

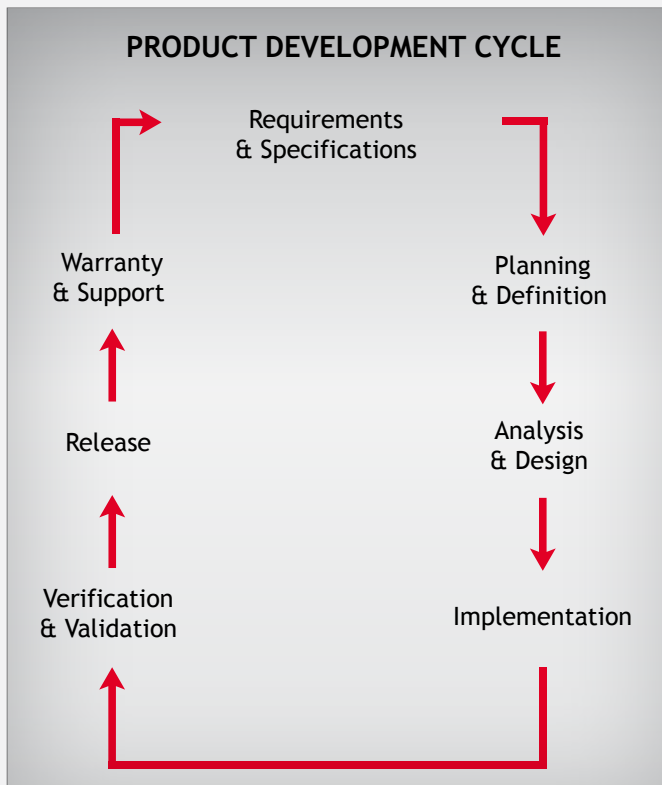
HMI – Build versus Buy

Any manufacturer of complex machines or vehicles that include HMIs must face a crucial decision: should you build your own human-machine interfaces or should you buy these vital components ready-made or customized from an outside source?

The build versus buy decision is both important and complex, involving many tough questions. Is developing the necessary hardware and software in-house the most cost-effective solution? Is such an engineering project consistent with your core competencies? Do your engineers have the time to develop these devices in house? Have you calculated the opportunity costs involved? Will a commercially available product line provide the features and operating reliability you require at a return on investment (ROI) you can afford?

A closer look

To help you solve the build versus buy dilemma, let us take a closer look at what is involved in designing, building, testing and maintaining a human machine interface system by outlining a typical product development cycle.



Planning

Begin by making an honest assessment of your engineering capabilities. Given your company’s core competencies and priorities as well as the opportunity costs involved. Is the design of a human-machine interface terminal the best use of precious engineering resources?

Design Phase

The first consideration in the engineering design phase is whether your engineers have the experience to design and build complex human-machine interface.

Next, consider that many aspects of electrical and mechanical design are highly specific, if not unique, to the requirements and constraints of the industrial environment. To mount components so they can withstand vibration and shock for example, or to seal displays and keypads from liquids, dust and other environmental hazards is highly specialized knowledge that most engineering design teams struggle to master. Developing those skills from scratch is a costly and time-consuming effort.

Finally, do not discount the complexity of software development for even a simple human-machine interface. Today, most displays provide graphical feedback to the human operator and intuitive navigational elements with a three-dimensional “look and feel”. The demands of programming in a graphical environment are many times more complex than programming for character-only displays.

Prototyping

It is important to prototype early and often in the design phase of a new product. Assess your company’s ability to develop mechanical prototypes quickly and cost effectively. Do your engineers have access to a 3D printer, for example, or will they have to send CAD files to an outside service?

Testing

How will your engineering team address the issues of testing both the hardware and software components? Does your team have the capability to design and build test fixtures and write the testing software? Also, fixtures and software must be created prior to the final assembly of a product. Does your company have the equipment to perform environmental tests?



Three questions are crucial to consider: time to market, risk assessment and cost analysis. All three are subject to the overriding question of core competency and opportunity costs.

Iteration

How many iterations of a design will your product development schedule allow? There are many potential failure points in the design and manufacture of a human-machine interface. Multiple re-designs and prototypes can use up critical weeks of development time. Yet most complex engineering projects require from three to six prototype stages to fully optimize the final product.

Final Testing and Certification

The final testing and certification could be a demanding discipline. Depending on the environment in which the machine will be used, HMIs may have to be tested for operation over for example extreme temperature ranges, as well as for thermal shock as devices are taken instantaneously from one temperature extreme to another. They may have to meet humidity requirements or be tested for sealing against immersion or high volume liquid spray. They may need to meet vibration and shock tests, and they must withstand electrostatic discharge and electromagnetic interference.

Product Mangement and opportunity Costs

- One of the hardest costs to calculate is opportunity cost. If you commit engineering resources to the development of a non-core competency human-machine interface, what other more important or more lucrative projects may be affected by this decision?
- Risk factors must be honestly assessed by the product managers. These run the gamut from the risk of losing key members of an in-house design team to the need to change a crucial specification, such as screen size, in the middle of product development. Risks are also involved in the availability of component parts, particularly if you need them in low quantities. Once the product is in production, there are also the additional costs of ongoing maintenance and support.

These tests are expensive and time consuming. Many of the environmental tests cannot be performed without specialized equipment and must be performed in a special laboratory. Regulatory certifications can take weeks or even months to schedule and pass.

Release to Manufacturing

The final release to manufacturing involves the generation of many types of documentation, including manufacturing documents, assembly drawings and flow diagrams. Repair manuals are required for service technicians and operator manuals for end users. The documentation task alone for an HMI involves many man hours of coordinated work, as well as a documentation tracking and updating system. Is your company ready to take on this task?

Sustaining Engineering

Once a human machine interface is incorporated into your product, the issues of maintenance, repair or replacement are major cost factors that must be planned for up front. If you source a terminal from a third party, product maintenance and repair will be covered by warranty, so no internal engineering effort is required on your part. In addition, when an HMI that you design requires an upgrade or becomes obsolete, your engineers will be responsible for the redesign.

The Bottom Line

Industry experts agree that the build versus buy question in any manufacturing industry finally comes down to a handful of key questions. Three questions are crucial to consider: time to market, risk assessment and cost analysis. All three are subject to the overriding question of core competency and opportunity costs.

If designing and building reliable terminals for your company’s line of products is not a core competency of your business, then the fastest, safest and most cost-effective course is to partner with a reputable manufacturer of human machine interfaces.

About Beijer Electronics

Beijer Electronics offer a full range of automation, human machine interface /mobile data terminals and industrial data communications products on a global market.

Since its start-up in 1981, Beijer Electronics has evolved into a multinational group. With locations in sixteen countries around the world and over 600 employees, Beijer Electronics provides a wealth of industry knowledge and a network of sales, support and engineering personnel to help you.