SPECIAL REPORT: Solid Edge

SOLID EDGE
& ELECTRO
MECHANICAL
DESIGN

EXPLORING SOLID EDGE ELECTRICAL DESIGN

PCB DESIGN
Syncing board and mechanical design

WIRING & HARNESS DESIGN
Wrangling order from wire-based chaos

ECAD/MCAD INTEGRATION
Collaboration across discplines

ELECTRO MECHANICAL: CHALLENGES & SOLUTIONS

The rise of more sophisticated and more intelligent products means efficient electromechanical design has never been more key. We explore how Solid Edge addresses this new challenge

A cross every industry, today's demanding customers expect more "intelligence" and functionality in their products. Because of this, the use of electronics in traditional mechanical devices is increasing at an unprecedented rate, and all of these electrical signals must be physically connected throughout devices.

Alongside traditional electrical and mechanical design and their inherent design challenges, sensors are being added to practically everything in an effort to connect devices and create a "smart" world.

Signals from sensors are carried via wires to embedded control boxes, actuated components and antennas. Then, wires are bundled into harnesses. As a whole, these electrical distribution systems create the nervous system of modern products.

The result is increasingly complex electromechanical systems, where electronics and software control the mechanical aspects of a design. Unfortunately, complexity is rendering previously best practice processes ineffective and ultimately obsolete , with designers having a hard time keeping up with the fast-changing demand.

The days of throwing designs over the wall for implementation, and then waiting for physical prototypes to be built to see if the product works as intended, are gone. Engineers are being asked to work outside their normal domain with mechanical engineers often dealing with electrical requirements, and vice versa.

Without a coordinated design flow, integration must rely on the availability of physical prototypes and can occur very late in the design cycle. Mistakes made during late phases of development can be costly. When not caught until the prototyping and testing phase of design, the result can be significant delays and additional costs. They can even lead to a product being introduced too late in the market. As complexity continues to increase, previous design processes are no longer viable.

When electrical and mechanical engineers work in two different environments, it can be difficult to communicate about the most basic things. Are the two talking about this wire or that wire? The electrical engineer is looking at a line on the diagram. The mechanical engineer is looking at a wire, cable or harness routing in the 3D mechanical assembly. This can introduce significant friction, delays and errors into the process.

Perhaps it is time for a new, more synchronised process in an environment that, instead of hindering communication, enhances and supports it?

KEY TRENDS IN ELECTROMECHANICAL DESIGN

INCREASING DESIGN COMPLEXITY:
Technological advancement, increasing safety and environmental mandates, and escalating consumer demand for advanced features and functionality is placing tremendous stress on both design and manufacturing processes. This is having a detrimental effect on a manufacturer's bottom line.

OPTIMISED PRODUCTS IN SHORTER TIMES:
Achieving first-pass success co-design has long been recognised as a potential enabler to increasing productivity and ensuring a robust design. With modern CAD tools, designers are able to synchronise their data more efficiently and collaborate more effectively on critical design items between domains.

COLLABORATION BETWEEN DISCIPLINES:
The days of throwing designs 'over the wall' and then waiting for physical prototypes to see if the product works are gone. A tightly integrated electromechanical solution enables true co-design across disciplines, freeing engineers to innovate, as the impact of a change can be assessed in both domains.

WIRING DESIGN
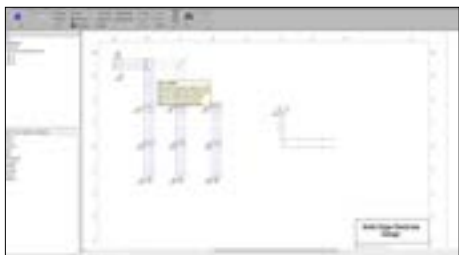
CHALLENGE: Without the proper contextual information, the merging of wiring and mechanical data can be especially problematic. This causes synchronisation issues, increasing the risk of error and time to market.
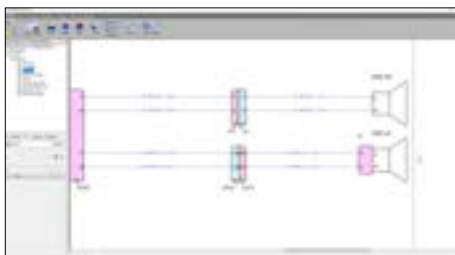
SOLUTION: Integrated design processes enable data to flow automatically between the mechanical and electrical domains, allowing more parts of the process to be automated and optimizing the design.

BENEFITS: Solid Edge Wiring Design provides interactive access to information from each domain. With it, both electrical and mechanical engineers are able to quickly reconcile incompatibilities as the design proceeds.

HARNESS DESIGN

CHALLENGE: Wire harness design is still a time-consuming, error prone, manual process. Without a coordinated design flow, integration efforts must rely on access to physical hardware late in the design cycle.

SOLUTION: New design and manufacturing capabilities allow users to produce a wire harness directly from assembly models, eliminating the need to build a physical prototype before producing the wire harness.

BENEFITS: Solid Edge Harness Design automates many harness development tasks including part selection, decomposition of harnesses into buildable harnesses and the creation of manufacturing reports.

PCB DESIGN

CHALLENGE: PCB designs, mechanical enclosures, and related components need to fit, and be correctly designed the first time to eliminate re-spins, get designs to market more quickly and minimise costs.

SOLUTION: Sharing 3D representations allows visualisation of a design and detection of potential problems earlier. This moves validation of manufacturing and electrical data earlier into the design cycle.

BENEFITS: Solid Edge PCB Design speeds development with communication of design changes and automated review and approval processes between the electronics and mechanical domains.

MCAD-ECAD COLLABORATION

CHALLENGE: Electrical and mechanical disciplines have traditionally been separated. When working in different environments, it can be difficult to communicate, introducing significant friction and errors in the process.

SOLUTION: Collaboration is recognised as an enabler for increasing productivity. With modern CAD tools and intelligent software, users are able to synchronise data and collaborate between domains.

BENEFITS: An efficient and effective ECAD-MCAD collaborative process provides increased productivity by enabling what-if scenarios and allows engineers to co-design in their native environments.

SOLID EDGE
A COMPLETE SOLUTION

While Solid Edge is a recognised technology leader in mechanical design, the depth and breadth of its toolset is now much broader, harnessing the strength of the Siemens PLM technology portfolio

Mechanical Design

Solid Edge has been developed to provide an environment for experimentation and engineering definition. It runs the gamut of 3D modelling of intelligent parts and assemblies, drawing creation and much more.

Electrical & PCB

New tools for developing wiring, harness and printed circuit board (PCB) components that bring to bear experience and know-how of Mentor Graphics (now part of Siemens PLM stable).

Simulation & Analysis
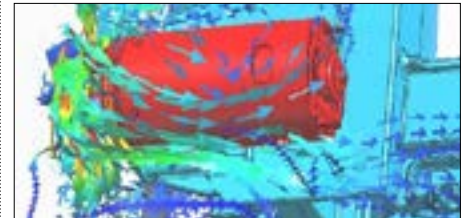
It's one thing to create the 3D form of your product, but how will it perform in the real world? Solid Edge has a wide range of simulation tools available from structural FEA to fluid flow and thermal cooling with CFD.

Manufacturing
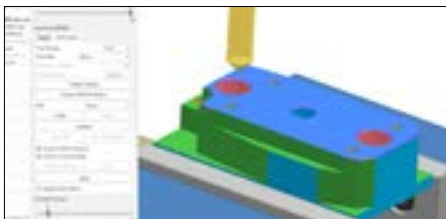
Whether you're looking to document a part for production, build a prototype with a 3D printer or prepare your part for additive manufacturing, Solid Edge has all of the tools you'll need to realise your next product.

Data Management

As engineering organisations create data, it's key that this is tracked and made available to all who need it. Solid Edge has a range of options to solve the data management needs of all business sizes.

Technical Publications

CAD data can be reused in many downstream applications - technical publications are a perfect example. Create high quality content such as work instructions, service documents, synchronised for design updates.

TRY SOLID EDGE FOR FREE

www.siemens.com/plm/try-solid-edge

READ MORE ON ECAD-MCAD COLLABORATION

siemens.com/plm/electromechanical