



**Ansys + Nhanz**

## / Nhanz designs a power-dense motor inverter for three-wheeler EV platforms using Ansys simulation

India is concentrating on ramping up two- and three-wheeler electric vehicle (EV) platforms. With lower additional costs from internal combustion engine (ICE) equivalents and very low running costs, customers can now choose a sustainable alternative to ICE vehicles. However, their drivetrain components were not originally made to comply with Indian environmental requirements, including thermal, vibration, and ingress protection requirements. Nhanz, with ample original equipment manufacturer (OEM) experience, front-loaded these requirements into their design and iterated different thermal combinations to create a practical drivetrain.

### / Challenges

The major challenge with these systems is their very low cost of system manufacturing, which eliminates the facilitation of liquid cooling. A shortage of qualified automobile fans rules out the alternative of forced air cooling. Hence, suppliers are inclined to meet requirements with practical, natural airflow within the vehicle. This is aggravated by high grade roads and heavy vehicle loads, which increases the average dissipation loss in the system.

### / Technology Used

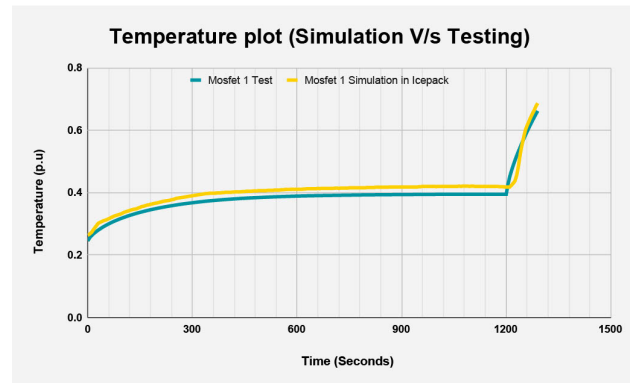
- Ansys Icepak
- Ansys SIwave

### / Engineering Solutions

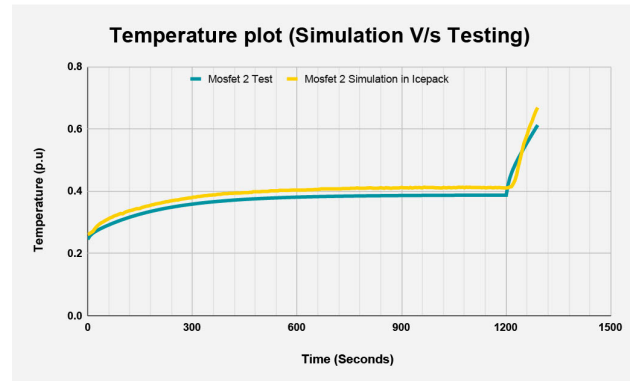
Nhanz worked out multiple inline thermal management systems to meet technical and cost requirements using the parameters from the challenges they faced. To consider a practical scenario, all peak ratings were checked after continuous ratings were stabilized. Simulations were performed to check multiple peak operations that a system could handle in sequence. With considerable effort spent in virtual validation in different scenarios, they developed a platform which worked, as per simulation, “first-time right.”

### / Benefits

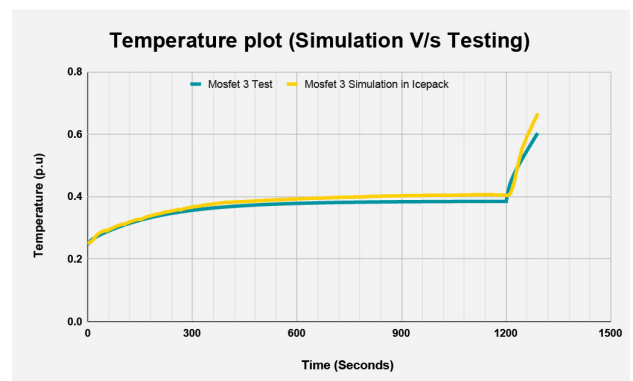
- Cost reduction from reduced weight in materials
- About three months saved by getting it right the first time
- 15% improved thermal performance for the same volume



Thermal test of mosfet 1 comparison with Ansys Icepak simulation



Thermal test of mosfet 2 comparison with Ansys Icepak simulation



Thermal test of mosfet 3 comparison with Ansys Icepak simulation

## / Company Description

Nhanz Systems Private Limited (NSPL) is registered by the Ministry of Micro, Small, and Medium Enterprises (MSME) in India and based in Bengaluru. Founded in 2017, Nhanz first offered services to automotive and manufacturing firms inline to motor and other drivetrain components. In 2021, product development kickstarted to manufacture drivetrain components for electric vehicles. Nhanz is currently moving into producing developed motor controllers, motors, gearboxes, and chargers for low voltage and validating its high voltage offerings. Product offerings are available in 2wheeler, 3 wheeler and small commercial vehicle segments. Nhanz also executes service projects in a wide domain with respect to system engineering with functional safety, proof of concept systems development, Problem solving in motor, power electronic control and dynamometer based motor characterization & testing. Nhanz work with major players in India, Europe and North America in automotive, locomotive and industrial segments.

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