



Microsoft Surface Laptop 3 (15-inch) Teardown

Teardown of the Surface Laptop 3 reveals a shocking turnaround in repairability on what used to be our least-favorite laptop design. Performed Oct 22, 2019.

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INTRODUCTION

Surface Laptop teardowns have historically been [a painful business](#)—but with the Surface Laptop 3, Microsoft hinted that something is very different. Is it a good idea to try this again? We say put away your tools and let the professionals try this one first. Oh wait, that's us.

Want even more exciting teardown news? Check out our [YouTube channel](#), follow us on [Twitter](#), [Instagram](#), or [Facebook](#), and subscribe to our [newsletter](#).

And check out our [13.5" Alcantara Laptop 3 teardown](#) video!



TOOLS:

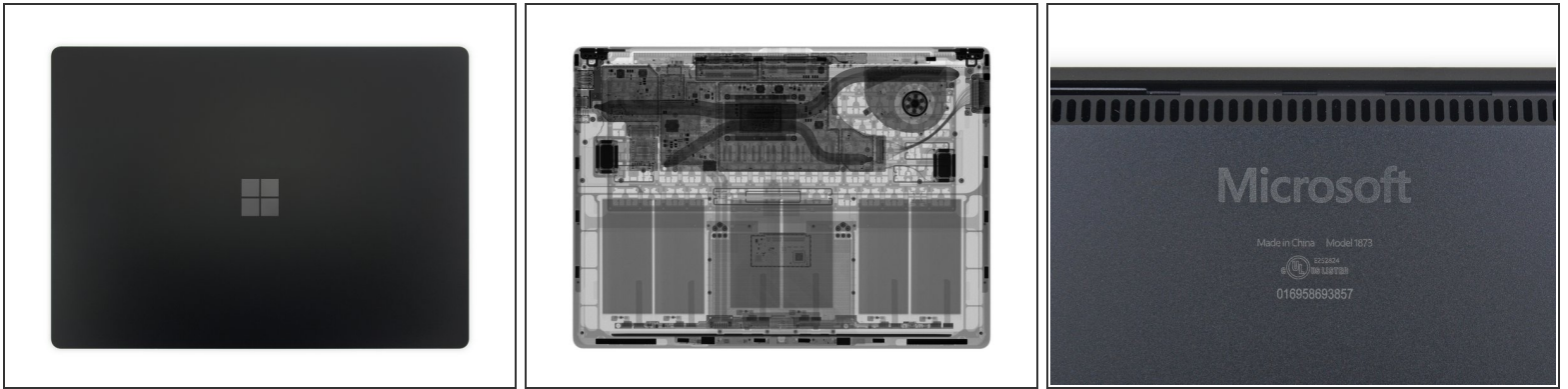
- [iFixit Opening Tools](#) (1)
 - [T3 Torx Screwdriver](#) (1)
 - [T5 Torx Screwdriver](#) (1)
 - [T6 Torx Screwdriver](#) (1)
 - [Spudger](#) (1)
 - [Tweezers](#) (1)
 - [iFixit Adhesive Remover \(for Battery, Screen, and Glass Adhesive\)](#) (1)
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Step 1 — Microsoft Surface Laptop 3 (15-inch) Teardown



- Before we begin, let's look at some *Surface*-level specs:
 - 15" PixelSense Display with 2256 × 1504 resolution (201 ppi)
 - AMD Ryzen 5 3580U mobile processor with Radeon Vega 9 graphics
 - 8 GB of DDR4 RAM
 - 256 GB removable SSD storage
 - 720p front-facing camera with Windows Hello sign-in
 - USB-C, USB-A, 3.5 mm headphone jack, and Surface Connect port
 - Wi-Fi 5 (802.11ac), Bluetooth 5.0

Step 2



- So far, the Surface Laptop 3 is looking pretty [familiar](#), but we've been [salivating](#) about the changes under this façade since the keynote.
- ❗ Speaking of façades, this one retains the stylized, monochrome Windows logo of prior Surface Products. [Rumor](#) has it that colorful logos are making a comeback, so maybe Microsoft will [join the party](#)?
- And speaking of monochrome, check out this amazing X-ray (thanks to [Creative Electron](#)). We get a preview of all the usual laptop bits, plus some unusual dark bars around the perimeter. Are those magnets?
- Underneath, along with vents and the standard regulatory markings, we find a new model number: **1873**.

Step 3



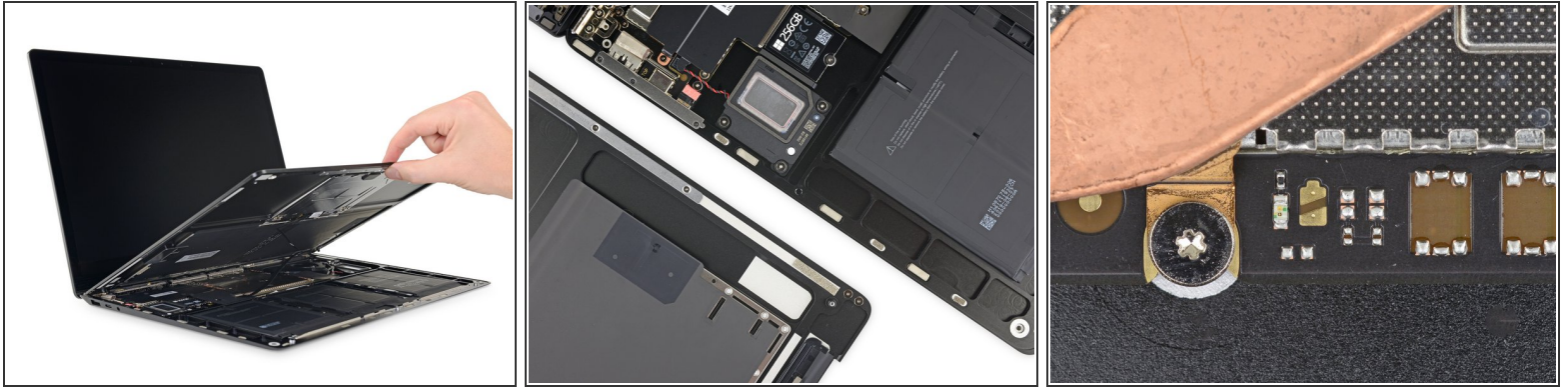
- The all-new 15" Surface Laptop towers over its 13.5" sibling. It may be bigger, stronger, and come with a custom Ryzen processor, but the 13.5" model has one thing the 15" line lacks: [a nice cozy bed for your palms](#).
- Compared with the 15" 2019 MacBook Pro, some more contrasts show up: The Surface Laptop is a little thicker, with a more [wedge](#)-like profile. Both have USB ports, but the Surface trades one USB-C for a USB-A.
- And as in every Surface Laptop, we find the lone proprietary Surface Connect port around the other side, which can deliver both power and high-speed data.
- Convenient, worry-free magnetic charging ports used to be an Apple thing, but now Microsoft carries that torch.

Step 4



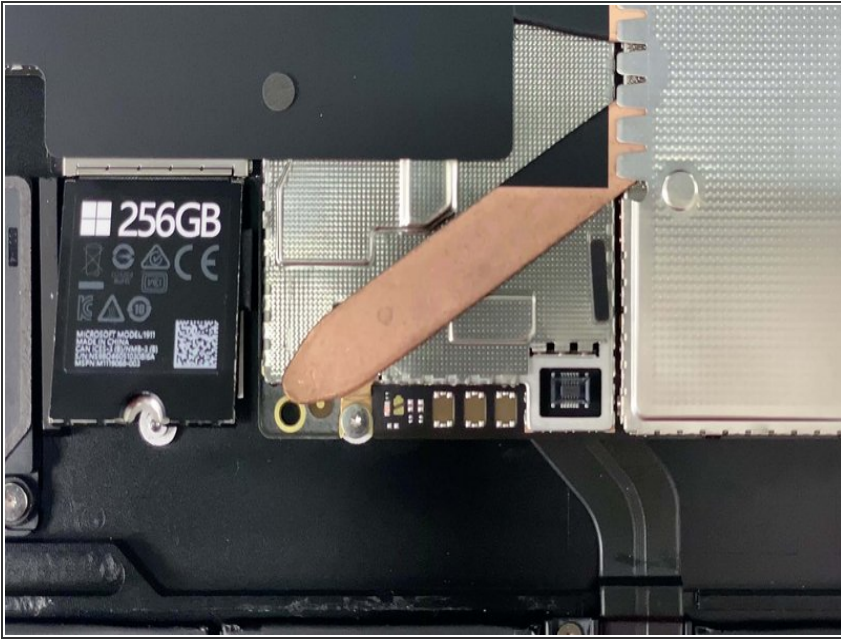
- Our expectations are low as we pry off the bottom feet. [Last time](#) we attempted this, it was the start of a painful, destructive jour—
⚠ Wait, what's this? A screw??
- A Torx Plus screw hides under each bottom foot—not the most common screw head in the world, but nothing our [Mako kit](#) can't handle with a little finesse.
- With the four Torx Plus screws removed, we take a stab with our opening tool at the seam between the upper and lower case, and ... it comes right apart! With nary a speck of unsightly glue in sight!
- ⓘ Grab your ESD-safe tweezers and pinch us hard—we *must* be dreaming.
- Once the shock wore off, we also tried popping open a [13.5" Alcantara-covered Surface Laptop](#). Same results!

Step 5



- Just like that, the whole top cover assembly lifts away! This is a magical moment. We sigh in relief and put away the knife we had on hand to [cut this thing open](#).
 - As a bonus, the cover is tethered by a single flex cable with plenty of slack ... and the connector at the end is secured with a magnet instead of those fussy clip-on brackets that we always ruin. Very slick.
 - With the top case flipped over, behold ... magnets. **Magnets!** No wonder Panos was able to [yank this thing off so easily on stage](#).
- ⓘ He did say to not try that at home. Good thing we're at work!
- ✦ The battery connector doesn't look accessible, which is a [recurring theme](#) with Surface devices. However, we find what may be a tiny battery icon on the main board near the top cover connector socket. Perhaps jumping these two pins would safely de-energize the board?

Step 6



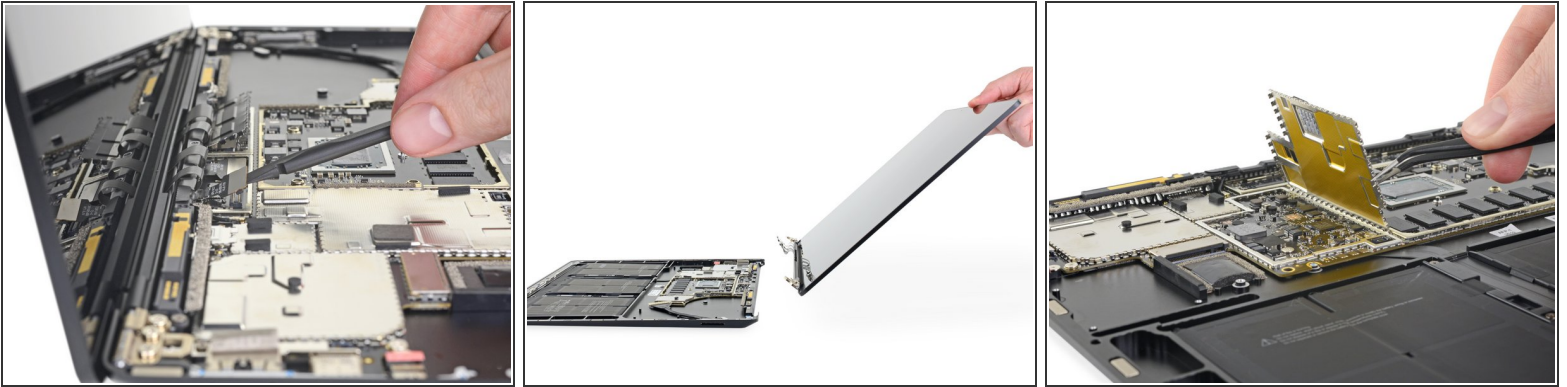
- **Teardown update:** Turns out the mysterious battery icon has an accompanying [status indicator LED](#)! It seems to light up when the board is energized. Jumping the battery icon pins doesn't turn out the lights, but removing the SSD does ...
- ⓘ Perhaps SSD removal is a secret kill switch, to mitigate the absence of an easily disconnectable battery?

Step 7



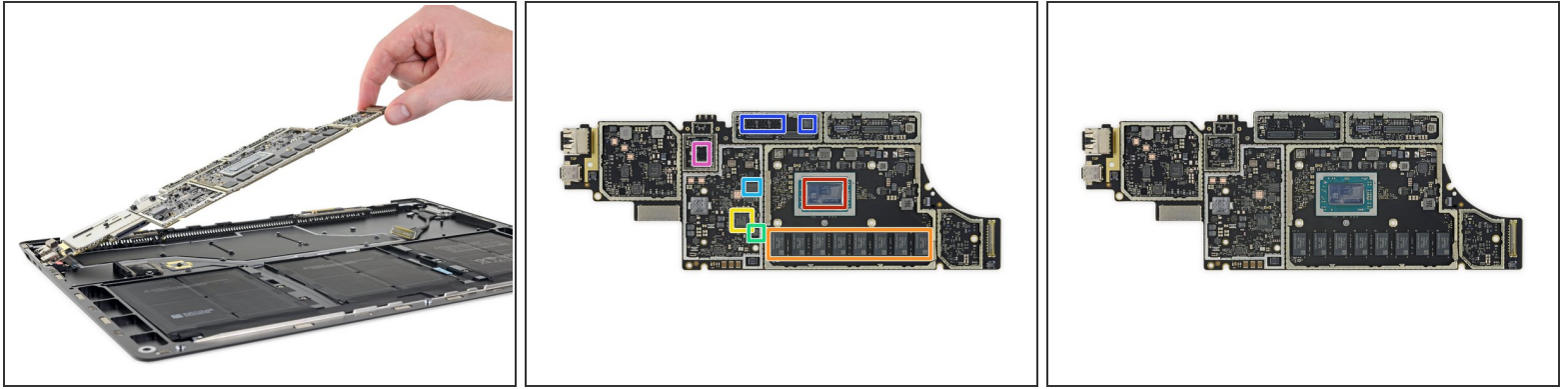
- First thing we spot with that magnet-y top cover assembly out of the way: the removable SSD. If we hadn't already seen this in Microsoft's keynote presentation, we'd probably be passed out in our chairs by now.
 - A single Torx Plus screw secures this M.2 2230 SSD, making swaps, upgrades, and user privacy management a reality for the mass—oh wait, it's "[not user removable](#)."
- Of the two speaker siblings, only one is allowed to leave freely. The other remains trapped under the heat sink for now.
- ❗ Are we only just now noticing that [these speakers](#) fire directly through the keyboard, with no special exterior ports or grilles? The keyboard *is* the grille.
- Despite the requisite stubborn shields, this disassembly seems almost too easy—the heat sink assembly is already freed and so far nothing is [irreparably damaged](#).

Step 8



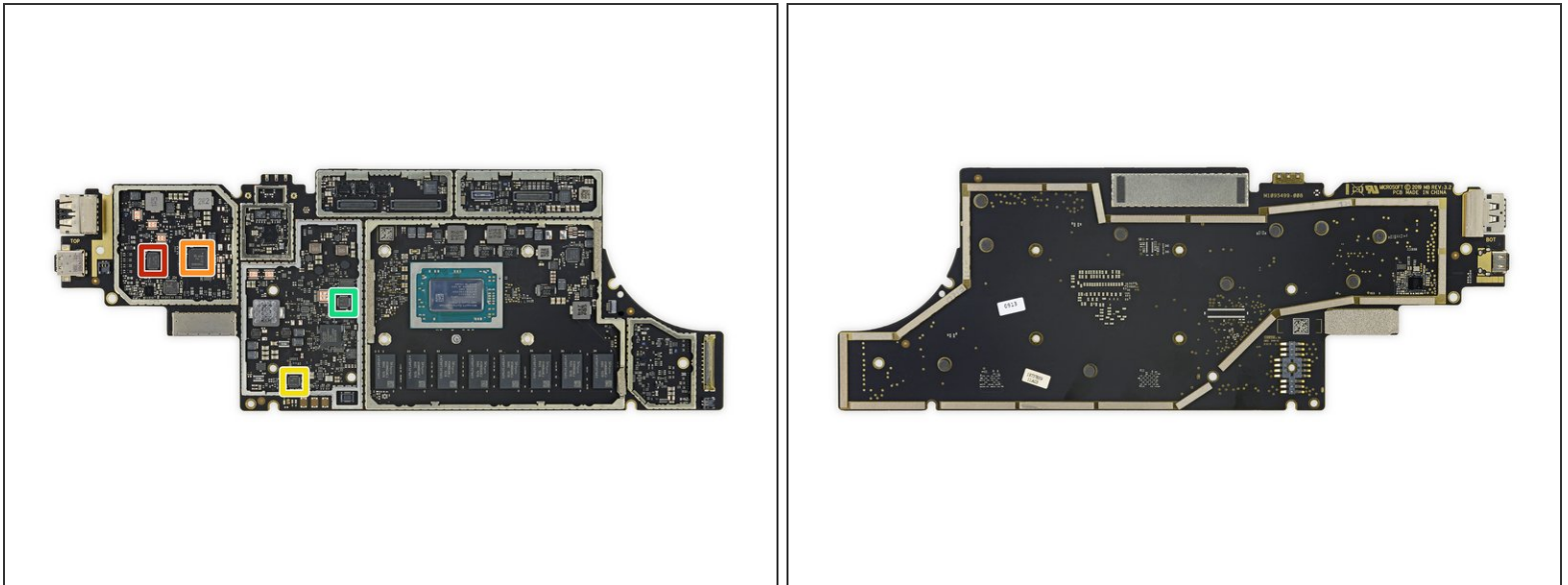
- We skipped ahead a little, but you can actually remove this display as soon as the device is open.
- Four flex cables wrap over the hinge and tuck into the back of the frame, where they're covered by some prickly metal shields. Prying up and wiggling out the shields without damaging the cables is somewhat of a nail-biter.
- ☑ These cables aren't modular, so if you cut one, you'll be pulling a [MacBook Pro](#) and replacing the entire display.
- With the shields aside, and a few more screws dispatched, the display lifts away easily.
- We're close to freeing the motherboard at this point, but we're slowed down by screws hidden underneath more shields.

Step 9



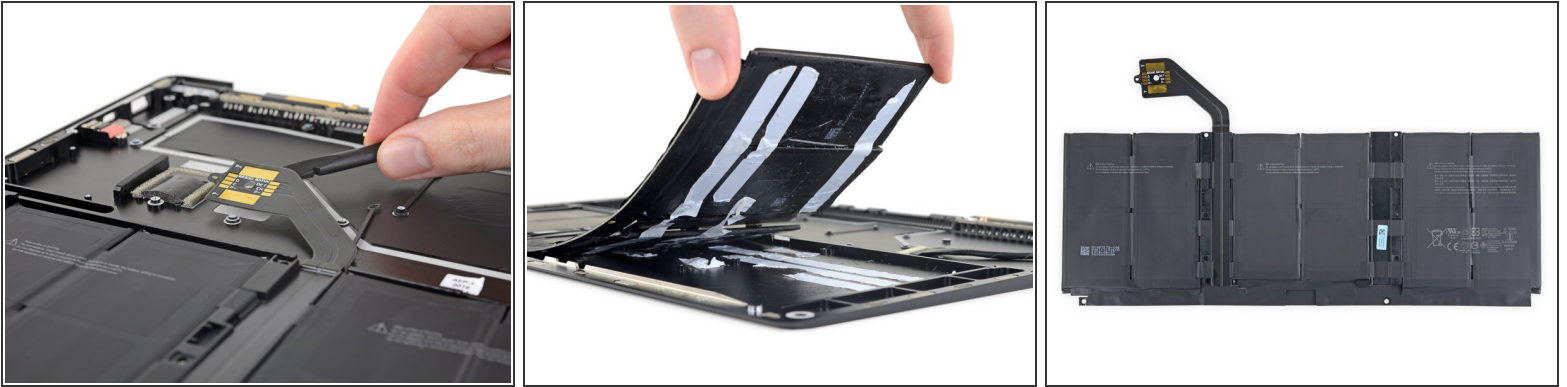
- This teardown is moving fast, so let's remember to stop and smell the chips:
 - Microsoft Surface Edition AMD Ryzen 5 [3580U](#) processor
 - SKhynix [H5AN8G6NCJR](#) eight 8 Gb DDR4 SDRAM—**sadly still soldered and not upgradable**—for 8 GB total
 - NXP LPC54S001J microcontroller
 - Macronix [MX25U1635E](#) serial NOR flash memory
 - Winbond [25Q128JW](#) 128 Mb serial flash memory
 - Microsoft X904169 display driver IC's and X904163 display driver IC
 - Qualcomm [QCA6174A](#) Wi-Fi/Bluetooth SoC

Step 10



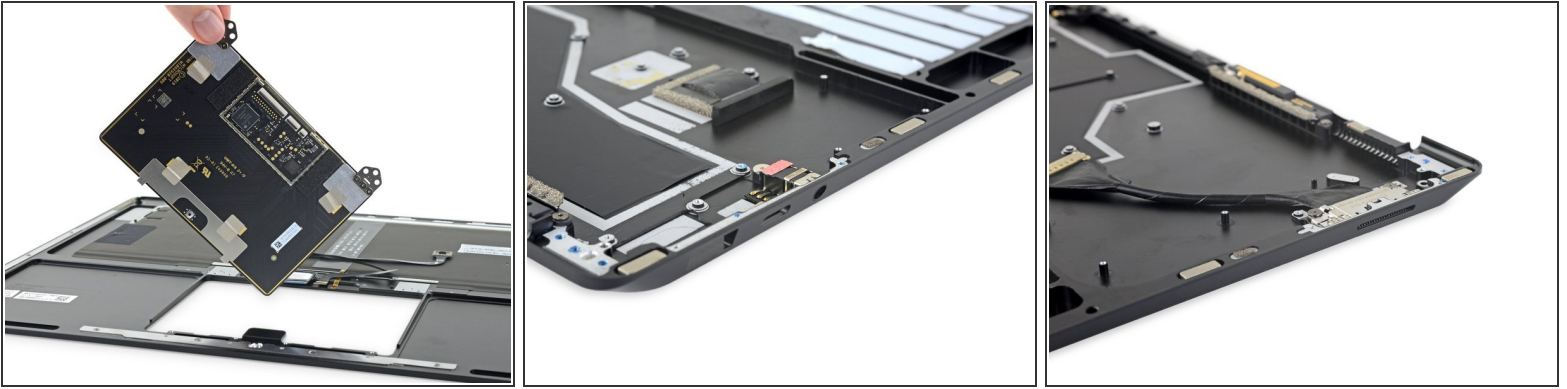
- We're having so much fun that this board gets a bonus round! Plus, a look at the (comparatively featureless) backside:
 - Texas Instruments [TUSB1044](#) USB Type-C 10 Gbps Linear Redriver
 - Texas Instruments [TPS65987D](#) USB Type-C and USB PD controller
 - Texas Instruments [BQ25713](#) battery charge controller
 - Texas Instruments [TS3A27518E](#) 6-channel multiplexer

Step 11



- Despite the other radical redesigns, the Surface Laptop 3's battery looks relatively unchanged—same pinned-under-the-board connector, same miserable removal process.
- A whole lotta [solvent](#), prying, and patience later, we have lift-off. No [stretch-release adhesive](#) here—this tape is tough and really wants to *stick* around.
- ⓘ Spec-wise, the battery comes in at 45.8 Wh—in both the 15" and 13.5" models. In fact, it's the exact same battery.
 - This is slightly more than the original [Surface Laptop](#) (45.2 Wh) and the [Surface Pro 6](#) (45 Wh). For those of you who measure everything in Apples, it's less than in the [15" MacBook Pro](#) (83.6 Wh).

Step 12



- What's left? We pop some more screws and two shields, and the trackpad lifts free from that floating magnetic top cover.
- Barnacled to the trackpad, we find some [familiar](#) silicon: an NXP/Freescale [MK22FN512](#) Kinetis MCU and Synaptics S9101B touch controller.
- ❗ Alas, we were hoping to avoid rivets [this time](#), but we're still stuck with a keyboard assembly that's riveted to the cover.
- That said, with the trackpad out, a keyboard + top cover replacement could be a reasonable repair. And it's about 1.5 zillion times easier than in [any current MacBook Pro](#).
- The final bits in the rear case include the still-modular headphone jack—which you can squeak out from under the main board if you're careful.
- Of minor note: the Surface Connect cable harness looks a bit more put together this time, clothed in handsome black tape instead of a rainbow of wire insulation. It's somethin'!

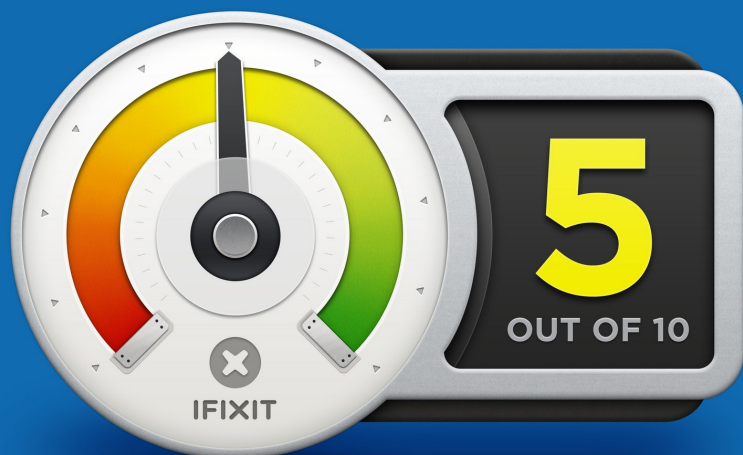
Step 13



- This concludes one very surprising Surface Laptop teardown.
- Based on its superficial similarity to past Surface Laptop designs, we would have expected something completely non-serviceable. Instead, the 3rd-generation Surface Laptop has swerved confidently into a better, more repairable direction.
- Microsoft pulled this off without making the laptop one iota thicker or clunkier, defying all the naysayers who claim repairable designs can't be sleek and attractive.
- While this iteration is still far from perfect, if Microsoft continues in this direction, the future of their laptop line is bright. There are some very clever design-for-repairability touches in this machine.
- Let's give it a score.

Step 14 — Final Thoughts

REPAIRABILITY SCORE:



- The Surface Laptop 3 earns a **5 out of 10** on our repairability scale (10 is the easiest to repair):
 - The opening procedure is straightforward, with a clever design that represents a *dramatic* improvement over its predecessors.
 - The M.2 SSD is fully modular and easy to access.
 - Torx Plus screws call for relatively rare drivers, but our standard Torx drivers worked in a pinch.
 - Display access is well-prioritized, but must be replaced as an (expensive) complete unit—subcomponents aren't modular.
 - While many components are modular, intricate layered construction makes them difficult to service.
- The firmly glued-down battery will be very difficult to service when it inevitably goes kaput.