

Daughterboards, Custom Boards, and Obsolescence

Cost-effective, Long-term Solutions for Your Handheld/Embedded Device Design



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08-01-02

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Today's market for board-level solutions is challenging. Customers desire state-of-the-art performance and features at a reasonable price and with guaranteed long-term availability. Whereas traditional board-level solutions based on mature technologies such as x86 can provide reasonable price and longevity, many customers desire solutions in the highly volatile handheld/wireless marketplace. In this market, because growth rates are still quite high and are expected to be so for several years, silicon and software providers are constantly introducing new products and obsoleting old products, in an attempt to "one-up" the competition.

In mass-market segments such as cellular telephones and PDAs, this approach is fine, as the shelf-life of a product is typically measured in months, not years. In the vertical segments, such as military, healthcare, and test and measurement, manufacturers want to reap the benefits of the mass-market tidal wave of technology, but at a reasonable price and with years of availability.

Companies such as InHand Electronics provide this service to manufacturers, by developing standard hardware and software products based on the latest technologies, and guaranteeing form, fit, and function ("3Fs") for years. InHand does this by upgrading products as components become obsolete and as new technologies come to the fore. Thus, while newer versions of existing products may include new features, they are backward-compatible with previous generations.

One example of this approach is evident in InHand's Elf product line. The original Elf platform debuted in 1999 and was based on the SA-1100 microprocessor. As a result of the SA-1100's obsolescence in 2001, InHand introduced the Elf2 based on the SA-1110. Elf2 has been a drop-in replacement for existing customers, providing the mechanical fit of the Elf, and improving it in areas such as memory density and performance, and LCD capabilities.

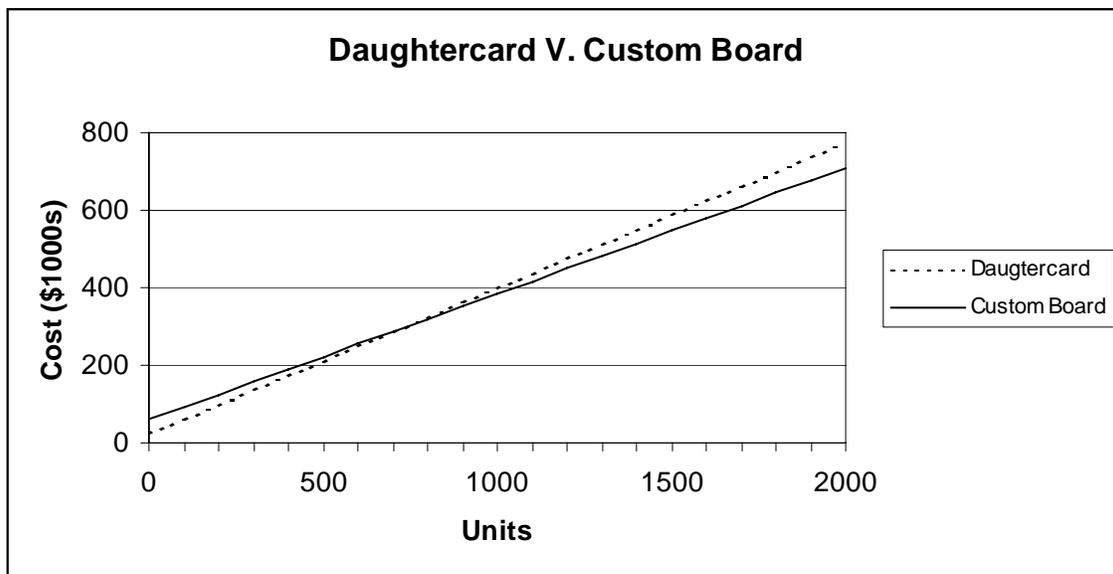
The challenge for many customers though is marrying a standard product to the customer's requirements. Almost by definition, a standard product will contain components that a customer does not need or wish to pay for, and will not contain some components that a customer does need. This problem is typically solved in one of two ways: daughterboard or custom board. A daughterboard-based solution implies a piggy-back board with the required custom components. In this way, the standard board is not modified and the customer benefits from its manufacturing economies of scale and the vendor's long-term commitment to that product. A custom board solution implies a modification to the standard board, so as to accommodate the required components and remove any unnecessary components. A custom board can also include mechanical changes to accommodate a customer's requirements, and can result in cost-savings in high-volumes.

The rest of this document describes the main issues in choosing an appropriate solution for your custom product. It weighs the pros and cons of the two approaches, and assumes that InHand provides the upfront engineering for your solution and then sells you that solution in volume. Of course, you can design your own daughterboards and you can license the designs of our standard boards and create your own custom boards. The bottom line is that the route you choose depends

on a number of factors, including cost, obsolescence, schedule, mechanical requirements, and power consumption.

Cost

There are typically two costs in a board-level solution: non-recurring engineering (NRE) charges and per-unit charges. Typically, a daughtercard-based solution will have lower NRE costs. In low volumes, such a solution makes more sense. As volumes get higher, the extra NRE costs of a custom solution can be outweighed by the per-unit savings of having a single board that does everything the customer needs (and no more). The graph below demonstrates the general relationship between these two types of charges, for a daughtercard-based solution versus a custom board solution.



As a more concrete example based on some typical scenarios that InHand sees, the NRE for a typical daughtercard might be \$25,000. The selling price for a combination of the Elf2 platform and a daughtercard of this complexity might be \$375 (500 per year). A custom board solution might cost \$60,000 in NRE and sell for about \$325 (500 per year). In this scenario, the difference in NRE price (\$35,000) is made up for after selling 700 units (\$50 multiplied by 700). So, without considering the time-value of money or obsolescence issues, if the customer is buying approximately 500 per year, the break-even point occurs at about 17 months of product life. Less than 17 months (or less than 700 units), and the daughtercard solution makes sense. Longer than 17 months, and the custom solution makes sense.

Your situation will obviously vary depending on your requirements. InHand can provide an analysis for you based on your parameters and help you make the right decision on a solution that will be most cost-effective for you in the short-term and the long-term.

Obsolescence

InHand guarantees the 3Fs for its standard products, regardless of obsolescence issues for components. With a custom solution, whether a daughtercard or a custom board, obsolescence for those components that are within the custom part of the solution must be handled. In either case, InHand can manufacture the custom part of the solution and guarantee the 3Fs for it. In this way, whether a daughtercard or a custom board, your solution effectively becomes a standard InHand product and we sign up to protect you from obsolescence. Typically, there is a combination of NRE charges and/or volume commitments required for such protection. In certain cases, NRE charges can be eliminated based on volume commitments. Conversely, volume commitments can be eliminated based on NRE charges.

Again, your situation will determine the best approach, and InHand can help you analyze obsolescence and longevity issues.

Schedule

The handheld and wireless markets are driven by extremely compressed schedules, and InHand has worked with customers in a variety of high-risk, short-schedule scenarios. As it relates to the daughtercard versus custom board selection, because a custom board typically requires higher NRE costs, its schedule can be longer. But, because there are so many variables in such a determination, it is best to work with InHand to determine which solution represents the lowest schedule risk.

Mechanical Requirements and Size

Handheld and wireless devices come in a variety of shapes and sizes, and often a daughtercard versus custom board decision is based solely on mechanical issues (size, connector type and placement, etc.). A daughtercard solution limits the mechanical form factors for the solution, whereas a custom board allows consideration of a variety of form factors. InHand has significant expertise with different mechanical form factors and with the significant challenge of making extremely small boards. We have mechanical engineers on-staff to help our customers deal with packaging issues and board layout and mechanical issues.

Power Management

In handheld devices, battery life is critical. InHand's standard board-level solutions coupled with our BatterySmart dynamic power management software have demonstrated unparalleled power consumption (below 500mW in certain cases, with high-performance systems). Typically, a daughtercard versus custom board solution affects power consumption. In the custom board case, InHand can take a holistic approach to the entire system to determine the best design actions to minimize power consumption. In the daughtercard case, InHand will rely on the low power consumption of its main platforms and specifically focus on designing a daughtercard that minimizes the additional power consumption.

Conclusion

You must consider many variables when designing your product. InHand can help you analyze the many tradeoffs of different approaches and recommend the best solution for your unique requirements. Our goal is to provide you with the highest-quality, lowest power consumption platform for your devices, in a time-sensitive and cost-effective manner.