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INTRODUCTION

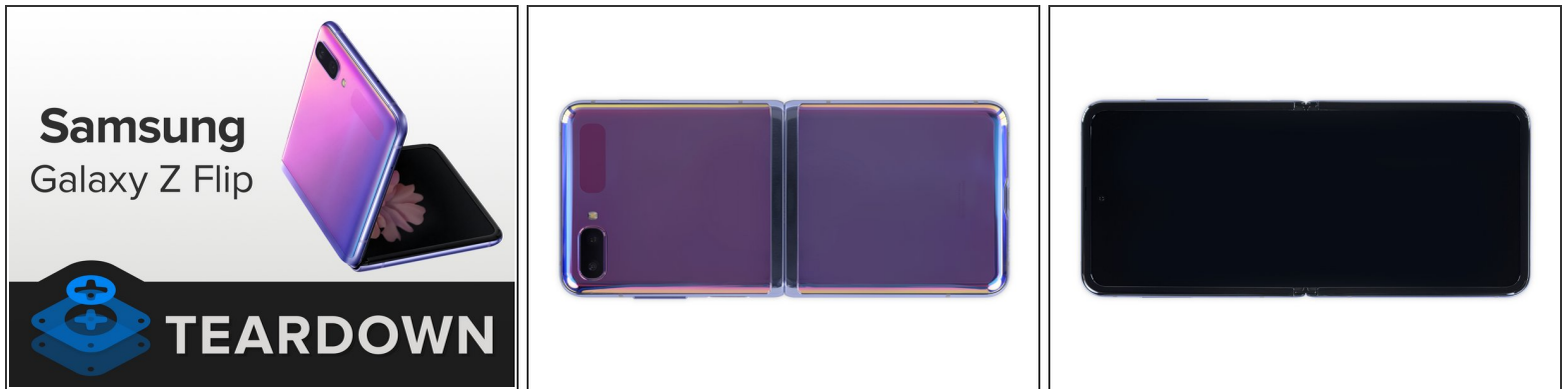
Samsung proudly touted their hot new Galaxy Z Flip's folding glass display and the "layer of fibers" built into its hinge at their Unpacked event last week. We *barely* managed to get ahold of one, and now it's time to put it to work. Not as a phone, of course—as a teardown victim. Let's see what's really going on in there.

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TOOLS:

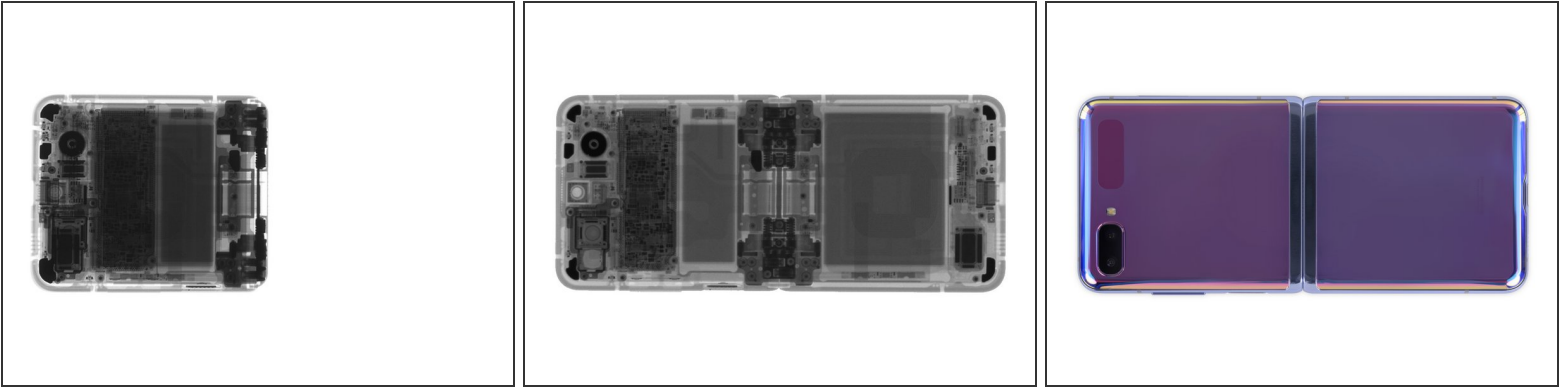
- [iOpener](#) (1)
 - [Suction Handle](#) (1)
 - [Phillips #00 Screwdriver](#) (1)
 - [Hot Air Rework Station Hakko FR-810](#) (1)
 - [iFixit Opening Picks set of 6](#) (1)
 - [Spudger](#) (1)
 - [Tweezers](#) (1)
 - [iFixit Adhesive Remover \(for Battery, Screen, and Glass Adhesive\)](#) (1)
 - [Essential Electronics Toolkit](#) (1)
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Step 1 — Samsung Galaxy Z Flip Teardown



- Do specs matter? For \$1,380 you'd expect to get a pretty cutting-edge handset, and at least in this case, you do. The Flip out-flexes the [Moto Razr we tore down](#) last week:
 - 6.7" foldable ultra-thin-glass AMOLED Display, 21.9:9 aspect ratio, 2636 x 1080 pixels (425 ppi)
 - 2.95 GHz, 64-bit, octa-core Qualcomm Snapdragon 855+ SoC
 - 8 GB of RAM and 256 GB of internal storage
 - 3300 mAh of battery power in two cells
 - Two rear cameras, both 12 MP: one $f/1.8$ wide-angle and one $f/2.2$ ultra-wide; one 10 MP $f/2.4$ selfie cam
 - "Sweeper technology" made up of "a layer of fibers" inside the "Hideaway Hinge" to "repel dirt and dust"
 - Blinding psychedelic Mirror Purple finish

Step 2



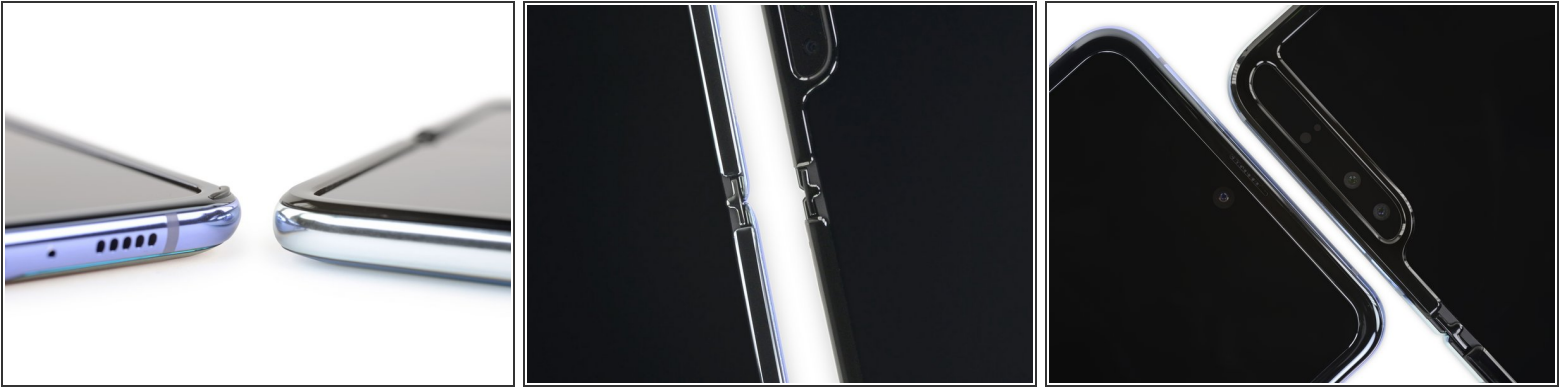
- We still flip out at every opportunity to put something in one of [Creative Electron](#)'s X-ray machines, and this occasion is no exception.
- Findings include:
 - Aluminum-and-glass construction—easily distinguished from the darker, denser steel frame we observed in the [Razr](#)
 - A tiny, stacked motherboard
 - Two distinct battery cells
 - An extremely robust spring-loaded hinge assembly
 - And at the corners, matching sets of magnets for secure closing action.

Step 3



- The Z Flip seems to fold closed a little more cleanly [than the Fold did](#). In other words: there's less of a gap around the hinge between the two folding halves.
- ❗ Neither is as *sharp* as the Razr, though, which can fold completely flush thanks to its [unique hinge and support plates](#).
- Open the Z Flip up, and you'll immediately spot the crease in the display. That new glass sure creases like plastic...
- Looks like it [scratches like plastic, too](#)! Unsurprisingly, it's not as durable as the Gorilla Glass that adorns the non-folding devices we're used to.

Step 4



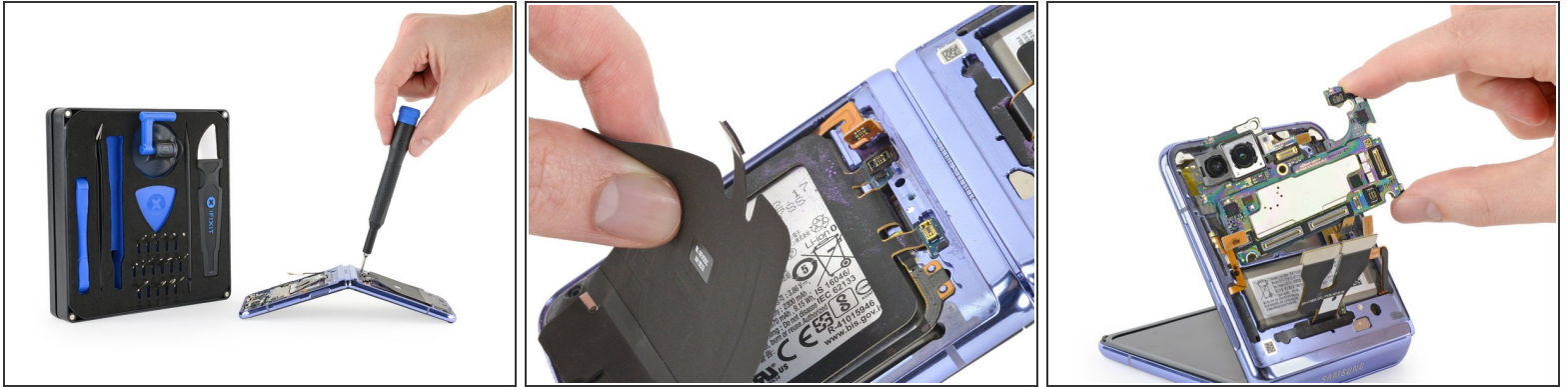
- Samsung touts a 6.9-7.2 mm thick phone, but measures that *without* the plastic bezels inherited from the Fold (seen on the right).
 - ❗ These bezels do seem to have a *slightly* lower profile, but the effect is somewhat marred by the extra rubber feet.
- Another thing the Flip inherits: the seemingly unchanged "crease caps"—those T-shaped bits—from the [v2 Fold](#).
- The camera notch situation, on the other hand, is *much* improved. The Flip's hole-punch selfie cam makes for a far less clunky experience.

Step 5



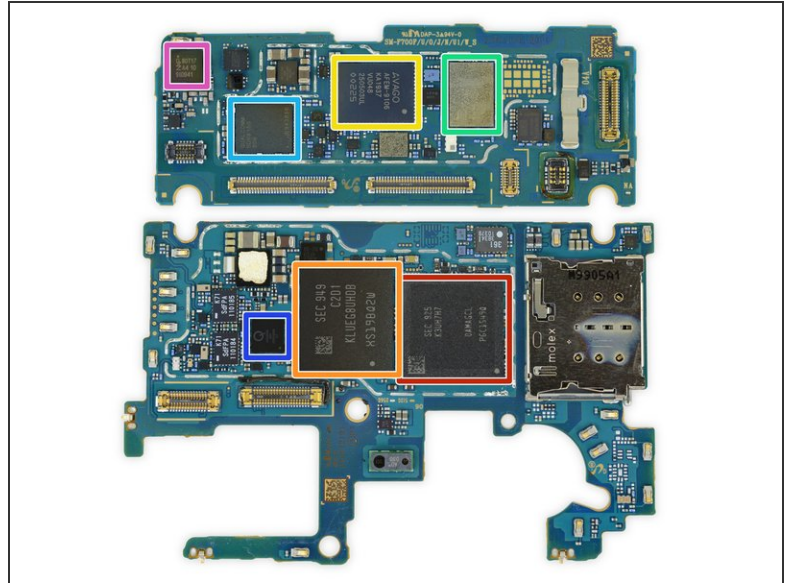
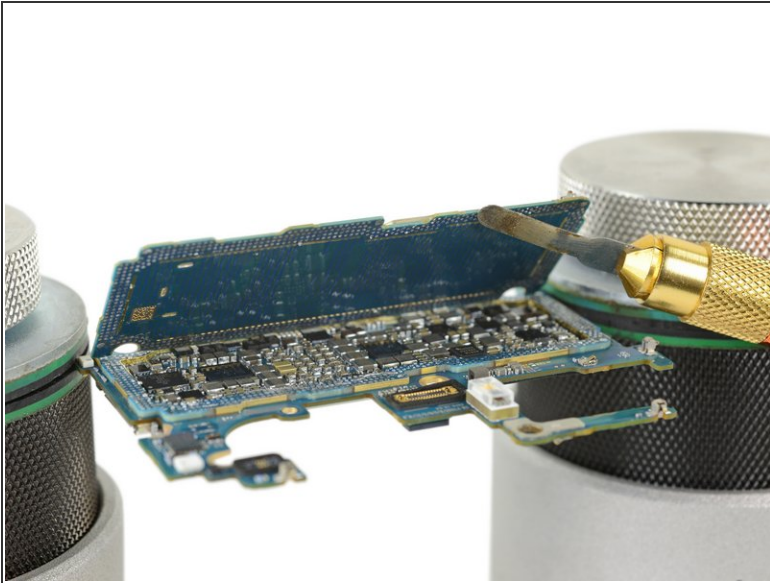
- Samsung [explains](#) that the Z Flip's hinge-sweeping "brushes"— and [we're quoting](#) here—use *nylon fibers crafted by micro-height-cutting technology to repel dirt and dust*.
- But if you actually buy this thing and turn it on, you get a litany of [warnings](#) that is somewhat less confidence-inspiring.
- We'd like to test the utility of that new "fiber shield," so we introduce our Flip to some bright purple dust, [shake n' bake](#) style.
 - *Spoiler alert:* After a few seconds of heavy dust exposure, opening the phone results in horrible popping noises and a hinge that's frozen solid. [Out pours](#) a teaspoon's worth of purple powder.
- This teardown just became an investigation. In standard Galaxy-opening fashion, we turn to our trusty [iOpener](#) to remove both rear covers.
- Already we spot our purple pixie dust peeking out from under the wireless charging coil—not a great omen.

Step 6



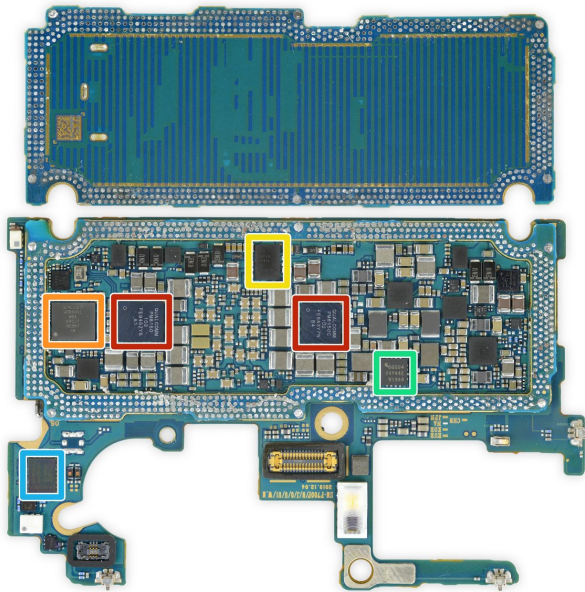
- This pocket-sized phone is perfect prey for our most portable toolkit yet, the [Essential Electronics Toolkit](#)—everything you need, and nothing you don't.
- *Dust, busted*—peeling up the charging coil reveals a powdery reminder that you should believe the scary warning text more than the "sweeper technology" marketing hype.
- Meanwhile, the motherboard exhibits a psychedelic rainbow sheen—clear evidence of a hydrophobic nano-coating.
- ① We see this coating and yet hear no claims from Samsung about repelling any water, unlike the Razr...

Step 7



- The Flip packs a dense, double-stacked motherboard—known in the industry as a [substrate-like PCB](#). We first saw this space-saving technology in the [iPhone X](#), and more recently in the [Note10](#). It makes life harder for board repair experts, but also packs a lot of chips into a tiny space:
 - Samsung 925 K3UH7H7 (likely 8 GB of RAM layered on top of the Snapdragon 855 CPU)
 - Samsung 949 KLUEG8UHDB (likely the 256 GB of flash storage)
 - Broadcom AFEM-9106 front-end module
 - Skyworks 78160-51 low noise amplifier
 - Qualcomm SDR8150 RF transceiver
 - Qualcomm WCN3998 WiFi + Bluetooth SoC
 - NXP 80T17 NFC controller

Step 8



- More chips inside this silicon sandwich include:
 - Qualcomm PM8150 power management ICs
 - Qualcomm WCD9341 audio codec IC
 - 2MIWO4
 - DOS04 09Y44E W1948 (likely a backlight IC)
 - Qualcomm QDM3870 RF front-end module

Step 9



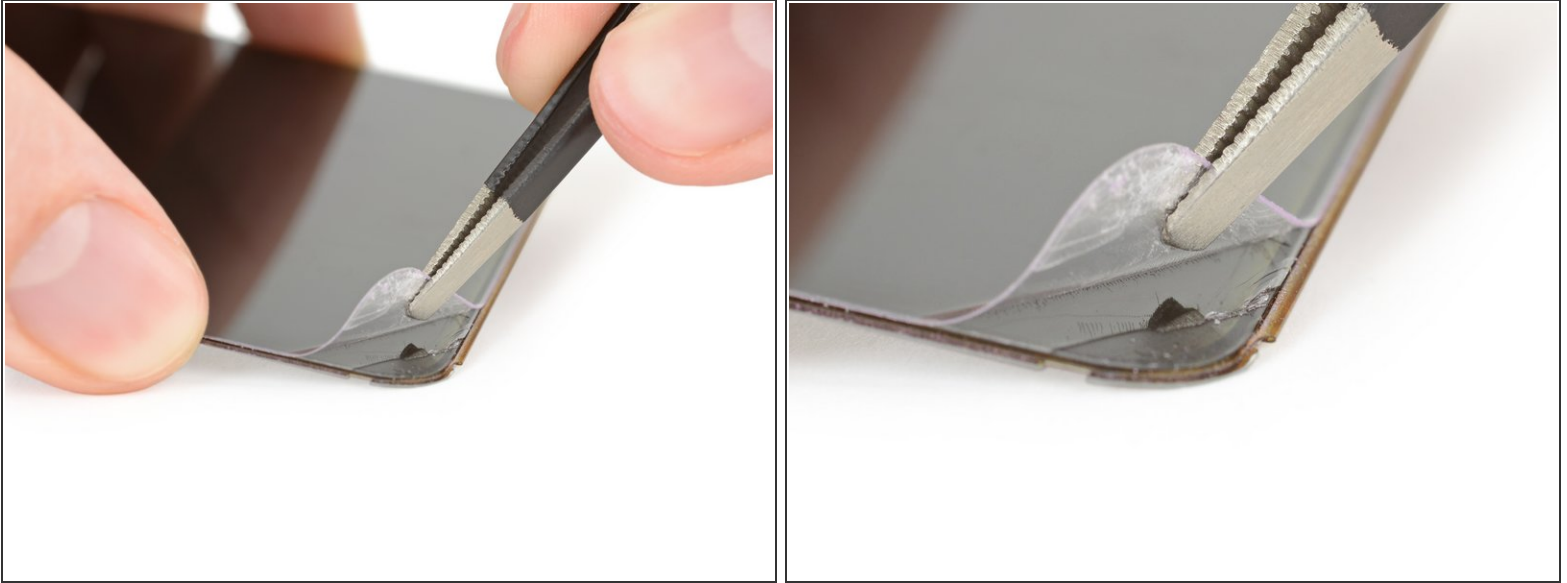
- We remove two batteries for UNLIMITED POWAHHH!*
 - ★ ** Actual POWAHH may vary depending on network environment, usage patterns, and other factors. POWAHH measurements and estimates are based on real-world usage patterns.*
- In terms of *actual* power, the larger of the two batteries is limited to a typical capacity of 2370 mAh and 9.15 Wh, with the smaller battery sporting 930 mAh and 3.59 Wh. All that adds up to 12.74 Wh.
- ❗ That's less than the [Galaxy Fold's](#) 16.87 Wh, but higher than the [Motorola Razr's](#) 9.7 Wh. It's about on par for flagship smartphones, like the [Galaxy S10](#) with 13.09 Wh, or the [iPhone 11](#) with 11.91 Wh.
- Stubborn glue secures both batteries, per usual. Alcohol and careful prying are required to fetch them out. This is starting to look like a miniature Galaxy Fold...

Step 10



- Lock Z-foils in attack position! These glued-down plastic bezels guard the primary display—just like on the Fold.
- Removing the display itself takes a little more tact—mild heat and careful prying gradually releases it from the frame. It's adhered mainly at the top and bottom edges, not so much in the middle.
- ⓘ The glue here is somewhat forgiving, but it's still far too easy to accidentally separate the display's layers.
- Like the [Fold's](#), this display wears armor—a metal support sheet backing each side, and slotted chain mail down the middle.

Step 11



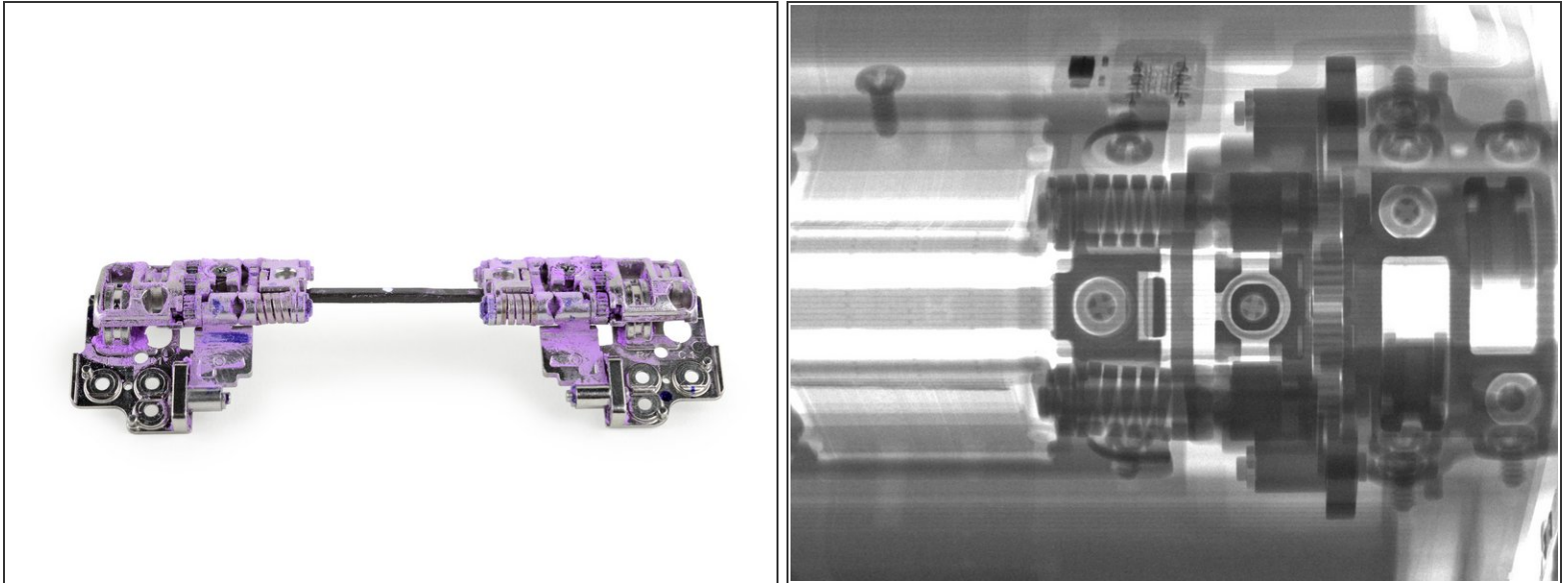
- Time to unfold this foldable's ultra-thin folding glass!
 - The top layer is indeed plastic, which sorta defeats the purpose of a "glass" display— *i.e.*, its scratch-resistance.
 - You can tell the middle layer is glass because of the way it shatters when we poke at it. *Oops.*
 - Overall, we rate this glasstic display a solid *meh*.
- ❗ It's thoughtful of Samsung to offer one-time screen replacements for \$119 (if you buy the Z Flip before the end of this year)—but [\\$499 for subsequent repairs](#) is a tough pill to swallow, especially considering how easily this thing scratches.

Step 12



- Peeling back the hinge's "protective" tape reveals the highest concentration of our purple-y powder yet.
 - ⓘ Looks like that tape kept the powder away from the display, but held it all in the hinge. At least that powder goes well with the rest of the phone.
- We're gonna need further disassembly to clean out all the powder. Let's go ahead and pull everything out.
 - First we find some clever interconnect cables, shaped to route them safely around the hinge.
- Next we spot the lauded brushes, standing guard over a dust-covered phone. What's that? They look a little embarrassed? Yeah they probably should.

Step 13



- Here's how our hinge looked after the dust test. We swear to Zeus we did not stage this in any way.
- We gotta say, the hinge *looks* really cool. Like something straight off of Iron Man's Mk. 2 suit.
- This hinge isn't quite as wild as the one [we found in the Fold](#), but it certainly seems robust (despite being laid low by dust) and full of handsome gears.
- And hey maybe it would clear itself eventually in normal use? Or maybe hinge lubricants turn this phone into a dust dragon...

Step 14



- Samsung's Galaxy Z Flip may unfold in a new direction, but its updates aren't the panacea for foldable phones.
- The "sweeper technology" brushes performed hilariously poorly in our dust test. Though the test wasn't *exactly* demonstrative of real-world use, the amount of dust trapped in the brushes (very little) wasn't exactly confidence-inspiring.
- The "ultra-thin glass" *is* actual glass—under a layer of plastic—but it doesn't feel like glass, or provide a more scratch-resistant surface than the Fold had.
- Unless you're an Instagram influencer living in a pristine apartment who needs the newest hotness, this phone is probably not for you. It's more of a novelty luxury item. And maybe that's okay? All new technology has to start somewhere—let's hope this one either matures quickly or perishes swiftly.

Step 15 — Final Thoughts

REPAIRABILITY SCORE:



- The Samsung Galaxy Z Flip earns a **2 out of 10** on our repairability scale (10 is easiest to repair):
 - A single Phillips driver takes care of all the screws.
 - Many components are modular and can be replaced independently.
 - Glued-down glass panels are an unnecessary barrier to entry for repairs, especially given the phone's lack of ingress protection.
 - Battery replacements are possible, but unnecessarily difficult due to poorly-routed cables and the lack of stretch-release adhesive.
 - The components involved in the folding process are likely to wear over time (even if you don't bathe them in purple dust), necessitating eventual replacement.