HuaWei P10 Cellphone Disassembly

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PennEngineering®
HuaWei P10 has smooth, curved corners with slender all-metal design, brushed aluminium finish and curved edges for a more comfortable fit in palm.
Details & Findings

The HuaWei P10 Disassembly Process.
Step 1: Preparing for the disassembly

Power off the cellphone and remove the SIM card tray (Use the E-Ject pin that comes with the phone).
HuaWei P10 Cellphone Teardown

Step 2: Removing the back cover

We remove the two M0.8 x 2.6 screws with pentalobe drivers, nylon locking patch and CD finish from bottom of the phone. The screws are engaged into internally threaded brass inserts that are molded-in the plastic chassis of the display assembly illustrated in the slides #8 (circled in Blue) and #21.
Step 2: Removing the back cover

After removing the 2 screws, we separate the display from the metal back cover with the use of a pry tool. The metal back cover is tightly attached to the display with the use of fourteen male snap fits (Male (circled in Pink) and female snap fit (circled in Blue) elements. The snap fits can unsnap simply with the use of a suction cup and a pry tool. After the two parts unsnap, and before we pull the screen from the back cover the fingerprint flex cable connector has to be disconnected.)
Step 2: Removing the back cover

The below picture focuses on the screw geometry and dimensions of the fastener. These screws go into the brass inserts into the plastic chassis illustrated in slides #8 (circled in Blue) and #21.

- M0.8 x 2.6 mm overall length
- φ 1.4 mm head diameter
- 0.45 mm head thickness
- Nylon locking patch
- Machined
- Pentalobe drive
- 400 Series stainless steel
- CD finish
- Quantity: 2
Step 2: Removing the back cover

The picture below shows the geometry and dimensions of the brass inserts that are molded-in the plastic chassis on the aluminum alloy display assembly. (slides #11 (circled in Pink) and #17).

- Thread: M0.8
- O.D.: φ 2.2mm
- Overall Length: 2.0mm
- Machined
- Brass
- Quantity: 2
Step 3: Removing the motherboard assembly

Six M1.4 x 2.58 screws (circled in Pink) are used to hold the motherboard in place. Three screws go through holes in the metal-spring-contacts (refer to slide #10). All six screws eventually attach to the tapped bosses (circled in Blue, refer to slide #10) that are machined in the aluminum alloy chassis of the display assembly.

- M1.4 x 2.58 mm overall length
- $\varphi$ 2.52 mm head diameter
- 0.5 mm head thickness
- Nylon locking patch
- Machined
- #0 Phillips drive
- Flat head
- Carbon Steel + Bright Nickel
- Quantity: 6
Step 3: Removing the motherboard assembly
The below pictures indicate the metal-spring-contacts and the internally tapped threads that are machined in the aluminum alloy chassis.

Metal-spring-contact
0.1mm Thick., S/S.

Threads inside boss
Step 4: Removing the metal covers from the motherboard assembly

All electronic chips on the motherboard are covered by 3 metal shields, 0.1mm thick., Stainless Steel. The inside of the metal shields is covered with a layer of yellow thermal grease. In this step, no mechanical fastener were identified.

The lines in **Pink** here present the intersectional paths on the PCB board and the external profiles on the three S/S metal sheet parts.

The paths are welded on the panel.
Step 5: Removing the loud speaker

The loud speaker is fastened at the bottom of the screen assembly with one M1.4 x 2.52 screw (circled in Pink). The screw engages in an internally tapped boss (refer to slide #13) that is machined on the aluminum alloy chassis of the display assembly (circled in Blue).
Step 5: Removing the loud speaker
The below pictures indicate the M1.4 x 2.52 screw and the internally tapped threads that are machined in the aluminum alloy chassis.

- M1.4 x 2.52 mm overall length
- φ 2.53 mm head diameter
- 0.49 mm head thickness
- Nylon locking patch
- Machined
- #0 Phillips drive
- Flat head
- Carbon Steel + Bright Nickel
- Quantity: 1
Step 6: Removing the USB Type-C port and other relative modules.

The USB Type-C port and other relative modules are fastened on the bottom of the display assembly with three M1.4 x 2.52 screws (circled in Pink, slide #15). The screws engage into internally tapped bosses (slide #15) that are machined in the aluminum alloy chassis (circled in Blue).
Step 6: Removing the USB Type-C port and other relative modules.

The below pictures indicate the M1.4 x 2.58 screw and the internally tapped threads that are machined in the aluminum alloy chassis.

- M1.4 x 2.58 mm overall length
- φ 2.52 mm head diameter
- 0.51 mm head thickness
- Nylon locking patch
- Machined
- #0 Phillips drive
- Flat head
- Carbon Steel + Bright Nickel
- Quantity: 3
Step 7: Removing the battery
The battery is attached onto the internal panel with double-sided adhesive tape.
In this step, no mechanical fastener were identified.
Step 8: Removing the audio jack module.
   The earplug module is fastened with double-sided adhesive tape. We used a pry to remove it.
   In this step, no mechanical fasteners were found.
The below pictures include all the components of the device after the completion of the disassembly process.
Fastener Summary
A total of 24 fasteners were identified in the device throughout the disassembly. All the fasteners are listed below:

<table>
<thead>
<tr>
<th>Item</th>
<th>Thread</th>
<th>Overall Length</th>
<th>Head Dia.</th>
<th>Head Thick.</th>
<th>Driver</th>
<th>Finish</th>
<th>Nylock</th>
<th>Qty.</th>
<th>Slide No</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>M0.8 Screw</td>
<td>2.60</td>
<td>φ1.4</td>
<td>0.45</td>
<td>Pentalobe #0.8mm</td>
<td>CD</td>
<td>Yes</td>
<td>2</td>
<td>#7</td>
</tr>
<tr>
<td>2</td>
<td>M1.4 Screw</td>
<td>2.58</td>
<td>φ2.52</td>
<td>0.5</td>
<td>Phillips #0</td>
<td>Bright Nickel</td>
<td>Yes</td>
<td>6</td>
<td>#9</td>
</tr>
<tr>
<td>3</td>
<td>M1.4 Screw</td>
<td>2.52</td>
<td>φ2.53</td>
<td>0.49</td>
<td>Phillips #0</td>
<td>Bright Nickel</td>
<td>Yes</td>
<td>1</td>
<td>#13</td>
</tr>
<tr>
<td>3</td>
<td>M1.4 Screw</td>
<td>2.58</td>
<td>φ2.52</td>
<td>0.51</td>
<td>Phillips #0</td>
<td>Bright Nickel</td>
<td>Yes</td>
<td>3</td>
<td>#15</td>
</tr>
<tr>
<td>4</td>
<td>Micro Machined-in Threads</td>
<td>2.0mm (Thread Length)</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>10</td>
<td>#10, #13, #15</td>
</tr>
<tr>
<td>5</td>
<td>Molded-in Insert</td>
<td>2.0</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>/</td>
<td>2</td>
<td>#8</td>
</tr>
</tbody>
</table>
The 24 fasteners that we found in the device can be categorized in the below 4 groups:

- **M0.8 x 2.6 mm overall length**
  - φ 1.4 mm head diameter
  - 0.45 mm head thickness
  - Nylon locking patch
  - Machined
  - Pentalobe drive
  - 400 Series stainless steel
  - CD finish
  - Quantity: 2
  - Reference slide #7

- **Thread Size: M1.4**
  - Overall Length: 2.52-2.58mm
  - Head Diameter: φ 2.52-φ 2.53mm
  - Head Thickness: 0.49-0.51mm
  - Nylon locking patch
  - Machined
  - #0 Phillips drive
  - Flat head
  - Carbon Steel + Bright Nickel
  - Quantity: 10
  - Reference slide #9, #13, #15

- **Thread: M0.8**
  - O.D.: φ 2.2mm
  - Overall Length: 2.0mm
  - Machined
  - Brass
  - Quantity: 2
  - Reference slide #8

- **Thread: M1.4**
  - O.D.: /
  - Overall Length: /
  - Machined
  - Aluminum alloy
  - Quantity: 10
  - Reference slide #10, #13, #15
Alternate Solutions

PennEngineering® recommendations of alternate hardware and cost savings opportunities.
PennEngineering® is fully capable of making all of the fasteners shown on slides #7, #8, #9, #13, #15, and #21. In addition to direct replacement and perhaps some manufacturing and material substitution for functional and cost improvement, some alternate fastening suggestions are presented for specific situations on the following slides.
• Micro screws alternative solution:

As an alternative approach, all of the micro screws can be replaced by PennEngineering® manufactured micro screws. PEM has license with Microstix®, Torx® and Torx Plus® driver and self-tapping thread patent as like TAPTITE®, FASTITE®, REMFORM® and REMFORM F® with different design solutions.
• PEM TackSert parts:

M1.4 screws are used to fix & connect top and bottom circuit boards and other modules to the main aluminum chassis body.

These M1.4 screws can be replaced with PennEngineering® TKA™/TK4™ microPEM® TackSert® Pins that can be used in this case to replace the joints. The press-in installation process will be quicker than the regular screws turn-in. The parts are meant to be used in permanent assemblies where disassembly is not required.
• Brass Inserts alternative solution:
   The brass insert can be replaced by PennEngineering® MSIB™ microPEM® Brass insert and MSIA series aluminum inserts. PEM® aluminum SI series inserts is an effective solution that can replace regular brass inserts with significant weight reduction. The inserts provides reusable metal threads to attach plastics securely in compact electronic assemblies. PennEngineering® can provide brass inserts with different sizes and types to meet the application requirement.
Alternate Solutions

• M1.4 Micro Machined-in Internal Threads alternative solution:

All of the M1.4 tapped internal threads can be replaced with the use of TS4™ microPEM® TackScrew™ Fasteners. The microPEM® TS4™ enables cost effective sheet-to-sheet attachment by simply pressing into place and can be removed by unscrewing, similar to original threaded fasteners.

![Diagram showing M1.4 thread replacement with TS4™ microPEM® TackScrew™ Fasteners.](image-url)
• Welding Spots alternative solution I:

At the bottom of the main aluminum chassis body, four leaf spring type contacts (circled in Pink) function as terminals for conductivity purposes. The contacts held by four sheet metal parts are welded on the main aluminum chassis body.

All of the welding spots can be replaced with PennEngineering® TA™/T4™ microPEM® TackPin® Fasteners. This solution enables sheet-to-sheet attachment, replacing costly screw installation in applications where disassembly is not required.
• Welding Spots alternative solution II:

At the bottom of the main aluminum chassis body, four leaf spring type contacts (circled in Pink) function as terminals for conductivity purposes. The contacts held by four sheet metal parts welded on the main aluminum chassis body.

In this case, PennEngineering® TackSert® fasteners can be used in replacing the welding spots. This however is a permanent connection and can’t be reworked. The press-in installation will be more time effective compared to regular screws.
Through-out the disassembly process of the Huawei P10 cellphone we identified a total of 24 fasteners. The battery and most of the flex cables are held with double-sided adhesive tapes.

PennEngineering® is fully capable of making all of the fasteners shown on slides in this teardown report. PennEngineering® can produce all of the fastening solutions used in this cellphone within our current manufacturing facilities. In addition to direct replacement and perhaps some manufacturing and material substitution for functional and cost improvement, some alternate fastening suggestions are presented for specific situations.

There are cost savings opportunities by changing the 10 pieces of Micro Machined-in Internal Threads on the slides #28 to TS4™ microPEM® TackScrew™ Fasteners. The microPEM® TS4™ enables cost effective sheet-to-sheet attachment by simply pressing into place and can be removed by simply unscrewing, similar to original threaded fasteners. The brass inserts on the slides #8 can be replaced with PEM® MSIB and MSIA series parts. PEM® aluminum SI series inserts as an effective method for lightening product weight and in a variety of designs and sizes are recommended to replace the brass inserts. MicroPEM® TS4™ or TA™/T4™ or TKA™/TK4™ introduced into the four leaf spring type contacts joining to replace original welding spots, in this way the original Ultrasonic Metal Welding machine cost and process cost can be saved and some welding defects can be effectively avoided. The replacement is illustrated on slide #29 and #30. Both improvements would result in substantial cost saving opportunities.

Additional savings could be obtained by using microPEM® FASTENERS being fed, positioned and installed automatically in an installation system to install fittings into the components in this cellphone.