Turning your supply chain into a competitive advantage

Design engineers are charged with creating the most innovative designs at the cheapest price, as fast as possible. Yet as a relatively young industry, the solar/clean technology industry lacks the deep worldwide manufacturing ecosystem that surrounds more mature industries such as telecommunications, industrial or medical. By Josh Chien

Despite the debate about whether to manufacture in-house versus outsource – outsourcing is on the rise. Fuelled by intense competition and coupled with complex regulations and increasing costs (transportation and raw materials), an immature supply chain can have unintended consequences. For OEMs to stay competitive, they must look at alternative manufacturing solutions or face delayed market entries and product launches, not to mention higher cost products.

Here are five ways solar design engineers leverage the supply chain to turn out projects through the process of new product introduction (NPI), and scale to volume production smoothly at the lowest possible costs.

Create an IP solution map

In any design project, there are typically five critical components in the design. These are the components that create 80% of the problems in getting to market because they are typically expensive, unique, complex and/or require long lead times to acquire.

Engineers don't choose a part because it has all of the bells and whistles or latest technologies. They balance those attributes with being able to deliver a viable, high quality product that meets all the design specifications quickly that are within, or below, targeted costs.

These engineers work with manufacturing and supply chain engineers to create an intellectual property (IP) map of all the design's components and parts: the solution maps identify who owns which IP. The solar engineers then collaborate with supply chain engineers and manufacturing engineers to source multiple suppliers. These partners can usually recommend alternative high quality parts that have shorter lead times, and/or be located closer to the manufacturing or assembly lines, at lower total landed costs.

If a part is a sole source (a frequent case in the solar industry), the supply chain engineers work with the sole source to license that IP so it can be replicated at other suppliers.

For instance, an OEM could need a wireless display for a solar product. Let's say there is only one supplier (based on the design specs), but it

can't meet the OEM's schedule. In such cases, the manufacturing and supply chain engineers team together to figure out a licensing arrangement that satisfies both the solar OEM's needs and the IP owner's requirements.

Full supplier reviews

Before the material requirements plan (MRP) and bill of materials (BOM) are finalised, solar engineers work with supply chain engineers who conduct a comprehensive review of the various suppliers for the different components in the IP solution map. These reviews include the suppliers' ability to meet the design specifications for a part or component, as well as whether they have the capacity to maintain quality while simultaneously scaling to the OEM's required volume, and can deliver to the manufacturing/assembly plants on time around the world (if needed) at the total lowest landed cost

The analyses also take into account the supplier's in-house engineering (manufacturing and design) expertise and hands-on experience with similar technologies, its equipment capability, the precision and completeness of its engineering documentation, its access to raw material availability, and its financial viability.

Doing this before the MRP and BOM are finalised gives the solar OEM an advantage in negotiating price points and lead times. On the other hand, if these specifications are locked before the analyses are complete, the OEM runs the risk of being at the mercy of the weakest link in its supply chain. And if that happens to be the supplier for one of the critical components, the OEM is now faced with potentially losing revenue and market share – not to mention incurring significant increases in costs.

One example often seen in the solar industry is design specs for extruded parts that have curved surfaces instead of straight ones. Such irregularly shaped parts often require unique tooling and equipment that few solar suppliers have. Acquiring that equipment or designing the tooling and having the expertise to use it competently can add significant lead times and costs. Design engineers may be unaware that this equipment, tools and expertise is standard for other suppliers that specialise in manufacturing for other industries such as industrial or telecommunications. Yet a supply chain engineer at a Tier 1 manufacturer already has a source or could quickly find and qualify one.

DFX analyses

For an OEM to be successful, a concept has to scale to the volumes, meet the schedules and costs required and at the quality its customers expect. The best way to ensure that outcome is to run DFX analyses at both the prototype and production phases.

DFX analyses help ensure the reliability of the finished product when it comes off the line and for years to come as it is used out in the field. Because the last thing an OEM wants is a product that fails.

Both DFM (design for manufacturability) and DFA (design for assembly) analyses surface potential problems well in advance of finalising the BOM and building tooling for material manufacturing and tooling for the assembly line. The earlier these problems are surfaced, the sooner they can be solved, resulting in significant savings. A $1 design error found during the concept

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stage could reach as much as $1,000 at prototype, tens of thousands of dollars at NPI and hundreds of thousands once it's running in volume.

These analyses often highlight ways to simplify the design and provide other options for materials, manufacturing and assembly processes. This smoothes manufacturing and assembly, helping the solar OEM's product get to market faster, at lower costs. And given the competitive nature and speed of the solar industry, being able to fill an order on time is the difference between getting or losing the business. This is especially true due to the time-limited nature of many local, regional and national government incentives, tax breaks, and rebates.

Review country/market constraints

For solar OEMs expanding their market presence into different countries, being aware of the different government constraints is crucial. Top solar engineers work with manufacturing, supply chain and logistics experts to understand the different regulations and government incentives that can affect a product's deliverability and total cost.

For instance, knowing that a product manufactured in one country can be imported into another without violating any trade agreements or import/export regulations is crucial. Sometimes there are financial advantages to be gained that can help reduce total landed costs. A country could require a higher import duty if X% of the BOM was assembled outside of its country. Conversely, if X% of the BOM was made in its country (or a trade partner's), a significantly lower export duty might be the result. Bottom line: the most successful solar OEMs factor these constraints and advantages into the overall product's manufacturing strategy.

Building long-term relationships

Staying ahead of the competition is the mantra of every design engineer. But unlike most design engineers in mature industries, solar engineers lack access to the depth and breadth of manufacturing and supply chain expertise found in other industries. The most effective solar engineers have learned to leverage their supply chain partners' expertise.

Successful solar engineers develop long-term, trusted relationships with these manufacturers in order to gain access to new technologies and processes that can be licensed and/or transferred from other industries that make products for use in harsh and extreme environments. Such opportunities come from developing mutually trusting relationships among OEMs, manufacturers and suppliers who adhere to strict, ethical practices in safeguarding each other's intellectual property. These relationships foster opportunities for co-development and licensing arrangements that can help them leapfrog their respective competitors.

The DFX analyses, supplier reviews and IP solutions maps bring to light many opportunities for collaboration and partnerships for solar OEMs. Each situation, whether using existing technologies or developing new technologies, leads to a case-by-case agreement regarding the intellectual property's development and its ownership.

There are many approaches to developing solutions; there is no single answer, which is why the most well-informed solar OEMs stay focused on meeting their end goals and remain open to a wide range of solutions of how to get there.