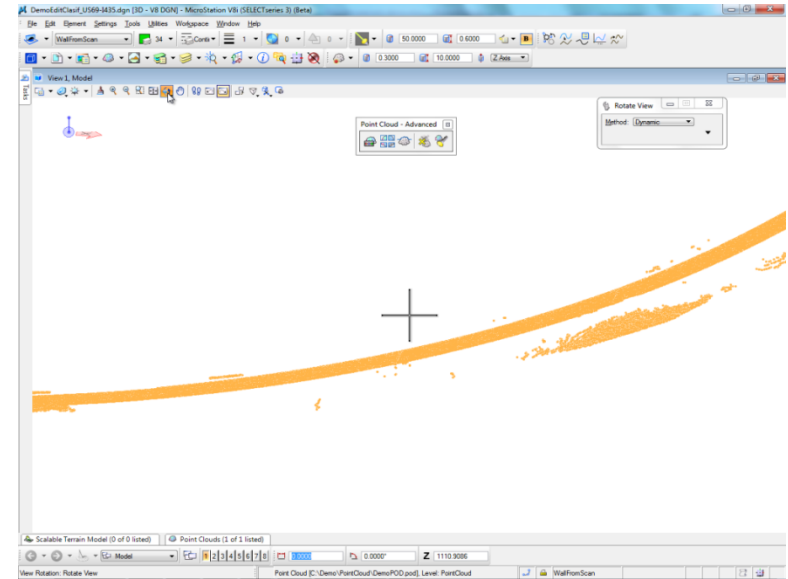
Benefits – Classification Editing

- Save time and money by empowering users to fix simple mistakes not detected by automated processes
- Improve point cloud data quality by improving the classification thereby adding value to existing data
- Generate better results out of the point cloud (terrain, shapes, etc)
- Facilitate hybrid workflows combining point cloud and vector based data



Civil Demo: Point Classification Editing and Creation of STM

- Visualize classification
- Edit the classification
- Generate Scalable Terrain Model (STM)



Demonstration

Data Courtesy HNTB – www.HNTB.com

Building/Factory Demo: Replacement of a portion of a point cloud

- Hide points using the Edit Classification tool
- Place an object in place of the hidden points

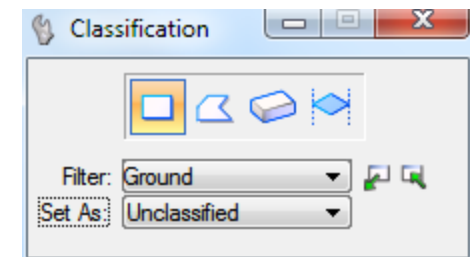
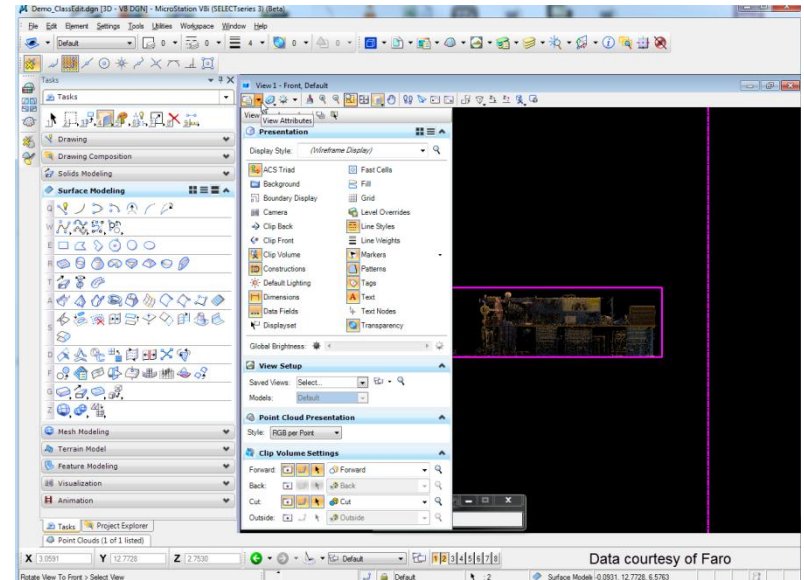


Image Processing

Hybrid Raster/Vector

3D Modeling

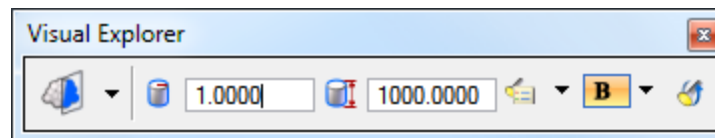
Terrain Modeling

Point Cloud Processing



Data Courtesy Faro

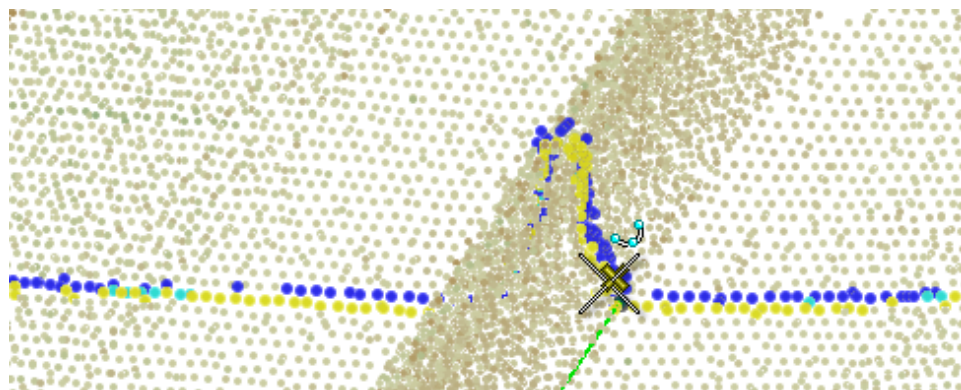
Visual Explorer



- Dynamically re-color points in the cursor neighborhood based on their 3D location and a direction
- Improves user understanding of how the points are organized:
 - Are there points behind my cursor position?
 - Are there points around the cursor almost at the same depth?
 - Is the cursor snapping on the top or the bottom of this edge?

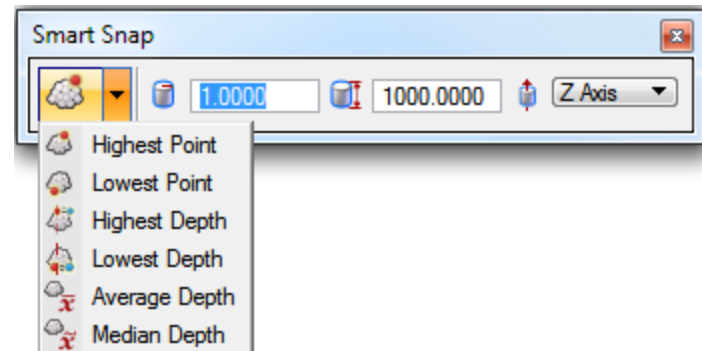
Benefits – Visual Explorer

- Enable better understanding of a 3D scene
- Enable simpler QA/QC of the point cloud data
- Enable better navigation of a 3D scene
- Provides faster and more accurate digitizing especially when combined with Smart Snap



Point Cloud Smart Snap

- Smart Snap is a tool for picking key points such as the lowest, highest, average or median point along a user defined path. For example, find the peak line along a road centerline.
- Works in conjunction with AccuSnap and uses the point found by AccuSnap as the center of the search area.



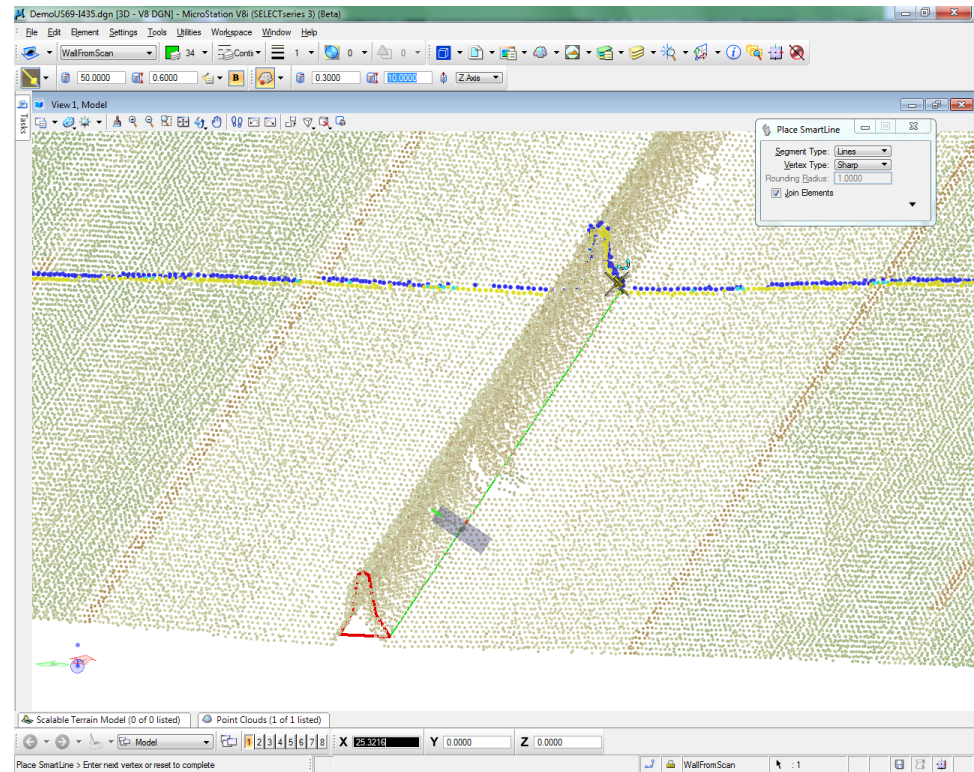
Benefits – Smart Snap

- Fully integrated with MicroStation AccuSnap, it simplifies modeling with point clouds
- It enables:
 - Fast semi-automatic break line extraction
 - Simple feedback on the particular point the tools are snapped on in the point cloud
 - Easier distance measurement
 - Faster digitizing by reducing the number of view rotations while working



Civil Demo – Visual Explorer and Smart Snap

- Use the Visual Explorer tool in Section mode
- Use Smart Snap snapping on lowest point to draw breakline
- Use MicroStation Solid tools to create wall from a pattern

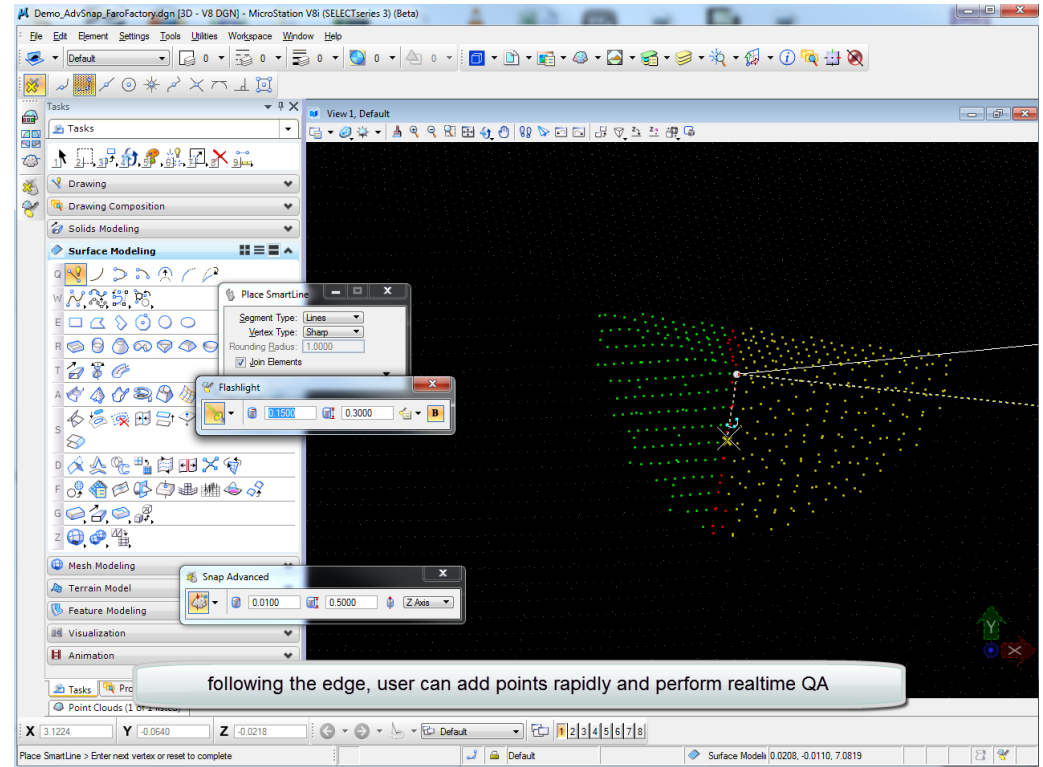


Data provided by HNTB

Demonstration

Building/Factory Demo – Visual Explorer and Smart Snap

- Visual Explorer tool
 - Section mode
 - Flashlight mode
- Smart Snap Using MicroStation

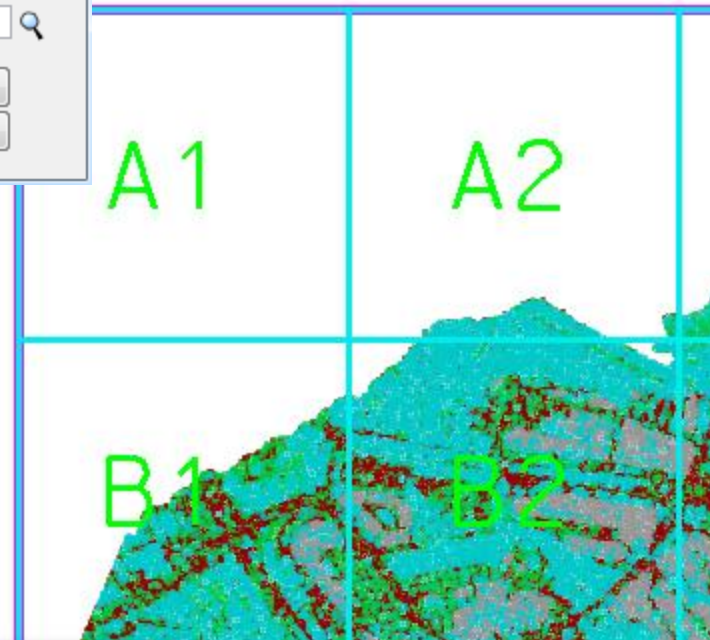
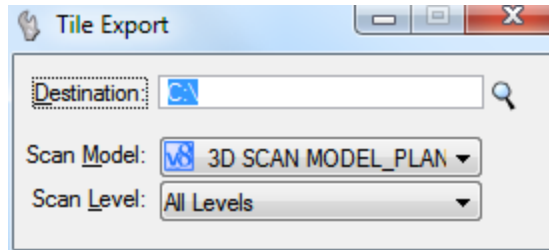


Data provided by Faro



Point Cloud Tiled Export

- Exports selected point clouds into a series of files according to a defined set of polygons or 3D volumes.



Benefits - Point Cloud Tiled Export

- Split large point clouds into smaller pieces
- Make large datasets more manageable for 3rd party software having less capacity than MicroStation

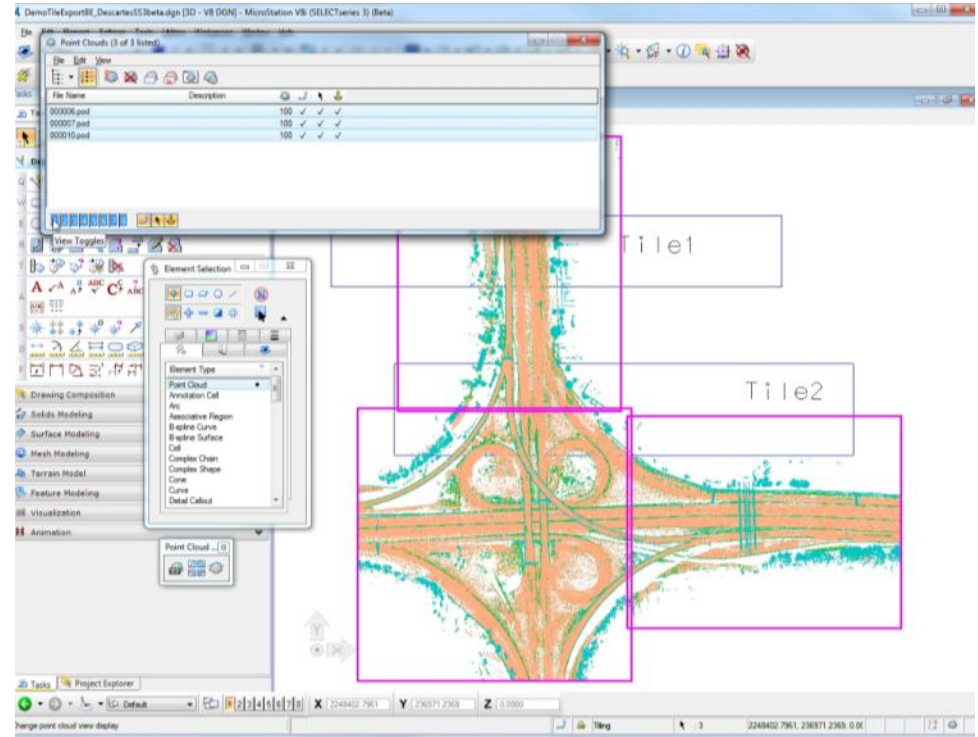


More file format support

- Exporting to LAS files
 - LAS is a well known standard in point cloud world
- Exporting to LAS, XYZ, or POD files in multiple tiles
 - User can specify a 3D “Grid” to define the extent of the exported files
 - Easily split large datasets in smaller files for easier handling in other software or for easier distribution on a network

Demo – Point Cloud Tiled Export

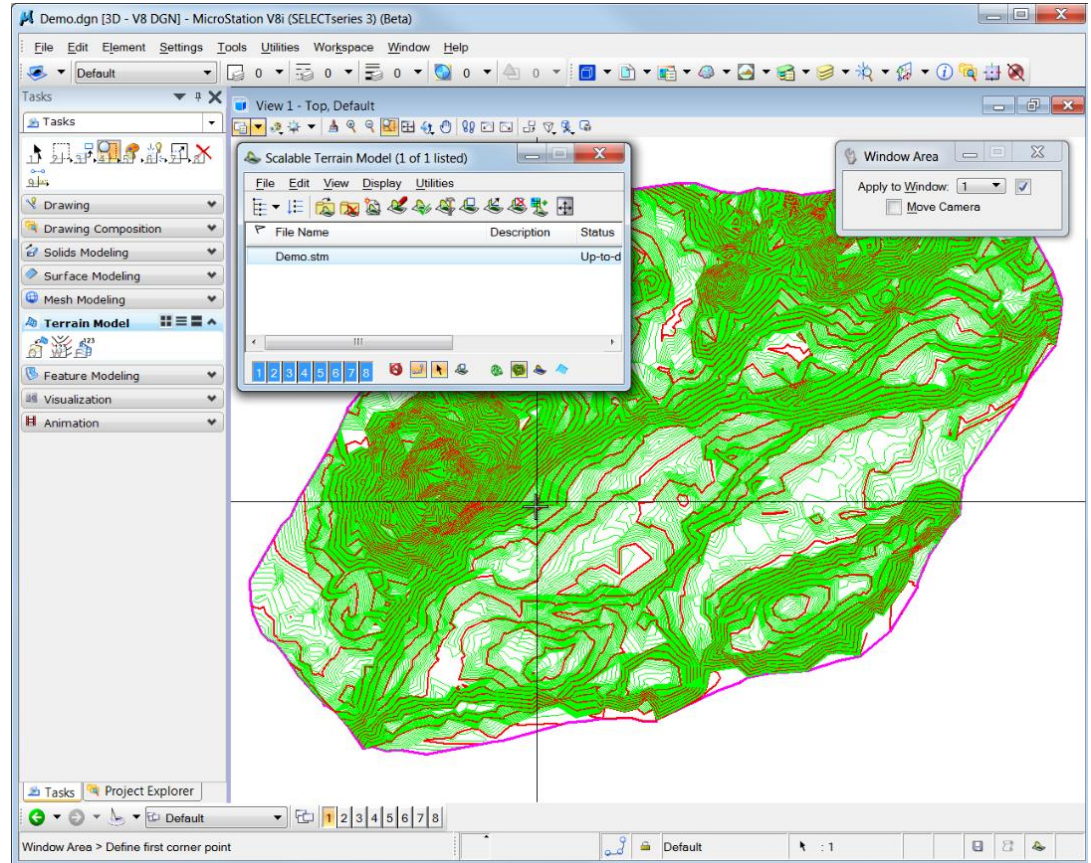
- Export single point cloud into multiple tiled files



Demonstration

Data Courtesy HNTB – www.HNTB.com

Advanced Terrain Modeling Workflows



Scalable Terrain Model

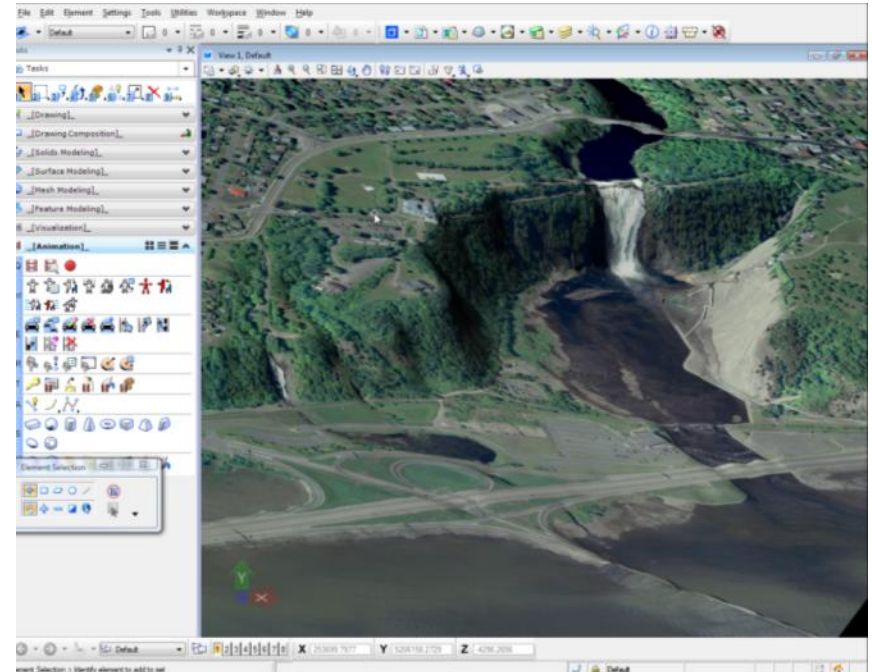
- STM is a revolutionary new technology that enables high-performance display of digital terrain models (DTMs) covering very large areas and containing billions of points
- For viewing huge digital terrain models at geospatial scale
 - City, Region, State, Country
- Potential users
 - Municipal, States, Federal agency and government
 - EPC working in GIS
 - Large infrastructure project

Benefits – Scalable Terrain Model

- Enables high-performance display of terrain models covering very large areas and containing billions of points and breaklines
- Saves time by displaying very large seamless terrain models enabling unprecedented workflows dealing with wide areas
- Scalable Terrain Model comes with high-resolution draping capabilities to display the raster backdrop on the terrain model with extremely good resolution regardless of the terrain model or image size
- The STM is easily kept up to date by synchronizing it with a wide variety of sources including DGN, Civil DTM, Point Cloud, XYZ. As the sources changes you can easily regenerate the STM

Demo – Scalable Terrain Model and High-Resolution Draping

- Scalable Terrain Model display
- High-resolution draping



Demonstration

Data provided by Quebec City and Images provided by Aero-Photo (1961) Inc, Quebec, Canada

Advanced Raster Workflows

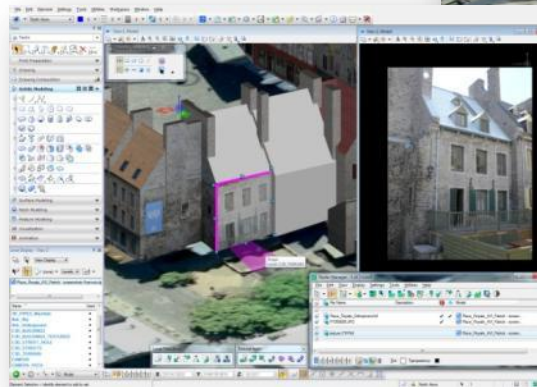


Raster is not dead, long live Raster!

- Raster is everywhere; whether you do CAD, mapping or GIS analysis
- Precise raster texturing on buildings is NOW easier than ever
- Raster is the fastest and cheapest way to view a large amount of information
- Imagery is becoming more accurate than ever
- Extremely large images and image catalogs are accessible to any organization
- Raster editing is extremely cost effective reducing the need for large scale raster to vector conversion

Advanced Texture Creation/Editing

- Create Advanced Textures with simple digital images
 - By rectangle; ideal for facades
 - By points; ideal for roofs
- Easy export to Google Earth (KML, KMZ), Collada, 3D PDF
- Animation creation



Data provided by Quebec City, Canada

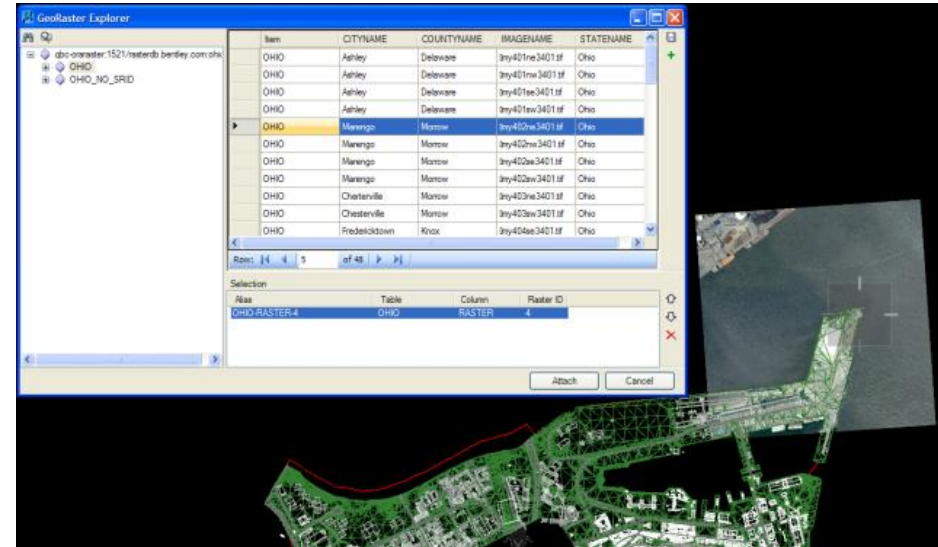
Advanced Texturing Demo



Data provided by Quebec City, Canada

Viewing of Oracle Spatial GeoRaster

- Extremely efficient viewing of GeoRaster
- Query GeoRaster by attributes and/or spatially
- View GeoRaster as Raster DEM





Who uses Bentley Descartes?

Used worldwide in multiple industries

Industry

Transportation - Engineering Consultants

GeoSpatial - Mapping Company

GeoSpatial - Electric and/or Gas

Transportation - Municipal Government/Agency

Transportation - Roadway Agency

GeoSpatial - Federal Cadastral Mapping Agency

GeoSpatial - Other Federal Agencies

Plant - EPC Firm (Process/Power)

Transportation - Rail Operations Firm

Building - Engineering Contractor



Municipality

- City of Saguenay

- The Scalable Terrain Model (STM) module has been used to validate the localization of the river under a project of mapping quality increase.
- The STM module also allows analysis of the residential development projects.



“The City of Saguenay has a very large territory covering approximately 1136 km² and we have always had issues trying to create terrain models covering our entire territory. With the new Scalable Terrain Model (or in short STM) technology shipping with Bentley Descartes V8i (SELECTseries 3) this problem is solved. We have created a large STM of more than 4,000,000 points and have draped more than 1.5 GB of raster imagery on top of the terrain and have seen amazing display performance.”

*Mr. Eric Bolduc
Technicien en système d'information géomatique
Ressources Informatiques
Ville de Saguenay, Quebec, Canada*

Bentley's Products:

- MicroStation
- Bentley Descartes

Railway



- London Underground
 - Using the point cloud functionality of Bentley Descartes

“Having been a user of point cloud data in various CAD packages for over 12 years I am most impressed with the point cloud processing tools in Bentley Descartes. I look forward to using the cross sectioning, flashlight and other concepts of extracting geometry to improve the efficiency of London Underground’s Land Survey Team further.”

*Matthew McCarter | CAD Technician
Capital Programmes Directorate | London Underground*

Bentley’s Products:

- MicroStation
- Bentley Descartes

Engineering

- NIRAS BlomInfo A/S
 - Using the Scalable Terrain Modeling functionality of Bentley Descartes, for visualization/communication of large project proposals

“With the release of Bentley Descartes V8i (SELECTseries 3) a strong improvement in the visualization of our survey data is possible, because in Bentley Descartes V8i (SELECTseries 3) it is now possible to manipulate very large terrain models and to drape high resolution orthophotos on them. These new functions have streamlined our workflows and improved the outputs, so it’s now possible for us to communicate our results to our clients faster, better and in a more convincing manner.”

Morten M. Sørensen, Project Lead

.....
NIRAS BlomInfo A/S

Bentley’s Products:

- MicroStation
- Bentley Descartes