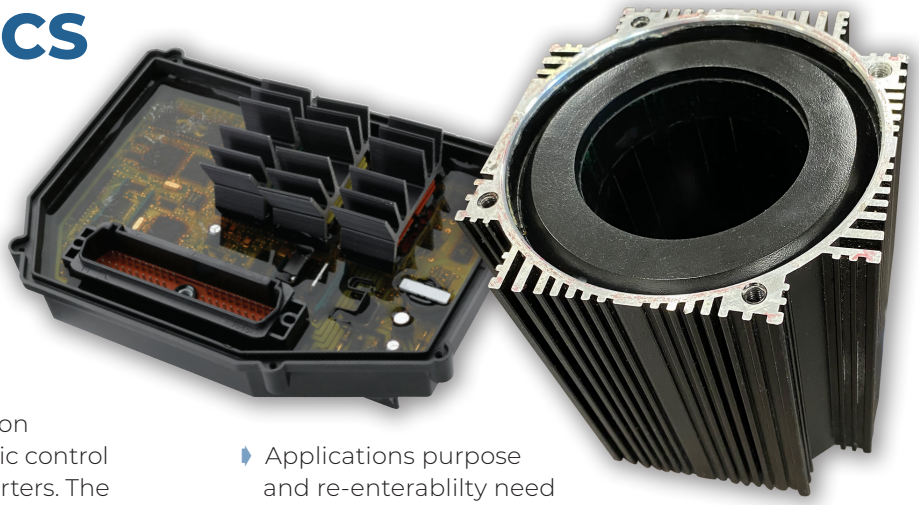
# The Never-Ending Battle: THERMAL CONDUCTIVITY IN ELECTRONICS

**The electric vehicle industry is new and exciting, creating challenges for design engineers. However, some of these challenges are very similar to the issues other industries have faced in the past.**



Concerns about heat within an electrical unit are common in the power distribution market; including transformers, electronic control units, motor controllers, motors and inverters. The transformer industry has been battling temperature control since the late 1800s. In the early days, a pitch tar or sand method for potting or heat dissipating was used. This has been replaced with highly technical formulated thermoset materials. Electronic control units (ECUs) have been working on pulling heat off boards and components since their inception. However, the electronic industry is still facing the same battle with thermal conductivity that it has for over 100 years.

Thermally conductive issues are not new, what is new is electrification in all transportation sectors. This is driving increased efficiency requirements for motors and batteries. Every engineer knows that heat distribution is one of the main factors that needs to be controlled when designing an efficient motor or battery.

**Common thermal conductivity challenges:**

- Controlling temperature in batteries
- Ensuring battery management systems can keep cool enough to ensure efficiency and safety
- Providing power to inverters or converters with tools to remove heat from components
- Managing your EV motor core to maintain an optimal temperature in prolonging life cycle
- Keeping up with frequently changing regulations
- Meeting low to no outgassing specifications

**It's important to understand these issues when selecting your sealant material:**

- Very high thermal conductivity will potentially affect other pre/post cure properties of a urethane; such as viscosity, hardness, adhesion, glass transition (Tg) and many electrical properties
- Consideration to all the materials present from the heat source to the dissipating surface
- Applications purpose and re-enterablilty need

A comprehensive understanding of how to solve thermally conductive issues is necessary for achieving the best performance in your application. That is where Epic Resins shines. We have the experience and track record in solving heat dissipation problems that are similar to what industry has battled for decades.

Epic Resins epoxies and urethanes have proven to stand up to the demanding challenges of today's electrification efforts just like they have with previous industry challenges. Here are a few examples:

- Motor impregnating materials, like 0218 and X19J5535 (1.9 - 2 W/mK), have shown a significant drop in operating temperatures by 50 - 60° C.
- Encapsulation materials, like S7202 for inverters and converters with a minimum of 0.78W/mK, have shown significant reductions in operating temperatures while ensuring maximum protection against environmental and operating stresses.
- Epic Resins S7566 (2.1 - 2.25 W/mK and hardness of Shore A 85) and the S7527 series of products have proven to protect components during thermal cycle and pull heat off electronics. They can also be used as a filler between battery cells and the cooling mechanisms.

Let us help you pick the best thermal management material for your demanding electronic application. Our customers success is our top priority.

**Contact Epic Resins' experienced technical sales staff today: (800) 242-6649 or sales@epicresins.com**

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