



THE LAST TIME INDUSTRY EMBRACED A WIDESPREAD CHANGE FOR THE DESIGN AND DOCUMENTATION OF ELECTRICAL SCHEMATICS THE PERSONAL COMPUTER REPLACED THE DRAFTING BOARD.

AutoDesk was first premiered in 1982. Being the first PC based system, it fostered an evolution in the way engineers work. Descendants of this technology are still in use today. Intelligent schematics are the next evolution in electrical design. This is not to say that the tools have not been available. In fact, there has been some form of intelligent schematics, parametric design, almost as long as AutoCAD has existed.

There are many benefits to this technology. The largest advantage being a unified platform for design and collaboration. A tool that can create designs faster, with fewer errors, cut the need for peer review, reduce change orders, and foster design re-use. This change is worth exploring. Change in any organization is difficult. Change is even more challenging when replacing an engineering system. The question to ask is what is the cost of not changing? The measure of status quo is no longer a financial one. Factors like being able to find and maintain willing employees, getting new employees productive, partnering with an organization to get the most out of your investment, and a tool that is adaptable across many business units are key factors in success.

LIGHTENING FAST DESIGN

Intelligent Schematics allow faster creation of electrical designs. The systems do this by automating the clerical tasks an engineer needs to complete a design. To place a symbol search through a library, instead of opening old or master designs. Symbols carry with them attributes that link to vendor part numbers. When selecting a part all the correct data displays, negating the need to align or arrange text. The tedious additions of wire numbers, device tags, and Bills of Material take away valuable design time. Spreadsheets dictate the current documentation process, not the design software. Time spent completing clerical tasks is time taken away from design and innovation.

Design at breakneck speed:

- Use libraries for symbols, parts, and wires
- Automated device tagging and wire numbering
- Assemble correct and dynamic reporting

Intelligent schematics keep all designs and design standards in one place. Each engineer has a style to their designs. Not all the same information is available in the same place. This can cause potential confusion with downstream recipients of this data. With an intelligent schematic design tool, an engineering department output becomes more homogeneous.



FEWER ERRORS

Engineers strive to produce correct and complete designs for an initial release. As designs become bigger and more complex the ability to do that decreases. Designs can have hundreds or even thousands of components each having many attributes. Adding wires and cable attributes add to the complexity and amount of data present. A peer review system will catch some errors in design, but often it does not catch everything. In this phase, a peer reviewer spends time checking wire numbers, device tags, attributes, and reports. With this valuable time engineers could be instead checking design integrity. Intelligent schematics all but end peer review for clerical error checking. Instead, engineers can use this time to vet out proper design.

No more check and re-check:

- Automate clerical error checking
- Complete and correct clerical tasks the first time
- Reduce peer review time
- Decrease the amount of engineering change documentation
- Help make design changes easier

Automating tasks in the design process the reliance is on the system, not the engineer. Yet, errors can still be present. The need for engineering change documentation is most often driven by the necessity to eliminate clerical errors. Clerical mistakes take time and effort to fix. Eliminating these frees up the engineer to concentrate on more productive endeavors. The larger problem is

that clerical errors put the integrity of the design at risk. Without intelligent schematics, catching errors that slip by peer review happens on the shop floor creating the second phase of engineering during manufacturing. Another risk introduced by clerical error-driven engineering change lays in manufacturing the incorrect version or release of a product. There are times the manufacturing team is not manufacturing the correct release of the design. Causing costly re-work.

The second type of clerical error occurs when a design changes. If a part is obsolete and a replacement selected, the exchange of the old for new is another place errors occur. Swapping one part for another seems standard practice. When all the references that part holds factors in, things begin to get complicated. This simple swap can incur a change in upwards of 30 different places on a schematic. Intelligent schematics eliminate this. Make a change once, and that change populates throughout the design.

The cost of clerical errors is impactful to the business. Knowing the true cost of these errors happens in few companies. This is because engineering time falls into one silo, making it difficult to understand the cost and cost implications of the varying engineering tasks. Making a true estimate of this amount hard to calculate. Engineering re-work estimate is often used to help calculate a return on investment when investigating a new tool. However, the help of an intelligent schematic system is impacting more than the engineering department. Showing the true value takes care to calculate.



UPCYCLING ELECTRICAL SCHEMATICS

Our mechanical engineering colleges have been using and re-using sub-assemblies for a long time. This has been difficult for the electrical engineering community to embrace as parametric design, intelligent schematics, have not yet become mainstream. Traditional schematic design re-use involves remembering which design contains the part of the schematic for re-use, locating that design on your computer or network, finding the part of the design you want to re-use, copy and paste into your current design, and deleting what is not needed and add what is. It is arguable that there is no time difference in this type of design re-use and creating the design from scratch.

Intelligent schematics enable engineers to:

- Catalog an entire library of electrical sub-assemblies
- Use the search tool to find sub-assemblies
- Have a common library of electrical sub-assemblies for a department

Intelligent schematics allow you to save portions of your design. These electrical sub-assemblies are then kept in a library for reuse not only by the engineer who created it, but instead available to the entire team. This elevates the idea of intelligent schematics beyond the building blocks of design.

EMBRACING THE FUTURE

Embracing the future parametric design has been a staple of mechanical design for many years. Electrical engineers have been slow to embrace parametric design for many reasons. Status quo is the biggest reason. Now is a great time to look at these toolsets that solve problems for electrical engineering departments. The usage of controls and electronics in all products is increasing and with that comes added workload to already thin departments. The right toolset combined with a company that is going to partner with you for success is something to ignore no longer. A modern intelligent schematic design package will set your company up to attract the best engineering talent, maximize engineering budgets, continuously improve and leverage designs in new ways.

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