SOLVING VEHICLE HOT SPOTS

WITH ALTERNATIVE HEAT SHIELDS

Reduce tooling costs, shorten lead time, eliminate fasteners and improve performance by replacing traditional heat shields with lightweight alternatives.

JBC Technologies

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OVERVIEW

When an automotive manufacturer tests for vehicle hot spots during production, the race is on. OEMs need an effective solution that won't waste time or money—and they need it fast.

There are go-to solutions, but as the industry changes, so must the decisions of automotive engineers. With the Corporate Average Fuel Economy (CAFE) standards requiring improved fuel efficiency, lighter vehicles are a priority. This focus on automotive lightweighting means heavy heat shields don't always measure up.

Manufacturers still have a production schedule to follow even with all the requirements for today's cars. Fixing hot spots can be an obstacle that slows down automotive OEMs, but alternative solutions can keep them on track.

This white paper from JBC Technologies delves into the problem of hot spots and how to solve them.

SECTION 1:

VEHICLE HOT SPOTS

As heat migrates from the engine to the tailpipe of a vehicle, metal more than 200 degrees Fahrenheit can warm the cabin to an uncomfortable level.

Hot spots are most commonly found along the engine dash and exhaust system. The manifold and catalytic converter are some of the hottest points due to exhaust heat. In these instances, more than one type of heat transfer are at play:

- **Conduction**—movement of heat directly from substance to substance

  From metal to metal, heat passes through the underbody of the car. Every metal connection off of the exhaust system also spreads heat to other areas of the car.

- **Forced convection**—movement of heat via the circulation of air as initiated by a fan or other organized flow of air

  As the air surrounding the exhaust system is heated, it rises toward the cabin. This heat is forced to convect faster due to an air flow created by the motion of the vehicle.

- **Radiation**—movement of heat in waves from a source

  The metal heats up along the exhaust system, it emits heat that is then absorbed into the cabin of the vehicle.

Heat shields stop the spread of excessive conductive, convective and radiant heat through the passenger compartment. These shields can be made of a variety of materials—from metals that radiate the heat back toward its source, to composites that often have multiple functions.

SECTION 2:

HEAT SHIELDING SOLUTIONS

Properly managing heat throughout a vehicle can lead to better fuel economy, reliability, longevity, passenger comfort and safety. When trying to prevent heat transfer from overheating the cabin, engineers must simultaneously consider issues such as the weight, installation time and production cost of a particular hot spot solution.

WEIGHT

In an age when lightweighting is a priority, engineers are challenged to reduce the overall weight of the vehicle, cost effectively join dissimilar materials, and maintain stringent safety and performance standards. Automotive OEMs might opt for a lighter heat shield in order to meet weight requirements.

"Lightweighting is the No. 1 issue in the automotive industry."

-ASSEMBLY Magazine

INSTALLATION TIME

Testing during the manufacturing process determines the location of hot spots in a new vehicle. At that point, manufacturers have to quickly and effectively solve the problem before going to market.

A solution with a short production time and easy installation that does not require regular maintenance is preferred. In particular, engineers will want to choose a solution that won't hinder their speed-to-market.

With these factors in mind, engineers have two heat shielding options:

- *TRADITIONAL METAL HEAT SHIELDS*

  Metal heat shields bolt onto the area of concern to prevent radiant heat from reaching the passenger compartment. The installation of this type of heat shield typically requires rivets, pins, screws, or other fasteners that increase the weight of the vehicle. This type of shield can be made of stainless steel, aluminum, aluminized steel or other metals.

- *ALTERNATIVE HOT SPOT SOLUTIONS*

  As automotive engineers become increasingly focused on reducing the overall weight of the vehicle, lighter weight alternatives are becoming more appealing. Many such alternatives are made with composite materials and are often adhered near the hot spot using a pressure sensitive adhesive (PSA).

  In addition to reducing vehicle weight, these new composites offer other benefits not found in traditional metal heat shields: improved acoustic performance, better formability, adaptability to space constraints and ease of installation. They also come with a significantly lower tooling cost.

SECTION 3:

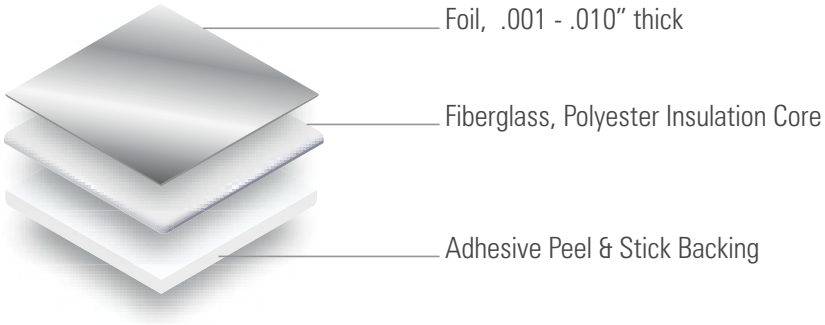
TABSHIELD AS A HEAT SHIELD ALTERNATIVE

JBC Technologies' new line of **TABshield** products is comprised of lightweight composite materials designed to provide superior thermal and acoustic performance under tough conditions.

Available in multiple constructions, the TABshield alternative heat shield line is an excellent solution for a variety of targeted noise and heat suppression applications. It is two-dimensional when die cut, but is easily formable during installation, making it ideal for:

- Engine shields
- Battery shields
- Tunnel insulators
- Dash insulators
- Hood insulators
- Engine compartments
- Exhaust shields
- Tunnel shields
- Marine heat shields
- HVAC
- Appliance
- And more

JBC supplies **TABshield** in sheets, rolls or custom die-cut to our customers' unique specifications. We also offer customized pull tabs for easier liner removal.



The TAB200 series is a heat shield material consisting of a polyester and fiberglass insulative core laminated with aluminum on one side and PSA on the other side for easy installation. The aluminum is available in multiple thicknesses and can be embossed for better formability and microperforated for better acoustic performance.

SECTION 4:

BENEFITS OF TABSHIELD

The benefits of an alternative like **TABshield** come down to saving manufacturers—and in turn, consumers—money and time.

LOWER TOOLING COSTS

The difference in tooling cost between **TABshield** products and traditional metal heat shields is significant. The average steel rule die required to cut TABshield costs less than $500. A metal stamping die, on the other hand, can run thousands of dollars.

FEWER PARTS NEEDED

Traditional metal heat shields typically require additional fasteners for installation. **TABshield's** optional PSA backing eliminates the need for those fasteners, lowering the part count and cutting weight from the vehicle.

HEIGHTENED ADAPTABILITY

Because **TABshield** products can be die cut, changes to part design can be implemented in a relatively short time frame. Prototypes can be turned around in 24-48 hours and production orders quickly follow.

FASTER INSTALLATION

With the optional PSA backing, installing **TABshield** is as easy as peeling and applying. Add in pull tabs for faster liner removal and it becomes easier still—speeding production and reducing labor costs even further.

INCREASED SPEED-TO-MARKET

At JBC, a die cut heat shield prototype can be produced in as little as one to two days. This is in contrast to a typical metal heat shield that takes several weeks.

BETTER COVERAGE IN TIGHT SPACES

TABshield can achieve optimal thermal performance in a smaller space with less material than a traditional metal heat shield. **TABshield's** thin foil layer is between 0.001 and 0.010 inches thick.

BETTER THERMAL PROTECTION

Unlike metal heat shields that only address radiant heat, **TABshield's** aluminum layer reflects radiant heat away from the passenger compartment while its insulation core slows conductive heat flow—providing additional protection in a compact form.

SUPERIOR ACOUSTICAL PERFORMANCE

Microperforating, or adding small holes to the foil, enhances **TABshield's** ability to absorb sound. Metal shields, on the other hand, tend to transfer sound. They also add unwanted noise as fasteners loosen over time and begin to squeak or rattle.

REDUCED MAINTENANCE

TABshield is a "stick it and forget it" solution that requires little maintenance. Metal heat shield fasteners can rust or loosen and need to be replaced, but **TABshield's** PSA can withstand high temperatures, negating the need for replacement.

Additionally, **TABshield** doesn't experience galvanic corrosion the way metal pieces of traditional heat shields do.

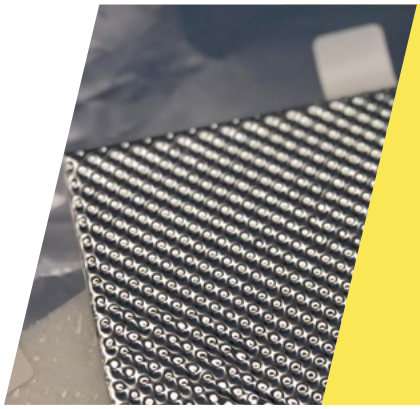
"TABshield is kind of a foolproof thermal solution with an acoustical benefit that you don't get with a metal heat shield."

-Joe Bliss, P.E.
Founder and President
of JBC Technologies

CONCLUSION

Alternative hot spot solutions offer more benefits for a lower cost than traditional metal heat shields. JBC's **TABshield** exceeds the expectations of engineers looking to solve problems and add value without adding weight to vehicles.

Contact JBC Technologies today to request free **TABshield** samples.



If you need something that is

- Light
- Fits in a small space
- Cost-effective
- Easy to install
- Requires little maintenance

TABshield is the solution for you.

About JBC Technologies

As a full service manufacturing partner, JBC Technologies provides innovative die cut solutions for leading manufacturers around the globe. But the impact of what we do goes far beyond converting flexible materials into custom parts. Drawing on the diverse talents of our team, we deliver supply chain optimization, engineering innovation, and manufacturing excellence—creating partnerships with our vendors and customers to ensure success.

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Sources:
"Lightweighting Is Top Priority for Automotive Industry" by Austin Weber, https://www.assemblymag.com/articles/94341-lightweighting-is-top-priority-for-automotive-industry
TABshield Data Sheet, 2019, https://www.jbc-tech.com/media/1180/tabshield-data-sheet-final.pdf
"Thermal Management of Vehicle Cabins, External Surfaces, and Onboard Electronic: An Overview" by Garrett J. Marshall et al, https://www.sciencedirect.com/science/article/pii/S2095809918312529