



Features and Benefits Overview

AutoCAD® Electrical 2004 is for anyone designing or laying out ladder-style control schematics or point-to-point wiring diagrams. If your design includes programmable logic controller (PLC) I/O, motor control, or discrete electrical control components, then AutoCAD Electrical can help you save time and improve drawing accuracy.

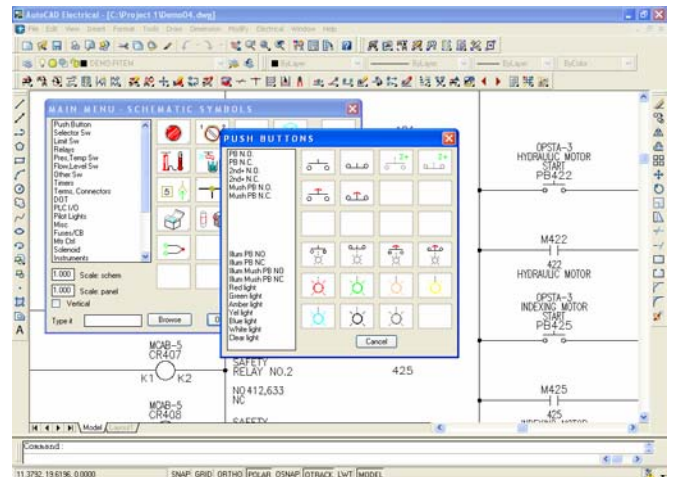
AutoCAD Electrical uses the AutoCAD® DWG file to store important project information and so does not require a proprietary database. As a result you can edit and manipulate AutoCAD Electrical drawings using standard AutoCAD software and maintain complete drawing compatibility with other AutoCAD users.

AutoCAD Electrical provides the following high-level benefits. For more detailed technical information, refer to the AutoCAD Electrical Technical Overview document. It can be found at www.autodesk.com/autocadelectrical.

Fast Control Schematic Generation

AutoCAD Electrical is an industry-specific version of the AutoCAD software application designed for an electrical engineer or designer who designs or documents industrial control systems. With AutoCAD Electrical, you can quickly design control schematic drawings. The intuitive menu system is easy to follow and understand.

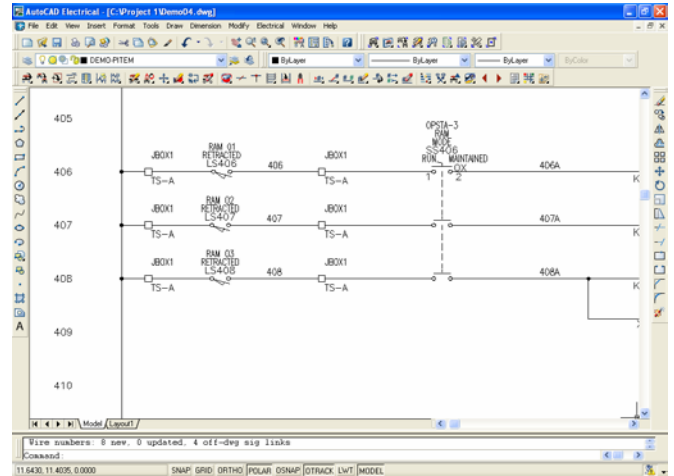
AutoCAD Electrical ships with a comprehensive set of JIC and IEC electrical symbols as well as a set of pneumatic symbols.



Automatic Wire Numbering and Component Tagging

AutoCAD Electrical automatically places sequential or reference-based numbers on all wires and components based on the configuration you choose. It also attaches a suffix to reference-based numbers and tags to ensure unique names (for example, 406, 406A, 406B).

This numbering convention is flexible enough to meet most design requirements. If AutoCAD Electrical determines that an inserted wire will interfere with another object, it searches for a clear spot to place the wire number and automatically draws a leader back to the wire, if necessary.

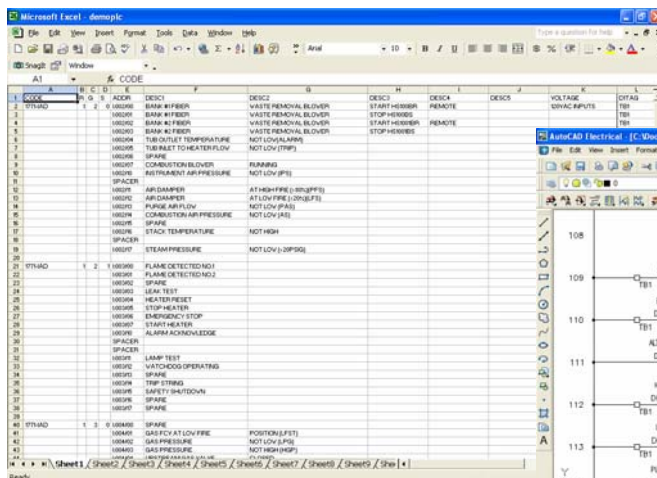


Automatic Creation of PLC I/O Drawings from Spreadsheets

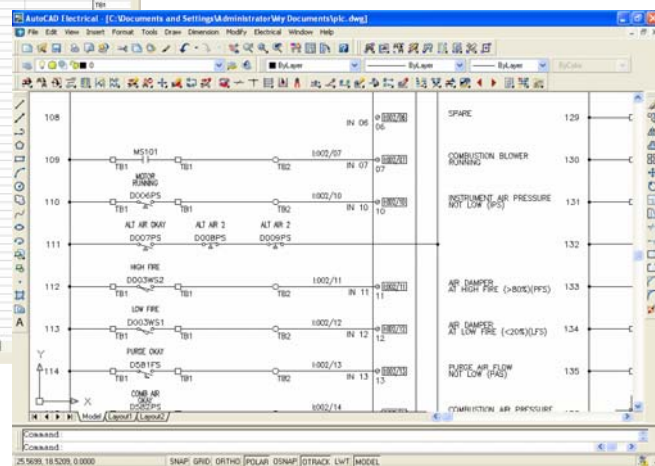
With AutoCAD Electrical, you can automatically generate a complete set of PLC I/O drawings by defining your project's I/O assignments using any spreadsheet program. Simply import your finished spreadsheet into AutoCAD Electrical. It draws the ladders per your drawing configuration, places the I/O modules, inserts the addresses and description text, and even drops in component and terminal symbols connected to each I/O point as defined in your spreadsheet.

As AutoCAD Electrical works its way through your spreadsheet, it creates new drawings as required to accommodate the inserted modules. If a module doesn't fit in a column, AutoCAD Electrical automatically breaks it at the bottom of the ladder and continues it at the top of the next ladder column or in the next drawing.

A few clicks can turn this...

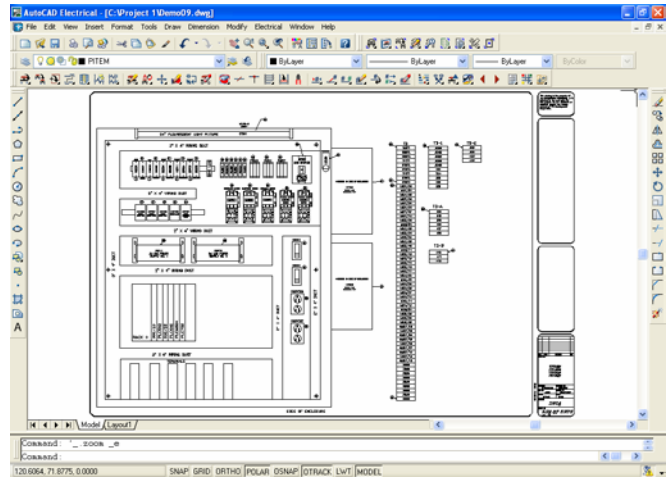


into this.



Smart Panel Layout Drawings

Once schematic creation is complete, AutoCAD Electrical extracts a list of schematic components for placement into panel layout drawings. All you have to do is select a device from this list and insert it. The footprint representation of each schematic device is inserted into the layout at your selection point. A link is established between the schematic and panel representations of a device so that changes to one prompt for permission to update the other. For example, when you change the tag ID of a schematic pilot light symbol, the software updates the equivalent panel representation of the pilot light. Items that do not exist on the schematic, such as wire duct and mounting hardware, can be added to the layout and automatically combined into a "smart" panel bill-of-materials report.

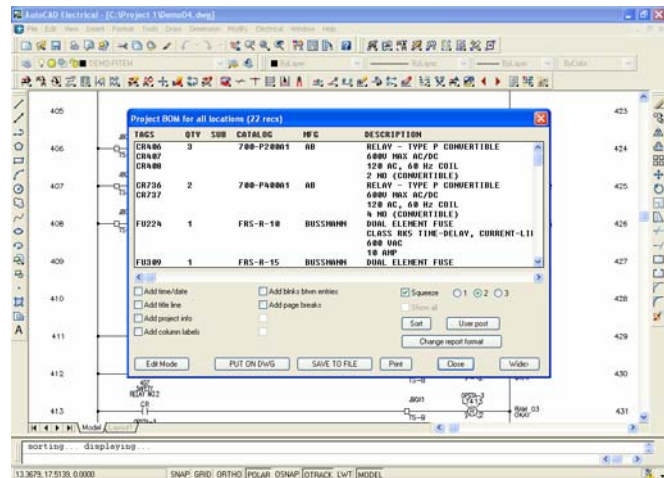


Automatic Reports

You can generate many different types of reports at any stage of the project, including

- Bill of materials (BOM) reports (tallied, purchase list format, or by tag ID)
- From/to wire reports
- Cable reports
- Terminal reports
- PLC I/O reports
- Component reports
- Connector plug/jack reports
- Various exception and design rules check reports

You can insert reports into a drawing as a table or save them directly to Microsoft® Excel, Microsoft® Access, XML, ASCII, or CSV format. You can also sort and customize reports to meet your specific needs.



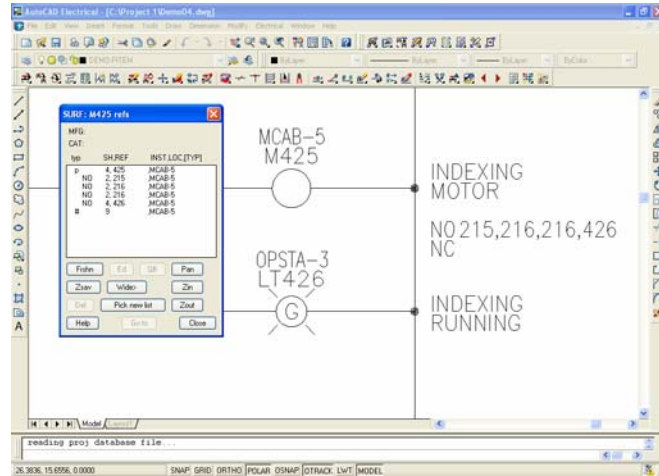
Reuse of Existing Drawings

When was the last time you started a design from a clean sheet of paper? Reusing drawings from another project is easy with AutoCAD Electrical. You simply incorporate a copy of that drawing into your new project, and AutoCAD Electrical takes care of the rest. Or, when you want to reuse an entire drawing set for your new design, you can use the Copy Project utility.

Simply running the Insert Wire Number command and the Retag Component command resequences the drawing into your project based on the configuration you have set up. You can also use the global Find/Replace/Edit command to substitute new values for component tags, descriptions, and catalog numbers or use the From/To Spreadsheet utility to export your project to a spreadsheet, edit it, and then import the new data into the drawing.

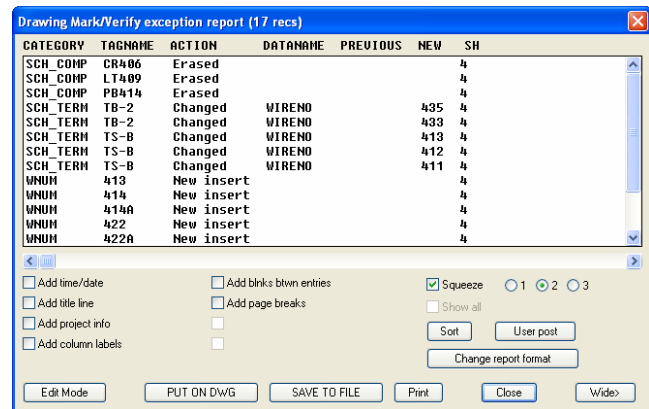
Real-Time Coil and Contact Cross-Referencing

How many times have you assigned too many contacts to a relay in your design? Did you catch it before the drawings reached the shop floor? With AutoCAD Electrical, you no longer have to keep track of your coils and contacts. AutoCAD Electrical sets up a parent/child relationship between the two and keeps track of how many contacts are assigned to any coil or multicontact device. The software alerts you when you have reached the limit. It can even assign the next available set of terminal pin numbers to each inserted child contact, based on the parent coil's assigned part number. Real-time cross-referencing information is displayed on the drawings, and cross-referencing reports are available at any time.



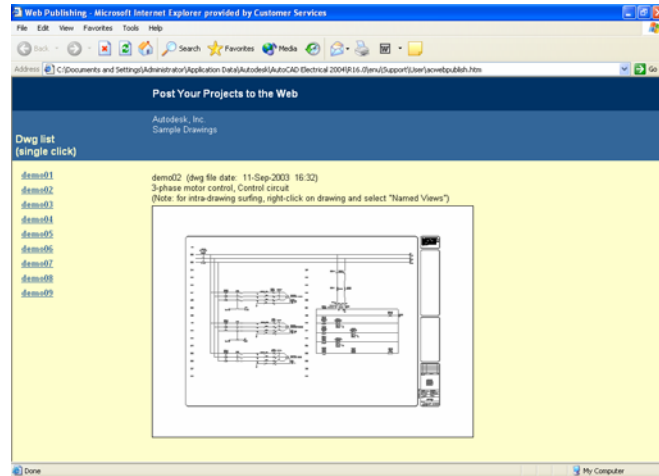
Share Drawings with Customers and Vendors and Track Their Changes

Any flexible software package enables you to share drawings with customers and vendors, but AutoCAD Electrical goes one step further. AutoCAD Electrical drawings can be viewed and edited by any DWG-compatible program such as AutoCAD or AutoCAD LT® software. When you get drawings back from outside sources, AutoCAD Electrical can create a report of what was changed. And when it's time for a drawing revision, AutoCAD Electrical can create a report of changes made since the last update.



Web Publishing

With AutoCAD Electrical, you can publish your designs to the Internet for better collaboration with customers and vendors. AutoCAD Electrical automatically creates the HTML pages and links needed to post your design to the web. If you choose, users can drag these drawings directly from the web into an AutoCAD session. Drawings maintain all AutoCAD Electrical intelligence.

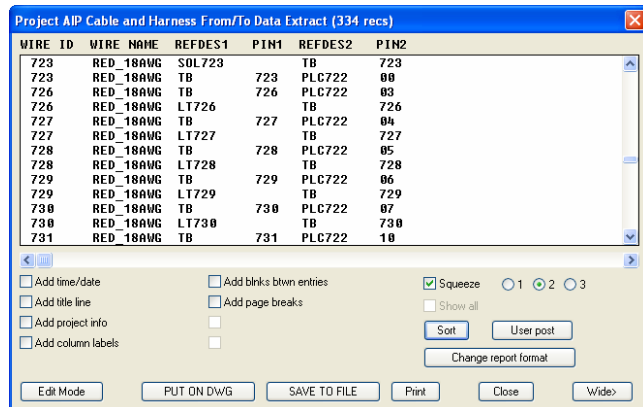


Open and Flexible API

The AutoCAD Electrical API (application programming interface) enables you to extend the software's functionality to address your company-specific needs. The API consists of two hundred programming entry points into the software executable. You can use it to create powerful, custom applications such as automatic schematic generation or special drafting and design utilities. These applications can be written using AutoLISP®, Visual LISP®, Microsoft Visual Basic®, Microsoft Visual Basic® for Applications, C, C++, or AutoCAD scripting. As a programming example, full source code is provided for the Spreadsheet to PLC I/O drawing generator utility.

Interface to Autodesk Inventor Professional Cable and Harness

AutoCAD Electrical enables you to create a from/to wire list that you can import directly into Autodesk Inventor® Professional for creating 3D wire harness and cable designs. This list contains point-to-point connector and pin information and helps you further reduce the time needed to create 3D cable and harness designs.



Feature Summary

The following list is a summary of AutoCAD Electrical features. For more detailed information about these features and more, refer to the AutoCAD Electrical Technical Overview. It can be found at www.autodesk.com/autocadelectrical.

Ladder Layout

- Unlimited ladders per drawing, with horizontal or vertical orientation
- Ability to add new ladders at any time, even on an existing drawing
- Multiple ladder widths and rung spacing on same drawing
- Support for line reference, X-zone, and X-Y grid reference modes; automatic X-Y axis setup
- Support for nonladder-style, point-to-point wiring diagrams
- Ability to use existing drawing format and title block
- Ability to automatically scale to metric units
- Renumbering of ladder references at any time; support for embedded alphas and leading zeros

Component Insertion and Automatic Tagging

- Icon menu access to 500+ symbols
- Ability to automatically adapt to your layer naming convention on the fly
- Ability to easily modify or expand JIC/IEC libraries
- Reuse of your existing libraries; conversion tools provided
- Automatic wire break and reconnect; automatic component alignment with wire
- Ability to move component from one wire to another with automatic break, retag, and cleanup
- Automatic sequential or reference-based component tagging with flexible format
- Utility that builds custom, multiconnection devices on the fly
- Manual tag annotation mode with real-time "tags used so far" list feature
- Semiautomatic component annotation by referencing external text file
- Support for component tags with leading zeros and IEC-style tagging
- Automatic component retag for drawing rename or reuse in a new project; automated contact update

Contact Tagging and Cross-Referencing

- Annotate by
 - Selecting "parent" or "sibling" component
 - Selecting from projectwide component extraction list
 - Manually typing annotation
- Use bidirectional cross-referencing with flexible format

- Set limits on coil maximum contact counts; automatic alert when you attempt to exceed
- Use Toggle Spare Fill feature to include unused references in cross-reference annotation
- Automatically track pin numbers, and automatically assign next pair of terminal pin numbers when new contact is inserted and tied to existing coil or other parent device
- Flip cross-reference annotation to smart multiline text to make it fit
- Easily generate full reports and exception reports; quickly review coil and contact exceptions, viewing and editing each one in context

Automatic Wire Numbering and Reports

- Sequential or reference-based automatic wire numbering; PLC I/O address-based wire numbering
- Flexible wire number format
- User-defined wire number suffix list for reference-based wire number tags
- Support for embedded alpha characters and leading zeros
- Predefined wire numbers
- On-off drawing wire number signal “jumps” and daisy chains, with multiple arrow styles
- Automatic wire number placement in clear spots and automatic wire leaders as required
- Smart color/gauge wire labels inserted at any time and automatically updated if wire color/gauge assignment changes
- Ability to number or renumber at any time: “new” only, windowed, whole drawing, or projectwide
- Automatic wire renumbering for connected wires if PLC I/O address changes
- Wire connection, from/to, terminal plan, and wire number reports on demand, with spreadsheet export option
- Cable or conductor color tracking, catalog lookup, reports on demand with spreadsheet export option
- Wire number exception report that lists duplicated and missing wire numbers projectwide; quickly review exceptions, viewing and editing each one in context

PLC I/O Modules

- I/O modules are parametrically generated on the fly, with automatic address annotation.
- Major PLC manufacturers included, new modules can be added easily.
- Modules adapt to underlying rung spacing on the fly.
- Break or stretch module at any point during insertion; multiple breaks; independent placement.
- Stretch module after insertion to provide space for parallel devices.
- Include or exclude no-connection terminals during module insertion.
- Automatically generate I/O drawings from spreadsheet listing, complete with text and connected components.

- Apply five different looks across all modules or manufacturers, or define your own.
- Instantly list module addresses used so far; edit individual I/O addresses and descriptions; support for modules with both inputs and outputs.
- Module and I/O connection point reports available on demand.
- Supports single I/O points distributed throughout drawing set; tracking tools provided.
- Supports “sideways” parametric PLC module generation.
- Supports complete PLC “shoebox” units, such as AB 1761 series.
- RSLogix™ import provides a way to create a spreadsheet from the RSLogix output.

Bills of Materials

- Use extensive, online catalog lookup files in industry-standard Microsoft Access MDB format
- Create or modify new catalog item entries from AutoCAD software or externally using Microsoft Access
- Generate comprehensive, real-time BOM reports at any time, including indented subassembly BOMs, total line-item purchase list BOMs, and by tag BOMs
- Use three user fields for every catalog item and extract them into BOM reports
- Extract BOMs by total project or by component location code (for example, BOM of PNL1 items)
- Instantly check BOM on a single component at any time
- Reference previous project’s BOM assignments in making new catalog assignments
- Edit reports to add items not shown on any drawing, change order, and so forth
- Save BOMs to Microsoft Excel, Microsoft Access, or comma-delimited files, or insert as a table into an AutoCAD drawing

Drafting and Editing

- Well-designed icon menus are easy to use and can be customized with a wizard.
- Insert Component command retains last six component insertions for quick selection.
- Devices automatically break and reconnect wires (without need for AutoCAD snap).
- Wire gap or loops are automatically drawn at wire crossings, if desired.
- Support for in-line wire text labels (in-line text breaks the wire).
- Trim wire segment utility automatically removes connection dots.
- Stretch Wire utility automatically stretches or trims wire end to connect to nearby component.
- Wire leaders are automatically generated in congested areas.
- Scoot command aids circuit manipulation and editing.
- Multicontact dashed link lines automatically reconnect when one contact is moved.
- Alert when new contact insert exceeds maximum allowed on parent coil device; provision to automatically annotate new contacts with next available set of terminal pin numbers.

AutoCAD Electrical 2004 Features and Benefits Overview

- AutoCAD Electrical “surfer” quickly displays related components in context across multiple drawings. Trace wire signal jumps from drawing to drawing. Go to any component or wire number simply by entering its tag name.
- Automated component location marks (graphical symbols) represent different device locations.
- Terminals automatically increment during multiple insertions.
- Software provides terminal strip and terminal number tracking, terminal and wire number reports, terminal strip generator utility.
- Supports circuit insertion via WBLOCK as well as automatic retag, automatic wire break, and reconnect.
- Powerful block swapper utility swaps one component for another in place, preserving text and reconnecting wires.
- Quickly swap an entire drawing’s symbols from one library to another (for example, JIC to IEC or IEC to JIC).
- Retag component and wire at any time in windowed area, drawing, or projectwide.
- Easily search and replace text substring and catalog number across entire project.
- Edit component tags, descriptions, and catalog assignments from a spreadsheet or database table; automated drawing update from spreadsheet or database table edits.
- Edit and update PLC I/O addresses and descriptions, stand-alone terminals, wire numbers, and wire color and gauge settings from spreadsheet data.
- Use three-phase bus and motor control drafting tools and libraries.
- Use API hooks to call AutoCAD Electrical routines and menus from your own AutoLISP, Visual LISP, VBA, or script programs. Call external catalog part number lookup routine from AutoCAD Electrical.

Reports

- Report types include BOM, cable reports, terminal reports, from/to wire reports, terminal reports, component reports, connector plug/jack reports, and various exception and design rule check reports.
- Reformat report data, and select column order, primary/secondary sort, page numbers, time, and date.
- Add items, remove items, edit data, or change item order.
- Save report data to a Microsoft Excel spreadsheet, an ASCII file, a comma-delimited file, an XML file, or a Microsoft Access database file.
- Automatically export report data to user-defined script or batch file for printing or postprocessing.
- Insert report data in tabular form right on the drawing with dynamic text height and width adjustment.

Panel Layout Capabilities

- Integrated with schematic drawings, pick and place from extracted schematic list.
- Use vendor footprint library symbols as is. AutoCAD Electrical adds intelligence at insertion time.
- Create new footprint symbols on the fly.

- Use bidirectional update capabilities between AutoCAD Electrical schematics and panel layout drawings.
- Generate ballooning, panel BOM, panel nameplates, and panel component reports and exception reports.
- Extract and merge schematic wire number, terminal pin connection, and wire color/gauge data right onto panel drawing symbols. You can also include far-end device connection information in this annotation.
- Define wire connection sequencing on schematics, which then determines the format of various from/to wire reports and wire connection data annotation applied to the panel drawing symbols.
- Panel BOM can include unreferenced schematic items for a combined BOM report.

Pneumatic Layout Capabilities

- Easily access pneumatic library symbols via icon menu
- Automatically break and reconnect pipe, and automatically align component with pipe
- Use drafting and editing features to modify pneumatic layout, including commands such as Just Like, Stretch Pipe, Trim Pipe, and Scoot

Drawing and Project Management

- Use simple tools to add or remove drawings from a schematic or panel layout drawing set of dozens to hundred of drawings.
- Flip back and forth between AutoCAD drawing file names and one-line drawing descriptions using project drawing list, making it easier to find the drawing you want in a large project set.
- Use the copy project utility to quickly create a new drawing set based on an existing AutoCAD Electrical project set.
- Subdivide large project set into sections and subsections for reports, wire lists, and so on.
- Use Mark/Verify utility to automatically track drawing changes related to components and wire numbers. Printed reports can be valuable for revision control.
- Automatically resequence when you insert or remove drawings from the middle of a project drawing set using Renumber Sheet utility.
- AutoCAD Electrical automatically establishes links between project information and your attributed title block.
- Use projectwide full or partial batch plotting, optional preplot and postplot user script files.
- Use projectwide ZIP file capability.
- Change text size globally or by category (for example, change all wire number text sizes) with text size change utility.
- Use projectwide component and wire number retagging and ladder line reference number resequencing.
- Publish a web page of selected drawings from an AutoCAD Electrical project.

Compatibility with Other Users

- Uses standard AutoCAD blocks with attributes and extended entity data.
- Does not require a proprietary database. All drawing intelligence can be extracted from AutoCAD DWG files.
- Customers and other team members can view and plot AutoCAD Electrical drawings and edit them with standard AutoCAD or AutoCAD LT software. The Mark and Verify command provides a report of all changes made to the drawing since the last snapshot.

autodesk[®]

Autodesk, Inc.
111 McInnis Parkway
San Rafael, CA 94903
USA

Autodesk, AutoCAD, AutoCAD LT, AutoLISP, Autodesk Inventor, and Visual LISP are registered trademarks of Autodesk, Inc., in the USA and other countries. All other brand names, product names, or trademarks belong to their respective holders.

© 2003 Autodesk, Inc. All rights reserved