Embedded Designs Drive Tomorrow's Solutions

Michele Portico, Product Marketing Manager, Vincotech GmbH, Unterhaching

1 Abstract

Embedded drive solutions for motion control simplify integration, enhance performance and speed up time-to-market. Vincotech's power modules lineup represents the best fit for highly reliable, low-cost motor controls that deliver higher performance in a smaller footprint.

2 Embedded drive solutions for Industrial motion control

Discrete drives are standard solutions designed to control a wide range of motion applications. Nevertheless, higher integration and more complex subsystems are some of the current trends in the Industrial market and more and more Companies provide embedded drive systems with different level of customization.

Embedded drive systems integrate drives and electric motor to reduce the space occupancy thanks to their compact and hermetical design. Since they are dedicated to specific applications, design engineers can optimize them to reduce the size and cost of the final product and increase the reliability and performance.

Discrete drives feature filters, connectors, and cables to be assembled and tested for UL and /or CE certifications. This increases the assembly time and the overall cost of the system. On the other hand, in embedded drives the overall system's size, cost, and time to market can be slashed by considerably increasing the level of integration. Mass-produced embedded drive systems benefit considerably from economies of scale.

3 Vincotech's product portfolio for embedded drives

Space is tight in embedded drive systems, and their compact, hermetical design makes it difficult to dissipate the heat generated by so many electronic components.

Vincotech's power module portfolio for embedded drives features 600V and 1200V intelligent power modules (IPMs) as well as power integrated modules integrating PFC circuit (PIM+PFC)

and achieves the highest level of integration of any power module available on the market today, representing the best solution for such space-constrained mechanical environments.

The overall system's size, cost, and time to market can be slashed by integrating all of a motor drive's functional blocks, apart from the input filter, DC capacitor and microcontroller (see Fig. 3).

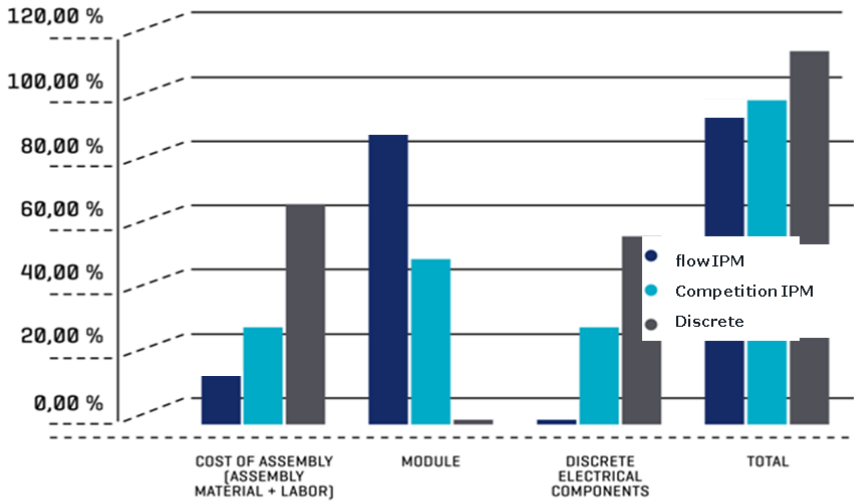

Fig. 3: Cost analysis – flowIPM vs. discrete and competing IPM

Protection circuitry is tuned to match the power device's capability and factory-tested to improve the system's reliability.

A lot of space is saved with highly integrated components and bare power chips to achieve a much smaller footprint than that of discrete designs.

Motor drive assembly is streamlined and simplified with fewer external components and smart isolation techniques.

The ceramic sheet used in thick-film technology improves the module's thermal performance by providing the best possible direct cooling for power components.

Vincotech’s power modules for embedded drives come into very compact housings eventually equipped with Press-fit pins (see Fig.5). Press-fit technology reduces PCB assembly time and effort considerably by eliminating the need for soldering. This cuts process time and costs and boosts production output.

Fig. 5: Press-fit pins for solder-less mounting

The module's creepage and clearance distances fulfill the applicable industrial standards. There are no special requirements regarding the shape of the heat sink.

The thermal interconnection between the power module and the heat sink is vastly improved by pre-applying phase-change material (see Fig. 6). Vincotech's in-house screen-printing process deposits the material with great precision, achieving the proper thickness. The material can be optimized for maximum heat transfer capability.

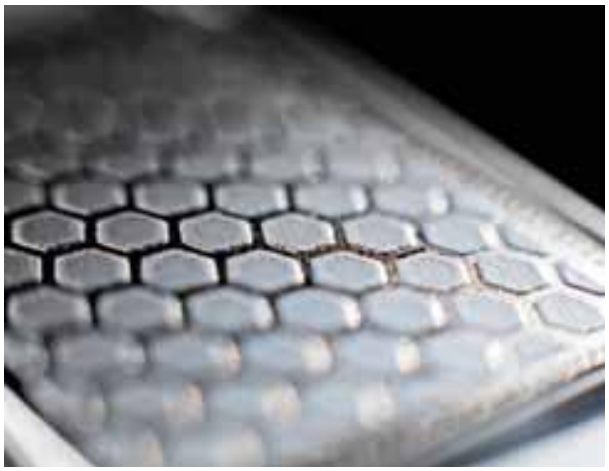

Fig. 6: Phase-change-material

4 Conclusion

Vincotech's product portfolio provides the functional integration and power density that engineers need to design embedded drive systems. The outstanding level of integration achieved by Vincotech's intelligent power modules enables system engineers to come up with

more compact designs and to take advantage of a proven combination of power components and gate drive circuits, which happen to be the most critical elements in the inverter's design. This mitigates the risk associated with circuit design, speeds up development, and dramatically reduces time to market.