# AutoCAD or AutoCAD Electrical? A Productivity Study.

AutoCAD® Electrical software, part of the AutoCAD® family of products, is built specifically to create and modify electrical controls designs. Built-in reporting tools help eliminate errors and provide accurate information to manufacturing, allowing more time for design and engineering. This study details the productivity gains that users can expect to see when moving from basic AutoCAD to AutoCAD Electrical.

Key Findings

• Creation of new designs was **84% faster.**

• Editing existing designs are **77% faster.**

• Risk of errors was greatly reduced because of a **30% reduction in number of commands used.**

The Study

This study explores 10 common design challenges and shows direct comparisons of the time and effort required to accomplish each specific task in basic AutoCAD and AutoCAD Electrical software. The same tasks were completed 80% faster using AutoCAD Electrical. The performance results in this paper were achieved by conducting automation testing over a controlled network. One user, with expert-level experience using both AutoCAD® 2008 and AutoCAD® Electrical 2008 software programs, conducted the comparative tests on the same sample using a Dell® Dimension™ 8400 computer with a 3.4 GHz Intel® Pentium® 4 processor and 1 GB RAM. The tasks are comprehensive in nature. For each task the number of commands used, number of times each command was accessed, and the total time it took to complete each task using both AutoCAD and AutoCAD Electrical are documented. A detailed description of the study follows.

Autodesk®
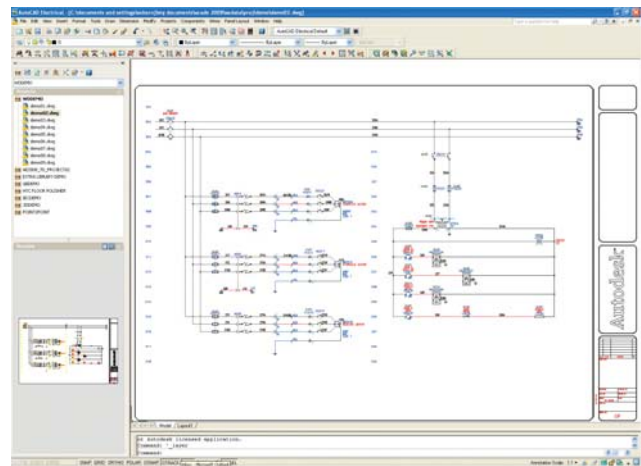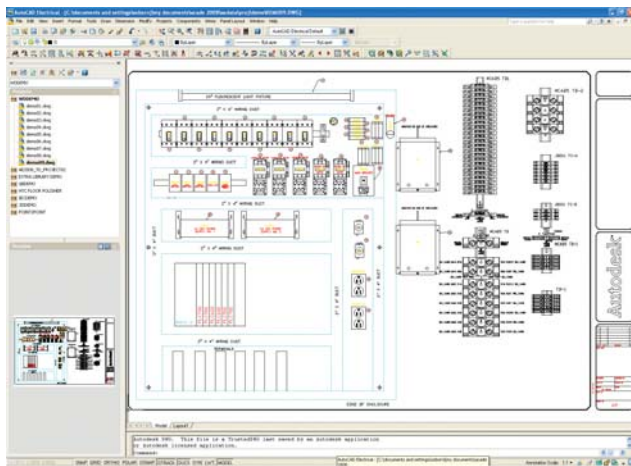
1. Thousands of Standards-Based Schematic Symbols

AutoCAD Electrical software ships with more than 2,000 standards-based schematic symbols. A simple, icon-menu-driven system for inserting electrical, pneumatic, hydraulic, and P&ID devices is provided, allowing you to quickly build standards-based control designs by simple pick-and-place. These are "smart" symbols in many ways, one of which is that wiring automatically breaks and connects to them.
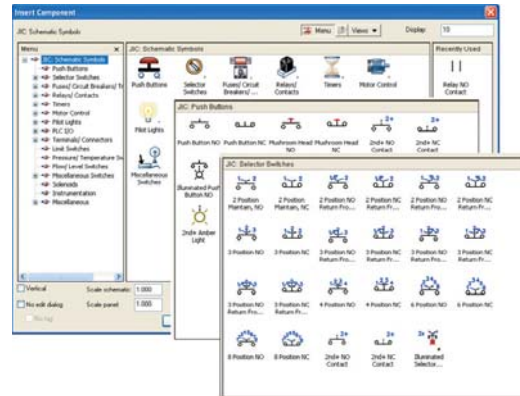

Task: Inserting Two Interlock References into an Existing Electrical Schematic

We start with a relay coil symbol that is interlocked with an emergency-stop pushbutton and a seal-circuit contact. The task is to add two more interlock symbols to the existing circuit.

Steps

1. Insert limit switch contact into an existing wire
2. Insert a relay contact into a branching wire
3. Add new wire numbers as required
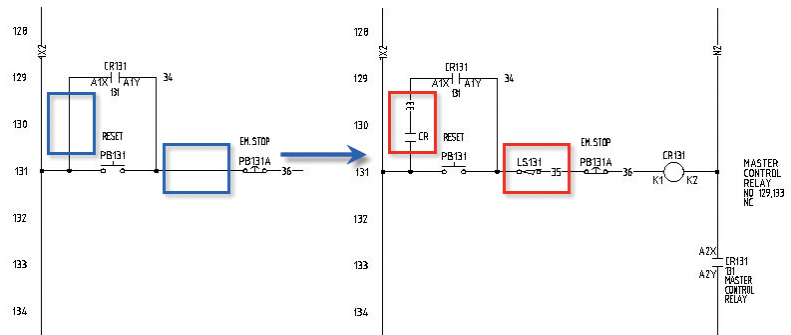
Study Results

In basic AutoCAD, the geometry for the limit switch and relay contact were readily available because existing instances of these block inserts were already present in the drawing. But one component block symbol instance had to be manually rotated to align itself with the underlying wire. One thing that made basic AutoCAD slower was the fact that neither symbol's block insert broke and reconnected with the underlying wire. This was a manual task requiring either using the AutoCAD BREAK or TRIM command. Finally, new wire numbers had to be manually typed in on the two new wires. Using AutoCAD Electrical resulted in an **83% time savings** over basic AutoCAD.

Advantages of AutoCAD Electrical

- It's easy to navigate and choose from the extensive library of component symbols through the icon menu—colorful, customizable.

- Inserted symbols automatically align with the orientation of any underlying wire.

- Existing wiring automatically breaks and reconnects to the inserted symbols.

- New, unique wire number assignments automatically generate for split wire pieces.

Productivity Gain*	AutoCAD	AutoCAD Electrical
Number of Commands Utilized	6	1
Number of Times Commands Were Accessed	11	2
Total Number of User Picks and Clicks	49	8
Total Time to Complete Task (minutes, seconds)	1:33	:16
Time Saving with AutoCAD Electrical — 83%		

2. Automatic Wire Numbering and Component Tagging

Automatically assign unique wire numbers and component tags in your drawings and reduce the time you spend tracking design changes so you can have fewer errors. AutoCAD Electrical automatically places sequential or reference-based numbers on all wires and components based on the chosen configuration. AutoCAD Electrical can determine if an inserted wire number will "bump" into anything and automatically searches laterally along the wire for a clear spot to place the wire number. If no clear spot is found, AutoCAD Electrical continues to search for a clear spot away from the wire and, when found, automatically draws a leader back to the wire.
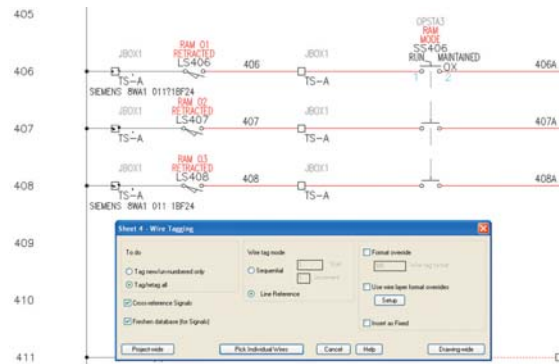
### Task: Re-tagging a Copied Circuit Drawing

This simple circuit represents a schematic drawing that needs to be duplicated in an overall controls design. The task is to completely retag this copied drawing with unique reference numbers, component tags, and wire numbers.

Steps

1. Change the starting line reference number from 121 to 510.

2. Re-tag all schematic symbols based upon the new line reference numbers.

3. Re-assign wire numbers sequentially, starting with wire number tag 100.

Study Results

In basic AutoCAD, each piece of text or attributed text needs to be manually edited. There are six line reference numbers, five pieces of wire number text, and seven symbol tag-IDs that need attention. Each manual text edit takes at least one pick and three keystrokes plus an [Enter] or right-click to go on to the next. For attributed text, it takes at least one selection pick, a pick and three keystrokes inside the editor dialog, and then a pick to apply to go on to the next one. By using AutoCAD Electrical, only 17 picks, clicks and keystrokes were used versus 115 in AutoCAD, resulting in an **71% time savings.**
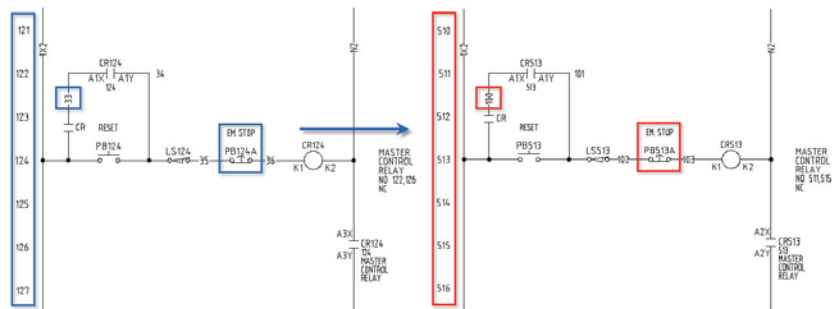
Advantages of AutoCAD Electrical

• Next unused wire number is determined automatically, even across dozens or hundreds of drawings in a project set.

• New, unique component tag-IDs automatically generate, appropriate for the component type.

• Automatic component and wire number tags can be reference-based or sequentially based with many formatting options.

• Wire numbering and component tagging can be applied project-wide, drawing-wide, or window select.

Productivity Gain*	AutoCAD	AutoCAD Electrical
Number of Commands Utilized	1	4
Number of Times Commands Were Accessed	21	4
Total Number of User Picks, Clicks, Keystrokes	115	17
Total Time to Complete Task (minutes, seconds)	1:10	:20
Time Saving with AutoCAD Electrical — 71%		

Avoid costly errors before the build phase begins by catching and removing errors during design. AutoCAD Electrical monitors and alerts users to potential design errors as they occur by constantly comparing the requested changes with the current project.

Task: Automatic Contact Pin Assignment and Contact Count Check

The task is to link child relay contact symbols to parent relay coil symbols and do two things: assign the next available set of contact pin numbers based upon the catalog number assignment and alert the user when there are no more contacts available.

Steps

1. Start with a relay coil symbol having a catalog part number assignment that corresponds to having four "normally open" child contacts. Scan the project and find that there are two existing instances of child contacts tied to this relay coil.

2. Relate two more child contacts, located on another drawing, back to this relay coil. Assign the next available contact pin number pairs based upon the coil's catalog number assignment.

Study Results

In basic AutoCAD, you are "on you own" for both 1) tracking how many contacts have been used versus how many are available and 2) figuring out the next available set of contact pin number assignments. This can get really messy when a given relay's contacts are spread out within multiple drawings in your controls design. In this task, even though the number of commands used was the same in both products, AutoCAD Electrical required substantially less picks, clicks and keystrokes and completed the task **5 times faster** in just seconds, versus minutes.
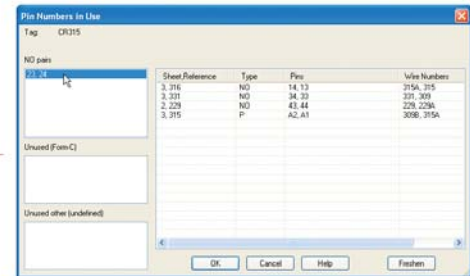
### Advantages of AutoCAD Electrical

- Automatically finds and assigns the next available pin pair as each child contact is inserted and tied back to the selected parent coil.

- Simple pick from a "parent" list also pulls in tag-ID, description text, and assigns the cross-reference annotation.

- Alerts when a maximum contact count is exceeded.

- Helps avoid costly errors on the shop floor.

Productivity Gain*	AutoCAD	AutoCAD Electrical
Number of Commands Utilized	1	1
Number of Times Commands Were Accessed	2	2
Total Number of User Picks, Clicks, Keystrokes	78	12
Total Time to Complete Task (minutes, seconds)	1:46	:19
Time Saving with AutoCAD Electrical — 82%		

4. Real-Time Coil and Contact Cross-Referencing

Reduce the risk of assigning too many contacts to any relay, and minimize time spent manually tracking assignments. AutoCAD Electrical sets up parent/child relationships between coils and contacts, keeping track of how many contacts are assigned to any coil or multicontact device, and alerting users when they have exceeded the limit.
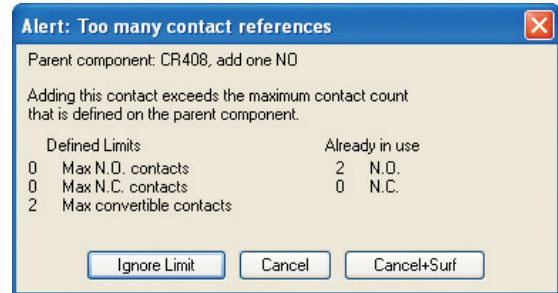

Task: Contact and Cross-Reference Update across Multiple Drawings

The task is to 1) tie a relay contact in to a relay coil when the coil is on some other drawing in your overall drawing set, and 2) show the appropriate bi-directional cross-reference annotation, child pointing at the parent coil and the parent coil pointing at the child contact(s), listing them in a tabular format.

Steps

1. Open the second drawing of a multi-drawing project and insert several relay contact symbols.

2. Tie each to a parent coil symbol on the first drawing in the project set.

3. Update cross-reference information on both the contact and on the parent coil symbol.
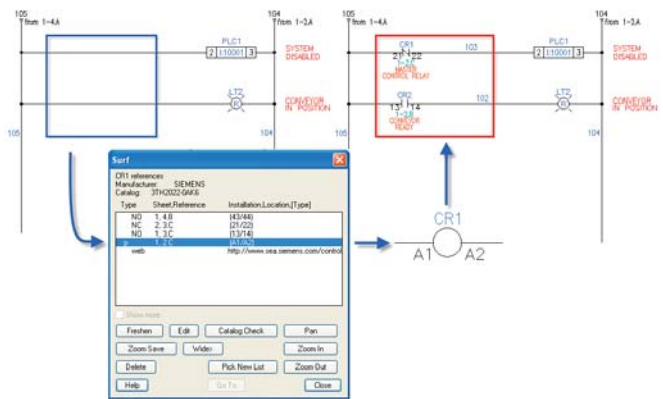
Study Results

In basic AutoCAD, you are again "on you own" for both 1) finding the tag-ID of the parent relay coil that might be anywhere in your project set, 2) figuring out the next available set of contact pin number assignments, and then 3) updating the cross-reference annotation at both ends. This can be frustrating when you don't know what drawing the relay coil might be on. In AutoCAD more than 6 times as many commands were used and accessed to complete this task versus with AutoCAD Electrical.

Advantages of AutoCAD Electrical

- Tracks contact usage across dozens or hundreds of drawings in your project so you don't have to.

- Simple selection from real-time list of parent relays. Error checking, auto-pin list assignment, auto-tagging.

- Bi-directional cross-referencing updates automatically, even when a complex tabular cross-referencing format is selected.

Productivity Gain*	AutoCAD	AutoCAD Electrical
Number of Commands Utilized	6	1
Number of Times Commands Were Accessed	18	2
Total Number of User Picks, Clicks, Keystrokes	232	16
Total Time to Complete Task (minutes, seconds)	6:44	:22
Time Saving with AutoCAD Electrical — 95%		

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5. Electrical-Specific Drafting Features

Slash design time by using commands designed specifically for electrical controls designers. Specialized features such as trim wire, copy and delete component or circuit, and scoot and align components make it much easier to create drawings quickly.
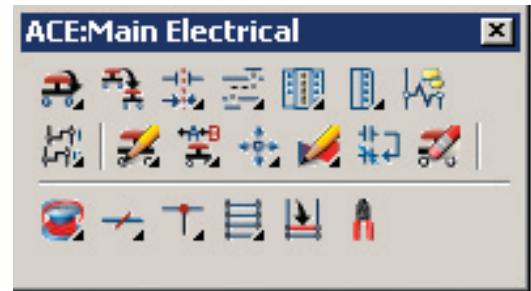

Task: Include Multi-bus Wiring, Connectors, and Rearranging Circuits

This sample drawing shows a partially completed variable speed drive. The task is to 1) connect the three-phase power wiring to the drive representation through a set of terminals, 2) wire up the remaining control connections through a plug / receptacle connector symbol, 3) come back in and add a current transformer to one phase of the power wiring and wire through two new pins added to the connector, 4) assume that when a wire crosses another, a small gap needs to be shown in one of the crossing wires. To make it easier for basic AutoCAD, we'll assume that the connector symbol exists in a block library and can be quickly inserted when needed.

Steps

1. Draw the three-phase power wiring from the disconnecting means and route it down, over, and up to connect into the upper left-hand power connection of the drive symbol.

2. Draw wires from two upper and seven lower terminals over to a newly inserted connector symbol positioned along the right-hand side of the drawing.

3. Adjust all wire crossings to show a small gap in one of the crossing wires.

4. Now assume that the customer requests an engineering change to add a current transformer in the middle phase of the power connection. Widen the spacing between the bus wires in order to insert a current transformer.
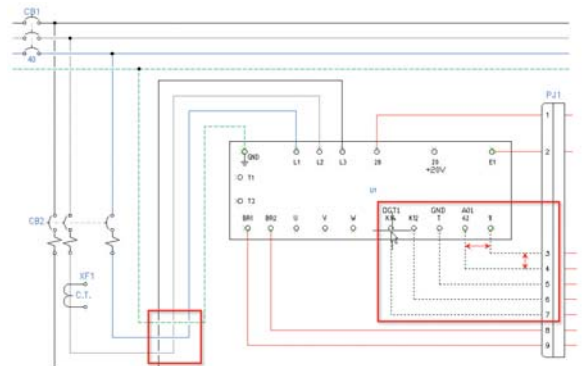
Study Results

The advantage of using AutoCAD Electrical becomes apparent, even for these simple drafting tasks. The Multiple Wire Bus command senses connection points and spacing automatically and makes nicely synchronized turns. Wires that cross other wires can trigger automatic gap insertions. The AutoCAD Electrical parametric connector tool automatically adjusts to the wire connection spacing. The "Scoot" command for moving/stretching existing wiring, components, and such is just plain cool. Using AutoCAD took 8 times as long , resulting in an **85% times savings**.

Advantages of AutoCAD Electrical

• "Intelligent" point-to-point wiring tools.

• Wires automatically connect to smart component wire connection points, no "SNAP" mode required.

• Connectors align with underlying wiring.

• "Scoot" command enables quick adjustments to wire and component positions.

Productivity Gain*	AutoCAD	AutoCAD Electrical
Number of Commands Utilized	4	5
Number of Times Commands Were Accessed	30	8
Total Number of User Picks, Clicks, Keystrokes	165	61
Total Time to Complete Task (minutes, seconds)	8:07	1:13
Time Saving with AutoCAD Electrical — 85%		

6. Automatically Create PLC I/O Drawings from Spreadsheets

Automatically create PLC I/O drawings from the design data stored in a spreadsheet. AutoCAD Electrical gives users the ability to generate a comprehensive set of PLC I/O drawings by simply defining the project's I/O assignments in a spreadsheet. AutoCAD Electrical then automatically creates drawings, complete with ladders per the drawing configuration, I/O modules, addresses and description text, and component and terminal symbols connected to each I/O point. Once the drawings have been created, the I/O address and description report can be exported to the PLC program.

Task: Turning a Listing of I/O Assignments and Connected Devices into a Drawing Set

This sample spreadsheet is what an engineer or designer might put together to define a project's PLC I/O requirements. Each I/O module is represented by a group of rows (example, 8 or 16 or 32 rows) in the spreadsheet, each group representing one I/O module in the design. Each row in the group corresponds to one I/O point in the module. The row carries the I/O address and a listing of any series-connected, in-line devices wires to the I/O point.

The task is to take this spreadsheet data and turn it into a set of PLC I/O schematic drawings. This means 1) insert a PLC I/O representation and renumber its I/O points to the appropriate range of address values, 2) insert symbols to represent the connected devices, 3) draw wires to connect to the I/O points, 4) type in appropriate description text on to each device and each I/O point, pulled from the spreadsheet. To make it easier for basic AutoCAD, we'll assume 1) the various symbols exist and can be quickly accessed and inserted into the drawing; 2) the description text can be cut and pasted from the spreadsheet to the symbols to save time. For AutoCAD Electrical, we'll assume that the spreadsheet columns are arranged in the PLC I/O generator's default column format.

Steps

1. Start with the first drawing. Find and insert the appropriate PLC I/O symbol. Edit the addresses to match the spreadsheet.

2. Insert the in-line device symbols. Draw wire lines to connect symbols from the left-hand bus over to the I/O point.

3. Cut/Paste description and tag text over from the spreadsheet.

4. Repeat above until all modules are accounted for.

Study Results

This study assumes the designer has created an initial controls scheme, with all information documented in a spreadsheet, which is properly formatted data. As there are many different workflows that could accomplish this task, overall time savings will differ among users.

The AutoCAD user would begin by manually drawing ladders or inserting existing blocks, which require editing of all reference numbers. This is followed by the addition of custom components (blocks), all of which require a combination of copying and pasting data from the spreadsheet, and attribute editing.

With AutoCAD Electrical, you need only insert the appropriate data into a preformatted spreadsheet, and drawings are automatically created for you within a preselected border.

As shown here, by using AutoCAD Electrical you can achieve substantial productivity gains over basic AutoCAD.

Productivity Gain*	AutoCAD	AutoCAD Electrical
Number of Commands Utilized	4	1
Number of Times Commands Were Accessed	244	1
Total Number of User Picks, Clicks, Keystrokes	442	4
Total Time to Complete Task (minutes, seconds)	~2 hours	0:30

Time Saving with AutoCAD Electrical — *Time savings is subjective based on the user's level of experience. Based on this example, the time savings was substantial.*
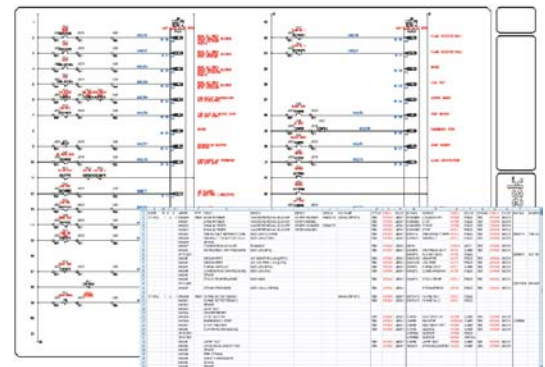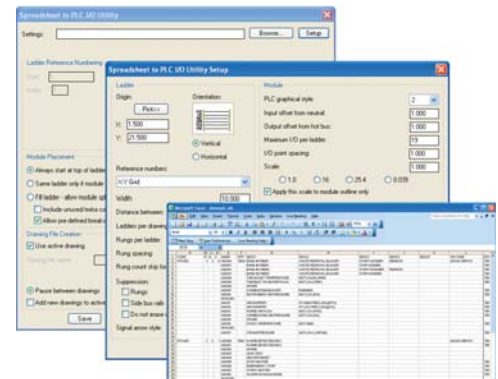
Simplify panel layout drawing creation to reduce errors and help ensure that all parts are placed and that drawings are automatically updated. Once the schematic creation phase is complete, AutoCAD Electrical extracts a list of schematic components for placement into panel layout drawings. Users choose the panel location and a physical "footprint" representation of each device to be inserted into the layout, and a link is automatically created between the device and its representation. Any changes to the schematic or panel representation automatically update the other. Nonschematic items such as wire duct and mounting hardware can be added to the layout and automatically combined to create a "smart" panel BOM report.
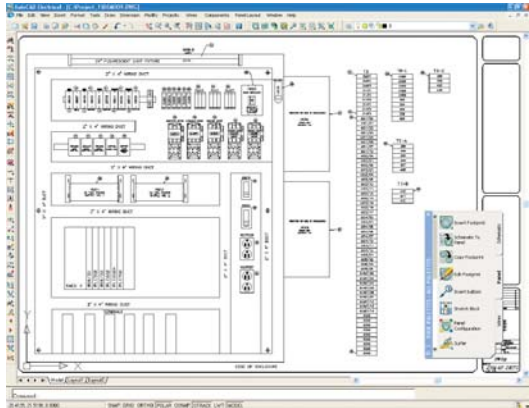

Task: Panel Layout from a Schematic Drawing

Here is a simple drawing set that includes five pushbuttons and pilot lights that need to go into a small operator station. The task is to 1) generate a panel door layout drawing from the schematic data, 2) add nameplates to each operator, and 3) apply unique item number balloons to each type of component used in the door layout.

Steps

1. To make it easier to do this in basic AutoCAD, create the panel layout on the same drawing as the schematic. Draw a rectangle to represent the door.

2. Insert footprint representations for each schematic pushbutton, selector switch, and pilot light.

3. Add nameplates to each operator and copy the descriptions found on the schematic representations.

4. Balloon each item. Mark like items with the same balloon item number.
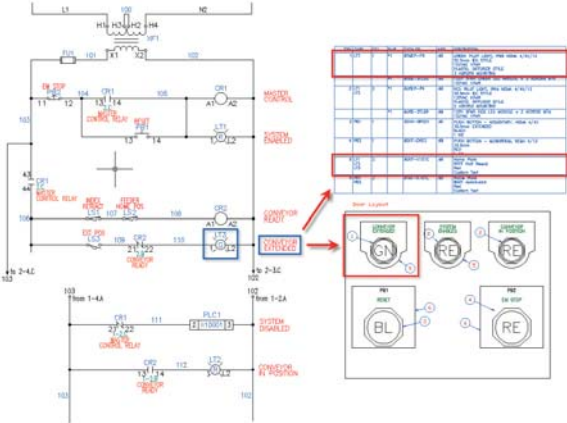
Study Results

To make it easier for basic AutoCAD, we're keeping the door layout's components limited to just two drawings. The first task in the basic AutoCAD program is figuring out what mounting hole/footprint representation applies to each type of pushbutton and pilot light. Our study assumes that the user has all of these memorized and instances of them already in the drawing (that is, does not have to browse and look for them). Once these are all determined and inserted, the nameplates go in, one at a time.

Here another disadvantage of basic AutoCAD reveals itself—the same description text keyed in for each schematic symbol is again keyed in for its name plate. Next, item number leaders are inserted. AutoCAD Electrical manages the number automatically, where in AutoCAD you must manually verify each item number.

Advantages of AutoCAD Electrical

• Part number assignments made to the schematic components can drive automatic footprint selection when doing the panel layouts.

• Tag-ID and description text from the schematic representations automatically copy across to the panel layout representations.

• Automatic tracking of "like item numbers" when adding balloon item numbering to the panel layout.

• Bill of Material table can generate automatically from AutoCAD Electrical panel layout drawings.

| Productivity Gain*	AutoCAD	AutoCAD Electrical
Number of Commands Utilized	4	4
Number of Times Commands Were Accessed	23	4
Total Number of User Picks, Clicks, Keystrokes	175	104
Total Time to Complete Task (minutes, seconds)	6:37	2:35
Time Saving with AutoCAD Electrical — **61%**		

8. Automatic Update of BOM Table

Automatic Project Reports

Drastically reduce time required to manually generate and update reports while removing associated errors. Report generation in AutoCAD Electrical is simple with automatic reports that cover everything from bills of materials (BOMs), cable lists, terminal reports, from/to wire lists, plus many more. The report function gives you the option of generating multiple reports with a single command and includes flexible export options.
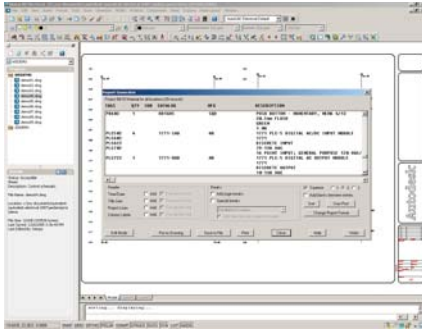
Task: Automatic Update of BOM Table

The BOM table shown below represents the schematic design of a simple circuit.
The task is to adjust some catalog part number assignments, quantities, and then update the BOM table to accurately reflect these changes.

Steps

1. Add a "mushroom-head" pushbutton to the design.
2. Change the part number assignment on one pilot light. Change it from its existing "red" part number to a "green" part number.
3. Update and expand the BOM table to reflect these changes.

Study Results

In basic AutoCAD, adding the new pushbutton into the existing wiring takes time to manually break and reconnect. Changing the red pilot light to a green one is pretty easy, just change the "R" attribute value to a "G". But then the tedious, error-prone part begins. The BOM table needs to be carefully expanded to make room for two new part numbers used in the design: the new mushroom-head pushbutton and the new green pilot light. Using the basic AutoCAD "table" object helps a lot but this is still a painful manual task, and lots of chances to miss something or incorrectly enter tag, part number, or quantity. Using AutoCAD Electrical resulted in a **82% time savings** over basic AutoCAD.
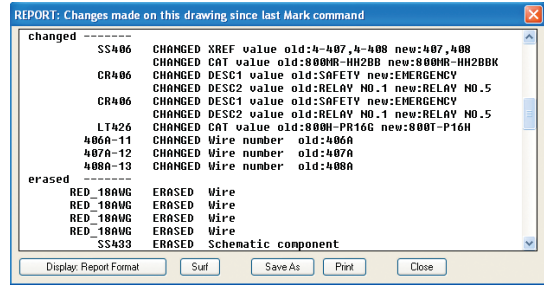

Advantages of AutoCAD Electrical

- Part number assignments selected from pick lists. Full descriptions are included automatically with the part number selection.
- Rerunning the BOM report / "Place on drawing" option updates the existing BOM table. It expands the table automatically if new entries have been added.
- Minimizes errors: miss-typed component tag names, quantities, and descriptions.
- The Surfable Report features allows you to automatically locate a component within your drawing set, by selecting tag number, catalog number or description directly from the BOM.

Productivity Gain*	AutoCAD	AutoCAD Electrical
Number of Commands Utilized	7	4
Number of Times Commands Were Accessed	9	4
Total Number of User Picks, Clicks, Keystrokes	154	25
Total Time to Complete Task (minutes, seconds)	4:25	:47
Time Saving with AutoCAD Electrical — 82%		

Easily exchange data with customers or suppliers in native DWG format. Edit and view AutoCAD Electrical drawings in any DWG-compatible program, such as AutoCAD or AutoCAD LT software. When designs are edited by outside sources, AutoCAD Electrical can create a report of any modifications made to the drawings by others. Also, when you are ready to issue a new revision to your design process, AutoCAD Electrical can create a report of changes made to the drawings since the last revision update.

```
REPORT: Changes made on this drawing since last Mark command            ☒
changed -------
        SS406    CHANGED XREF value old:4-407,4-408 new:407,408
                 CHANGED CAT value old:800MR-HH2BB new:800MR-HH2BBK
        CR406    CHANGED DESC1 value old:SAFETY new:EMERGENCY
                 CHANGED DESC2 value old:RELAY NO.1 new:RELAY NO.5
        CR406    CHANGED DESC1 value old:SAFETY new:EMERGENCY
                 CHANGED DESC2 value old:RELAY NO.1 new:RELAY NO.5
        LT426    CHANGED CAT value old:800H-PR16G new:800T-P16H
      406A-11    CHANGED Wire number  old:406A
      407A-12    CHANGED Wire number  old:407A
      408A-13    CHANGED Wire number  old:408A
erased  -------
    RED_18AWG    ERASED  Wire
    RED_18AWG    ERASED  Wire
    RED_18AWG    ERASED  Wire
    RED_18AWG    ERASED  Wire
        SS433    ERASED  Schematic component
   Display: Report Format      Surf      Save As    Print     Close
```

Task: Detect What Changes Were Made to Your Drawings While They Were in the Customer's Hands

AutoCAD Electrical drawings can be viewed and edited by any DWG compatible program such as AutoCAD, or AutoCAD® LT. When you get drawings back from outside sources, AutoCAD Electrical can create a report of what was done to them while they were out of your control. Also, when your design process reaches the point where a new revision is to be issued, AutoCAD Electrical can create a report of changes made to the drawings since the last revision update.

Steps

1. Run the "Mark" part of the Mark/Verify command on the small project drawing set prior to releasing the drawing set to the customer for "approval."

2. Now imagine that these drawings are in the customer's hands. Use various basic AutoCAD editing commands to make alterations to the design and component rating values.

3. Now the drawings are back in your hands. Create a list of the changes that the customer appears to have made to the drawing set.
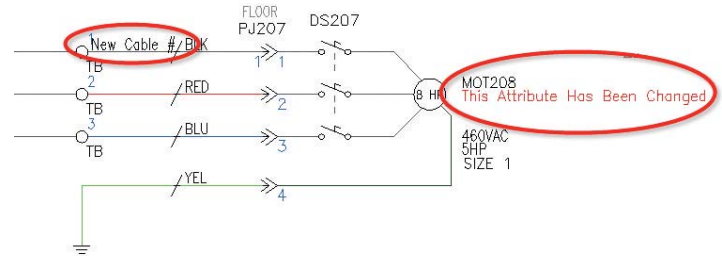
Study Results

There are no dedicated tools included within AutoCAD to perform a quantifiable comparison of this workflow, and therefore there was no time recorded. In order to provide you with an accurate measurement to compare against your current workflow, we have included the basic steps and time allotment to perform such tasks in AutoCAD Electrical.

The benefits of this feature should become self evident to any user who performs theses tasks via tedious drawing reviews or an engineering change order process. In either case, the inherent nature of these manual processes leaves you susceptible to design errors from missed edits.

Advantages of AutoCAD Electrical

• Automatic tracking of modifications

• Accepts changes from AutoCAD, AutoCAD LT® software, or any DWG™-compatible program

• Report generation of design revisions

Productivity Gain*	AutoCAD	AutoCAD Electrical
Number of Commands Utilized	NA	1
Number of Times Commands Were Accessed	NA	2
Total Number of User Picks, Clicks, Keystrokes	NA	11
Total Time to Complete Task (seconds)	NA	:30

Time Saving with AutoCAD Electrical — *There are no dedicated tools included within AutoCAD to perform a quantifiable comparison. AutoCAD Electrical is clearly the more capable and efficient application.*

10. Reuse Existing Drawings

Get a head start on your design projects by reusing drawings from another project. Make a copy of a specific part, or reuse an entire drawing set when starting a new design. Save commonly used circuits for reuse in future designs. AutoCAD Electrical automatically renumbers the wires and devices to match the configuration of the current drawing or project in which they are placed. You can also reduce design time and errors by retagging all components in a project with a single command.
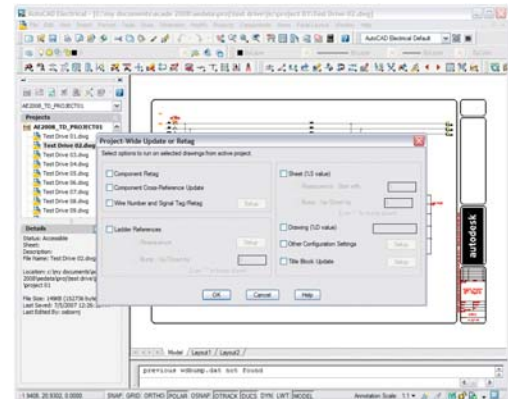
Task: Copy an Existing Project Drawing Set and Automatically Update Title Blocks

This sample project is a small set of inter-related schematic and panel layout drawings. The study task is to copy each drawing to a new name and update each drawing's title block. This represents the first step in the common practice starting a new design by copying and renaming drawings from an existing design.

Steps

1. Copy each drawing to a new folder and rename the file name.
2. Open each drawing and edit the attribute values on the title block to reference information related to the new project.

Study Results

In basic AutoCAD, you have to manually copy, paste, and rename each filename to the updated project nomenclature. Once complete, one of the title blocks must be edited, and then copied to the remaining project drawings, each of which must be edited manually and saved.

In AutoCAD Electrical, the copy project command manages the copying of files, find/replace style renaming of file names, and creates a unique project folder. Updating of title block information is highly customizable, and automatically cycles through the entire drawing set, saving updating information, without having to open, edit, and save individual drawings manually. To complete this task in AutoCAD, 84 commands were accessed and more than 300 picks/clicks and keystrokes were done. Using AutoCAD Electrical resulted in a **73% time savings** over basic AutoCAD.
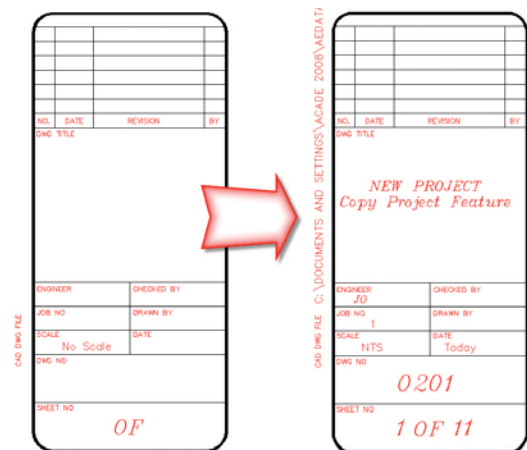
Advantages of AutoCAD Electrical

• Reduce repetitive and time-consuming renaming of DWG files and title block information

• As your drawing set increases, so does your overall time savings when using the Copy Project command in AutoCAD Electrical

Productivity Gain*	AutoCAD	AutoCAD Electrical
Number of Commands Utilized	7	3
Number of Times Commands Were Accessed	84	3
Total Number of User Picks, Clicks, Keystrokes	382	53
Total Time to Complete Task (minutes, seconds)	6:30	1:45
Time Saving with AutoCAD Electrical — 73%		

Conclusion

The ten typical workflow examples in this study have shown how the fundamental features in AutoCAD Electrical can help increase your overall productivity level. As these tasks are very basic, you may find an even greater increase in time savings when creating your own controls designs.

Key Findings

• Creation of new designs was **84% faster.**

• Editing existing designs are **77% faster.**

• Risk of errors was greatly reduced because of a **30% reduction** in number of commands used.

To complete the same tasks, it required 36 minutes 52 seconds using basic AutoCAD software and only 7 minutes 37 seconds using AutoCAD Electrical software an **80% productivity gain.**

AutoCAD Electrical contains many other features and benefits that enable users to profoundly increase their design efficiency and eliminate many of the errors caused by repetitive manual tasks. Maintaining consistency throughout the design process allows manufacturers to create products in shortened design cycles with less overall expense.

The AutoCAD Electrical Advantage

Based on these ten tasks, AutoCAD Electrical provides a level of productivity for electrical controls designers that is not possible with general-purpose CAD applications such as AutoCAD. Because AutoCAD Electrical is built specifically for electrical controls designers, using the software can help you realize immediate and substantial productivity benefits such as the ones discussed in this paper.

For more information about AutoCAD Electrical, including "Test Driving" the product, go to www.autodesk.com/autocadelectrical or contact your local reseller. To locate the reseller nearest you, visit www.autodesk.com/reseller.

Keep up-to-date on what's happening in your industry, stay in touch with other industry professionals, and take advantage of a host of online resources at the Manufacturing Community Portal at mfgcommunity.autodesk.com.

		AutoCAD (minutes and seconds)	AutoCAD Electrical (minutes and seconds)	Time Savings with AutoCAD Electrical
1.	Inserting Two Interlock References into an Existing Electrical Schematic	1:33	0:16	83%
2.	Re-tagging a Copied Circuit Drawing	1:10	0:20	71%
3.	Automatic Contact Pin Assignment and Contact Count Check	1:46	0:19	82%
4.	Contact and Cross-Reference Update across Multiple Drawings	6:44	0:22	95%
5.	Tasks that Include Multi-bus Wiring, Connectors, and Rearranging Circuits	8:07	1:13	85%
6.	Turning a Listing of I/O Assignments and Connected Devices into a Drawing Set	~2:00	0:30	N/A
7.	Panel Layout from a Schematic Drawing	6:37	2:35	61%
8.	Automatic Update of BOM Table	4:25	0:47	82%
9.	Detect Changes Made	N/A	0:30	N/A
10.	Copy an Existing Project Drawing Set and Automatically Update Title Blocks	6:30	1:45	73%
	Total Times	3:15:38	0:8:07	
	Time Savings with AutoCAD Electrical			**80%**

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