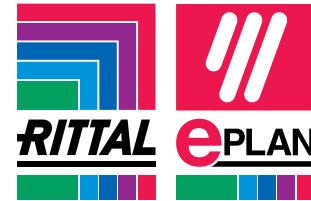




Interactive PDF
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instead of scrolling

White Paper

Intelligent Wiring – From Digital to Physical



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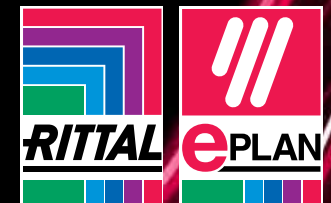


Introduction

Electrical control manufacturers are being placed under considerable pressure right now. Projects are becoming more complex, the trading environment is extremely competitive, and customers will naturally want to keep their costs to a minimum.

With a typical specification having more than 300 pages and taking approximately 54 hours to read (source: Stuttgart University), it's no surprise that the pressures (and costs) start from the moment a manufacturer's estimating engineers receive details of a new project.

In this e-book we address the current challenges facing electrical control manufacturers, paying particular interest to the most time-consuming phase - wiring. From there, the strong partnership of EPLAN and Rittal, illustrate how this phase can be drastically reduced with the help of automation.





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EPLAN
Design

2.
Automation of Wire
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Design and
Engineering

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Wiring

Design and Engineering

Delivering a control panel build takes a substantial number of man-hours, resources and again, of course, costs. Simply preparing engineering and schematic drawings for client approval might involve:

- Incorporating client changes (potentially time-consuming and complex)
- Last-minute project adjustments
- Close co-ordination between design and manufacturing teams
- Using standard products wherever possible



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Panel Manufacturing

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Panel Manufacturing

Key challenges for the next step – the manufacturing phase - include managing resources within tight timescales. There's no doubt that rising demand in the sector is being matched by a trend for shorter lead times. Meanwhile, the sector is experiencing long-term major shortages in skilled workers so recruitment has become more problematic, particularly for short-term contracts on major projects. Moreover, it is not easy to cope with a peak in production, as not enough people with the same level of knowledge, skills and experience are available.

Both of these first two stages, design and engineering, as well as, the further modifications including the number of cut-outs and the holes for door fixings account for around 36% of the total time.



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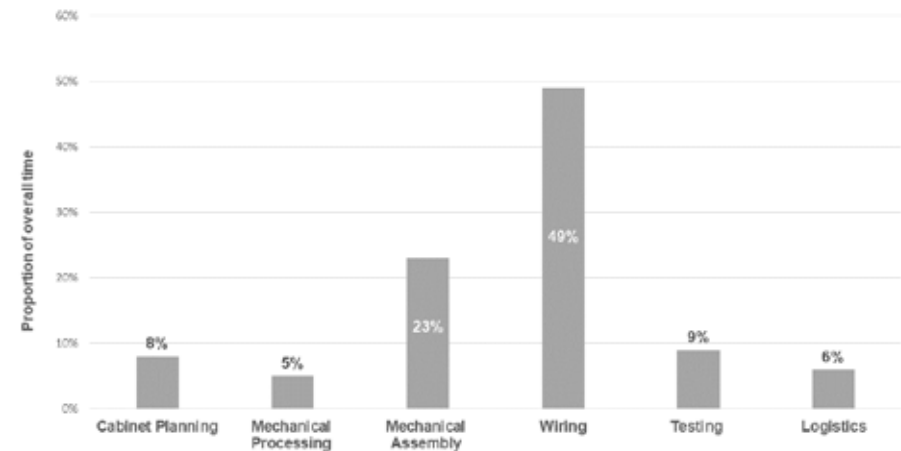


Wiring

The most time-intensive phase of a typical control panel is usually wiring (preparing wires, reading drawings for routing points and termination), often taking up to 49% of the total time.

Wiring according to a schedule takes a lot of experience and even then there are risks of errors in the wiring process. For example, if two identical panels are wired by two different engineers, the output may be influenced by their own insight and way of working.

Such influence also arises when there is time pressure on delivery and several people have to work together on one panel. In such a case, there is little chance that the wiring will be 'as-designed' which ultimately makes purchasing, service and maintenance much more difficult. And then there's the thankless task of adjusting the wiring diagram. Someone will have to update the wiring diagram in-line with the as-built version before shipping the cabinet to ensure that there is one single source of truth.





Cost-saving Measures

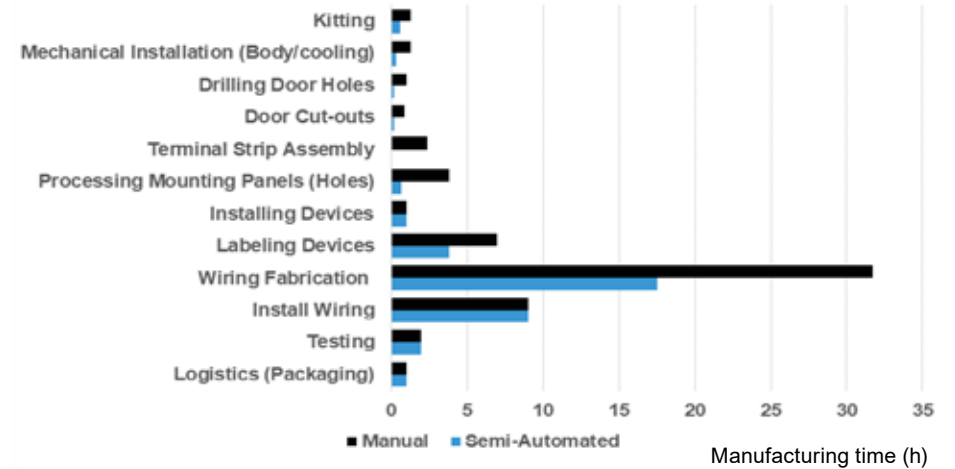
Whilst wiring is the lengthiest process in the production of control panels, it is also the stage which has the biggest opportunity to save time with the help semi-automated and fully-automated processes by Rittal and EPLAN.

There are three ways in which Rittal and EPLAN can considerably reduce the manufacturing costs of a control panel.

These are:

- Optimise the engineering and schematic design phase using EPLAN software
- Automate the processing of wires ready for installation
- Seamless data transfer

Which manufacturing stage has the biggest opportunity to save time?



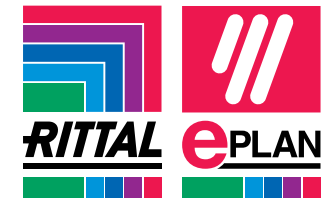
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EPLAN Pro Panel

Wiring control cabinets will always remain a job for skilled and experienced staff, but it can be made easier. If the control panel is designed with EPLAN Pro Panel, the engineer can visualise the route of each individual wire in 3D, to optimise the pathway and for easy installation. It also ensures that the trunking capacity is not exceeded and that the correct cable separation takes place.

EPLAN Pro Panel also easily and automatically generates lists that provide all the necessary information to engineer, including the routing, end points, cable designation, as well as the size and colour of each wire. The lists make wiring easier and faster and significantly reduce the chance of errors – and fewer errors translate into significant time-savings during testing.

Another major benefit is uniformity. The detailed wiring lists ensure that two or more of the same control cabinets have identical wiring, making life a lot easier during later modifications or fault-finding.

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EPLAN Pro Panel

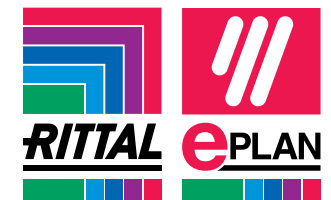
Other EPLAN solutions

EPLAN Platform

EPLAN Pro Panel can also be used alongside other solutions within the EPLAN platform to further improve efficiency and increase productivity.

The potentially complex client changes can also result in increased engineering time due to the to-and-fro nature of passing designs for the client's approval. With the cloud-based solution EPLAN eVIEW, project data can be made digitally available to clients and all other project stakeholders so changes can be made to the schematics quickly and easy. Having a single source of truth ensures there is only one version of the schematics, eliminating any duplicate confusion.

Another solution, EPLAN Smart Wiring, allows wiring technicians to see the connection points and exact wiring routes for every wire in step-by-step instructions. This can be viewed on a laptop or tablet, and their progress is mapped, tracked and displayed in real time. This means it is virtually impossible to miss wires, even if a wiring job starts with one person and is finished by another.



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Rittal Wire Terminal Machine

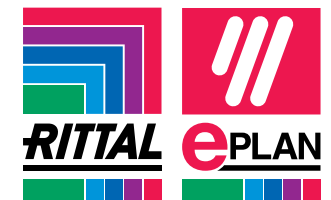
Wiring control panels is a time-consuming, painstaking job: the wire must be cut to length; stripped; crimped; labelled and finally, the finished cable must be routed and connected to a terminal. It's not surprising that wiring accounts for 49% of the total time needed for the production and assembly of a control panel. Automating these processes therefore will offer significant improvements in operational efficiency.

Rittal's Wire Terminal (WT machine) is a compact and fully automatic wire assembly machine, and is designed to improve wiring procedures, therefore improving quality and making wire assembly production processes eight times faster.

Two WT machines are available:

- WT24
- WT36

The WT24 will process up to 24 wire types and the WT36 will process up to 36 different wire types in cross sections ranging from 0.5 mm² to 2.5 mm². An optional 4 mm² and 6mm² is also available. Work such as cutting to the required length, wire stripping and crimping can all be carried out without any manual intervention, freeing up time for shop floor personnel to focus on other value added projects/work. In fact, the machine doesn't just free up time, it completes the wire processing much faster at around 240 wires per hour.

[Contact](#)



Rittal Wire Terminal Machine

01

Wire storage

The WT has available wire storage for up to 36 wires. drums.



02

Wire Fabrication

Incorporates the RC-I insulation stripping and crimping machine allowing five different wire cross-sections (from 0.5 mm² to 6 mm²) to be processed without having to change the wire end ferrules.



03

Wire Printing

To ensure optimum identification and positioning of the origin/ destination wires, a optional printing system may be fitted which is available in either in black or white, or alternatively both.



04

Ordered storage

The processed wires are then stored in sequential order via the EPLAN Smart Wiring option. The 13 way storage cassette system can hold 1820 wires ready for terminating in control panels.



The Wire Terminal can include a 'lift' option, for a quick changeover to different automatic crimping machines if these are needed (for example, for dissimilar cross-sections).





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The data flow

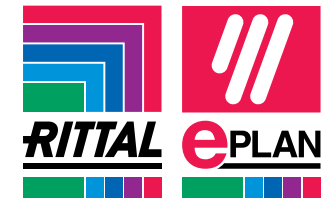
Benefits

Seamless Data Flow

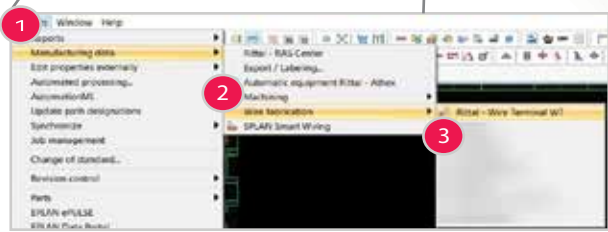
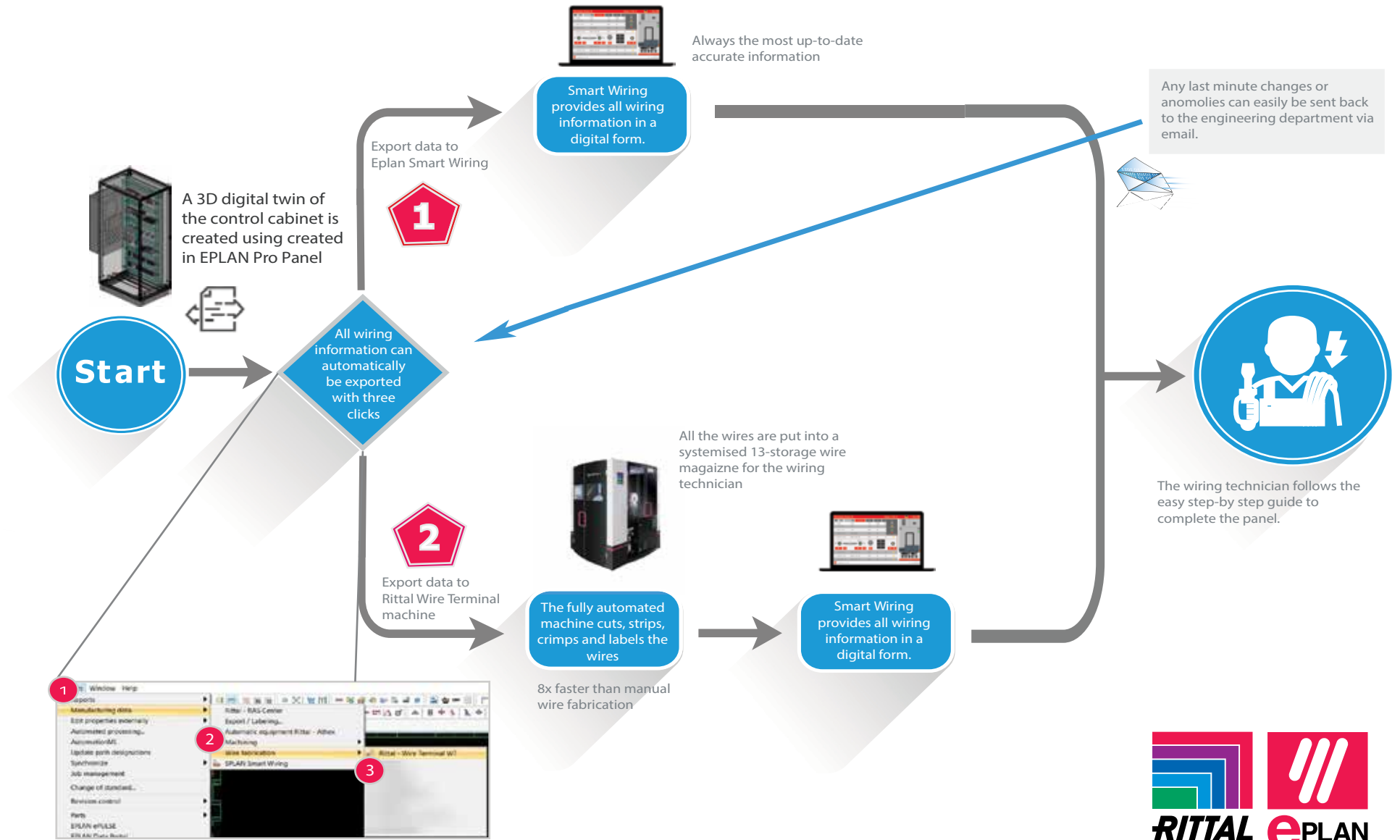
If a workshop is to adopt efficient automated work-streaming, then consistent data management is absolutely vital and this is something which is integral to the Wire Terminal machine.

The data provided during the planning and design stages in EPLAN Pro Panel (for example, wire lengths) can be directly exported to the Wire Terminal machine with just three clicks by the seamless digital interface. However if you prefer, the data can also be entered into the machine by hand. The fully automated wiring machine can then begin to process all wires with little to no interference from a wire technician.

Using the same data from EPLAN Pro Panel, the Wire Terminal stores and sorts the processed wires sequentially according to the EPLAN Smart Wiring tool. This allows users to locate the correct wire within the system quickly and easily, just by following the Smart Wiring schedules.



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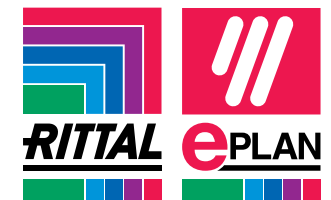
Why?

The data flow

Benefits

Benefits of a Seamless Data Flow

- The cable and wire lengths have already been accurately calculated in the EPLAN software therefore ensuring less waste/scrap.
- The most efficient wire route have been automatically calculated in EPLAN Pro Panel. This data is fed through to the wiring technician with EPLAN Smart Wiring, therefore diminishing the need for interpretation which could lead to costly mistakes.
- Improves communication between all departments.
- There is no need for lengthy wiring diagrams on the shop floor - everything can be sent digitally.
- EPLAN Smart Wiring allows for the wireman to directly feed information back to the engineers such as any changes or anomalies via an email from the shop floor. This can then be documented for future projects.



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What's next?

Using a Wire Terminal WT for wire processing means this phase of the control panel build can be up to eight times faster. That means automated wire processing, used in conjunction with EPLAN software can drastically reduce manufacturing time and costs and offers consistently high quality. When considering a Wire Terminal, you can't think of it as just purchasing a piece of machinery. You have to think about your upstream and downstream processes and how the seamless data flow will increase efficiency throughout your whole value chain.





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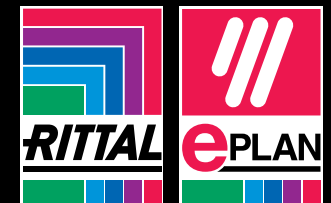
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