The Concept and Practice of "Concurrent Engineering"

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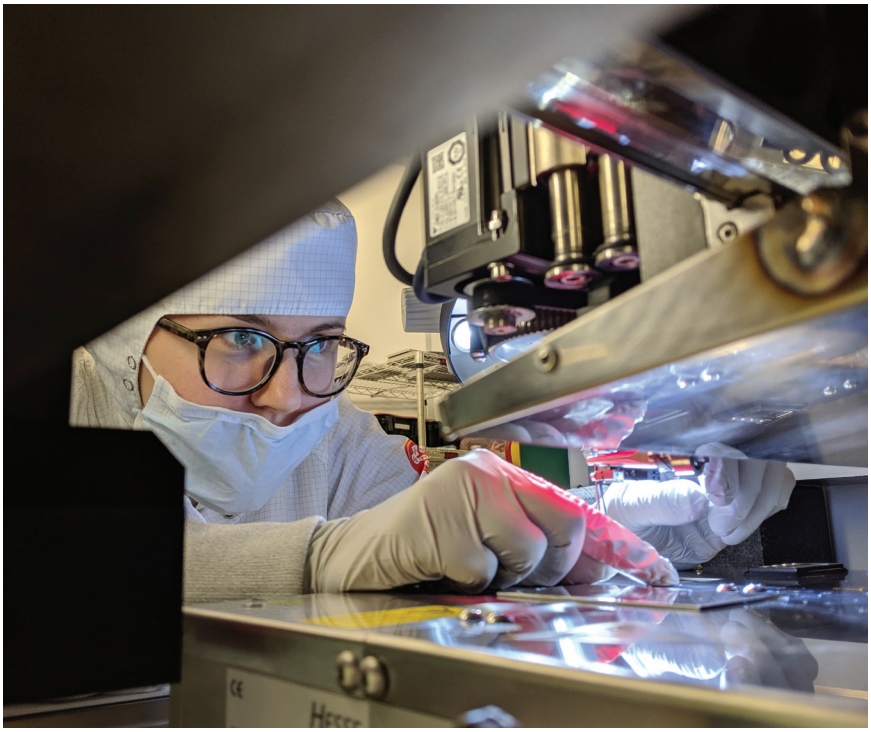
A LOT HAS BEEN SAID OVER THE years of the concept of concurrent engineering. There are courses available at engineering colleges and universities that delve into the value of the practice of concurrent engineering. Sometimes it goes by "simultaneous engineering" or "integrated product development (IPD)", but they all refer to the same basic practice. To some, the concept of concurrent engineering implies that once the design is "frozen", the design engineers can engage with the process engineers to begin the task of designing the process to produce the product as designed. To others, it implies that the design engineers have gained input from other engineering groups. To us at SMART Microsystems, it means having a complete team approach from the very beginning of the product design until the product launches.

In a not uncommon organization process flow, the process engineering group will see the design for the first time when the design is "frozen" by the design engineering group. This is when the redesign iterations begin to make the part or assembly compatible with a cost-effective process, or perhaps an existing process. Then, when the process engineering group hands off the modified design to the manufacturing engineering group for review, it is discovered that more iterations are needed to make the design manufacturable. At this point, it is even possible that the design goes back to the initial design group only to discover that the part or assembly no longer meets the original design intent.

You have probably seen these scenarios play out first-hand. Just think of how many iterations you have seen in product concepts that make it out of the design engineering team but cannot be manufactured. Or, think of how many times a "completed" design was not able to be manufactured because the manufacturing folks only saw the design at the end and determined it wasn't able to meet the design-to-cost goal.



With this in mind, it is somewhat funny that when some people hear the words "concurrent engineering", they recoil and think of all the time it will take to get the different disciplines (and people) to agree on anything. They believe that the process will slow to a crawl, and deadlines will be missed. However, in actuality, just the opposite is the case. A fully integrated concurrent engineering development cycle saves time and cost by eliminating costly iterative cycles.

That said, concurrent engineering can be implemented incorrectly and make all the fear of organizational morass come true. Simply gaining random input from other groups is not typically sufficient. Nor is it typically sufficient to only implement concurrent engineering at the beginning or end of product development. Both of these approaches—random input and partial implementation—can lead to confusion, organizational morass, and missed deadlines.

An interactive collaborative approach from beginning to end is always preferable. One effective way to implement concurrent engineering is to take advantage of the very first "concept phase" design review process to integrate different groups and individual ideas. Gaining

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valuable insight from as many sources as possible at this early step will help the process get off on the right foot.

So who do we invite? Who are the interested parties? Here is the short list of those that should be considered:

- Design engineering team needs to be present to weigh in on the design intent or customer requirements.
- Program management folks need to be present to weigh in on program timing and design to cost requirements.
- Process engineering team needs to be present to make certain that the design is manufacturable.
- Manufacturing engineering team needs to be present to consider the manufacturing needs once the product is released.

And don't be afraid to invite participants from outside the product development responsibility. Machine operators, technicians, assembly people, even people outside the scope have all attended design reviews with my groups in the past. These team members are not simply placeholders to demonstrate compliance to a design philosophy of concurrent engineering, but need to be full participating members that have valued input and respected as full stakeholders in the outcome.

Very large multidiscipline design corporations have the advantage to implement concurrent engineering because all of the development disciplines are contained within the company. But what about the smaller organizations, ones that do not have the luxury of a design, process, and manufacturing groups within the same reporting structure? What about new product development groups that are start-ups without a formal organizational structure? These smaller groups need to get a little more creative in their design approach if they want to take advantage of the benefits of concurrent engineering. For smaller organizations one possibility is to take advantage of outside entities to take part in the review process.

At SMART Microsystems, we are a process and manufacturing engineering development firm that also performs contract manufacturing for a variety of different firms from the very large corporations to very small startup ventures. We help develop sub-assemblies and complete assemblies for medical, aerospace, and energy sectors to name a few. Sometimes we are asked to take part in the development cycle as a member of the concurrent engineering team during a design review. When the spirit and intent of this time-tested and valued process is recognized and respected by all the team members, the outcome can be very powerful.

For more information visit our website at www.smartmicrosystems.com. ◆

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