

## Features of Galaxy Eye

### ●File input

Original File	GLW GLP
3D measurement data	PTX FLS/FWS ZFS
Geometry file	STL
3D-CAD file(*1)	IGES STEP ACIS CATIA V5 他
Files for an adjustment of position	DXF
Definition files for each setting	TXT

※\*1 It is optional function

### ●File output

Original File	GLW GLP
3D-CAD file	DXF IGES
Geometry file	STL
Output file for EYECAD®	XML
Definition files for each setting	TXT
Image file	BMP
Video file	AVI others

### ●Recommended movement environment

Hardware(*2)	
CPU	Corei5, Corei7 and over
Memory	8.0GB and over(*3)
HDD	80GB and over
Graphic card	More than OpenGL 3.2 correspondence (recommend it more than memory 2.0GB)
others	Mouse, Keyboard, CD-ROM drive

※\*2 Please contact us for more information.

※\*3 To use fully-automatic piping function, 48GB of memory are required for processing 1 billion points.

### Software

OS	Windows 7 (64bit), Windows 8 / 8.1(64bit)
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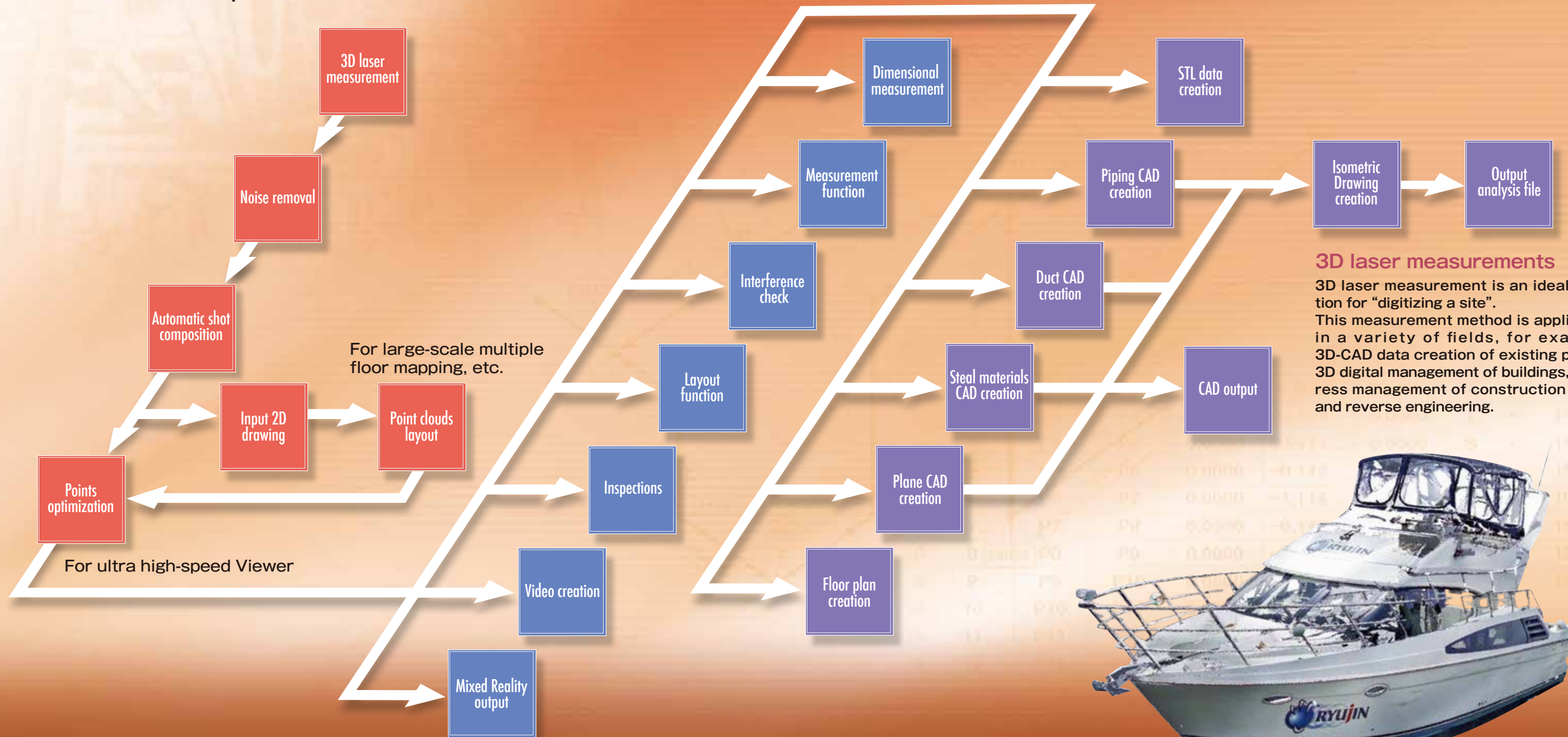


# Galaxy-Eye Instantly Visualizes 3D Laser Measurement Data with Smooth Data Processing!



Galaxy-Eye is totally new software that instantaneously and smoothly processes large-scale measurement data acquired from a 3D laser scanner. It solves a number of problems and is stress-free.

*Equipped with ultra high-speed Viewer!!*



## 3D laser measurements

3D laser measurement is an ideal solution for “digitizing a site”. This measurement method is applicable in a variety of fields, for example 3D-CAD data creation of existing plants, 3D digital management of buildings, progress management of construction sites, and reverse engineering.



Galaxy-Eye meets the 3D measurement needs of any industry.



Plants



Bridges



Buildings



Power generation facilities



Piping equipment



Vehicles



# Galaxy-Eye Features of Galaxy-Eye

The group of functions of Galaxy-Eye takes advantage of 3D laser measurement data from various situations, including managing the construction progress, planning how to move equipment with new installations or modifications, examining layout, and creating CAD data on facilities.

## Preprocessing



### 3D laser measurement

3D laser scanner scans the site as it is. The acquired measurement data is a huge cluster of 3D point data called point cloud data.

### Noise removal

This function removes the floating points called measurement noise. Unused data, etc. is also deleted in this process.

### Automatic shot composition

This function integrates data measured in multiple locations in three dimensions, and handles it as one large data.

### Input 2D drawing

This function is for entering 2D equipment layout drawings, etc. in DXF format prepared in advance. Figures can also be input directly.

### Points optimization

This function adjusts the position of the input 2D layout drawing data and point cloud data. Accordingly, the direction, etc. of an overall building can be adjusted.

### Point clouds layout

This function converts data into a data format supporting the ultra high-speed Viewer, which allows for smooth operation even for measurement data exceeding 10 billion points. What data is located where can be searched without concern of the maximum size of the measurement data. During a search, no delays will occur in the loading.



## Simulations

### Dimensional measurement

This function allows you to utilize 3D point cloud data, to measure distances, angles, heights, and etc.

### Measurement function

This function allows you to calculate the volume of soil to compare the volume before and after construction. The volume of material can be understood by comparison of the point cloud.

### Interference check

This function is for checking interference while moving the CAD (STL) through the point cloud data. This is ideal for performing examination of routes for moving equipment in/out of factories and plants, and the swing motion of working robots.

### Layout function

This function is for the grouping of measured point cloud data, which can be copied and pasted freely. This is ideal for performing examinations for relocating equipment, and space saving plans, etc. Layouts can also be performed by importing 3D-CAD (Option).

### Inspections

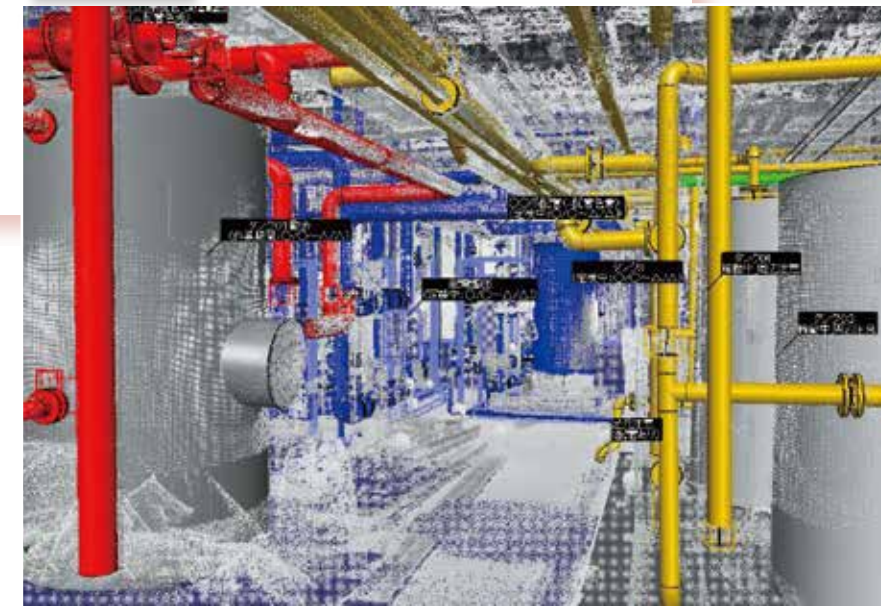
This function compares the CAD (STL) and point clouds, and outputs the difference in a contour map. Periodic inspections, and the differences between plants, etc. can be compared.

### Video creation

This function allows you to create movies where camera work to be performed along a free path line. Movies for interference checks can also be output.

### Mixed Reality output

This function allows you to perform 3D drawings (Option) supporting MR (Mixed Reality). The measurement data of remote locations can be checked and examined in a conference room.



## Modeling

### 3D-CAD creation

This function is for creating determined CAD shapes from the point cloud. The fully automatic CAD creation function with improved speed by parallel processing, greatly reduces the man-hours required for modeling, even with large-scale data.

### Isometric Drawing creation

This function allows for the creation of isometric drawings based on grouped piping CADs. It can also be used for integration, etc., not only for the entry of dimensions based on isometric drawings.

### Output analysis file

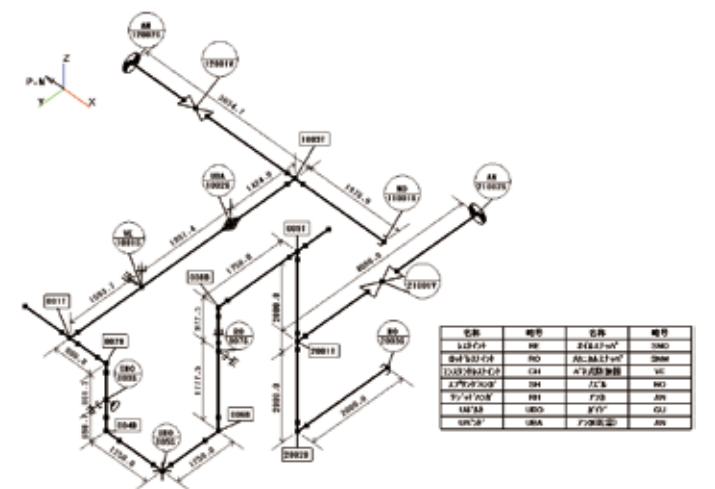
This function outputs isometric drawings as analytical data of the Nastran format. It can also be used for earthquake resistant analysis, etc.

### STL data creation

This function outputs point cloud data in STL format as is. This function is convenient when extracting a portion of the point cloud data to implement reverse engineering.

### Floor plan creation

This function projects 3D point cloud data in 2D to draw straight lines, curves and other figures. Plan views, elevation views, etc. can be created easily.





Several preprocessing steps are required to make use of data acquired from laser measurements. Automation of complicated noise removal and shot composition has significantly reduced the necessary man-hours with preprocessing.

### Automatic noise removal

Floating points regarded as measurement noise are automatically extracted and removed from the point clouds. This measurement noise must be completely removed in making more efficient use of data acquired from laser measurements. The automated processing of this complicated noise removal can drastically reduce the burden of preprocessing.



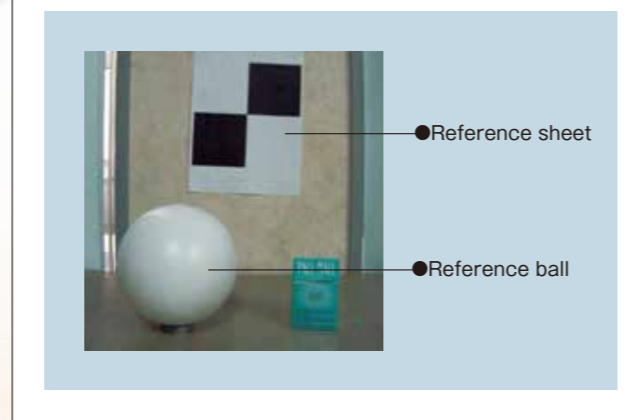
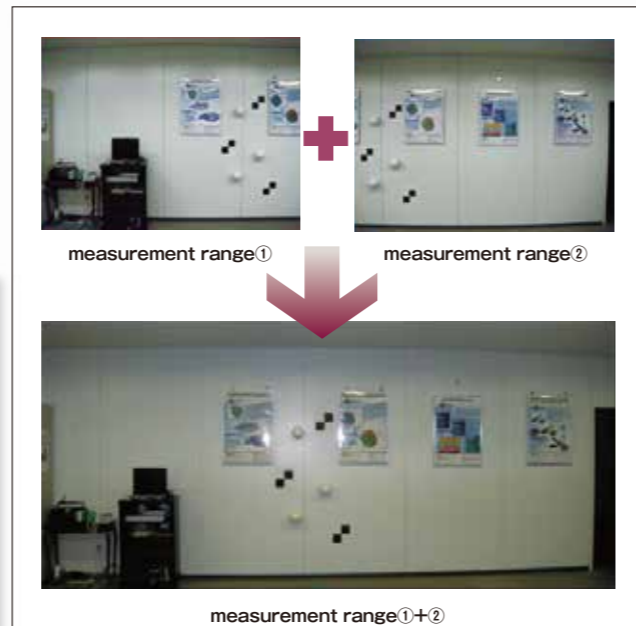
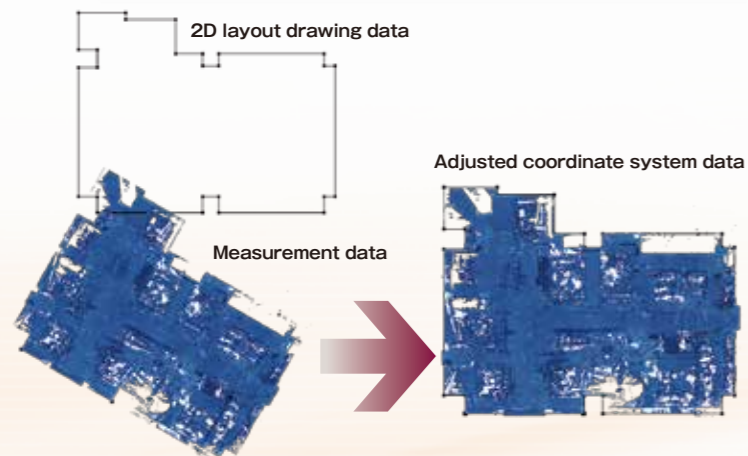
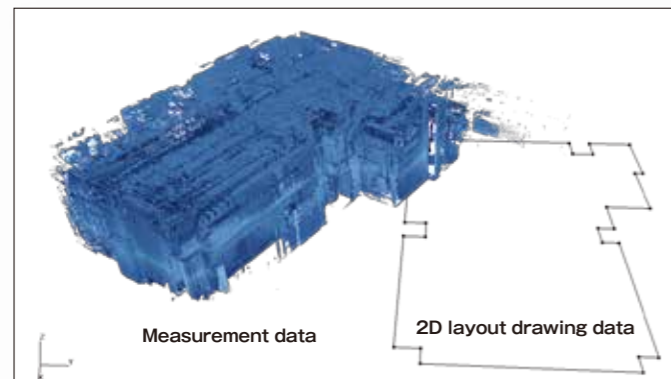
Automatic noise removal

### Automatic shot composition

Galaxy-Eye employs a fully-automated process when composing several shots. It can compose a shot containing the measurement data on 40 million points in around three minutes, thus significantly shortening the necessary man-hours. Any shot composition of measurement data that cannot be automatically composed can then be simply achieved by specifying reference values for the composition (three characteristic points, plane and ball).

### Point clouds layout

When 2D layout drawing data of a plan view, etc. already exists, the positions can be adjusted using the data as a reference. Accordingly, work can be performed with the coordinate system along with the existing plan view, not only performing work with the coordinate system of the measurement data. Since the floor level can be set arbitrarily, positions above the floor which used to be difficult can now be adjusted.



The simplest way of utilizing point cloud data is to visualize and confirm the data on the monitor. Galaxy-Eye achieves extremely smooth visualization by drawing point clouds at extremely high speed.

Since the display format of various point cloud data is prepared, the point cloud data can be confirmed and utilized in optimal display conditions according to the application.

### Walk-through

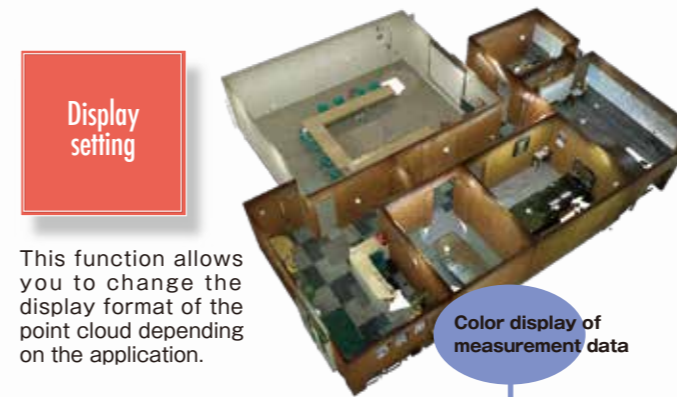
These functions allow you to move around the point clouds via simple operation. The walk-through function reveals the on-site status in detail by walking you around in the data while the fly-through function enables observation from the ceiling, from an outdoor position inside a building, or from other viewpoints from which are hard to observe in reality.



Walk-through

### Display setting

This function allows you to change the display format of the point cloud depending on the application.



Color display of measurement data



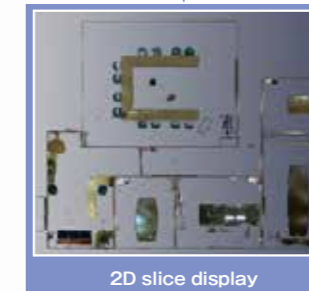
Fly-through



Gray-scale display



Clipping display



2D slice display



Color display for each group

Only the point clouds within the specified area are displayed. This can be used to easily hide any point clouds from outside the area of concern.

Point clouds are displayed like 2D slices projected in the specified axial direction. This allows the point clouds to be displayed like a 2D drawing.

The function color-codes point clouds for each group. The point clouds can be grouped simply by selecting them. This function is convenient not only for displaying but also making use of data.

### Ultra High Speed Viewer

This function allows for infinite data to be read with the unique high-speed data processing technology. Since the data can be read seamlessly, it can be handled smoothly even with data exceeding 10 billion points.





One way of making more efficient use of point cloud data involves simulations using the point cloud data. We have developed a dimensional measurement function for identifying the size or length, an interference identification function for examining the moving of equipment, and a layout function for examining the arrangement of equipment and devices. The use of a simulation function enables desktop examination of any problems at a measurement site.

### Dimensional measurement

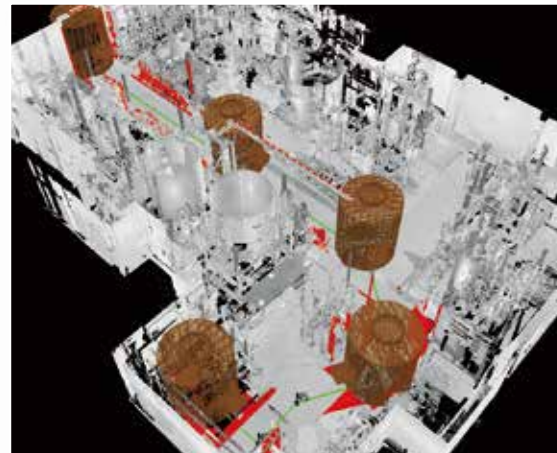
This function allows the distance between two points and the angle made by three points to be measured using point clouds.



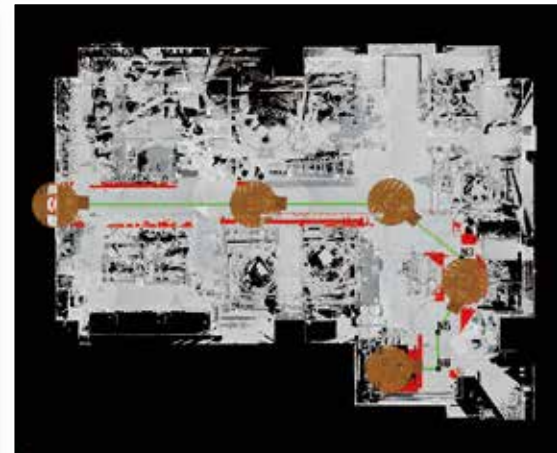
Main dimensional measurements



Interiors can also be measured



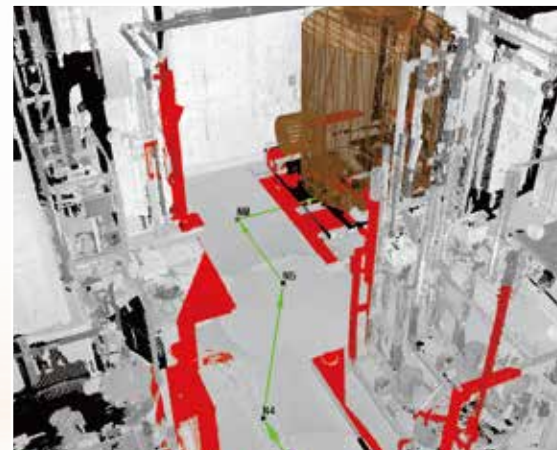
3D examination of the route used to move equipment



2D examination of the route used to move equipment

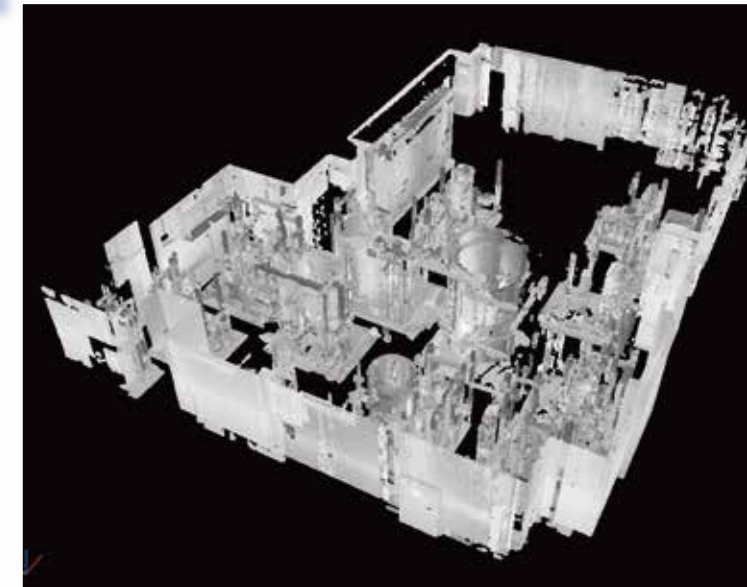
### Interference check

This function allows any interference to be identified between the point cloud data and the shape data when moving through the specified route. The interference point clouds change color, thus facilitating confirmation of any interference.

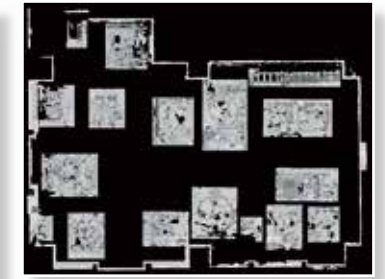


### Point clouds Layout function

This function allows for layouts to be examined by creating model data for layout examination in the point cloud data. The layout can be very easily changed via the mouse, thus allowing various layouts to be examined in a short period of time.



After 3D layout has been changed



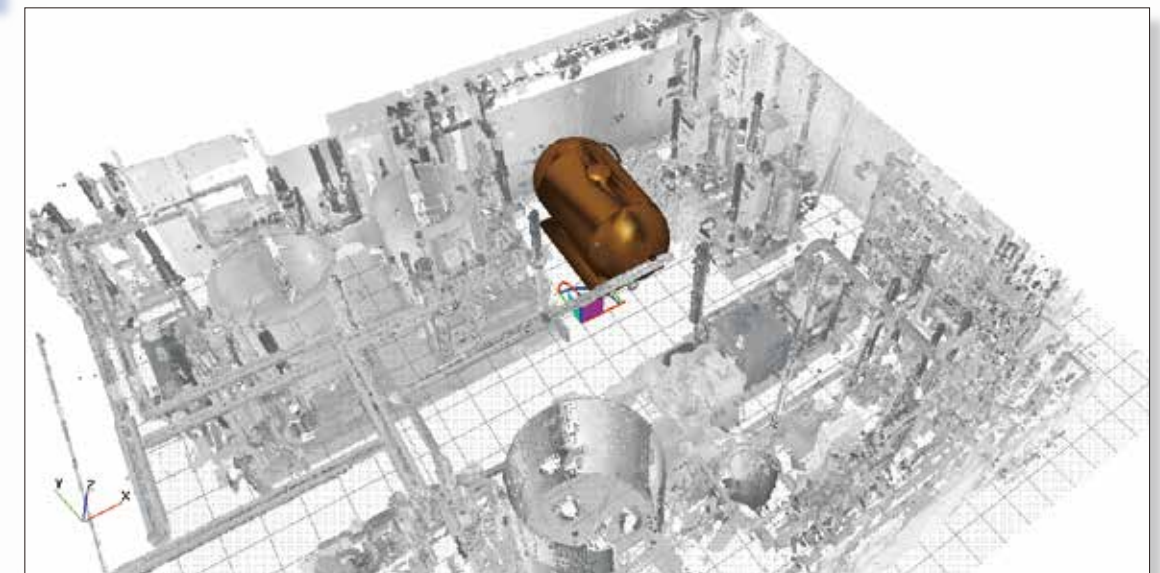
Before 2D layout has been changed



After 2D layout has been changed

### CAD Layout function

This function allows for design CADs to be laid out freely in the point clouds, by reading external CAD data. Designs can be created using actual data, such as layout examinations on site, actual placement and etc.



### Video creation

This function allows you to output a video file (AVI) of a walk-through or interference check.



Modeling used to create shape data from the point cloud data is the most attractive function of the point cloud processing software. For use in modeling plants we developed a function for use in creating CAD data on the major shapes (pipes, steel materials, and planes). The modeling function can be used to acquire shape data based on the actual object.

Piping CAD creation semi-automatic

This function allows for the creation of CAD data on pipes from point clouds. It searches for a standard shape from the library that conforms to the point cloud, and then creates the appropriate standard shape. In addition, new standard shapes can be registered through editing the library.



Point cloud data on pipes in a plant



3D CAD model of pipes

Isometric Drawing creation

This function allows for the creation and output of isometric drawings based on the created piping CAD. All piping CAD models of Galaxy-Eye are controlled by the center line. Numerous convenient functions tied to analytical data are provided, such as setting the support position, automatic dimension output and etc. to the center line.

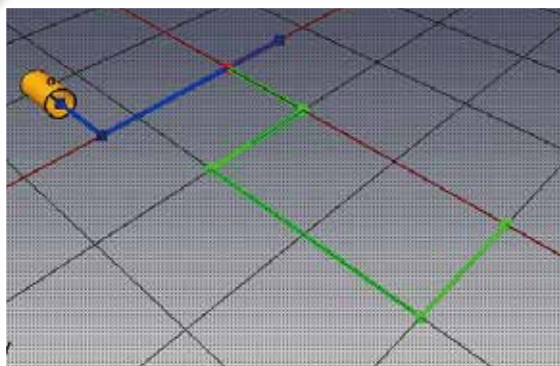


The isometric drawing function provides various functions, such as support creation, constraint condition settings, ID settings, automatic dimensional drawing creation between IDs and between supports, and a drawing function.

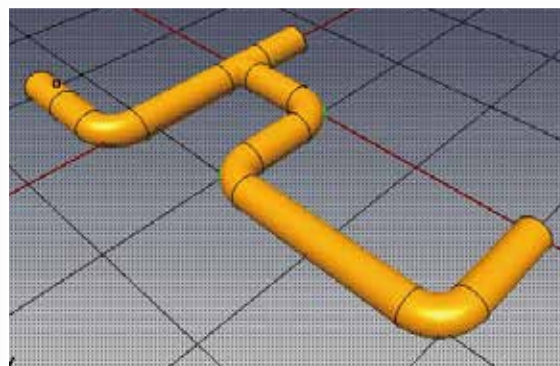
名称	単位	単位	単位
寸法	mm	mm	mm
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Piping CAD free creation

This function allows for the free creation of CAD data on pipes in space using CAD data on a given pipe. It creates the data without point clouds and thus complements sections from which measurement data has been successfully acquired.



A pipeline is created in space using CAD data on a pipe.



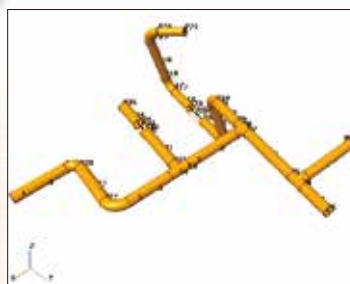
CAD data on a pipe is created from the pipeline. Tees, elbows, or other piping components are automatically created at branches and bends.

Piping CAD creation fully-automatic

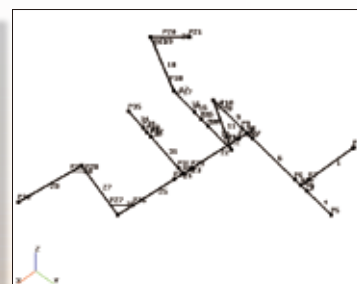
This function provides for fully-automatic processing of the creation of CAD data on pipes and planes. Parallel processing allows CAD data on large-scale point cloud data to be created in a very short time.

Piping CAD creation data table

Galaxy-Eye is not only for the modeling of shape data from point cloud data, but also allows for entry of data as table data. This function expands the range of applications, such as entry from design dimensions, examination of new designs and etc.



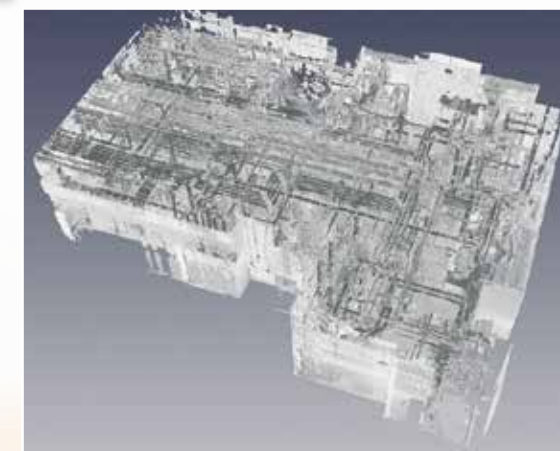
CAD view



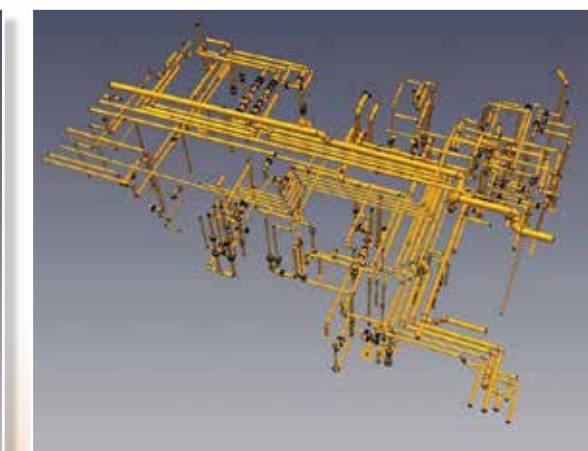
Isometric view



Table data



Before automatic CAD data creation

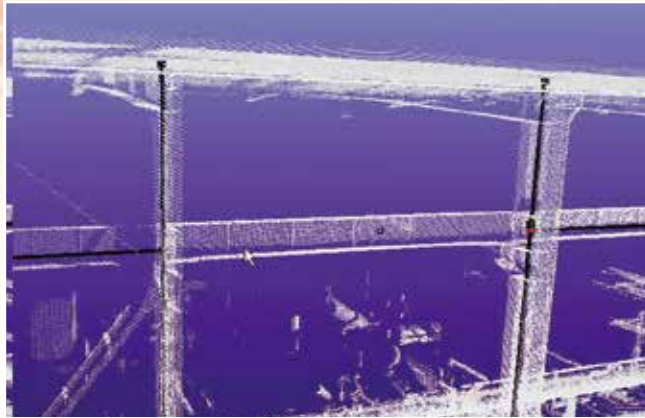


After automatic CAD data creation

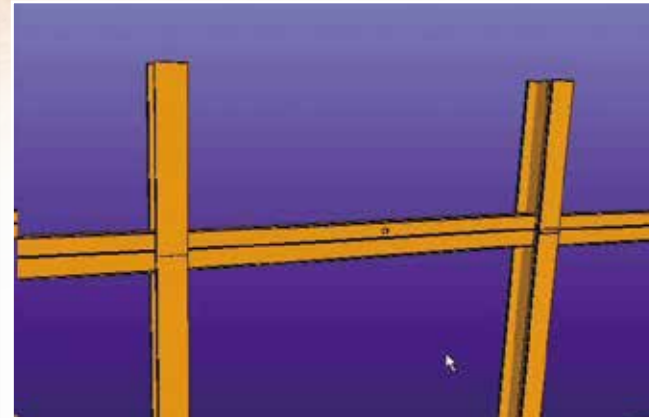


### Steel materials CAD creation

This function allows for the creation of CAD data on standard steel materials like angle and H-steel. Specify the steel material to be created from the library and use the CAD data on the steel material to compare it with the point cloud. New standard shapes can be registered through editing the library.



Point cloud data on steel materials in a plant



3D CAD model of steel materials

### Duct CAD creation

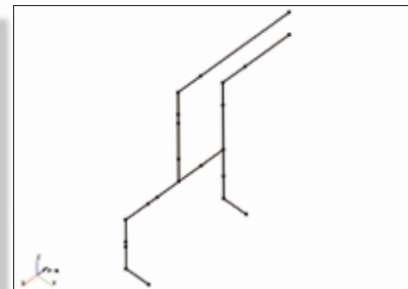
The duct creation function is for creating ducts by entering table data. Sectional shapes, constraint positions and etc. can be set freely, and also allows for displaying by center line, and creation of isometric drawings.

番号	種別	寸法	位置	方向	材料	注
1	FD	φ100	0	0	ステンレス	
2	FD	φ100	0	0	ステンレス	
3	FD	φ100	0	0	ステンレス	
4	FD	φ100	0	0	ステンレス	
5	FD	φ100	0	0	ステンレス	
6	FD	φ100	0	0	ステンレス	
7	FD	φ100	0	0	ステンレス	
8	FD	φ100	0	0	ステンレス	
9	FD	φ100	0	0	ステンレス	
10	FD	φ100	0	0	ステンレス	

Table data



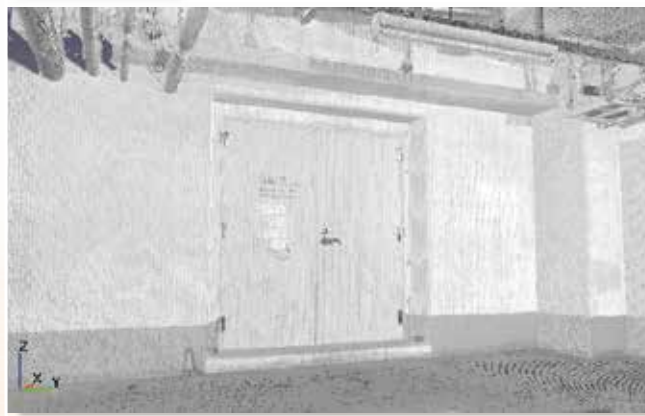
Duct Model



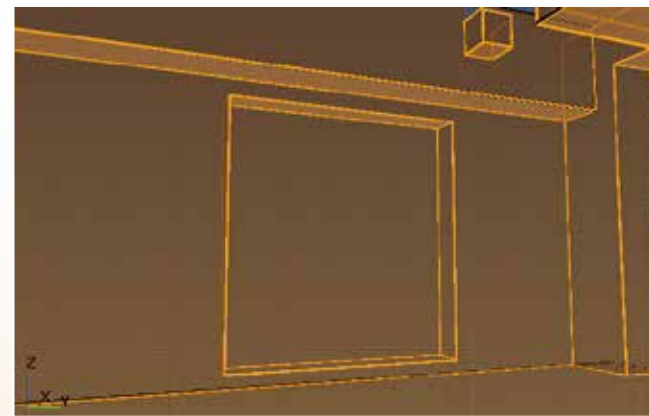
Centerline view

### Plane CAD creation

This function creates CAD data on planar sections like the floors and walls of buildings. It creates a planar shape that fits with the point cloud specified with the mouse.



Point cloud data on a wall in a plant



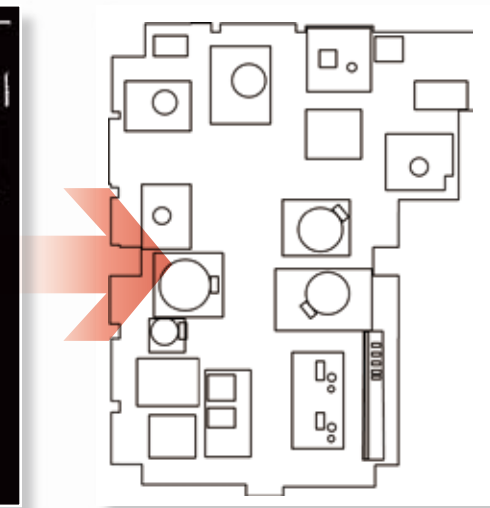
3D CAD model of a wall

### Floor plan creation

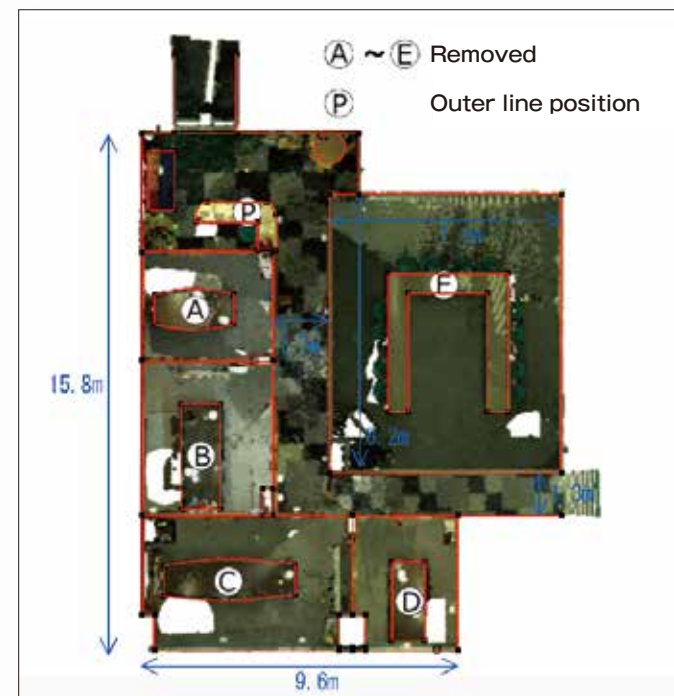
This function is for creating 2D drawings by tracing straight lines and curves on the point cloud data. Since the 2D data of a wall or equipment position can be easily created based on the measured point cloud data, it can be utilized for understanding the site conditions and the materials for planning.



measurement data



2D data



2D drawing



Example of symbols

Using symbols enables the creation of materials with more information. A printing function according to the scale is also available, which allows for allotment printing of multiple sheets.

### CAD output



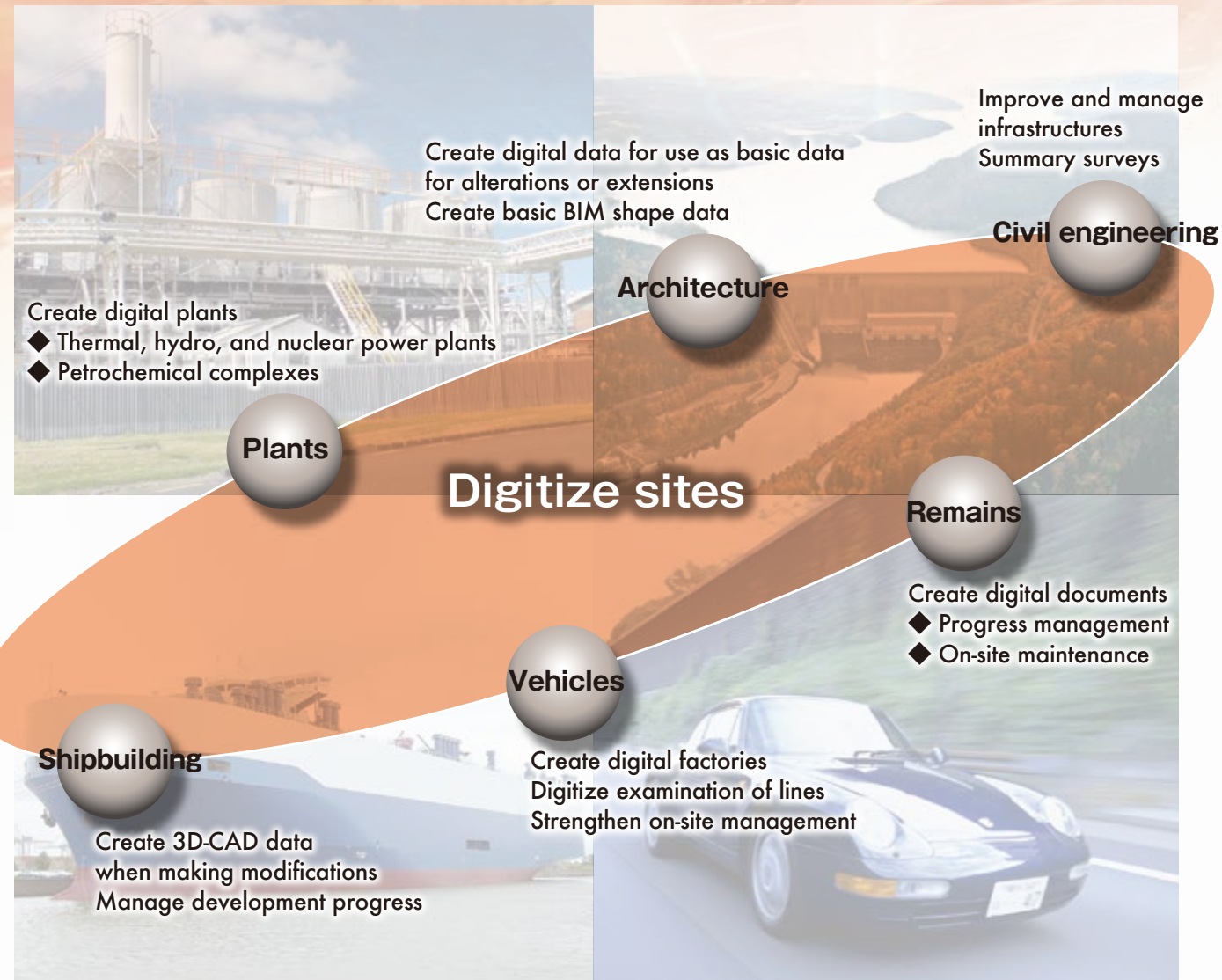
Outputs created 3D models in various formats

### CAD output function

Galaxy-Eye can output 3D models in the following formats:

File format	Description
DXF	Compatible with various types of CAD software, including Auto CAD®
DGN	Format to retain CAD data for MicroStation®
IGES	Intermediate file format used for data exchange between different types of CAD software
STL	General-purpose file format that represents 3D shapes with triangles





**Constructions** **Digitalization of structures**

This function allows for the creation of basic shape data of BIM conforming to a structure, by modeling a site based on 3D laser measurement data. Secular changes and the status of construction in progress can also be accurately understood by periodically acquiring measurement data and managing the history.

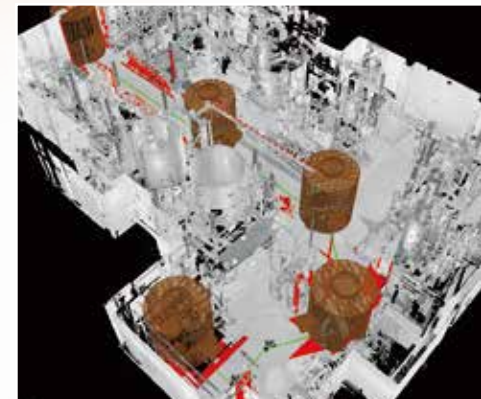


building, road

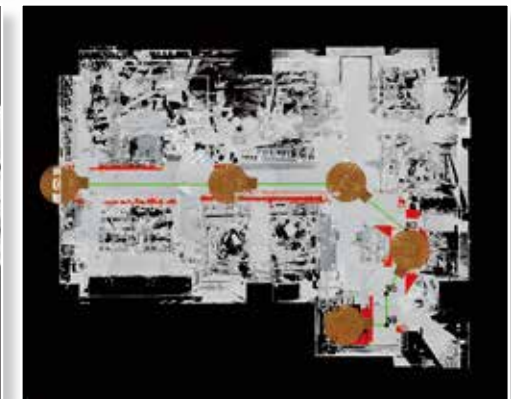


under a girder bridge

Plants



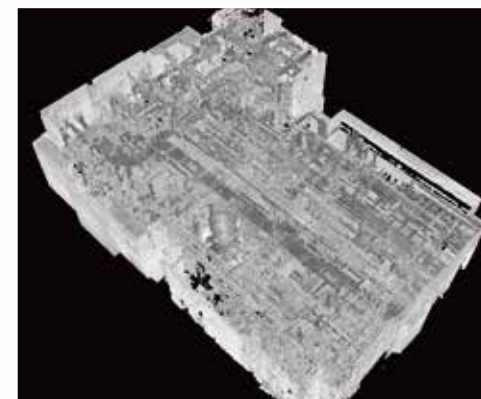
3D examination of the route used to move equipment



2D examination of the route used to move equipment

**Examine routes used to move the equipment**

The software enables examination of routes used to move cumbersome equipment into sites or remove existing equipment from sites. The use of point clouds to examine the route can reduce the necessary man-hours to create CAD data on the equipment, which was far longer with the conventional system. The CAD software detects any interference of individual members, and the point cloud detects only collisions, thus enabling the route to be examined in greater detail.



Point cloud data of a plant



3D-CAD data created from the point cloud

**3D modeling of a plant**

The software allows timely creation of 3D-CAD data acquired from 3D laser measurement data for renovating plants that are yet to have had up-to-date drawings prepared. The automatic function of Galaxy-Eye that creates pipes or planes can reduce modeling man-hours down to 1/10 or less when compared to conventional software.

Vehicles



Acquisition of main dimensions



Acquisition of interior dimensions

**Measure product dimensions and examine interior layout**

The software facilitates the extraction of any dimensions by simultaneously measuring both exterior and interior dimensions. In addition, examining the layout using point clouds allows for desktop examination of the interior layout via the use of CAD data and without altering the actual vehicle.