CORE CONCEPT TECHNOLOGIES INC.

News Release

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Core Concept Technologies Inc.

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Cooperation in Development of "TERNO," an App for Supporting the Management and Cross-checking of Drawings for Infrastructure Design with AI Release of a Free Trial Version Today

Core Concept Technologies Inc. (headquartered in Toshima City, Tokyo; Representative Director, President and CEO: Takeshi Kaneko; hereinafter referred to as "our Company") has cooperated with Yachiyo Engineering Co., Ltd. (headquartered in Taito City, Tokyo; Representative Director, President and Executive Officer: Tsutomu Takahashi; hereinafter referred to as "Yachiyo Engineering") in the development of "TERNO," an AI-based cloud app linked with Box.

"TERNO" is a cloud app that automates the management of drawings, which has been manually dealt with by design engineers, and identifies correction parts by utilizing the AI-based difference extraction function.

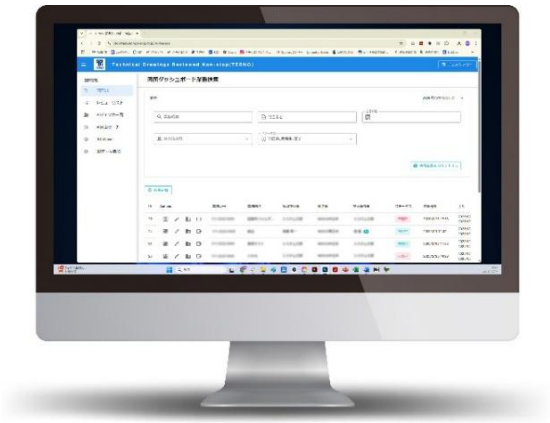
This app would streamline business operations, by preventing design errors, improving the quality of drawings, and shortening working hours.

Today, we started offering the free trial version of "TERNO" with limited functions.

Our Company will continue to cooperate with Yachiyo Engineering for the official release of this app, by supporting the improvement in productivity of design work.

Click here to inquire about or apply for the free trial version.
https://www.cct-inc.co.jp/contact/

TERNO
Personal AI Assistant



1. Background of development

In the design of infrastructure, including dams, roads, and bridges, the number of corrections and improvements increases according to facility scale. Several tens of design drawings are used per facility, and including previous versions, it is not rare that several hundreds or thousands of design drawings are used. An enormous number of such drawings have been manually handled by design engineers so far, organizing them into folders and so on. Correction checks and cross-checks with drawings on paper sheets and PDF files have been conducted by the naked eye, so there has been a risk of quality degradation due to correction errors. Since 2016, "double-checking for errors and mark the correct sections" has been mandatory in the cross-checking process, and it is now common to submit a list of items that have been pointed out and correction records.

Accordingly, the workloads of design and cross-check engineers have augmented further.

In addition, there are social issues, such as the improvement of long working hours and the shortage of manpower in the civil engineering field, and it is imperative to improve the productivity of design work.

Under these circumstances, our Company cooperated in the development of "TERNO," an app based on AI and cloud technologies, in order to support the reform of workstyles of design engineers and the streamlining of business operations.

Comparison of functions between TERNO and competitors' products

	TERNO	Company A	Company B	Company C
Edition management	○ ◆ It is possible to display data with a tree chart. ◆ It is possible to cross-check data with the difference extraction function.	○ ◆ It is possible to display data with a tree chart.	△ ◆ The edition management function is an additional option. ◆ Drawings are not displayed with a tree chart, but just listed. The linkage with BOX is an additional option.	— ◆ With no functions
Difference extraction	◎ ◆ Differences are highlighted with frames. ◆ It is possible to output files of results. ◆ High extraction speed ◆ Bar arrangement drawings can be retrieved with high-precision AI.	○ ◆ Differences are highlighted with frames. ◆ It is possible to output files of results. ◆ High extraction speed	○ ◆ Superimposition with two-colored lines (can be finetuned by users) ◆ High extraction speed (with AI)	△ ◆ Low precision with respect to complex drawings, such as bar arrangement drawings ◆ Low extraction speed
Search for similar drawings	◎ ◆ Search based on data learned by AI (Search targets can be specified freely.)	— ◆ With no functions	○ ◆ With the function to retrieve similar drawings (only data in the app)	— ◆ With no functions
Data management method	○ ◆ Unified management with BOX is possible. (No data stored in the web)	△ ◆ Data of drawings are stored in the web. ◆ The linkage with BOX is an additional option.	○ ◆ Automatic import from a file server is possible.	○ ◆ It is possible to see files inside BOX.
Drawings and related data	◎ ◆ DWG data can be automatically produced in a PDF format. ◆ Compatible with PDF, Docuworks, and DWG formats	○ ◆ DWG data can be automatically produced in a PDF format. (required option)	△ ◆ The thumbnails of PDF files can be displayed.	— ◆ With no functions

■To manage drawings and visualize the management

- **Edition management dashboard**

"TERNO" is equipped with a function to systematically manage the drawing files stored in Box.

As a major feature, files with the same name are automatically sorted as the same files regardless of format (PDF, Docuworks, or DWG).

The edition management dashboard displays the list of the following information:

・Number of times of update of each file

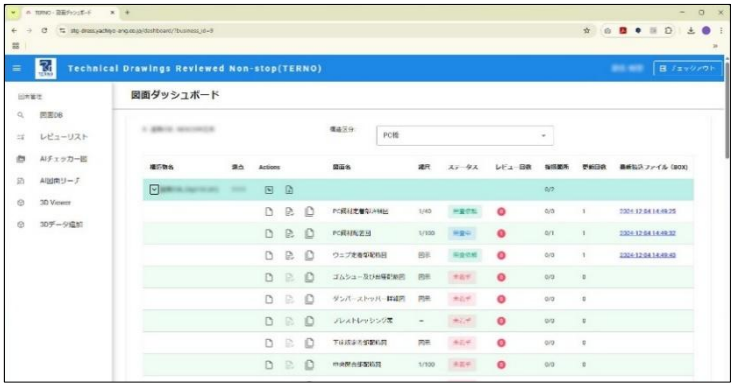
・Status (untouched, cross-check requested, being cross-checked, being handled, or completed)

・Parts pointed out (the number of such parts and the number of parts dealt with)

・Number of times of review

With these functions, design engineers can access the latest drawings anytime, and grasp the current status and items to deal with in one glance. "TERNO" prevents workers from overlooking some tasks and supports

swift and accurate design work.



Edition management dashboard

■AI-assisted function

- **AI-based difference extraction function**

The “AI-based difference extraction function,” which can be utilized for correcting and cross-checking drawings, supports the improvement in quality and streamlining of design work.

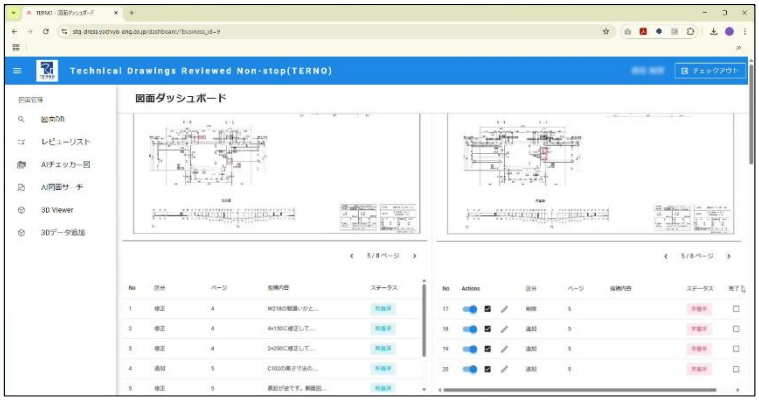
If you open drawings in “TERNO” and register corrections and cross-checks, including the double-checking with red and yellow pens, the information will be stored in the edition management dashboard as pointed-out items. When corrected drawings are uploaded, AI will automatically extract differences and identify the following items.

・Registered corrections and cross-checks
・Parts that have been changed unintentionally
・Parts additionally corrected by design engineers

The extracted differences can be checked visually with the drawings before and after corrections, and compared with comments at the time of registration. This function helps prevent errors in correction and confirmation.

In addition, it is possible to perform a batch output of the correction record for each structure in an Excel format, so it is possible to produce a list of cross-checks, which has been produced manually, by a single click.

The AI-based drawing analysis technology included in this function can be used for drawings with complex lines, such as detailed bar arrangement drawings of a bridge, which are difficult to handle with conventional difference extraction tools.



AI-based difference extraction function

- **AI-based drawing retrieval function**

To refer to past cases at the time of design, it was necessary to retrieve files one by one from an enormous number of drawings.

AI learns two-dimensional drawings registered in “TERNO” by digitalizing the number, thickness, and direction of lines in drawings, so that you can retrieve similar drawings with this function. It will reduce labor and time to search for files and check data one by one, make it easier to access past cases and similar drawings, and improve the quality of design.

■Other solutions

- **3D Viewer**

Normally, it is necessary to boot dedicated software to check 3D data, such as BIM/CIM, which are necessary for design, but the files of point cloud data and 3D models have become heavy, and it takes time to boot the software.

By optimizing rendering with LOD*, “TERNO” has made it possible to browse and handle data smoothly on a browser regardless of PC specs. It is also equipped with functions to measure distance, add footnotes, and so on for the designing process.

*LOD (Level of Detail): A method of reducing calculation loads by controlling the precision of drawing according to the distance from the viewer

<Functions restricted in the free trial version>

- The edition management dashboard can handle files in PDF, Docuworks, and DWG formats, but the free trial version can handle files in a PDF format only.
- The AI-based difference check and the AI-based drawings search can be used for a PDF format only, and cannot be used for a Docuworks or DWG format.
- The review list and the list of drawings can only be browsed, and cannot be output.
- With the 3D viewer, it is possible to browse prepared sample data only.

3. Effects of installation of TERNO

It was confirmed that TERNO decreased working hours by about 30%. Mainly, it is possible to simplify the management of drawings, correction and cross-check processes.

*Calculated from working hours for handling 20 drawings (surveyed by Yachiyo Engineering)

※Calculated from 20 drawings

	So far	After the installation of TERNO
01 Check of design content	• Clarification of the list of structures 10 min.	• Clarification of the list of structures 10 min.
02 Preparation	• Preparation of folders 4 min.	• Task registration • Registration of structures for design 30 min.
03 Check of design drawings	• Check and printing of data (multiple sheets) 10 min.	• To store drawings, such as DWG, in a database (automatic sorting and automatic production of PDF files) 5 min.
04 Correction and cross-check of drawings	A total of 67 min.	A total of 48 min.
	Correction/cross-check (1) Double-checking with red and yellow pens (1) • To fill in correction instructions • To send corrections by email or the like 31 min.	Correction/cross-check (1) Double-checking with red and yellow pens (1) • To input correction instructions • Automatic production of a review list 25 min.
	▼ Correction → Printing of corrected drawings	▼ Correction → To store corrected drawings in a database (automatic sorting and automatic production of PDF files)
	Correction/cross-check (2) Double-checking with red and yellow pens (2) • To check corrected parts • To fill in additional correction instructions • To send corrections by email or the like 31 min.	Correction/cross-check (2) Double-checking with red and yellow pens (2) • AI-based difference check • To input additional correction instructions • Automatic production of a review list 20 min.
	▼ Correction → Printing of corrected drawings	▼ Correction →To store corrected drawings in a database (automatic sorting and automatic production of PDF files)
	Correction/cross-check (3) Checking with a blue pen • To check corrected parts 5 min.	Correction/cross-check (3) Checking with a blue pen • AI-based difference check 3 min.
05 Conversion of drawings into PDF files/ final check of drawings	8 min.	4 min.
06 Production of design	• To identify and organize the drawings of structures for delivery • Production and printing of the list of drawings • Printing of drawings for delivery 71 min.	• To check the drawings of structures for delivery (in a database) • Printing of the list of drawings (automatically produced) • Printing of drawings 26 min.
07 Production of the list of cross-checks	• Production of the list of cross-checks (past corrections and cross-checks) • Printing of the list of cross-checks 101 min.	• To check correction and cross-check records with the review list (automatic production of the list of cross-checks) • Printing of the list of cross-checks 63 min.

Required time

- Check of design content
- Preparation/check of design drawings
- Correction and cross-check of drawings/conversion of drawings into PDF files/final check of drawings
- Production of design
- Production of the list of cross-checks



4. Overview of Yachiyo Engineering

Yachiyo Engineering

For over 60 years since its establishment, Yachiyo Engineering has been offering technical consulting services regarding social infrastructure and environmental conservation in civil engineering projects entrusted by the public sector, including the Ministry of Land, Infrastructure, Transport and Tourism, as a top-class general construction consulting company in Japan. Recently, it has provided private enterprises with its technical know-how accumulated so far, broadening its business domain.

Corporate name:	Yachiyo Engineering Co., Ltd.
Location:	CS Tower, 5-20-8 Asakusabashi, Taito City, Tokyo
Representative:	Tsutomu Takahashi, Representative Director, President and Executive Officer
Capital stock:	450 million yen

For inquiries about this release

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