Microsoft Surface Pro 4 Teardown

Teardown of the Microsoft Surface Pro 4 on October 26, 2015.

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INTRODUCTION

Is anyone else getting sick of apples? Time to take a bite out of a juicy Microsoft offering, the Surface Pro 4, to see just what it’s made of. Personally, we're hoping Microsoft spent this last year thinking about what they've done and opting for a more fixable laplet (laptop+tablet, eh? ehh?). There's only one way to see inside...okay two ways, we have X-ray vision. It's teardown time!

For the rest of our fall lineup, check out our Facebook, Twitter, and Instagram to be #first.

TOOLS:
- iSclack (1)
- iFixit Opening Picks set of 6 (1)
- iOpener (1)
- T5 Torx Screwdriver (1)
- T3 Torx Screwdriver (1)
- Plastic Cards (1)
- Spudger (1)
- Tweezers (1)
With the top-of-the-line model coming in at over $2600, the Surface Pro 4 had better be a cut above the rest—the spec sheet looks promising so far:

- 12.3" PixelSense 2736 × 1824 (267 ppi) IPS LCD display
- Intel Skylake Core m3 (4M Cache, 2.20 GHz) up to Core i7 (8M Cache, 3.80 GHz) CPU
- 4 GB/8 GB/16 GB DDR3L 1600 MHz RAM
- 128 GB/256 GB/512 GB/1 TB of PCIe solid state storage
- 8 MP rear-facing 1080p camera, and 5 MP front-facing camera
- USB 3.0 port, micro-SD slot, mini DisplayPort, and SurfaceConnect charging port
- 802.11a/b/g/n/ac Dual Band Wi-Fi and Bluetooth 4.0
Step 2

- At first glance, the Surface Pro 4 appears to outshine its predecessors with its forward sensor array.
- We spy at least four nodes of interest. One's a camera, one's probably a microphone, but the rest?
- On the rear of the new Surface, we find a familiar arrangement of circles—the 8 MP rear-facing camera accompanied by a status LED and microphone.
- Anxious to see the camera array but too impatient to open the device? X-ray it.
Step 3

- That's something we don't see too often—grease! The Pro 4's exposed kickstand hinges are lubricated to meet your transforming computational needs.
- Just try not to get any lint, or pet hair, or sand in there...

- To get such a wide spread of kickstand angles, with the resistance required to support the tablet's weight, Microsoft's engineers probably spent a lot of time on these hinges. So we X-rayed them.
Step 4

- Sticky nightmares still haunt our teardown engineers after the [harrowing Surface Pro 3 teardown](https://www.ifixit.com/Guide/Surface+Pro+3+Teardown), and this year we've prepared for the worst.

- Things start to heat up in the teardown room as the [iOpener](https://www.ifixit.com/Guide/iOpener) battles to weaken the display's adhesive.

- Our [iSclack](https://www.ifixit.com/Guide/iSclack) joins the fight to provide us the leverage we need to make our entrance, and dare we say it, things seem easier than before.

- Not even a Pro can keep us out. As soon as we get an [opening pick](https://www.ifixit.com/Guide/Opening%20Pick) underneath the edge of the display it's off to the races!

> We strain our ears to listen for the telltale cracking of glass, but it seems like we're getting away with this opening procedure shard-free!
Step 5

- Well, these are new. The last time we tore down a Surface Pro, we encountered a display connector trapped beneath a springy metal bracket.

- This time around, there are two cables holding the display to the body, preventing it from being opened like a book on any hinge. Our only recourse: tackle those connectors.

- And of course, Microsoft has modified their connector design. The display connectors are relatively common press-on connectors—similar to an iPhone display—but they're trapped under snap-on metal shields.

ℹ️ Luckily, we only have to juggle the display for the first connector, this display is nearly free!
Step 6

- It's not exactly a greeting card, but the underside of the display is adorned with heartfelt-looking barcodes.
- Maybe it's a congratulatory message! More likely, it's proof of some intense quality controls.

As a matter of curiosity, and bragging rights, we measure the display glass at a mere .4 mm. That's only *four* human hairs thick. And we didn't break it. *self high-five*

- Time for our favorite silicon-based snack—chips! Among them, a number of **N-trig** IC's, likely control hardware for the Surface Pen.
  - N-trig DS-D5000 A1
  - N-trig DS-A5048 B2
  - Macronix **MX25U1635F** 1.8V 16 Mb MXSMIO Serial Flash Memory
Step 7

- Turning our attention to the rest of the Pro 4, we spy a *suspicious* blank space beside the motherboard (and heat sink tubing!).

  i Presumably, this is for the fan that drives the [hybrid cooling system](#), absent from our 4.5-watt Core m3 model.

- The motherboard is so close, yet so *far*. Unable to wait, we skip to dessert and pop off some shields to get a closer look.

- The rest of the motherboard is nestled too snugly to investigate, but that SSD looks ripe for the picking...
Step 8

- Oh Surface, look how you've grown!

- The Surface 4's Samsung branded SSD is considerably larger than the little whipper snapper we saw in the previous generation.

- Awww, they brought us more chips. The 128 GB Samsung PM951 SSD is packing the following:
  - Samsung S4LN058A01 PCIe 3.0 x4 NVMe flash controller
  - Samsung K9CHGY8S5C 64 GB NAND Flash
  - Samsung K4E4E324EE 4 Gb (512 MB) DRAM
  - Texas Instruments TPS22966 5.5V, 6A, 16mΩ, 2-Channel Load Switch
Step 9

- The Surface Pro 4's heat sink shows off its impressive makeover, flaunting longer copper heat pipes and a large copper plate for added heat dissipation.

  Most likely, these changes were made to address the heat-related throttling issues observed in the Surface Pro 3.

- Designed with a hybrid cooling system, the Pro 4 takes advantage of both passive and active cooling.

  Well, some of them do. Our unit uses a combination of passive cooling and...well, passive cooling. More powerful models include a fan that activates when temperatures get too high for passive cooling.
Fittingly, the Surface has a pro line-up of cameras and sensors:

- Infrared emitter
- Infrared camera
- Front-facing camera
- "Privacy light" indicator LED (mounted on the rear-facing camera)
- Microphone
- Ambient light sensor

We're pretty sure the lil' guy marked in red is an IR emitter, like the one found in Project Tango. It should work with the IR camera to recognize your face and unlock your computer. Aw, he knows his mummy.
Step 11

- Amidst this sea of tech, the tablet's three cameras all float to the surface.

- From left to right:
  - Infrared face-detection camera supporting Windows Hello
  - Front-facing 5 MP camera
  - Rear-facing 8 MP main camera
Step 12

- We tweeze out the two stereo speakers from the corners of the case and make an interesting discovery...

  > It looks like the volume and power buttons are integrated directly into one of the speakers.

  - The Good: These integrated buttons are much less fiddly to replace as one piece than each button individually.

  - The Bad: The entire speaker will have to be replaced to replace one of the buttons, increasing the cost of repair.
With the peripherals deftly dissected, we can move on to the main event—the motherboard!

- Intel SR2EN Core m3-6Y30 (4M Cache, up to 2.20 GHz)
- Samsung K4E8E304EE-EGCF 8 Gb LPDDR3 (4 chips × 1 GB for a total of 4 GB)
- Marvell Avastar 88W8897 802.11ac, NFC and Bluetooth SoC
- Freescale Kinetis KL17 MKL17Z256VFM4 48 MHz ARM Cortex-M0+
- ITE IT8528VG
- Realtek ALC3269 Audio Codec
- Realtek RTS5304 micro-SD Card Reader Controller
Chip ID continued...

- Winbond 25Q128FV Serial NOR Flash
- Texas Instruments TPS51367 Integrated FET Converter
- Infineon Technologies SLB96659TT20 Trusted Platform Module
- Monolithic Power Systems MP3388S 50V, 8-String, Step-Up, White LED Driver

And on the reverse...

- Intersil ISL95857 1+2+1 Voltage Regulator for Intel IMVP8 CPUs
- This huge array of spring contacts connects the motherboard to the battery and the keyboard dock cable.
Step 15

- The iOpener comes out for an encore performance, loosening the tough adhesive that holds the battery in place.

- The battery *finally* comes loose after a great deal of sweat, tears, and prying.

  - Not much has changed here—the adhesive is still extremely challenging to overcome, even with the proper tools.

  - :')
Step 16

- This 38.2 Wh, 7.5 V battery is rated at 5087 mAh—a 9 percent decrease from the 5547 mAh battery in the Surface Pro 3.

- Despite the smaller battery capacity, the 4 generally outperforms the 3 in terms of battery life.

  We attribute the majority of this to improved efficiency in the design and size of the processor.

- Just to compare Apples to oranges, the iPad Air 2 weighs in with a 27.62 Wh battery, however the upcoming iPad Pro is probably a more apt comparison, function-wise. We'll have to wait and see!
Step 17

**Microsoft Surface Pro 4 Repairability Score: 2 out of 10 (10 is easiest to repair).**

- The SSD is replaceable.
- The battery is not soldered to the motherboard, but very strong adhesive makes removal and replacement a hazardous chore.
- Non-standard connectors make for tricky display removal.
- The display removal procedure, while difficult, and required for any repair, is not as hard as in previous generations, due to less stubborn adhesive.
- The display assembly consists of a fused glass panel and LCD, and is difficult to remove and replace.
- Adhesive holds many components in place, including the display and battery.