COMPANY

Chahoo

LOCATION

25, Pangyo-ro 256beon-gil, Bundang-gu, Seongnam-si, Gyeonggi-do, KOREA

SOFTWARE

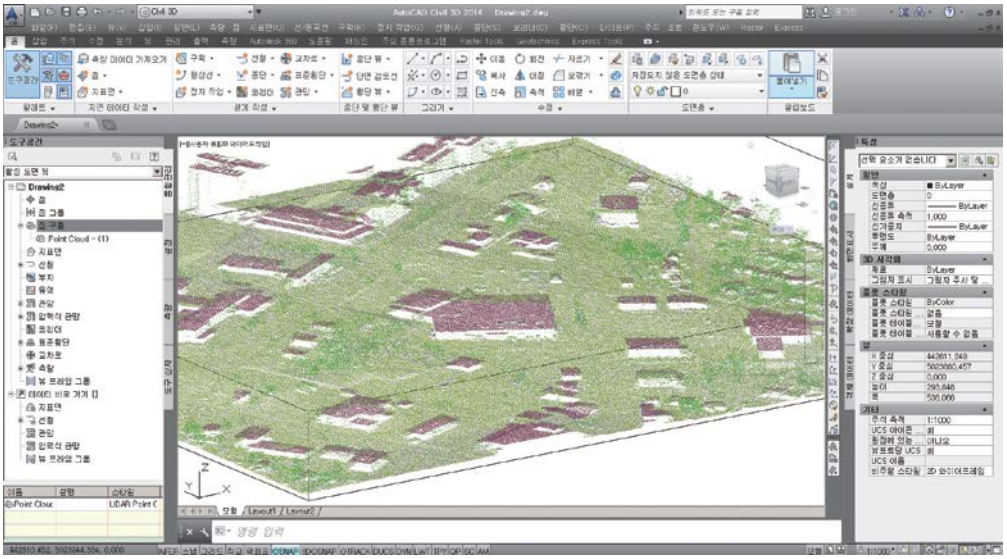
Autodesk® AutoCAD® Infrastructure Design Suite
Autodesk® ReCap™
Autodesk® Plant Design Suite

3D scan data–based plant reverse engineering automation project

Autodesk Suites implement automation for factory site and interior modeling

Autodesk Recap was used to create point data from turning 3D scans into data suited for reverse engineering. We built up the topology using scanned geographic data in AutoCAD Civil 3D. At the planning stage, Autodesk Infraworks was used to implement many different design proposals used to help team members shape the final design. BIM data was built using 3D scan data, which enabled us to streamline visualization through process management and create the data we needed to examine whether BIM data was capable of standing up to the rigors of real-world conditions.

— **Jeong Taekseon**
R&D Team Manager
Chahoo



Scanned data in AutoCAD Civil 3D. Image courtesy of Chahoo

Company

Established in 2008, Chahoo aims to become the IT convergence company that leads convergence between green, smart technology and livelihood infrastructure. Chahoo remains firmly committed to developing IT convergence technologies that include smart facility management systems, IT security/control systems, emergency safety management systems, energy-saving solutions, and intelligent image recognition solutions.

Chahoo works to continually strengthen its core competence through ongoing investment in research and development to discover new business opportunities involving convergence between IT and other industries. Moreover, Chahoo continues to expand the team of research workers and enhance our technological prowess through securing additional patents and certifications.

Such efforts have enabled Chahoo to diversify business fields into smartphone-based underground facilities management systems and 3D reverse engineering. Hence, the business has expanded from the infrastructure industry to the IT industry. Chahoo spares nothing in its efforts to discover promising businesses for a better future.

Chahoo has launched a project to develop a precise pipeline management system using 3D scans. This reverse engineering automation project is for time-worn plants and/or plants without design data. Chahoo used Autodesk® ReCap™, Autodesk® InfraWorks™, and Autodesk® AutoCAD® Civil 3D® software with interior/exterior 3D data, including scanned geographic data. Autodesk® AutoCAD® Plant 3D software is particularly suited to creating a wide library of CAD data.

"We used Autodesk ReCap to create point data from turning 3D scans into data suited for reverse engineering, and we built up the topology using scanned geographic data in AutoCAD Civil 3D," says Jeong Taekseon, R&D Team Manager at Chahoo. "At the planning stage, Autodesk Infraworks helped to implement many different design proposals, making it easier for team members to shape the final design. We used BIM processes to build 3D scan data, which enabled us to streamline visualization through process management and to examine whether this 3D data was capable of standing up to the rigors of real-world conditions."

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The challenge

3D scanning-based plant reverse engineering automation project

The project goal is to provide a precise measurement solution for pipes installed at the plant, enabling more efficient and stable management using 3D drawings alongside maintenance software. The project calls for adopting 3D plant reverse engineering using visualized data—rather than the old 2D drawing-based reverse engineering—so team members can analyze and re-create designs using data from facilities in-operation. There are typically many differences between design drawings and actual plant conditions due to frequent design modifications, relocation of equipment, and the installation of additional equipment. For this reason, it is difficult to reflect the as-built conditions of the plant in reverse engineering based on 2D drawings.

The 3D plant reverse engineering approach, by contrast, is capable of extracting on-site coordinates from accurate, high-precision real-world data obtained through 3D scans. The challenge was to automate 3D modeling of that bulk data. Meanwhile, the surrounding topology of the plant was implemented in such a way as to embody the actual conditions through BIM model-based reverse engineering using the accurate data from the 3D scans. Chahoo then used the exact coordinates extracted from the point data to create geographical data and combined them into a single file for further revamping and rebuilding projects.

The solution

Autodesk Infrastructure Design features address multiple challenges

Chahoo looked into several solutions capable of processing scan data. It was during this research phase that they learned about Autodesk ReCap, which is included in Autodesk Infrastructure Design Suite 2014. The experience of a free trial of the software confirmed that it would be the best choice for the project, and hence Chahoo adopted it. With the help of Autodesk Infrastructure Design Suite, Chahoo was able to address all the challenges faced during the factory site review and 3D reverse engineering project. The challenge at the planning state was how to complete the modeling of the facilities placed on the factory site and carry out revamping and rebuilding tailored to the actual location demands of the facilities. Chahoo used Civil 3D surface modeling to obtain 3D point data, and then used this as-built data to combine the terrain inside and outside the plant.

Optimization with AutoCAD ReCap helped the team facilitate the modeling process. The team used Autodesk® AutoCAD® Plant 3D SpecEditor software, which is included in Autodesk Plant Design, to place piping geometry depicted in the 3D model of the plant interior (created with Autodesk Infrastructure Design Suite) into the library.

Collaboration

Chahoo ran a simulation of the modified design using AutoCAD Civil 3D, Infraworks, and ReCap (all included in Autodesk Infrastructure Design Suite), and implemented piping geography using AutoCAD Plant 3D. As Autodesk solutions are compatible with each other, Chahoo was able to accomplish all the tasks that ordinarily cannot be handled with a single program.

The result

Expand the scope of 3D reverse engineering automation and discovering new businesses

Autodesk Infrastructure Design Suite and Autodesk Plant Design Suite have made great contributions to the development of 3D scanning-based plant modeling automation systems. With the intuitive GUI and the all-encompassing range of features provided by the Suites, Chahoo was able to better streamline the entire project process, from importing the 3D point cloud data to creating the 3D model and library configuration. Chahoo is now set to further improve 3D reverse engineering automation systems with the help of comprehensive Autodesk Suite solutions like Autodesk Infraworks, AutoCAD Civil 3D, and Autodesk Plant Design Suite.

"We plan to implement such solutions across the scope of our work from communication,

The greatest thing about Autodesk Infrastructure Design Suite is that it is a total solution applicable to all areas of construction and civil engineering. As Autodesk Infrastructure Design Suite offers efficiency and versatility across so many areas, it can import data from many different sources. It offers an easy-to-use interface with customizable GUI that improves work productivity.

With automated modeling of bulk 3D scan mesh data, we were able to achieve modeling time savings of up to 50%, and the whole process time was reduced by as much as 70%. The shortened project timescale resulted in reduced personnel expenses.

— **Jeong Taekseon**
R&D Team Manager
Chahoo

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Chahoo improves project–communication, terrain design, and review through interior design and specification

terrain design, and review through interior design and specification," says Taekseon. "Moreover, we will ramp up our adoption of collaboration solutions like Autodesk® Navisworks® software (included in Autodesk Infrastructure Design Suite) to take the completed 3D scanning-based plant reverse engineering system to a whole new level." Chahoo now expects to use Autodesk Infrastructure Design Suite and Autodesk Plant Design Suite for 3D model–based safety simulation and maintenance work as well as looking into using 3D scanning for their underground utilities management system.

A number of upcoming projects are similar to this 3D reverse engineering project. Chahoo now plans to expand the scope of work into construction BIM areas, including housing complexes, landscaping, water resources, and drainage systems. With the know-how acquired through this project, Chahoo expects to win orders not only in Korea, but also internationally, including in China, Vietnam, Japan, and Indonesia. "To ensure international competitiveness and achieve global success," says Taekseon, "Chahoo is adopting Autodesk® solutions such as Autodesk Infrastructure Design Suite, Autodesk Plant Design Suite, and Autodesk® Building Design Suite to help us cater to the needs of diverse industry fields. Doing so will power our growth as a leader in the field of IT convergence, enabling Chahoo to respond quickly to changing times."

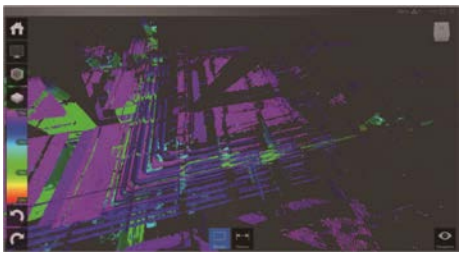

Image courtesy of Chahoo

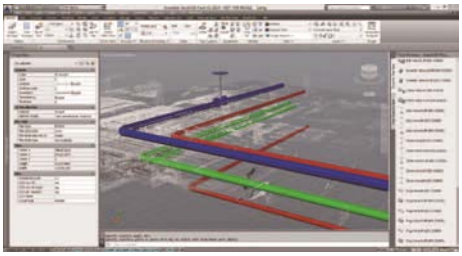

Image courtesy of Chahoo

We plan to implement such solutions across the scope of our work from communication, terrain design, and review through interior design and specification. Moreover, we will ramp up our adoption of collaboration solutions like Autodesk® Navisworks® software (included in Autodesk Infrastructure Design Suite) to take the completed 3D scanning-based plant reverse engineering system to a whole new level.

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