Owens Design
YOUR DESIGN+BUILD PARTNER

February 1, 2010 | Photovoltaics World
Mark Danna, Owens Design, Fremont, CA USA

Faulty Logic in Production Tool Development Will Lead to Poor Results

In tight economic times, equipment companies have a tendency to cut back on engineering resources, making it harder to develop that next-generation production tool. Ironically, companies that are able to introduce new technology during downturns usually gain market share. This issue can be further exacerbated in emerging markets, such as solar, where there are many competing technologies and a lack of general standards, especially in the thin-film technology area.

Successful production tool development is possible, however, if certain mistakes—resulting from faulty logic—are avoided:

Rushing the job. Setting an unrealistic timeframe upfront is probably the most common error in production tool development. In most cases, the faulty logic of rushing the tool installation date is the result from a “top down” rather than a “bottom up” approach to planning. Instead of accurately estimating the time required for tool development, a tool install date is set based on company goals that have no relation to the actual development cycle.

Jumping the gun. Beginning tool development before the production process is fully characterized increases the length and cost of the development cycle. The result is multiple tool redesigns—a costly and frustrating process for all involved.

Not ready for production. Another common error is assuming a development tool will easily transfer to volume production. Any number of factors, such as non-scalable cost of ownership, inadequate throughput, excessive maintenance requirements, or high consumable costs, can turn such an attempt into an engineering nightmare. The faulty logic here involves failing to fully characterize critical process parameters before finalizing tool design specifications. It is usually more cost- and time-efficient to design a production tool from the bottom up, rather than to modify the lab tool and put it straight into production.

We can do it all. In some technology areas, solar manufacturing companies are following the tool development path that was utilized in the early days of the semiconductor industry. The solar product company not only develops the production processes, but also builds tools and then moves on to manufacture the product. As the semiconductor industry discovered, trying to do it all is less than efficient and costly. The engineers responsible for developing the production processes often lack the proper skill set for tool development, and companies manufacturing end products usually lack the

infrastructure to efficiently design and build capital equipment in-house. Even worse, the same engineers are often tasked with designing the process and the production tool simultaneously. This typically extends development cycle and heightens costs, while resulting in a less than optimal production tool.

Leveraging outside expertise in areas such as product handling, automation, and software development can reduce development time and costs, while letting company process engineers focus on their core competencies.

Tool cost is king. Decisions based purely on overall tool cost rather than optimized tool performance and ROI can result in outsourcing tool development to a contract manufacturer (CM) in a low-cost region. For a variety of reasons, including lack of necessary skills on the part of the CM, and poor project coordination and communication, the likely result is a tool that fails to meet performance specifications and requires redesign.

Each of the pitfalls described is likely to cause development time and cost overruns, as well as cost customer confidence. Each can be avoided by ensuring all tool development decisions are based solely on ensuring an effective tool development process.

Mark Danna is senior director of business development at Owens Design, 47757 Fremont Blvd., Fremont, CA USA; 510-659-1800; mdanna@owensdesign.com