Utility Network Design and Data Management: Autodesk Utility Design and Autodesk Topobase

Combining Autodesk® Utility Design and Autodesk® Topobase™ software applications enables utility organizations to harness best-in-class platforms for utility network design and data management.
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Utility Network Design and Data Management: Combining Utility Design and Topobase

Introduction: Flow of information in Utility Departments

Typical utilities consist of several departments that have responsibilities related to various aspects of the utility’s business. These departments are all participants in the flow of information that starts from design through to construction and the maintenance and operations of network infrastructure.

- **Systems Engineering**—Process new engineering service requests from site developers and their engineering and architectural contractors for new residential and commercial building projects
- **Design/Planning/Estimate**—Process and deliver information regarding electric and gas usage to support planning for new distribution systems
- **Construction**—Support work order requests for inspections at new construction and rehabilitation of existing systems
- **Mapping and Records**—Maintain the records database that feeds into the asset management systems and provides information to maintenance and operations
- **Maintenance and Operations**—Repair and build service infrastructure
- **Customer Service**—Manage information from enterprise customer information and financial data applications to support customer service inquiries
- **External Contractors/Consultants**—May provide design drawings and require data for planning, design, maintenance, and repair of facilities
Network Infrastructure Design and Data Management - Using the Autodesk Geospatial Solution

Autodesk Geospatial Solutions are built on AutoCAD®, AutoCAD® Map 3D on the desktop, Autodesk MapGuide® Enterprise on the web which shares a common open sourced data interface, Feature Data Objects (FDO), and native use of the DWG file format. DWG™ plays an important role in the flow of information from design to build to records with design accuracy and intent maintained through these processes.

Because Autodesk® Topobase™ software is built on AutoCAD and is using the Oracle® database, the computer-aided design (CAD) information created by designers and planners can be maintained in a relational database that can serve as the database of reference for network data to asset management systems, operations and maintenance systems and other business systems in an efficient manner, retaining both design accuracy and the intent of the designers.

- **Analyze/Plan**—the geospatial capability built into the solution also enables organizations to use common geospatial functionality directly with existing network and business data to visualize information using desktop and web platforms for planning and analysis.

- **Design**—Autodesk® Utility Design is built on AutoCAD Map 3D to quickly enable designers to produce network designs.

- **Build**—The Autodesk collaborative project management solutions provide a content-sharing portal that streamlines the flow of design documentation and feedback during the construction phase.

- **Records**—Autodesk Topobase manages existing network data and proposed versions of designs. Topobase enables asset management to reference the design intent and accuracy of the data stored within a centralized Oracle database environment.

- **Operate/Maintain**—With DWF™-based map books and web-based mapping technology using Autodesk MapGuide Enterprise and Topobase Web applications, operations can get enhanced views of asset information, improving efficiency and responses.
Autodesk Utility Design—an Intelligent, Rule-Based CAD Design Tool

Built on AutoCAD® Map 3D, Autodesk® Utility Design software provides design tools with true rules-based automation. As a result, gas and electric work orders can be completed faster, more easily, and more accurately. Autodesk Utility Design enables designers and planners to quickly generate finished construction work orders for both gas and electric systems that include layouts, engineering data, bills of materials (BOMs), design scenarios, and estimated costs.

To accurately plan and design new networks, designers often need to have access to existing network information that resides in the mapping and records database. Using Autodesk® Topobase™ Client software, the records team responsible for the quality of the data in the asset database can extract as-built data into DWG™ files that can then be sent to external contractors and stand-alone designers and planners who work on the designs while disconnected from the Topobase database. With the use of Topobase Client, designers and planners can work while connected to the database, retrieving existing network information and using Autodesk Utility Design software’s powerful design tools to create network designs quickly and accurately.

![Diagram of Usage Scenario 1]

Figure 1 Usage Scenario 1
Usage Scenario 1

The following usage scenario illustrates one possible workflow between Topobase and Utility Design applications where Topobase contains existing network data which is used as reference in Utility Design:

- As a part of a new infrastructure building project, project areas have been identified.
- The records staff uses Topobase Client to extract these areas into DWG format files and sends them to the designers for section designs.
- Alternatively, the designer/planner can directly extract the information needed from Topobase and use that data with Autodesk Utility Design.
- The designer uses Autodesk Utility Design tool palettes to quickly create electric network assets in a standardized manner.
- The engineering design rules help ensure that the designs are validated at design time.
- The designers then use Autodesk Utility Design analysis tools to analyze voltage drop and sag calculations, and simulate what-if scenarios.
- Finally, using Autodesk Utility Design BOMs, designers can generate cost estimates as well as detailed AutoCAD work order sketches.

*Right:* Autodesk Utility Design has standardized engineering rules for design creation.

*Below: *Autodesk Utility Design has analysis tools to calculate voltage drops and flicker based on consumption.
Autodesk Topobase—the Infrastructure Data Management Solution

Autodesk® Topobase™ infrastructure design and management solutions integrate CAD design information with a relational database, providing organization-wide access to spatial information by engineering, GIS, operations, and business teams. Built on AutoCAD® Map 3D, Autodesk MapGuide®, and Oracle® software, Topobase is an open solution with utility-specific data models and workflows that helps team members see the big picture and make better decisions, manage infrastructure assets more efficiently, and enhance data quality.

The submitted designs created in Autodesk Utility Design are usually merged with the records database after they are constructed. There is value, however, in moving proposed designs into a versioned state in the database so that the data is available across the organization over the construction lifecycle. Designs can then be moved into the as-built or live state when construction is complete.

In addition, these versioned designs that reside in the database allow for better what-if analysis and multiple design scenarios, while becoming the database of reference for design data. As a result, team members can perform analysis on proposed networks as well as those that are already built. Design proposals received from Autodesk Utility Design can then be merged into a version of the Topobase asset management system and be maintained over the approval and construction lifecycle or be merged into the as-built database once construction is complete.

Usage Scenario 2

The following usage scenario illustrates another possible workflow between Autodesk Topobase and Autodesk Utility Design applications where design data from Utility Design is merged with Topobase:

- Using Topobase Client, the engineer opens the DWG file submissions and reviews the design. Since Topobase Client is built on AutoCAD Map 3D, which uses the DWG format as its native file format, the engineer sees the same data that the designers create.
- Using Topobase conversion tools, the engineer can selectively view and merge the data into an Oracle database.
- Doing so makes the design data available within an asset management system across the organization and to operations.
- If construction is ongoing, designs are stored in a “version” of the database pending completion, after which they can be moved to the live database.
UTILITY NETWORK DESIGN AND DATA MANAGEMENT: COMBINING UTILITY DESIGN AND TOPOBASE

**Figure ii Usage Scenario 2**

Left: The Create Features from Geometry command enables users to merge DWG entities from designs created in Autodesk Utility Design into an Oracle database.

Top: The Autodesk Topobase client is built on AutoCAD Map 3D, allowing the use of DWG natively across the information flow.
Customized Solutions and Integration

Autodesk Utility Design and Autodesk Topobase are built on powerful CAD and database software using industry-leading development tools and an open architecture that lends itself to customization and integration. In a scenario where certain tasks might benefit from automation, such as the direct submission of designs from Autodesk Utility Design into Autodesk Topobase, an integrated workflow can improve efficiency across the organization and can be purpose built for such situations.

The workflow scenarios described earlier are just two of several potential scenarios in a utility organization. Autodesk Utility Design and Autodesk Topobase are built using AutoCAD Map 3D can be extended to suit specific workflows and processes.

Summary

Using Autodesk Geospatial Solutions, organizations can use the industry’s leading design tools to create network asset design data.

The design information is created using tools that are built on the AutoCAD Map 3D platform using the DWG format. As a result, design information, accuracy, and design intent are seamlessly carried into the processes of building, operating, and maintaining utility assets.

With Autodesk Utility Design, organizations have a standardized engineering rules-based design platform for creating network assets.

With Autodesk Topobase, design information can be maintained in a centralized database, providing a database of reference for design data across the organization, enabling organizations to enhance cross-departmental efficiency and realize better return on investments.

Learn More

For more information about Autodesk Topobase software, visit www.autodesk.com/topobase.

For more information about Autodesk Utility Design software, visit www.autodesk.com/utilitydesign.

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