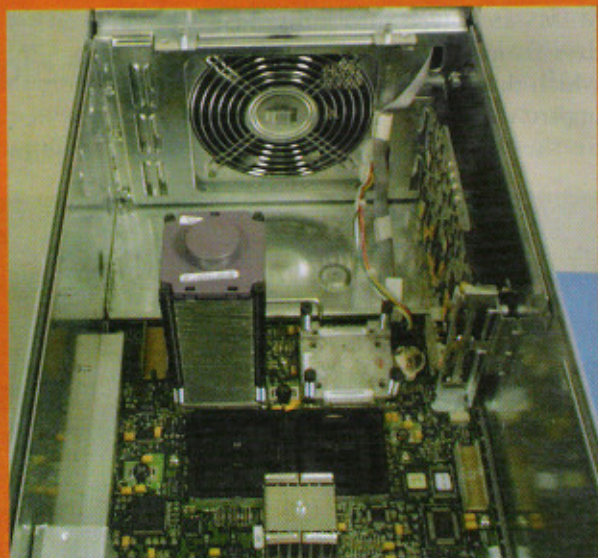


The Teardown Artist

An engineer keeps his clients one step ahead by taking a deep look into their competitors' products.

By Michael Abrams,
Contributing Editor



The tower in this computer is a heat pipe, meant to cool a chip—just one of the many products Dave Meeker has been asked to analyze.

Soon after Xerox came out with its first copy machine, a joke began to circulate within the company—that the first two machines were sold to IBM and Kodak. The same thing could have been said of IBM—that its first two machines were sold to Xerox and Kodak—and of Kodak, as well. But there's only a crumb of humor in the joke, as all three companies certainly had a good look into their competitors' machines as soon as humanly possible.

For Dave Meeker this fact raises neither a conspiratorial eyebrow nor a suspicious one. The big copy machine companies weren't just looking for an easy way to jump into the new market, and they didn't buy each other's products just to make copies, as it were. In the spirit of true economic competition, they wanted to know exactly what their competitors were doing so they could improve their own designs and lower their costs. Taking things apart for those purposes is how Meeker makes his living.

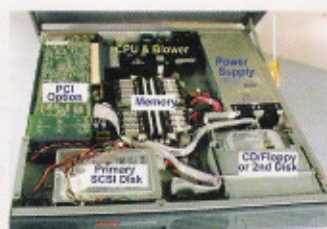
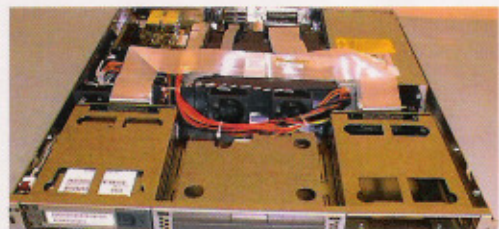
After graduating from Carnegie Mellon University as a mechanical engineer, Meeker learned the value of understanding every step of a product's

production, from design to manufacturing, at his first job, with AVCO. There he worked on the design, costing, and manufacturing of a boosted kinetic energy weapon for the destruction of runways. He went on to work for the Advanced Manufacturing Technology Group, the Design for Manufacturing Institute, and Hewlett-Packard, as well as teach at MIT, before taking his skills to the freelance market.

From Coffee Grinders to Erasers

Since then, he has ripped apart and "costed" products as diverse as medical pumps, insulin injectors, game systems, diver propulsion vehicles, coffee grinders, and retractable erasers, just to name a few.

Meeker likes to make it clear that what he does is benchmark testing, not reverse engineering. According to Meeker, "Reverse engineering is the disassembly of something with the sole purpose of replicating it, which nine times out of ten is against the law. What I try to do is to take



These four 1U machines all do essentially the same thing, but their architecture, design, and cost are very different. "There are all sorts of tradeoffs that have been made around service and accessibility," Meeker explained.

something apart, glean as much as humanly possible from it, and use that to take several steps forward and innovate beyond that."

To meet the challenge, Meeker has to keep himself well informed of case laws as well as stay abreast of the newest engineering technology in every field he can. "I try to subscribe to every free periodical out there," he said. "Everything from a magazine on wood, to one on medical products, and all the design news—any periodical that's out there. There's zillions of them." But the real key to succeeding as a teardown man is what he calls "good, old-fashioned detective work."

Every job starts with Meeker scouting out the best price for whatever he might be hired to dissect. Then he carefully takes apart the packaging.

He may already have deduced much about what's inside. "One of the things you always do is look at the bottom of the box—to figure out where the corrugated was made. Boxes are seldom made far away from where the product is assembled." Sometimes he can decipher the entire supply chain just by looking at where the various components were put into the box.

Playing Sherlock Holmes

Once inside the actual machine, the private-eye stuff gets trickier. Meeker often has to put a price tag on every screw, wire, and chip, and while some OEM components and standard elements may be easy to track down, other parts remain elusive.

"You find a symbol, or a couple of letters on a particular subassembly. You start looking for a company logo, or a set of initials—maybe JEB that happens to make fans. Then, you stumble across a fan company named JEB and you look for the model number and, lo and behold, you find it in a parts catalog. So now you know, A, who the vendor is, and B, the model number. Now you can go do things like get quotes and figure out what the costs were," he said.

Because many of Meeker's clients want every part identified, quotes for every part, and an explanation of how the whole thing is put together, it might seem as if he has one of the most encyclopedic engineering minds around.

"To be honest, I know a whole bunch of stuff at a systems level, and I can probably ask questions four or five levels deep. However, I'm not an expert in any one of them. For corrugated, I know enough to be really dangerous, but when we get down to the real nitty-gritty of

corrugated, there's an expert I call. You're not going to find any one person who can be an expert at everything that you would find in a product like, say, a digital camera. Or a desktop computer or a set of speakers or an automobile." And when there's no one else to call, the trusty Internet can be pretty helpful. "It might be on search page 40, but there's a lot of data out there," Meeker said.

So how does a company protect itself from people with Meeker's expertise—and contacts? Meeker's simple answer is that they can't. There are measures that companies can take, of course, like more savvy labeling of OEM parts and putting circuit boards in pods, but these detours can't stand up to the prodding of a determined benchmark tester.

"Lots of times, people put in little traps and pitfalls in semiconductors to prevent you from disassembling them," Meeker said. "But there are ways to very slowly and systematically take them apart, and try and restore them to get more information. People X-ray chips, they pop the top off the ceramic package to see the die size, and then they can slowly start to work their way through the chip, layer by layer."

Rather than spend their money trying to figure out how to stop the com-

"One thing often overlooked is the bottom of a corrugated box," said Meeker. "It gives the name of the corrugator and the location where it was made."



petition from copying them, companies should use those funds for benchmark testing to know their

sector in and out. Rare is the case when knowing how a competitor's product works, how it was made, and how much it costs doesn't pay off.

"I have been to some places where people rip stuff apart and they say, 'We didn't learn anything we didn't already know. We're still the leaders and they're not,'" Meeker said. "And I'm usually saying by that time you missed the boat. In any teardown, there's got to be a least a zillion things you can learn. Even if you're still the leader and still the best, there should have been a lot of stuff you could have learned." ■