

## Functional Tests Help Improve Headset Strength by 273%

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- Dominic Amae, Logitech

### Real Challenge

Logitech is known for innovative and well-made accessories for computers and cell-phones. The company’s Audio Business unit has a philosophy of “continuous innovation – flawless design.” To assist with its mission, the company recently added an Fortus FDM (fused deposition modeling) system.

Prior to using the FDM process, the company’s prototypes weren’t durable enough for functional testing. “We couldn’t run functional tests until late in development, when we made parts from prototype injection molds,” says senior mechanical engineer Dominic Amae. At this stage, the time and cost to optimize a design were high, prohibiting engineers from freely iterating designs.

### Real Solution

With FDM, the ability to run functional tests resulted in improved reliability and comfort for Logitech’s Mobile Bluetooth® Headset. Logitech recently updated the headset design to eliminate a problem that occurred for some users. If handled roughly, the microphone boom could rotate 360 degrees and break the electrical contacts. Investigation showed that distortion allowed the boom to sweep past its rectangular stops. “We determined the solution was to modify the stops to a wedge shape,” says Amae, “but we didn’t know the best configuration.”

Since the boom and stops are tiny, Amae built functional ABS prototypes to allow failure observation. In the lab, weights were added to the boom until it failed. Following each test, the boom and wedge-shaped stops were redesigned. “We’re confident that the failure modes seen in the ABS prototypes will be true to that for the production part,” says Amae.

Logitech repeated the process of design and destructive testing until it reached peak performance — a 273 percent strength improvement. “We were surprised to find that the best wedge design was counter intuitive,” says Amae. “Had we relied on formulas and CAD models, rather than testing functional models, we might never have found the optimal design.”

“We used to worry about our expensive prototypes breaking during user testing. But now that we use ABS parts, which are robust enough to be handled like real parts, we



Image 1: Logitech’s mobile Bluetooth® headset in use.



Image 2: Logitech redesigned its headset to improve the microphone boom’s strength.



Image 3: Headset components were modeled in ABS plastic, using the FDM process.

don't have that concern," says Amae. "This really gives us the freedom to perform realistic tests." Amae finds that one FDM prototype is strong enough to outlive many SLA parts.

Logitech's investment in FDM technology yielded more than just a quick payback, according to Amae. "We build parts on-site and enjoy faster design cycles. The speed and low cost of models lets us make enough to serve the design team, the marketing team, and the manufacturing team. We now test more designs, in more ways, which results in better products and satisfied customers."



*Image 4: Functional tests helped engineers design a new microphone boom that is 273% stronger.*

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