

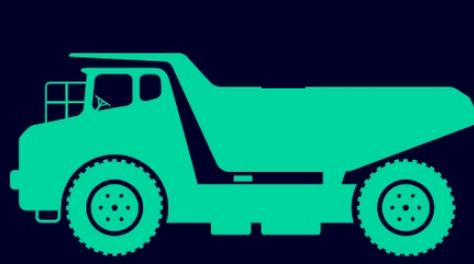
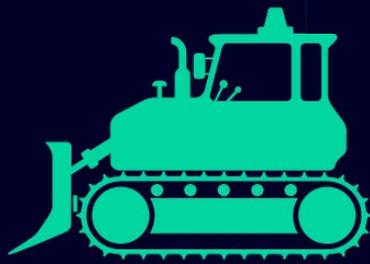


DIGITAL INDUSTRIES SOFTWARE

# Selecting the best electric architecture for your machine

Accelerate innovation, unlock data and enable collaboration

Agricultural, construction, mining and logistics machinery.



## Business imperatives

### Your industry needs to adapt to unprecedented challenges

#### From an internal combustion engine to electrified power

##### Heavy equipment manufacturers are under pressure:

- Their customers need to show the general public they are making a dynamic transition
- Regulatory authorities impact machine performance by setting standards that manufacturers must meet



#### Increase versatility to match varying work environments

##### Maximize operational availability

- More stringent regulations such as European Union (EU) Stage V and International Organization for Standardization (ISO) 6393
- Ensure global machine operability and reliability and offer specific machines tailored to each customer
- Innovate to guarantee productivity gains and smarter operations despite an increasing number of variants

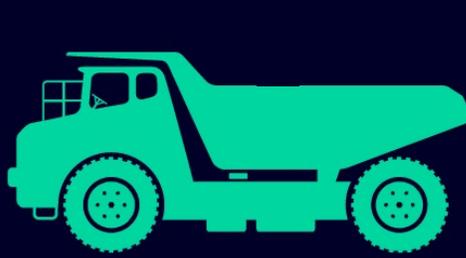
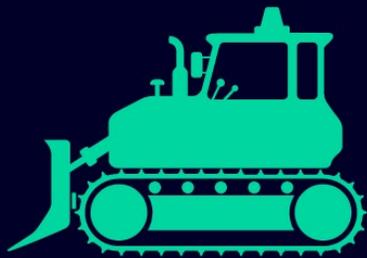


#### Faster time-to-market

##### Regulations and customers force your company to rethink the design of your machine in an agile way:

- Practice efficient decentralized engineering
- Software-driven development
- Early and fast decision-making
- Beat the competition





## Threats and opportunities

Discover a powerful, reliable and scalable platform backed up by Siemens Digital Industry Software's expertise.

### How do you?

Define the correct architecture and technology to invest in early for each machine type when you face thousands of configurations.

Leverage and simulation AI

### How do you?

Size new and key electric components like batteries, fuel cells, inverters and electric motors much faster.

Deploy an integrated simulation and test portfolio

### How do you?

Verify and validate electric component controls and their integration into the vehicle.

Scale model-based method MiL/SiL/HiL

Access Siemens electrification expertise

### How do you?

Address the challenge of rapidly acquiring expertise in all electric areas.

Break silos with system simulation

### How do you?

Virtually optimize performance and safety to find the best compromise between regulations and market requirements.

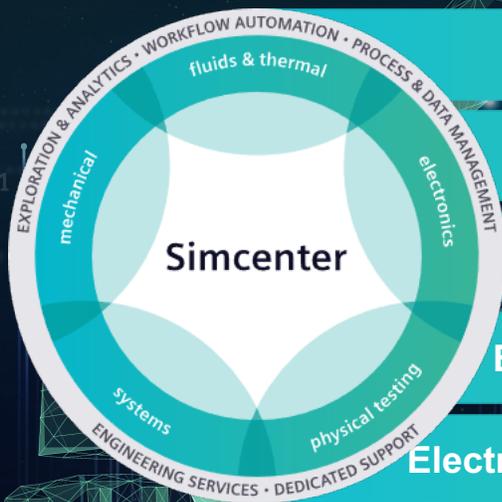
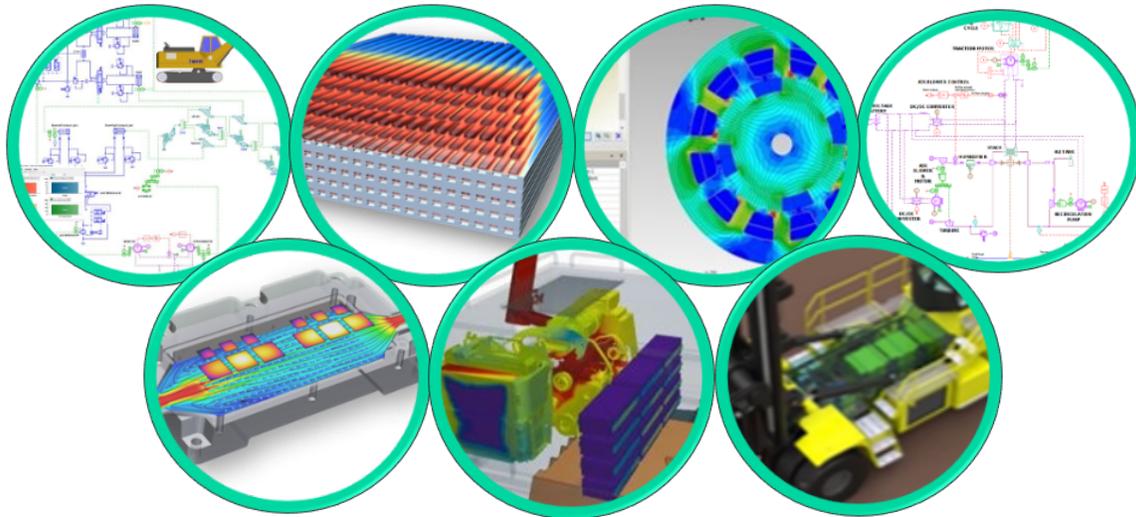
## Benefit from the Siemens experience in heavy equipment:

- Re-use your existing digital twin and explore thousands of architectures with a new artificial intelligence (AI) technology, selecting the proper system for your machine
- Easily evaluate new innovative concepts, reduce engineering risks and avoid failure at the launch of a new vehicle program
- Break down silos between design and simulation to reduce design cycle times thanks to a powerful, reliable and scalable platform: Simcenter™ software, which is part of the Xcelerator portfolio, the comprehensive and integrated portfolio of software and services from Siemens Digital Industries Software



## Comprehensive simulation and testing portfolio

Discover Siemens' powerful, reliable and scalable digitalization solutions to transform your development process.



Technology and architecture selection

Energy distribution strategy trade-off

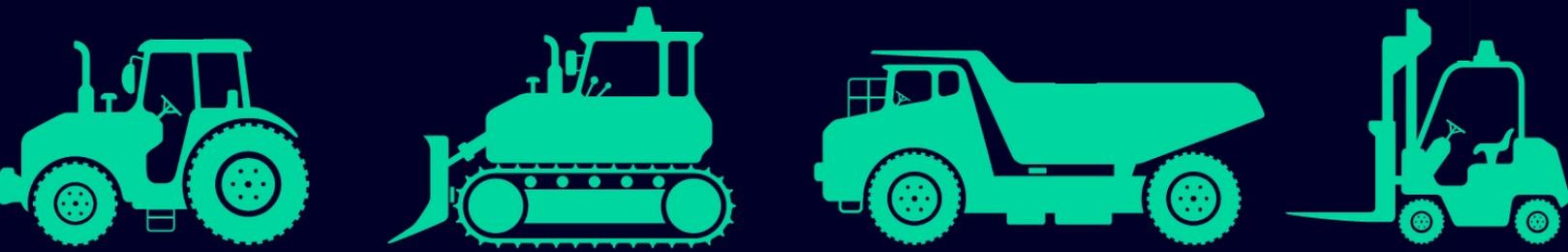
Electric component performance

Electric component thermal management

Electronics control verification and validation

## Realize innovative and reliable engines

Simcenter offers comprehensive and validated computer-aided engineering (CAE) solutions to address jet engine design challenges, enabled with design exploration, workflow automation, simulation process and data management.



A trusted partner for the digital enterprise

Heavy equipment manufacturers partner with Siemens to simulate their next generation of vehicles.

## Electrify a laden container handler combining a fuel cell and Li-ion battery technologies

**+15%** Gain potential energy recovery



Improve variant sizing process

// Siemens gave us the ability to simulate, analyze and adjust the truck systems in a very short time frame."

Rob Damen, Project Engineer



**HYSTER-YALE**



<https://blogs.sw.siemens.com/simcenter/how-to-convert-a-conventional-120-ton-gw-lift-truck-into-an-electric-vehicle/>

## Evaluate new technologies to electrify your machine



Creating a first-time-right prototype of a 100% excavator



Quantify energy losses

// System simulation frees up time to examine more solutions and technology options which we would not otherwise have had time to explore. In short, Simcenter system simulation boosts our creativity."

Thomas Schaep, Mechatronic Systems Engineer



**Mecalac**

<https://www.plm.automation.siemens.com/global/en/our-story/customers/mecalac/59781/>