

Eschmann Testimonial



Eschmann Equipment realise major benefits after switching CAD tools to Pulsonix

Eschmann Equipment is the trading name of Eschmann Holdings Ltd: a leading manufacturer of medical equipment in the area of operating tables, electrosurgery units, surgical suction units, bench top autoclaves and surgery trolleys. Originally established in 1830 Eschmann is registered to ISO 9001 standard for Quality, and exports to over 100 countries world-wide.

The existing CAD system

Early in 2001 an internal company review was undertaken on the efficiency of the existing Design Capture and PCB Layout tools. It was then decided to seek a replacement system for the existing Mentor Schematic Capture and PCB Layout. It was determined that the existing system could no longer support the design department's ability to achieve development deadlines. Many Eschmann product variants are reworked from existing layouts and this could not be conducted quickly enough with the existing tools.

Another major factor was that concurrent schematic and layout was not possible with the Mentor system. This meant that design capture and layout was always a sequential process, which was no longer acceptable. Eschmann engineering staff needed to start the design capture, transfer to PCB at an early stage and while the Layout process was under way, complete the design. Updates to the layout during development needed to be by a fast and efficient method of engineering change orders (ECOs). As a side issue, ongoing support costs with the Mentor system were quite high and were no longer sustainable by the engineering department.

Search for a replacement

Starting May 2001 the company commenced an evaluation of alternative PCB design, simulation, and layout solutions. The specification was for a product delivering significantly higher performance to overcome as many as possible of the short-comings experienced with the existing Mentor system. This would enable the product development department to meet the ever-shortening new product lead-times, but at the same time maintain the company's ISO 9001 quality standards.

Eschmann electromedical products are usually mixed analogue/digital designs so it was important that the new system was expanded to include a reliable mixed-mode SPICE simulator; preferably integrated into the Schematic design and PCB Layout environment. Though high performance was required, the product had to be easy to learn and understand. Eschmann's design department always have a high workload of new projects, and so a short learning curve was essential. They simply could not accept the type of delays normally experienced ramping-up with a new Design Capture and Layout product.



The Eschmann T20 multi-axis operating table designed with Pulsonix mixed mode simulation & PCB Layout tools

After an initial search they came down to a list of products that met the initial criteria. This was PADS PowerPCB, P-CAD 2001, OrCAD and a new product, Pulsonix. Eschmann requested a detailed demonstration and then an in-depth, on-site evaluation of each complete software system. OrCAD was quickly rejected as Schematics and Layout were not integrated enough and the OrCAD Layout system could not address the complexity of designs adequately. P-CAD 2001 was rejected as the product did not appear easy to understand; engineering change order handling was not as straightforward as they required; and copper creation was not to the standard required.

The shortlist: PADS PowerPCB and Pulsonix

The short-list came down to PADS PowerPCB and Pulsonix. PADS was found to be a comprehensive and powerful system, but certain factors were not favoured by Eschmann: (a) the Schematics product proposed was Viewdraw. This product looked quite different to PowerPCB and Eschmann concluded this could result in a long learning curve which would not be acceptable and (b) the purchase price and ongoing maintenance costs with PADS were quite high and would be difficult to justify.

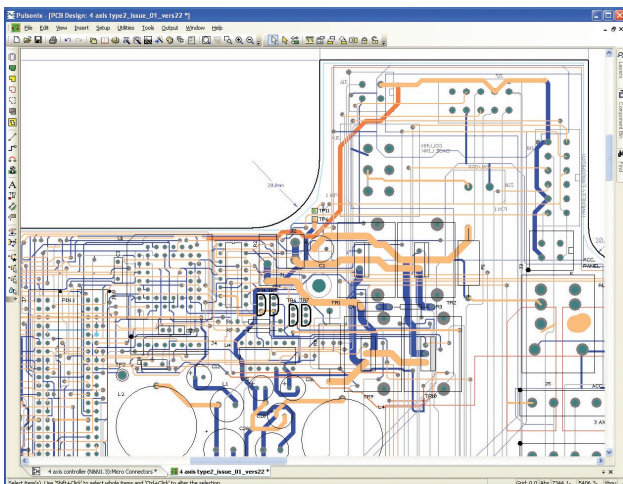
In comparison, Eschmann found that the new product, Pulsonix, delivered a state-of-the-art system meeting the company specification for performance plus ease of use at only a fraction of price quoted for the PADS product both in terms of purchase and ongoing support costs. The Pulsonix Schematics, Simulation and PCB Layout tools was found to be an integrated tool-set. The fast backward and forward annotation in Pulsonix meant the company could efficiently conduct concurrent design capture and layout, which was essential to meet the development deadlines. As with the rest of the toolset, Pulsonix Spice was found to be an easy to learn, cost effective tool that completely matched the company requirements in mixed-mode simulation.

The decision was made in favour of Pulsonix and the system comprising 6 Schematic licenses, 2 Pulsonix Spice, and 1 Pulsonix PCB Layout seat with autorouter; was ordered and installed in October 2001. During the training course Eschmann staff all found the product quite simple to understand and progress was fast. At the end of training the electronics development staff were quite confident to use Pulsonix immediately on a new, high profile project with a short development timescale.

The initial project

This initial design project was for the new Eschmann "T20" operating theatre table. The product prototype had been presented at a recent exhibition and considerable interest had been generated, so it was essential the delivery deadline for production in early 2002 was achieved. The "T20" product included two complex, multi-layer, PCB boards to control multi-axis movement of the table either at the table or by remote handset. One, the 4 axis table movement and master control board is 4 layer plus power-plane board with 328 components and 306 nets. This board also had two daughter boards with Motorola microprocessors on each as part of the master control and safety circuitry. The other 3 axis table control board is an 8 layer board with 238 components, 202 nets and included 12 power FETs driving 20 amp motors. The table has an RS485 internal interconnection and an RS232 port providing a PC connection for fault diagnosis and re-calibration.

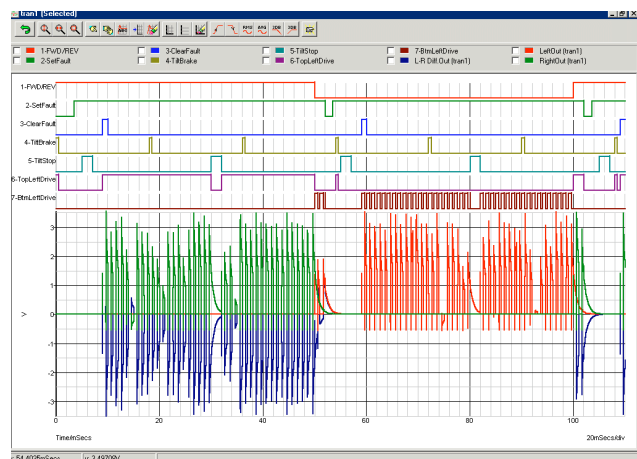
Medical electronic products have extremely stringent safety standards. The biggest issue is keeping earth leakage to the absolute minimum. The maximum total leakage is 50 microamps and the internal systems must be impervious in leakage to any dust or dirt that could possibly build-up on the board over many years of use. The second issue is again associated with safety. In the design of an operating table with multi-axis movement, under no circumstances can movement in one axis interfere with another, or movement of



A multi-axis control board completed a few weeks after initial training on Pulsonix

the table occur for any reason whatsoever after a chosen position is reached, as this could of course have disastrous results. Therefore, the control circuitry must remember the precise position of each part of the table and account for all contingencies to ensure that no un-requested movements occur.

Mixed-mode simulation was new to Eschmann and as part of the new system 2 seats of Pulsonix Spice were included. During the Spice simulation training part of the "T20" schematic was used as a working example. Spice models were assigned to newly created Parts (where they didn't exist in the library) and additional Spice models downloaded from the manufacturers' web sites. Shortly after running the simulation a problem with the design was discovered. The design was broken down into logical modules and each module



Simulation results from Pulsonix quickly identified errors in specified components

simulated. The reason was immediately established - the FETs used for the motor driver circuit were working in depletion mode and not as required. A different FET was chosen and the circuit worked. All the table control and safety logic was simulated and a number of potential design flaws found before the first prototype was built. Following simulation the control and safety circuitry was found to work perfectly on the initial prototype. This saved a great deal of time on this project.

Pulsonix Spice is now in daily use on other projects. In particular, the engineers like the random probing mode which frequently eliminates the need for re-simulation of the design when additional measurements were needed, and the fast Monte Carlo analysis to simulate the effect of component tolerance variations. A factor in the design team's philosophy is there are no potentiometers so there is minimal calibration required. The Monte-Carlo analysis has proved beneficial in ensuring that equipment works consistently within specification when it gets to production.

Savings of 4 weeks per project

Now that Eschmann development staff can identify design problems before the prototype is built by using Pulsonix Spice, they calculate this is saving one complete design iteration per project. This represents a saving in time of approximately 4 weeks per project, which has a real effect on meeting company deadlines.

Eschmann Engineering Manager, Patrick Clayton:

"All of our new product designs are on tight deadlines so it is essential we get the design right first time. In changing our product design tools to Pulsonix we are able to simulate the critical areas of the design accurately and transfer the results into layout, quickly creating a working prototype ready for test. We experienced the benefits of the Pulsonix integrated tool-set almost immediately."

"We estimate that Pulsonix system has improved our efficiency in the electronic design department over the original Mentor system by approximately 50% and as a result we are now much better positioned to achieve the development targets set by the company. As an added benefit we have significantly reduced our ongoing maintenance costs for the electronic design tools. Therefore, the introduction of the Pulsonix products have been a great success for Eschmann Equipment."