

# AutoCAD or AutoCAD Electrical? A Productivity Study.

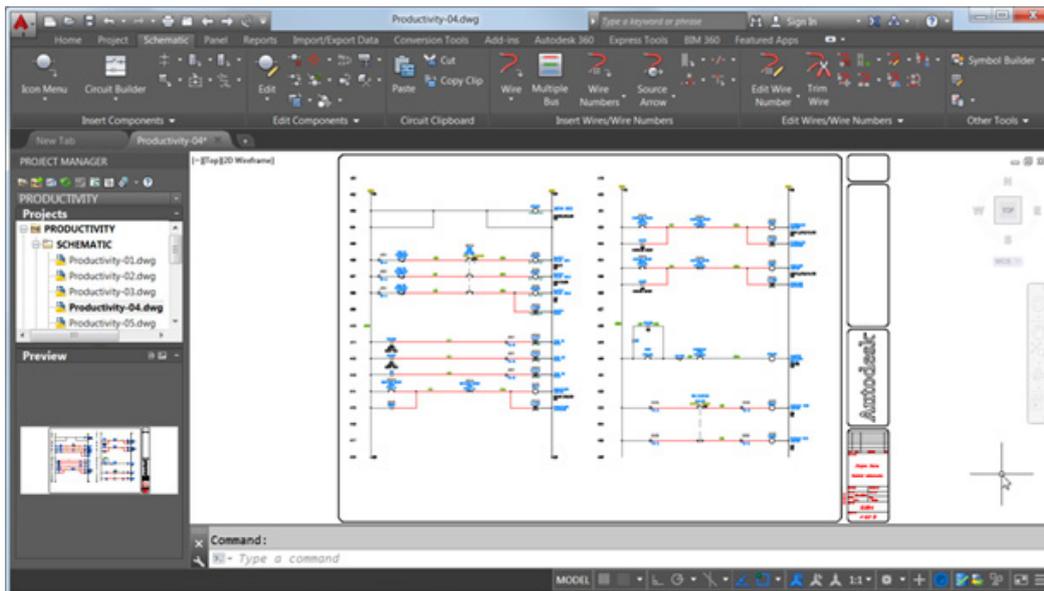
Autodesk® AutoCAD® Electrical software, part of the AutoCAD® family of products, is built specifically to create and modify electrical controls designs. Purpose built Electrical design tools that help eliminate errors and provide accurate information to manufacturing, allowing more time for design and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

## > Executive summary

Designed by Autodesk and commissioned to an independent consultant, this study explores 10 common design challenges and shows direct comparisons of the time and effort required to accomplish each specific task in AutoCAD® and AutoCAD® Electrical® software. The same tasks were completed 80% faster on average using 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 67% 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® and AutoCAD® Electrical software programs, conducted the comparative tests on the same sample using a Dell® Precision™ M4800 computer with a 2.7 GHz Intel® Core® i7 processor and 32 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.

It was assumed during the study that all symbols and title blocks needed in AutoCAD® for the design process were local to the document. Searching time is subjective and the methodologies allowed for the quick placement of required block in the shortest amount of time possible.

A detailed description of the study follows.

➤ 1. Comprehensive Symbol Libraries

AutoCAD Electrical software comes equipped 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.

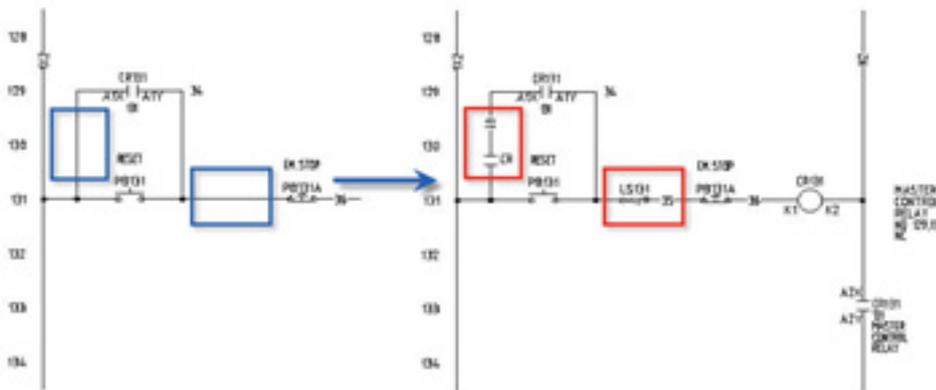


Task: Inserting Two Interlock References into an Existing Electrical Schematic

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 rotated to align 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 commands. Finally, two new wire numbers had to be manually added on to the wires. Using AutoCAD® Electrical resulted in an 82% 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.
- New, unique wire number assignments automatically generate for split wire pieces.

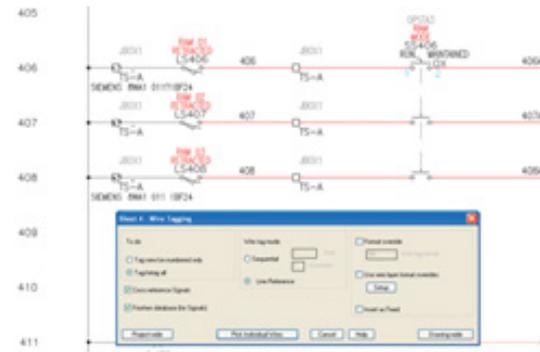
Productivity Gain*	AutoCAD®	AutoCAD® Electrical
Number of Commands Utilized	4	1
Number of Times Commands Were Accessed	8	2
Total Number of User Picks and Clicks	48	10
Total Time to Complete Task (minutes, seconds)	1:30	:16
<b>Time Saving with AutoCAD® Electrical — 82%</b>		

## 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 circuit represents a schematic drawing that needs to be updated to reflect a numbering scheme change for an existing controls design. The task is to completely re-tag the drawing with unique reference numbers, component tags, and wire numbers.

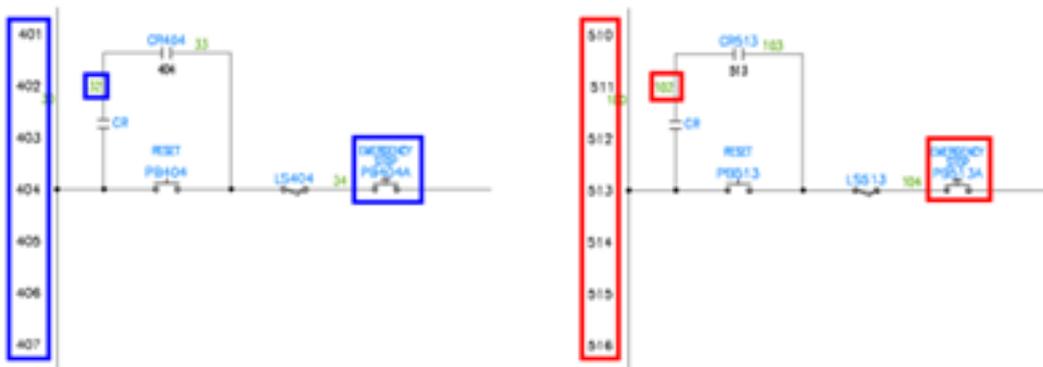


### Steps

1. Change the starting ladder reference number from 410 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 seven line reference numbers, four pieces of wire number text, and six 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 14 picks, clicks and keystrokes were used versus 91 in AutoCAD®, resulting in an 81% time savings.



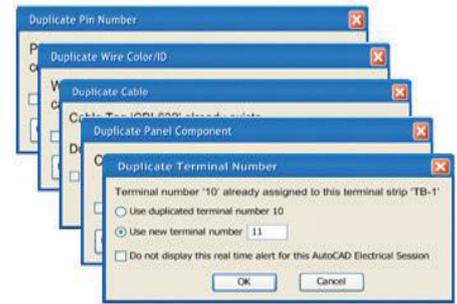
### Advantages of AutoCAD® Electrical

- 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 by picking individual wires.

Productivity Gain*	AutoCAD®	AutoCAD® Electrical
Number of Commands Utilized	2	3
Number of Times Commands Were Accessed	17	3
Total Number of User Picks and Clicks	91	14
Total Time to Complete Task (minutes, seconds)	1:45	:20
<b>Time Saving with AutoCAD® Electrical — 81%</b>		

3. Real-Time Error Checking

AutoCAD® Electrical includes real time error checking to help you avoid errors during the design process. The software AutoCAD® compares the requested changes with the current project and alerts to, duplicated schematic component reference designations, wire numbers and more.

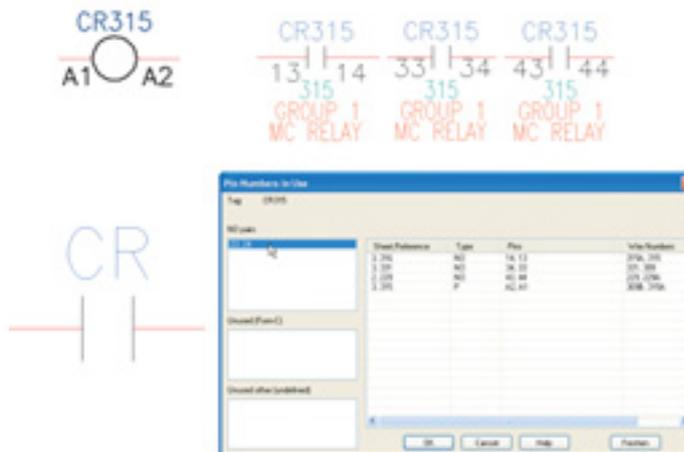


Task: Automatic Contact Pin Assignment and Contact Count Check

The task is to link child relay contact symbols to parent relay coil symbols and assign the next available set of contact pin numbers based upon the catalog number assignment.

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.

Productivity Gain*	AutoCAD®	AutoCAD® Electrical
Number of Commands Utilized	2	2
Number of Times Commands Were Accessed	5	3
Total Number of User Picks and Clicks	112	17
Total Time to Complete Task (minutes, seconds)	2:01	:22
<b>Time Saving with AutoCAD® Electrical — 82%</b>		

#### 4. Real-Time Coil and Contact Cross-Referencing

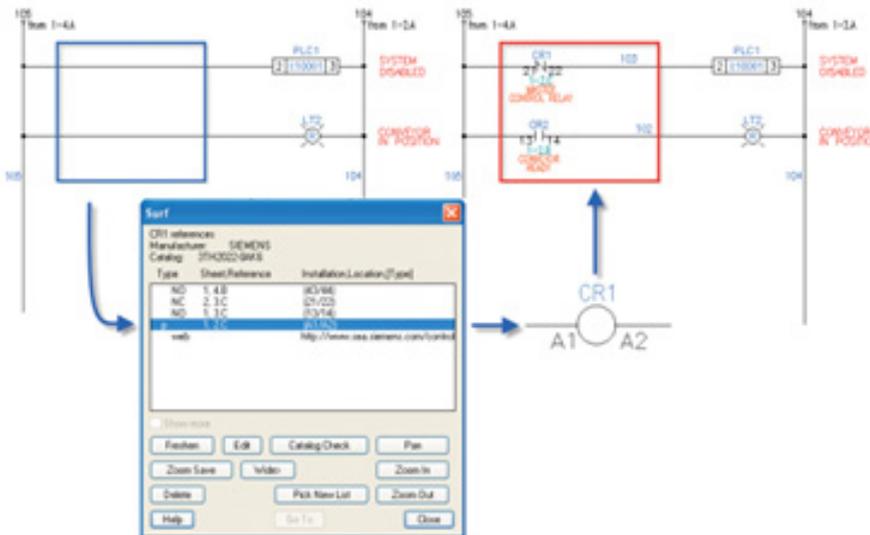
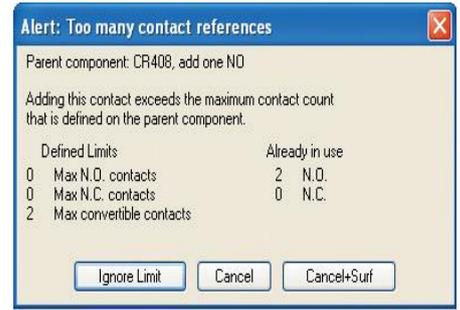
Reduce the risk of assigning too many contacts to any relay, and minimize time spent manually tracking assignments. AutoCAD® Electrical sets up parent/child relationships between coils and contacts, keeping track of how many contacts are assigned to any coil or multi-contact device, and alerting users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

#### Task: Contact and Cross-Reference Update across Multiple Drawings

The task is to tie a relay contact to a relay coil, when the coil is on different project drawing, and too 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 two 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 your own” for both, finding the tag-ID of the parent relay coil that might be anywhere in your project set, and figuring out the next available set of contact pin number assignments. Then 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 5 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	5	1
Number of Times Commands Were Accessed	7	2
Total Number of User Picks and Clicks	80	4
Total Time to Complete Task (minutes, seconds)	1:47	:25
<b>Time Saving with AutoCAD® Electrical — 77%</b>		

➤ 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.

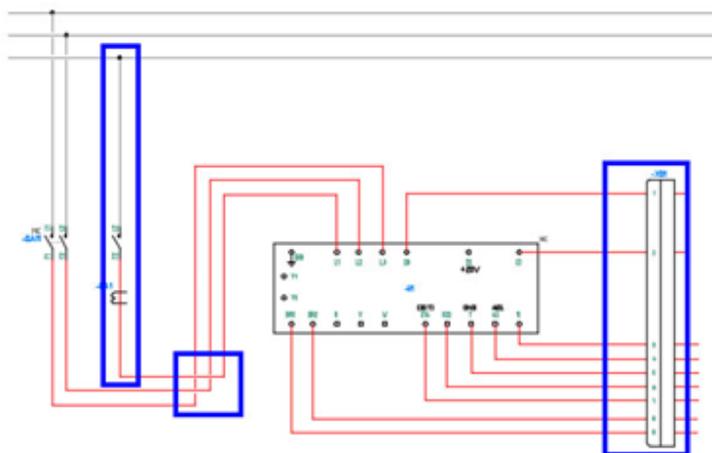


**Task: Include Multi-bus Wiring, Connectors, and Rearranging Circuits**

Start with a drawing partially completed drawing with a variable speed drive. The task is to connect the three-phase power wiring to the drive terminals. Wire up the remaining control connections through a plug / receptacle connector symbol. Accommodate a new transformer to one phase of the power wiring. According to company standards when wires cross one another a gap must be added for clarity of documentation.

**Steps**

1. Draw the three-phase power wiring from the disconnecting to L1, L2 and L3 terminals on the variable speed drive.
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. An engineering change, to add a current transformer in the last phase of the power connection. Widen the spacing between the bus wires in order to insert the transformer.



**Study Results**

The advantage of using AutoCAD® Electrical becomes apparent. 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.

**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

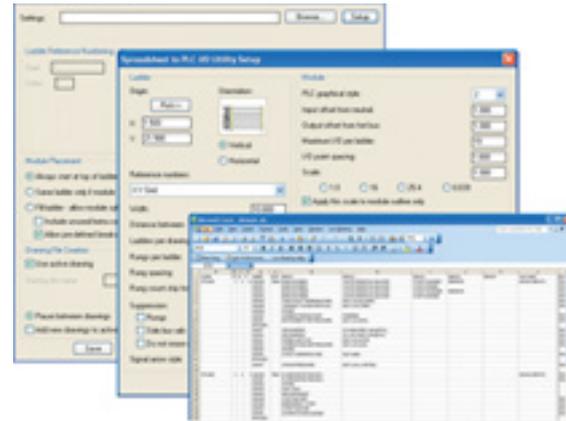
Productivity Gain*	AutoCAD®	AutoCAD® Electrical
Number of Commands Utilized	6	5
Number of Times Commands Were Accessed	23	8
Total Number of User Picks and Clicks	110	44
Total Time to Complete Task (minutes, seconds)	4:47	1:47
<b>Time Saving with AutoCAD® Electrical — 63%</b>		

## 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 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. The symbols to save time.



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.



### 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. Repeat above until all modules are accounted for.

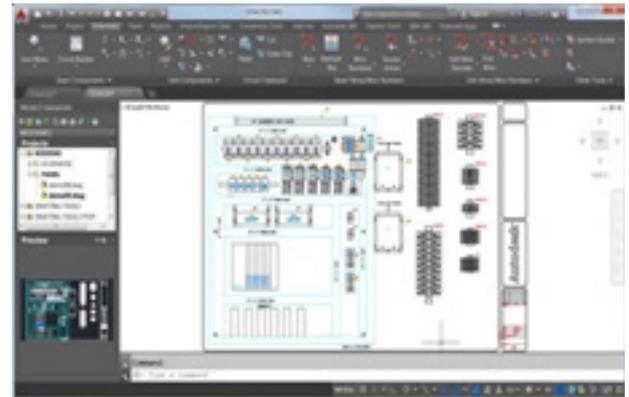
### Study Results

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 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.

Productivity Gain*	AutoCAD®	AutoCAD® Electrical
Number of Commands Utilized	4	1
Number of Times Commands Were Accessed	244	1
Total Number of User Picks and Clicks	442	6
Total Time to Complete Task (minutes, seconds)	120:00	:39
<b>Time Saving with AutoCAD® Electrical — 99%</b>		

7. Create Smart Panel Layout Drawings

Simplify panel layout drawing creation, reduce errors and help ensure that all parts are placed in panel drawings. 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. Non-schematic items such as wire duct and mounting hardware can be added to the layout and automatically combined to create a “smart” panel BOM report.

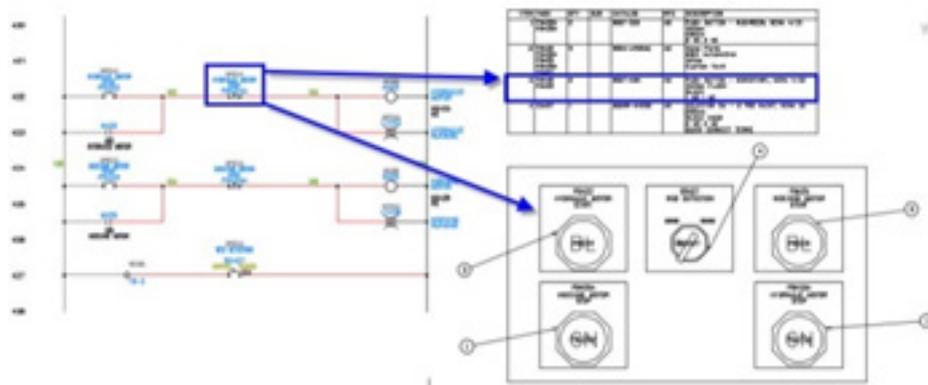


Task: Panel Layout from a Schematic Drawing

This drawing set includes pushbuttons, switch and pilot lights that need to go into a small operator station. The task is to generate a panel door layout drawing from the schematic data, and add nameplates to each operator. Also apply balloons to the pushbuttons and switch in the door layout.

Steps

1. 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, and selector switch.
3. Add nameplates with descriptions for each component on the door panel.
4. Balloon each of the pushbuttons and the switch with the same balloon item number in the parts list.



Study Results

The first task in AutoCAD® 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. 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.

Productivity Gain*	AutoCAD®	AutoCAD® Electrical
Number of Commands Utilized	3	4
Number of Times Commands Were Accessed	16	4
Total Number of User Picks and Clicks	202	73
Total Time to Complete Task (minutes, seconds)	6:21	2:28
<b>Time Saving with AutoCAD® Electrical — 61%</b>		

## 8. 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.

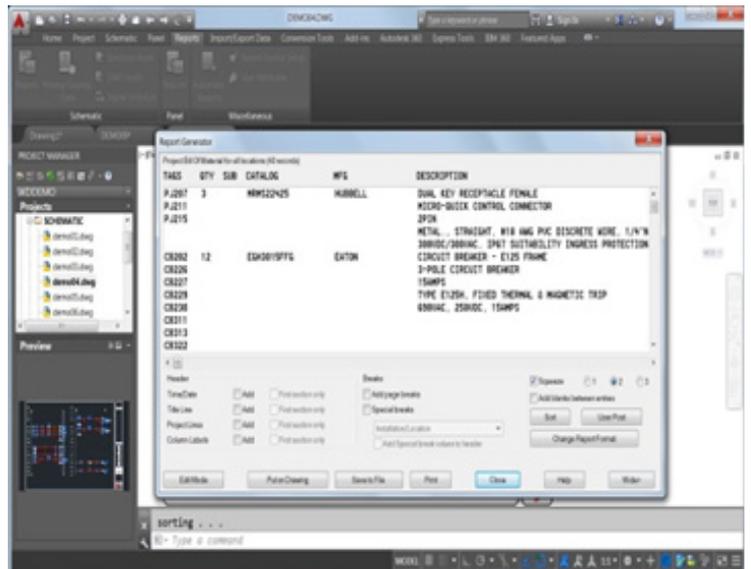
### Task: Automatic Update of BOM Table

Create a Bill of Material list for the current drawing in a project, this drawing consist of 9 unique components that are used 24 times. The BOM list will consist of: Tag numbers, Quantity, Manufacturer name, Catalog number, and description for each of the items.

### Steps

1. Create table with required fields.
2. Add component data to table

TAGID	QTY	SUB	CATALOG	MFG	DESCRIPTION
CR406 CR407 CR408	3		750-PS2AL	AB	P TYPE ELECTRICALLY HELD RELAY, 4 POLE, AC COIL, CONVERTIBLE CONTACTS TYPE P 32 NO 125-250VAC 60Hz / 250VAC 50Hz COIL, RATING 10A, OPEN TYPE RELAY RAIL MOUNT
LS406 LS407 LS408	3		25V-25AP-25Z5	OMRON	LIMIT SWITCH - MOMENTARY SPRING RETURN PNEUM. ROLLER LEVER 1 NC
LT405 LT403 LT406	3		BSH-PR6AG	AB	GREEN PILET LIGHT - STANDARD, ROUND OULTIGHT 125mm 250VAC 15W PLASTIC LENS CORROSION RESISTANT
LT401	1		BSH-PR6AR	AB	RED PILET LIGHT - STANDARD, ROUND OULTIGHT 125mm 250VAC 15W PLASTIC LENS CORROSION RESISTANT
LT409 LT402 LT403	3		BSH-PR6AR	AB	RED PILET LIGHT - STANDARD, ROUND OULTIGHT 125mm 250VAC 15W PLASTIC LENS CORROSION RESISTANT
RA4 RA02 RA25 RA30 RA25	3		AW620H3	EATON	FULL VOLTAGE MOTOR STARTER NEMA SIZE 1 NON-REVERSING 250VAC 15HP 3-POLE, 20/30 AC, 55/60HZ COIL 300% TYPE, 1/2SIZES INCLUDE
FB402 FB405	2		B00T-42A	AB	PUSH BUTTON - MOMENTARY, NEMA 4/13 125mm FLUSH BLACK 1 NO 1 NC
FB403A FB405A	2		B00T-303	AB	PUSH BUTTON - PUSH/RELEASE, NEMA 4/13 125mm GREEN 1 NO 2 NC
SS406 SS403	2		BS06-10233	AB	SELECTOR SV - 2 POS MOUNT, NEMA 13 125mm BLACK KNOB 1 NO 2 NC QUICK CONNECT TERMS



### Study Results

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 97% time savings over basic AutoCAD®.

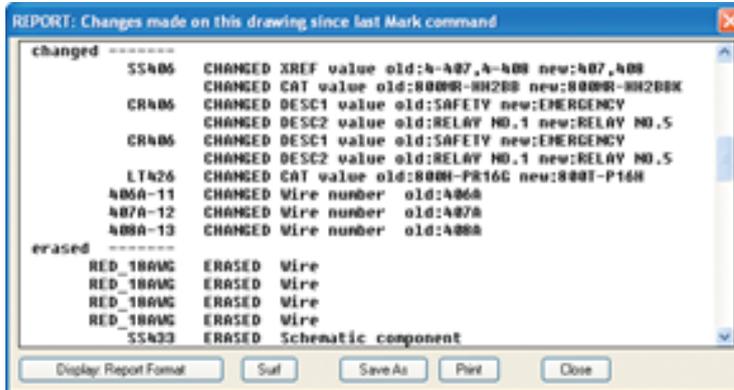
### Advantages of AutoCAD® Electrical

- Part number assignments selected from pick lists. Full descriptions are included automatically with the part number selection.
- Running the BOM report / "Place on drawing" option create or updates the existing BOM table.
- 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	1	1
Number of Times Commands Were Accessed	1	1
Total Number of User Picks and Clicks	691	7
Total Time to Complete Task (minutes, seconds)	9:23	:16
<b>Time Saving with AutoCAD® Electrical — 97%</b>		

9. Share and Track Drawing Changes

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.

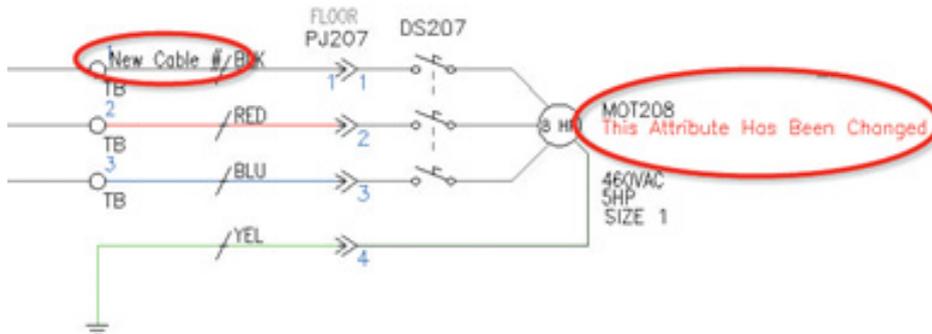


Task: Identify Drawings Changes, After a Customer’s Modification

During the design process drawings will need to be updated and changed frequently. Capture the current state of the project before sending to the customer for review and modification. After the customer returns the project, identify all the changes to the project drawings.

Steps

1. Run the “Mark” part of the Mark/Verify command on a project drawing set prior to releasing to the customer review.
2. The customer will use various basic AutoCAD® editing commands to make alterations to the design.
3. Now the drawings are back in your hands. Create a list of the changes that the customer made to the drawing.



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 these tasks via tedious drawing reviews or an engineering change order process.

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 and Clicks	NA	12
Total Time to Complete Task (minutes, seconds)	NA	1:08

**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

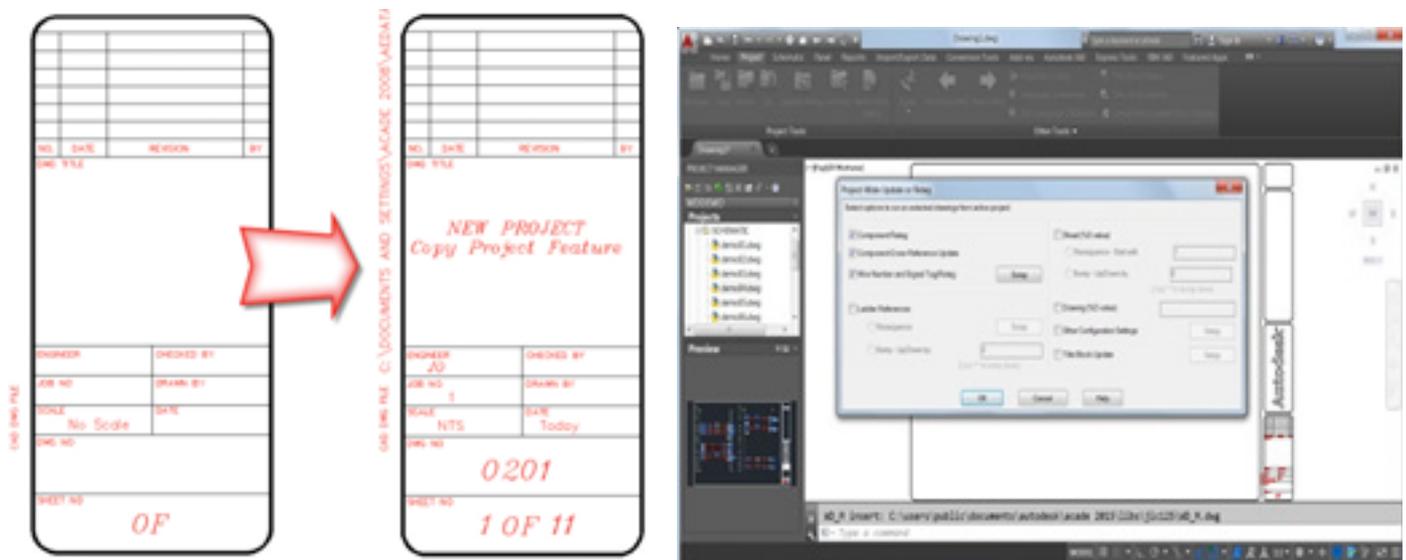
Get a head start on your design projects by reusing drawings from another project. Make a copy of a specific part, or reuse an entire drawing set when starting a new design. Save commonly used circuits for reuse in future designs. AutoCAD® Electrical automatically rennumbers the wires and devices to 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 of 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 Project name, Job number and Engineer 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. 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 268 picks/clicks and keystrokes were done. Using AutoCAD® Electrical resulted in a 79% time savings over basic AutoCAD®.

#### Advantages of AutoCAD® Electrical

- Reduce repetitious and time-consuming renaming of DWG files and title block information
- As your drawing set increases in page count, so does your overall time savings with Copy Project command in AutoCAD Electrical.

Productivity Gain*	AutoCAD®	AutoCAD® Electrical
Number of Commands Utilized	8	3
Number of Times Commands Were Accessed	33	3
Total Number of User Picks and Clicks	268	63
Total Time to Complete Task (minutes, seconds)	5:31	1:09
<b>Time Saving with AutoCAD® Electrical — 79%</b>		

## ➤ 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 67% reduction in number of commands used, minimal manual data entry, and reuse of existing data.

To complete the same tasks, it required 153 minutes 5 seconds using basic AutoCAD® software and only 8 minutes 50 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.

Productivity Gain*	AutoCAD (Minuets, Seconds)	AutoCAD Electrical (Minuets, Seconds)	Time savings
Comprehensive Symbol Library	1:30	:16	82%
Automatic Wire\Component Numbering	1:45	:20	81%
Real Time Error Checking	2:01	:22	82%
Real Time Coil and Contact Cross Reference	1:47	:25	77%
Electrical Specific Drafting Features	4:47	1:47	63%
PLC for Spreadsheet	120:00	:39	99%
Smart Panel Drawings	6:21	2:28	61%
Create BOM	9:23	:16	97%
Track Changes	N\A	1:08	N\A
Reuse Drawings	5:31	1:09	79%
<b>Total Time</b>	<b>153:05</b>	<b>8:50</b>	
<b>Time Savings with AutoCAD Electrical</b>			<b>80%</b>

For more information about AutoCAD® Electrical, including “Test Driving” the product, go to <http://www.autodesk.com/products/autodesk-autocad-electrical/overview> or contact your local reseller. To locate the reseller nearest you, visit [www.autodesk.com/reseller](http://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.

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