



Integration of Motor & Traction Inverter

Challenge: Different thermal requirements.

SCAPE's Solution: Increased heat distribution in space.

Recommendation: Place the inverter first, then the motor in the cooling path.



Initial System Production

Strategy: Approach industry with familiar systems to increase acceptance.

SCAPE's Actions: Setting up a simple three-phase traction inverter prototype.



Estimating Cost & Viability

Analyse market prospects of power semiconductor devices.

SCAPE's Advantages: Fast assembly of new conversion systems, adaptable voltage & current ratings.



Fault Analysis

Importance: Identify & analyze all possible system component faults.

Current Stage: Ongoing comprehensive fault analysis in SCAPE.



Maintainability

Vision: Develop converters where modules can be easily replaced during maintenance.

To Do in SCAPE: Define such implementation methods.



Assumptions Verification

Key Assumptions:

- Guaranteed failure of switching cells in open circuit.
- Power device failure rate increases with breakdown voltage.

SCAPE's Progress: Efforts underway to prove the above.

Take Aways on Design

Take Aways on Chip Embedding

What is Chip Embedding (CE)?

Packaging technology where bare-die semiconductor devices are included in stacked structures, typically in laminated PCB multilayers.

WORKSHOP

Modular and Scalable EV Power Converter Design

Unlocking a future of reliable, lightweight, and affordable EVs?

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Operation Under Different Fault Scenarios

Objective: Analyze operation during different faults & mission profiles.

Progress: SCAPE team is actively working on it, with many research avenues open for exploration.

SCAPE's Perspective

CE is ideal to:

- create modular & scalable power electronic solutions,
- use PCB technologies and processes,
- combine elementary & validated building blocks in PCB CAD-tools for a full converter development.

Benefits of CE

Integration: Higher levels.
Efficiency: Stray-inductance reduction, short connection paths, and higher overall efficiencies.

Protection: Internal shielding & protection against plagiarism.

Economics: Lower cost & higher reliability.

Enabling Technologies

CE requires specific manufacturing technologies, e.g., interconnections of chips within the stack.

SCAPE will address these technologies for broader and easier adoption of the CE approach.

Economic Consideration

CE increases PCB complexity & cost.

But... Overall converter cost is expected to be lower with CE implementation.

Conformability of CE

Offers flexibility in design shapes.
Opportunities to better adapt products & integrate elements like the inverter with the motor.

Some topics require further exploration, beyond SCAPE!

Find out more about SCAPE's modular, scalable, and cost-effective design of power converters for EV application through the Switching-Cell Array concept!

Visit

www.scapepower.eu



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