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SALCOMP

Salcomp uses Simcenter 3D Electromagnetics to significantly reduce development time <

Shenzhen, China

Chinese smartphone and tablet charger market leader turns to new Siemens simulation solution to reduce prototypes and enhance processes

CHALLENGES

- Create designs for charger applications within specific OEM parameters
- Develop planar magnetics transformation process for design and development
- Meet requirements for electromagnetic simulation work
- Create accurate planar transformer designs
- Reduce/eliminate costly filtering materials

KEYS TO SUCCESS

- Simulate optimal transformer and reduce prototype rounds with Simcenter 3D Electromagnetics
- Require advanced electromagnetics simulation solution for low and high frequency issues
- Determine where material is being overused to save costs and reduce weight
- Receive training and technical support from IDEAL GRP

RESULTS

- Discovered balance between different electrical, magnetic and chemical engineering elements
- Saved at least one prototype round (one month) of development time
- Changed electromagnetic engineering processes

Salcomp

Salcomp develops and manufactures adapters for mobile phones and other electronic devices. They are a market leader in smartphone and tablet chargers, having produced over 3.4 billion chargers.

<http://www.salcomp.com/> (<http://www.salcomp.com/>)



Our goal with Simcenter 3D Electromagnetics is to simulate the optimal transformer so that we can have as few actual prototype rounds as possible.

Lauri Puranen,
Magnetics Manager Salcomp

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With accurate simulation results, like those we get from Simcenter 3D Electromagnetics, you can reduce the number of design experiments to get to the planar transformer parameters you need.

Lauri Puranen,
Magnetics Manager Salcomp

Chargers are one of the most indispensable products in daily life. They are a necessity for all kinds of devices, including smartphones, tablets, headphones and ear buds. Salcomp is a global leader in smartphone and tablet charger manufacturing. Originally founded in Salo, Finland, in 1973, Salcomp has produced approximately 4 billion phone chargers over the past three decades, making the company a pioneer in its field. Today, Salcomp has a 520 million-piece annual production capacity and approximately 16,000 employees worldwide. In 2019, the [siemens.com/simcenter](https://www.siemens.com/simcenter) company was acquired by Lingyi iTech, a Shenzhen, China-based magnetic materials manufacturer.

Introducing Simcenter 3D Electromagnetics

Several years ago, Salcomp recognized that planar magnetics would become suitable for mass production as global technology evolved. Anticipating this shift, the company turned to Siemens Digital Industries Software's Simcenter™ 3D Electromagnetics software for accurate low- and high-frequency electromagnetic simulation capabilities to improve development efficiency and reduce production costs.

"Salcomp's former R&D director believed that planar magnetics would become more popular with the increasing demand for high-power density," says Lauri Puranen, magnetics manager, Salcomp. "This technology now plays a huge role in power supply and planar magnetics transformation techniques.

"By 2017, adapting planar magnetics to mass production started to look feasible and we had customer requests for simulation work on this level. Today, we work on quite a few high-power planar transformer designs using Simcenter 3D Electromagnetics."

Planar magnetics are a popular solution for applications where available space for magnetic components on printed circuit boards (PCB) have constraints. Compared to traditional wire-wound components, planar components are flatter, making this an interesting solution for engineers who need to be on the cutting-edge of charger technology.

Electromagnetics and smartphone chargers

Simcenter 3D Electromagnetics is part of Xcelerator, a comprehensive and integrated portfolio of software and services from Siemens Digital Industries Software, where today meets tomorrow. Simcenter 3D Electromagnetics is essential to Salcomp for effective planar transformer design and solving electromagnetic interference (EMI) issues in the company's smartphone charger design.

Traditional transformer design is pretty straightforward. Engineers make samples using basic parameter calculations and measure the results in-house. In a bestcase scenario, the engineer has a selfmade prototype on the same day they have a basic calculation. But for planar transformers, files need to be prepared in computer-aided design (CAD) software. The drawback of this process is that it can take up to three days before the design is sent to the PCB manufacturer. Depending on the lead time, it could be an additional three weeks before a first prototype is available.

Like traditional transformers, the parasitic calculations required for planar transformers are also quite challenging. Most of the time, they don't match the real result. This is where accurate and advanced simulation is desirable.

"With accurate simulation results, like those we get from Simcenter 3D Electromagnetics, you can reduce the number of design experiments to get to the planar transformer parameters you need," says Puranen.

Dealing with EMI

With magnetic components and capacitors that reduce size while increasing power density, planar transformer technology offers cost and size savings benefits and increases energy efficiency. This provides flexibility to adapt and create designs for a wide range of charger applications within the design parameters of the original equipment manufacturer (OEM). However, EMI in planar transformers can be a major obstacle for any electromagnetics engineer.

"With EMI, what worked in one project might be a terrible solution in the next one," says Puranen. "Each project is different and the EMI challenge in planar transformers plays a key role in our design process." A typical solution for EMI issues is to add filtering components to meet customer specifications. Although workable, filter components are not cost-effective.

Puranen says it is best to fully optimize the design because poor transformer designs require additional filtering components to meet customer specifications, which cuts significantly into the budget.

Have Questions?

Virtual prototyping with Simcenter 3D Electromagnetics

One of the newest modules in the Simcenter portfolio, Simcenter 3D Electromagnetics offers an advanced electromagnetics simulation solution for both low-frequency and high-frequency issues. More importantly, when it comes to material savings, Simcenter 3D Electromagnetics is an excellent tool to help determine where material is being overused and can be removed to save costs and reduce weight. Users can also specify a minimum efficiency percentage for the operating range of a transformer being designed.

"Our goal with Simcenter 3D Electromagnetics is to simulate the optimal transformer so that we can have as few actual prototype rounds as possible," says Puranen.

The Salcomp team is trying to find the right mix between different electrical, magnetic and chemical engineering elements. This means finding the lowest total loss and the right balance between conduction loss in copper and core loss. It also means finding the optimal balance between alternating current (AC) and direct current (DC) loss and comparing different core material performances. In addition, electromagnetic engineers need to find the optimal level for common mode noise – without forgetting about other potential holistic EMI issues.

"It is hard to put a number on this as some of the work has been general research," says Puranen. "For a specific project, let's say we could save one prototype round. This is easily one month and shortens a typical total development time for us from six months to five months. This is good for our supply chain as well."

Still rather early days

Puranen is quick to point out that even though he is one of the first hands-on users of Simcenter 3D Electromagnetics, he is not an expert.


"The electromagnetic field is lagging behind in development," says Puranen. "There is still a lot of room for improvement, especially in fields that don't always match up like chemistry and electronics. Thanks to Kang Chang, a Siemens electromagnetics expert, we've been able to explore what the real possibilities are for electromagnetics engineering at Salcomp."

"I also wanted to point out that the team at IDEAL GRP in Finland was key to our success. They introduced us to the new Simcenter 3D Electromagnetics software and their comprehensive training really helped get this project up and running. I am convinced Simcenter 3D Electromagnetics has the potential to really change the way we think about electromagnetic engineering."

Heading into the summer of 2020, Salcomp continues its work to produce the high-tech chargers and wireless charging pads for the next generation of smartphones and tablets.

Long history with Siemens

In addition to Simcenter 3D for Electromagnetics, Salcomp is a long-term Siemens customer using NX™ software for product design, 3D modeling and CAM, and the Teamcenter® portfolio for its lifecycle collaboration backbone.

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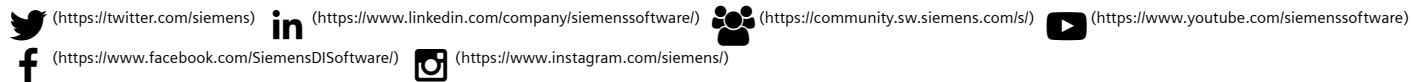
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