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Apple's Supply-Chain Secret? Hoard Lasers

The iPhone maker spends lavishly on all stages of the manufacturing process, giving it a huge operations advantage

By Adam Satariano and Peter Burrows

About five years ago, (AAPL)Apple design guru Jony Ive decided he wanted a new feature for the next MacBook: a small dot of green light above the screen, shining through the computer's aluminum casing to indicate when its camera was on. The problem? It's physically impossible to shine light through metal.

Ive called in a team of manufacturing and materials experts to figure out how to make the impossible possible, according to a former employee familiar with the development who requested anonymity to avoid irking Apple. The team discovered it could use a customized laser to poke holes in the aluminum small enough to be nearly invisible to the human eye but big enough to let light through.

Applying that solution at massive volume was a different matter. Apple needed lasers, and lots of them. The team of experts found a U.S. company that made laser equipment for microchip manufacturing which, after some tweaking, could do the job. Each machine typically goes for about $250,000. Apple convinced the seller to sign an exclusivity agreement and has since bought hundreds of them to make holes for the green lights that now shine on the company's MacBook Airs, Trackpads, and wireless keyboards.

Most of Apple's customers have probably never given that green light a second thought, but its creation speaks to a massive competitive advantage for Apple: Operations. This is the world of manufacturing, procurement, and logistics in which the new chief executive officer, Tim Cook, excelled, earning him the trust of Steve Jobs. According to more than a dozen interviews with former employees, executives at suppliers, and management experts familiar with the company's operations, Apple has built a closed ecosystem where it exerts control over nearly every piece of the supply chain, from design to retail store. Because of its volume—and its occasional ruthlessness—Apple gets big discounts on parts, manufacturing capacity, and air freight. "Operations expertise is as big an asset for Apple as product innovation or marketing," says Mike Fawkes, the former supply-

chain chief at (HPQ)Hewlett-Packard and now a venture capitalist with VantagePoint Capital Partners. “They’ve taken operational excellence to a level never seen before.”

This operational edge is what enables Apple to handle massive product launches without having to maintain large, profit-sapping inventories. It’s allowed a company often criticized for high prices to sell its iPad at a price that very few rivals can beat, while still earning a 25 percent margin on the device, according to the estimates of Piper Jaffray analyst Gene Munster. And if the latest rumors are to be believed, Apple’s operational expertise is likely part of what gives the company enough confidence to enter the notoriously cutthroat television market by 2013 with a TV set that would tightly integrate with existing Apple software like iTunes. The widespread skepticism over Apple’s ability to compete in such a price-sensitive market, where margins are often in the single digits, is “exactly what people said when Apple got into cell phones,” says Munster.

Apple began innovating on the nitty-gritty details of supply-chain management almost immediately upon Steve Jobs’s return in 1997. At the time, most computer manufacturers transported products by sea, a far cheaper option than air freight. To ensure that the company’s new, translucent blue iMacs would be widely available at Christmas the following year, Jobs paid $50 million to buy up all the available holiday air freight space, says John Martin, a logistics executive who worked with Jobs to arrange the flights. The move handicapped rivals such as Compaq that later wanted to book air transport. Similarly, when iPod sales took off in 2001, Apple realized it could pack so many of the diminutive music players on planes that it became economical to ship them directly from Chinese factories to consumers’ doors. When an HP staffer bought one and received it a few days later, tracking its progress around the world through Apple’s website, “It was an ‘Oh s—’ moment,” recalls Fawkes.

That mentality—spend exorbitantly wherever necessary, and reap the benefits from greater volume in the long run—is institutionalized throughout Apple’s supply chain, and begins at the design stage. Ive and his engineers sometimes spend months living out of hotel rooms in order to be close to suppliers and manufacturers, helping to tweak the industrial processes that translate prototypes into mass-produced devices. For new designs such as the MacBook’s unibody shell, cut from a single piece of aluminum, Apple’s designers work with suppliers to create new tooling equipment. The decision to focus on a few product lines, and to do little in the way of customization, is a huge advantage. “They have a very unified strategy, and every part of their business is aligned around that strategy,” says Matthew Davis, a supply-chain analyst with (IT)Gartner who has ranked Apple as the world’s best supply chain for the last four years.

When it’s time to go into production, Apple wields a big weapon: More than $80 billion in cash and investments. The company says it plans to nearly double capital expenditures on its supply chain in the next year, to $7.1 billion, while committing another $2.4 billion in

prepayments to key suppliers. The tactic ensures availability and low prices for Apple—and sometimes limits the options for everyone else. Before the release of the iPhone 4 in June 2010, rivals such as HTC couldn't buy as many screens as they needed because manufacturers were busy filling Apple orders, according to a former manager at HTC. To manufacture the iPad 2, Apple bought so many high-end drills to make the device's internal casing that other companies' wait time for the machines stretched from six weeks to six months, according to a manager at the drillmaker.

Life as an Apple supplier is lucrative because of the high volumes but painful because of the strings attached. When Apple asks for a price quote for parts such as touchscreens, it demands a detailed accounting of how the manufacturer arrived at the quote, including its estimates for material and labor costs, and its own projected profit. Apple requires many key suppliers to keep two weeks of inventory within a mile of Apple's assembly plants in Asia, and sometimes doesn't pay until as long as 90 days after it uses a part, according to an executive who has consulted for Apple and would not speak on the record for fear of compromising the relationship.

Not every supplier gives in. An executive who works with a major parts manufacturer says that Apple's bargaining tactics tend to exert downward pressure on prices, leading to lower profits and margins. After months of negotiations, the company declined a $1 billion payment from Apple that would have required the supplier to commit much of its manufacturing capacity to Cupertino's products. The executive familiar with these talks, who asked not to be named because the discussions were not public, says that while deals featuring $1 billion in cash up front are basically unheard of, his company didn't want to be too dependent on Apple—and didn't want to help it deflate prices.

Apple's control reaches its crescendo in the leadup to one of its famed product unveilings, a tightly orchestrated process that has been refined over years of Mac, iPod, iPhone, and iPad debuts. For weeks in advance of the announcement, factories work overtime to build hundreds of thousands of devices. To track efficiency and ensure pre-launch secrecy, Apple places electronic monitors in some boxes of parts that allow observers in Cupertino to track them through Chinese factories, an effort meant to discourage leaks. At least once, the company shipped products in tomato boxes to avoid detection, says the consultant who has worked with Apple. When the iPad 2 debuted, the finished devices were packed in plain boxes and Apple employees monitored every handoff point—loading dock, airport, truck depot, and distribution center—to make sure each unit was accounted for.

Apple's retail stores give it a final operational advantage. Once a product goes on sale, the company can track demand by the store and by the hour, and adjust production forecasts daily. If it becomes clear a given part will run out, teams are deployed and given approval to spend millions of dollars on extra equipment to get around the bottleneck.

Apple’s enormous profits—its gross margins were 40 percent last quarter, compared with 10 to 20 percent for most other hardware companies—are in large part due to this focus on operations, which is sure to remain a priority under Cook. The new CEO is known to give colleagues copies of *Competing Against Time*, a book about using supply chains as a strategic weapon in business. According to Martin, the logistics executive, Cook uses a catchphrase to hammer home the need for efficiency: “Nobody wants to buy sour milk.”

The bottom line: *Apple plans to double spending on its supply chain, to $7.1 billion, continuing its focus on streamlining and controlling manufacturing.*

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