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AR 003 – Maintaining investment security with intelligent packaging

Maintaining investment security with intelligent packaging

By Christoph Adam

SYSTEM DEVELOPMENT AND MANUFACTURE set a wide variety of challenges - all the way from product concept through to final delivery. The choice of the appropriate packaging technology often forms the basis for an efficient end product. The following example clearly demonstrates how an experienced outsourcing partner can contribute to the implementation of technologically optimised system solutions with the help of successive integration levels – from Level 1 (packaging units such as side panels, flanges, and connecting rails) up to Level 5 (system integration through to delivery to the end customer).

The starting point for this project was the customer's request for Standard 19"Racks, in this case a mounting kit for a CompactPCI system which was to be supplied by Heitec "off the shelf". Further integration of the electronics for the Laser Direct Imaging (LDI) system was planned to be implemented by the manufacturer.

The application

Laser Direct Imaging (LDI) systems are used in the production of PCBs. Their advantage lies in their precision, sensitivity and the resulting excellence of picture quality. During the process a Laser beam is focussed directly at the varnished circuit board and exposes it. The Laser is then moved on – and thus draws the interconnects. This method is particularly suitable for low volume production and for high-density boards. Correspondingly, systems must fulfil stringent deployment requirements – for example the meeting of clean room specifications,

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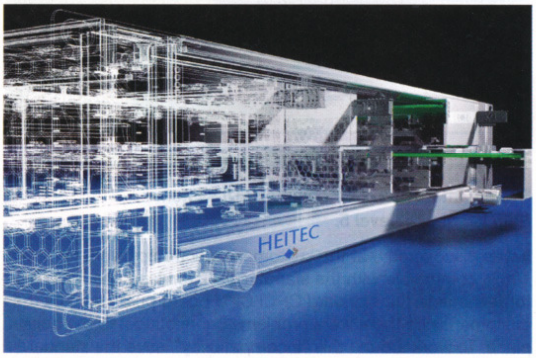
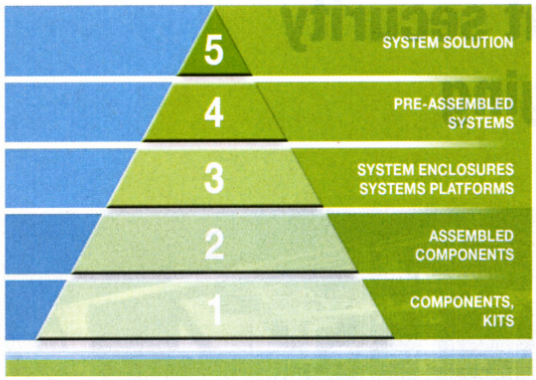


precision in operation and extremely high levels of failsafe. Further important aspects apply to temperature management with respect to high currents, ventilation and electromechanical compatibility (EMC). This extremely complex electronic system – which includes various architectures, bus systems, interfaces and the adaptation of high resolution optics with a sophisticated lens system must be housed so accurately in the case that operation can be achieved at the lowest possible production cost. This means that every single aspect of the system concept must take the complete requirements of the target application into consideration to achieve an optimum, customised result.

Integration

Heitec was able to deliver the standard components immediately. However, upon further analysis of the system architecture



System integration of a complex LDI system from Level 1 to Level 5.

it was discovered that the customer's electronics were not 100% compatible with the standard. Customised changes had to be made to the standard CPCI CPU board purchased by the customer since there were problems connecting it to the backplane. To work around this "incompatibility" issue the standard board had to be adapted into a customised variety – which was time consuming and costly. Customised boards suffer from the dual disadvantages of higher costs and, mostly, longer lead times. Furthermore, they generate additional internal control costs during their life-time with the risk of incurring additional costs in the future. This is because any changes to the standard board must be reflected by changes to the customised board – costs which are normally passed on to the customer by the manufacturer.

Heitec therefore proposed installing a new Backplane solution and retro-fitted the Rack accordingly. The advantages for the customer are obvious: Instead of a specially designed and assembled CPU, a far more economical and more easily procured standard CPU board could be used.

A further challenge was offered by the busses developed by the customer as well as the homogenous integration of different electricity supplies for three different power supply units with differing specifications. At this stage it was proven to be critical to have an exact understanding of all aspects of the hardware spectrum to ensure that an ideal coordination of the inner workings of the system could be achieved. As a specialist in packaging technology and electronics Heitec assumed responsibility for the procurement of the power supplies, fans, etc. Moreover, Heitec was able to call upon its extensive eco system of packaging technology partners in order to offer respectively the best possible and most cost efficient solution. One must look at what is viable, what makes sense and where the system layout can be improved.

Considering the specified installation of the LDI system in the target application, namely deployment in clean room technology, the system was equipped with a special ventilation concept. Cool air is redirected to achieve better temperature values countering the effects of high packaging density and furthermore to reduce power loss and ultimately to improve reliability and the life-time of the system.

In close collaboration with the customer the integration level was successively raised from Level 1 to Level 5 and all electronic components were integrated into the case. This also included bundling the software: the system was equipped with Windows

XP operating system and the CPU with image application software. At the customer's request prototypes were produced which, following a compatibility test, should go into series production. Heitec here assumed responsibility for the complete handling, product care as well as logistics.

The test put special emphasis on temperature management, voltage, functionality and EMC. A complete verification system was built by the Eckental company which also made a verification routine for the electronics available. Joint thermal simulation tests were carried out together with the customer. Crucial improvements were also achieved in EMC behaviour: to improve cable shielding Heitec proposed that the customer adopt new cable routing. This was achieved by designing cable harnesses which later went into economical series production via a partner company. Here too Heitec's wide ranging experience in systems with high MEV requirements proved to be of immense value to rule out potential disturbances between packaging and electronics from the beginning.

Following an extensive system check an operational and ready to run system was delivered to the customer for immediate integration into his application. From prototyping to serial production, from components and assembly up to full integration a time-saving of circa half a year was achieved. And it all began with a request for a standard component.

Generating benefits at each stage

The basis of this success story was and is the close, trusting cooperation with the customer/partner and the on-going dialogue between the customer and the dedicated Heitec team. Through constant questioning of the process improvements could be realised quickly. Feedback was immediately acted on and optimisation of subsequent steps undertaken. The result was an advanced system consisting of the customer's proprietary design and new standard solutions which were economically achieved in a remarkably short time-frame. The packaging was conceived to be the integral ingredient of the system solution. Furthermore, the ultimate manufacturing aspect was always kept in mind. Thus, components were purchased by Heitec on behalf of the customer, local prototypes produced which then went into cost-efficient serial manufacture and were then assembled via an existing network – resulting in an attractive final price and a simplification of the supply chain. Since Heitec assumed responsibility for care of the complete system integration the customer was able to concentrate on his own core competence. He was able to optimise his costs, increase production and, last not least, pursue "Investment security" for the future.