

## **Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

Subject to its express reservation of rights to supplement or amend its contentions as may be appropriate in view of discovery, further investigation, and/or the claim construction process, Plaintiff Stratasys, Inc. (“Plaintiff” or “Stratasys”) provides its preliminary disclosure of asserted claims and infringement contentions to Shenzhen TuoZhu Technology Co., Ltd., Shanghai Lunkuo Technology Co., Ltd., Bambu Lab Limited and TuoZhu Technology Limited (collectively, “Defendants” or “Bambu Lab”), pursuant to the Court’s Scheduling Order, D.I. 20; the Court’s October 30, 2024 Order extending the time to comply with P.R. 3-1, 3-2, 3-3, and 3-4, D.I. 22; and P.R. 3-1. Nothing in these contentions should be interpreted as an admission or concession regarding the scope of the asserted claims.

Disclosure of Asserted Claims for U.S. Patent No. 11,167,464 (“the ’464 Patent”) under P.R. 3-1(a): Claims 1, 2, 3, 4, 5, 6, 12, 13, 14, 15, 17, and 18.

Disclosure of Accused Instrumentalities for the ’464 Patent under P.R. 3-1(b): For each of the Asserted Claims, all Bambu Lab branded or manufactured three-dimensional (3-D) printers with a tag reader, including but not limited to the Bambu Lab X1C, X1E, P1S, P1P, A1, and A1 mini printers, alone or in combination with Bambu Lab software, such as Bambu Studio and Bambu Handy, run on a device, and/or in combination with the Bambu Lab Automatic Material System (“AMS”) or AMS Lite and all Bambu Lab Parts.

Bambu Lab has not yet produced any discovery. Based on information available to-date, the Bambu Lab X1C and X1E have no material differences relevant to these infringement contentions. The X1E includes several upgrades over the X1C, including an active heating chamber, an Ethernet socket, and certain air purification filters. <https://bambulab.com/en/x1e>. The X1E is also better for certain filament types and has a higher max temperature for the toolhead. *Id.* Accordingly, references to components or functionality of either the X1C or X1E in this chart—other than the heating chamber, ethernet socket, and certain air purification filters that are only in the X1E—apply to both printers.

Based on information available to-date, the Bambu Lab P1S and P1P have no material differences relevant to these infringement contentions. The P1S includes several upgrades over the P1P, including an enclosure, air filter, and cooling fans. See <https://us.store.bambulab.com/collections/3d-printer/products/p1s> (comparing P1P to P1S). The P1P is also ideal for certain filament types. *Id.* Accordingly, references to components or functionality of either the P1S or P1P in this chart—other than the enclosure, air filter, and cooling fans that are only in the P1S—apply to both printers.

Additionally, “controlling and operating the AMS on Bambu Studio and Bambu Handy is essentially the same [on the P1 series] as on the X1.” <https://wiki.bambulab.com/en/p1/manual/connect-ams>. Accordingly, references in this chart to operation of the AMS with the X1 series also apply to operation of the AMS with the P1 series, and vice versa.

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Based on information available to-date, the Bambu Lab A1 and A1 mini have no material differences relevant to these infringement contentions. See <https://bambulab.com/en-us/compare> (comparing A1 and A1 mini upon selection). The A1 includes several upgrades over the A1 mini, including a larger build volume, higher max build plate temperature, and larger display. *Id.* Accordingly, references to components or functionality of either the A1 or A1 mini in this chart—other than the larger build volume, higher max build plate temperature, and larger display—apply to both printers.

Additionally, the Bambu Lab A1 and A1 mini as “A1 series printers can only be connected to one AMS lite for use.” <https://wiki.bambulab.com/en/ams-lite/manual/faq>. Accordingly, references in this chart to the operation of the AMS Lite with the A1 printer also applies to the operation of the AMS Lite with the A1 mini printer, and vice versa.

Disclosure of Priority Date under P.R. 3-1(e): The asserted claims of the '464 Patent are each entitled to a priority date of at least October 28, 2013.

Disclosures under P.R. 3-1(c)-(d): Stratasys identifies in the chart below specifically where each element of each Asserted Claim is found within each Accused Instrumentality.

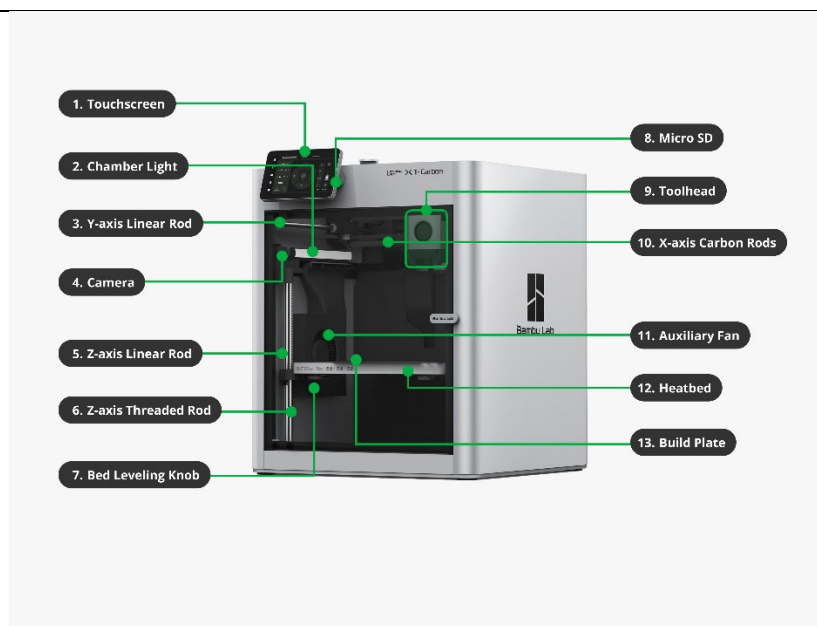
Disclosure under P.R. 3-1(f): At this time, Stratasys does not intend to rely on the assertion that its own products or other instrumentalities practice the claimed invention. Stratasys reserves the right to amend and/or supplement this disclosure as discovery progresses.



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| Claim                                                                                                                                                                                                                                                      | Bambu Lab                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>1. A method, comprising:<br/>reading data from a tag included on a supply of a build material using a tag sensor in communication with a controller of a three-dimensional printer, the data including at least one property of the build material;</p> | <p>To the extent the preamble of the claim is limiting, the Accused Instrumentalities are each used for reading data from a tag included on a supply of a build material using a tag sensor in communication with a controller of a three-dimensional printer, in which the data includes at least one property of the build material.</p> <p>For example, Bambu Lab sells various additive manufacturing systems with 3D printers, including the X1C, X1E, and P1S, P1P, A1 and A1 mini. See, e.g., <a href="https://bambulab.com/en/x1">https://bambulab.com/en/x1</a>:</p>  <p>The image shows a Bambu Lab X1 Carbon 3D printer. It is a large, industrial-grade machine with a grey and black finish. On top of the printer is a filament rack with a clear, curved lid, containing several spools of filament in various colors (green, blue, red, etc.). The printer has a control panel on the left side with a small screen and buttons. The Bambu Lab logo is visible on the front right of the machine.</p> |

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<https://wiki.bambulab.com/en/x1>

### **“How does X1 work?”**

The X1 3D printer is a machine that uses plastic filament as the material for creating 3D objects.

Most of the time, the printable objects are files with the .stl extension that hold the 3D model which needs to be processed before it's ready to be printed with a piece of software called a slicer.

The slicer, in our case the Bambu Lab Studio, takes that .stl file and slices it into layers which are then printed by the X1. All these slices are then converted into code, a type of language which tells the machine how to move its axis to print the model.

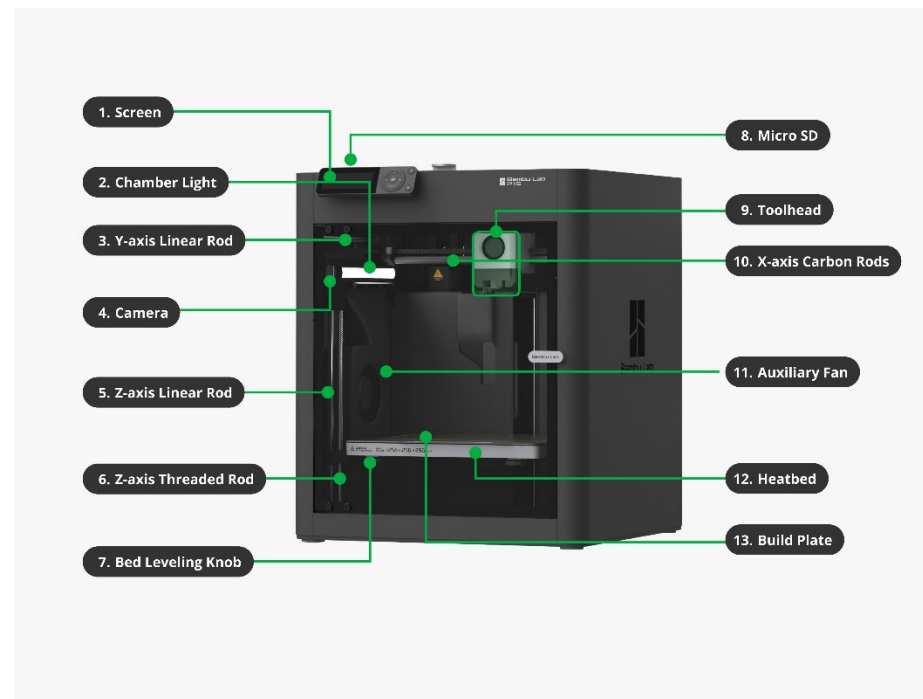
Besides the movement, the slicer is also able to integrate various other settings inside the generated file, like the temperatures of the filament, printing speeds, and generate supports for some sections of the print.”

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<https://wiki.bambulab.com/en/x1/manual/intro-x1>

The Bambu Lab X1C and X1E are largely the same; the X1E includes several upgrades over the X1C, including an active heating chamber, an ethernet socket, and certain air purification filters.

<https://bambulab.com/en/x1e>. The X1E is also better for certain filament types and has a higher max temperature for the toolhead. *Id.* Accordingly, references to components or functionality of either the X1C or X1E in this chart—other than the heating chamber, ethernet socket, and certain air purification filters that are only in the X1E—apply to both printers.



<https://wiki.bambulab.com/en/p1>

““How does the P1 series work?”

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The Bambu Lab P1 inherits the X1 series' renowned kinematics and motion control technology and the wealth of sensors that ensure its reliability. It can connect the automatic material system (AMS) for multi-color printing. Great for beginners, professionals, or others who enjoy the fun of being creative, the P1P has been designed for easy setup and use in minutes. Additionally, it allows upgrading and customizing hardware with mod-friendly features for people to enjoy the fun of making their one-of-a-kind 3D printer.”

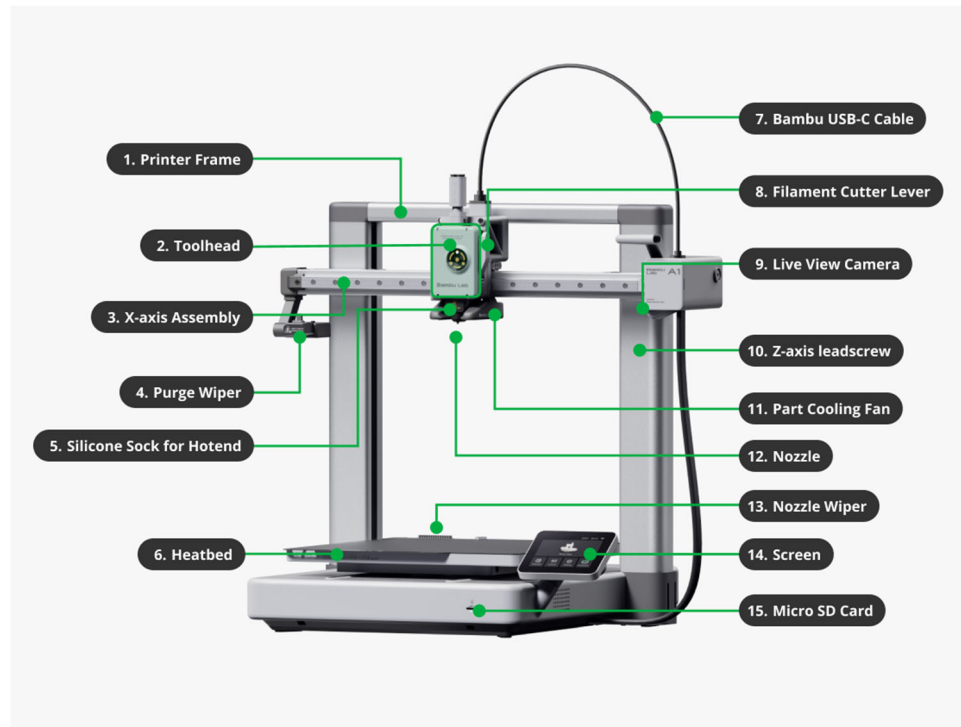
<https://wiki.bambulab.com/en/p1/manual/intro-p1p>



[https://us.store.bambulab.com/products/p1p?gad\\_source=1&gclid=Cj0KCQiAly5BhDeARIsABRc6Zui1LA-KILBpMwww10C9BEnkbXOizh2T2VXHke9YId\\_ufwLMvZND0AaAjzfEALw\\_wcB](https://us.store.bambulab.com/products/p1p?gad_source=1&gclid=Cj0KCQiAly5BhDeARIsABRc6Zui1LA-KILBpMwww10C9BEnkbXOizh2T2VXHke9YId_ufwLMvZND0AaAjzfEALw_wcB)

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The Bambu Lab P1S and P1P are largely the same; the P1S includes several upgrades over the P1P, including an enclosure, air filter, and cooling fans. See <https://us.store.bambulab.com/collections/3d-printer/products/p1s> (comparing P1P to P1S). The P1P is also ideal for certain filament types. *Id.* Accordingly, references to components or functionality of either the P1S or P1P in this chart—other than the enclosure, air filter, and cooling fans that are only in the P1S—apply to both printers.



<https://wiki.bambulab.com/en/a1>

### **“How does the A1 work?”**

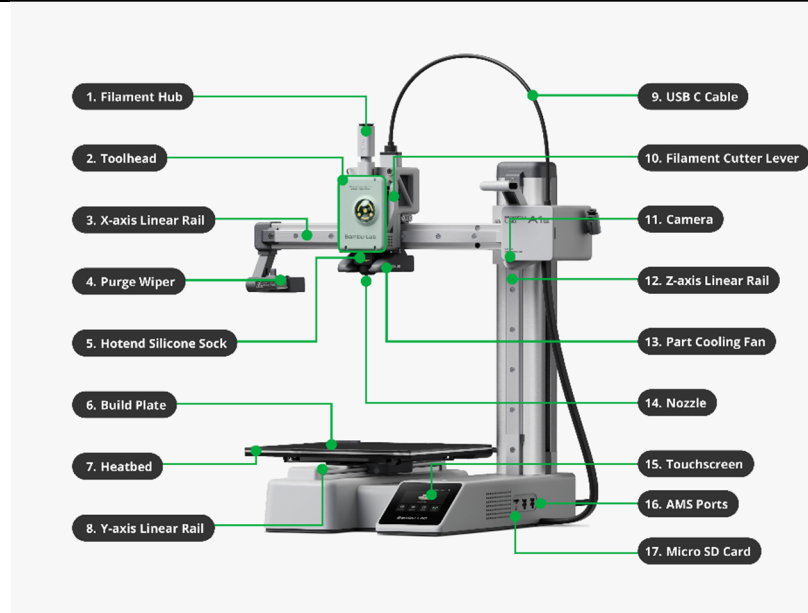
The A1 3D printer is a machine that uses plastic filament to create 3D objects. It can transform digital models into physical objects. The working principle of the A1 typically involves the following steps:

#### **Creation or acquisition of a digital model**

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|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>First, generate a 3D model or obtain an existing digital model using computer-aided design software, online resources, or other means.</p> <p><b>Slicing</b><br/>Next, Bambu Studio slices the digital model into multiple thin layers. Each layer's information is converted into "G-code," a language understood by the printer. The G-code provides instructions to the printer regarding movement paths and speeds of the different axes during the printing process.</p> <p><b>Preparing the printer</b><br/>Before initiating the printing process, the printer needs to be prepared. This involves loading the printing filament, positioning the build plate, and calibrating the printer's parameters to ensure optimal print quality.</p> <p><b>Printing</b><br/>Once all preparations are complete, the A1 printer gradually constructs the object layer by layer on the print platform.”<br/><a href="https://wiki.bambulab.com/en/a1/manual/intro-a1">https://wiki.bambulab.com/en/a1/manual/intro-a1</a></p> |
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<https://wiki.bambulab.com/en/a1-mini>

### **“How does the A1 mini work?”**

The A1 mini 3D printer is a machine that uses plastic filament to create 3D objects. It can transform digital models into physical objects. The working principle of the A1 mini typically involves the following steps:

#### **Creation or acquisition of a digital model:**

First, you need to create a 3D model or acquire an existing digital model. This can be done through computer-aided design software, online resources, or other sources.

#### **Slicing**

Next, Bambu Studio slices the digital model into multiple thin layers. The information for each layer is automatically converted into a language that the printer can understand, known as "G-code." This code instructs the printer on the movement paths and speeds of the various axes during the printing process.

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### **Preparing the printer**

Before starting the printing process, you must prepare the printer. This includes loading the printing filament, placing the build plate, and calibrating the printer's parameters to ensure print quality.

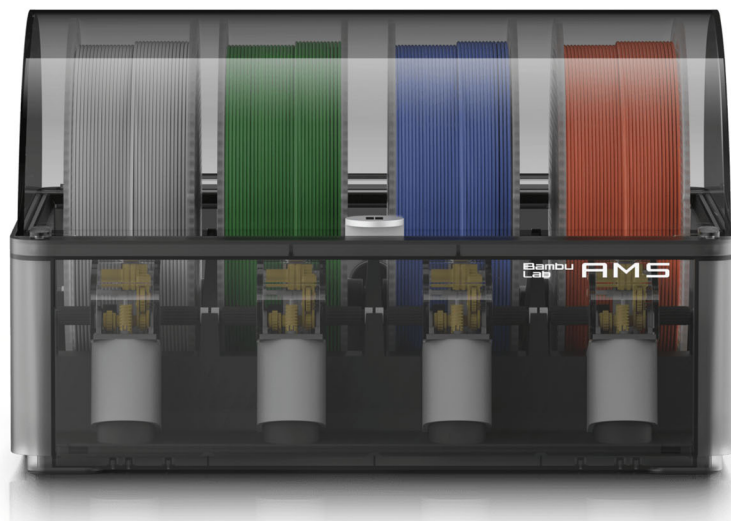
### **Printing**

Once everything is prepared, the A1 mini gradually prints layer by layer onto the print platform, gradually building the object.”

<https://wiki.bambulab.com/en/a1-mini/manual/intro-a1-mini>

Bambu Lab sells an automatic material systems (AMS) used with X1 and P1 series Bambu Lab 3D printers in Bambu Lab additive manufacturing systems. For example, the Automatic Material System includes four filament bays or slots that each receive a spool of filament. See, e.g.,

<https://bambulab.com/en/x1>:



Color, the ultimate expression of emotions, is brought to you by Bambu Lab's Automatic Material System (AMS). You can now enjoy printing freely in multiple colors and materials, a 3D Printing Maestro.



See also <https://wiki.bambulab.com/en/x1/manual/connect-ams> (explaining how to connect the AMS to



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|  |                 |
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|  | the X1 series). |
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See also <https://wiki.bambulab.com/en/p1/manual/connect-ams> (explaining how to connect the AMS to the P1 series):

“Connect AMS to P1 series

How to connect the AMS (automated material system) to the P1P

The Bambu Lab P1 series inherits the X1 series' renowned kinematics and motion control technology, including AMS compatibility.



After connecting the AMS to the P1P, controlling and operating the AMS on Bambu Studio and Bambu Handy is essentially the same as on the X1. This article simply covers the instructions for connecting AMS to P1P; for AMS control and operation, please see the wiki videos and text tutorials of the X1 series listed below.”

Also, the Automatic Material System Lite used with the A1 and A1 mini printers includes four filament

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slots or positions that each receive a spool of filament. See <https://us.store.bambulab.com/products/ams-lite>.



See also <https://wiki.bambulab.com/en/ams-lite/manual/intro-ams-lite>:

“AMS, short for Automated Material System, collaborates with 3D printers to accomplish automated

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|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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|  | <p>multi-color printing. AMS lite is one variant of the Automated Material Systems developed by Bambu Lab. This article aims to outline the modules, primary functions, and workflow of AMS lite.</p> <p>...</p> <p>1. The A1 series printers can be connected to a single AMS lite, limiting its support to a maximum of 4-color printing.”</p> <p>The AMS includes RFID tag sensors, and Bambu Lab filament spools include RFID tags on both sides of the filament roll. When a tagged spool is placed in a filament slot or position of the AMS, a tag sensor in the AMS reads the data stored on the tag. See, e.g., <a href="https://us.store.bambulab.com/products/ams-rfid-board:">https://us.store.bambulab.com/products/ams-rfid-board:</a></p> |
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AMS RFID Board | Bambu Lab U

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us.store.bambulab.com/products/ams-rfid-board

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Bambu Lab

Store Printers Filament Maker's Supply Accessories Spare Parts Support

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AMS RFID Board

\$9.99 USD

 [Pay in 4 interest-free payments on purchases of \\$30-\\$1,500. \*\*Learn more\*\*](#)

Shop now. Pay with Klarna. [Learn more](#)

**Klarna**

Compatibility

AMS

Quantity:

- 1 +

Order Info

- Order will be shipped out from USA warehouse in 1-3 business days once being processed.
- Free shipping on orders over \$49.
- Free shipping on orders over \$199 to remote areas including Alaska, Hawaii, Puerto Rico, Guam and Northern Mariana Islands.

Overview

The RFID sensor is used to identify Bambu Lab filament from the spool and set printing parameters accordingly.

Also see <https://wiki.bambulab.com/en/x1/manual/intro-ams> regarding the AMS:

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**Bambulab AMS RFID readers and sniffing**

The Bambulab AMS RFID readers are located between slot 1&2 and slot 3&4



**“RFID system**

The **RFID System** can automatically identify the RFID tag on the Bambulab filament spools, which can then sync the filament information to the Bambulab slicer (Bambu Studio).”

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Also see <https://wiki.bambulab.com/en/ams/manual/ams-function-introduction>:

**“Reading RFID**

Bambu's official filament roll has RFID tags on both sides, and on AMS there are two RFID-reading circuit boards that can read the filament information.

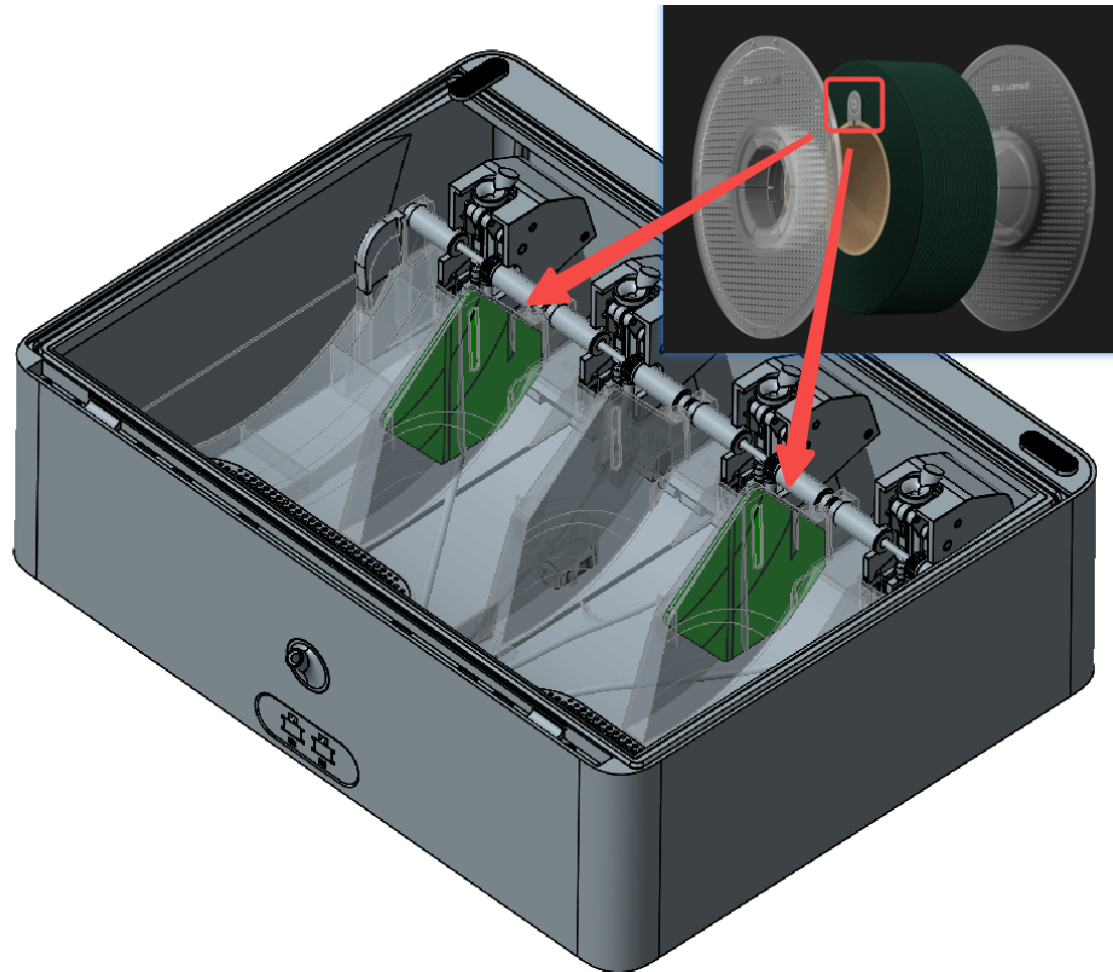


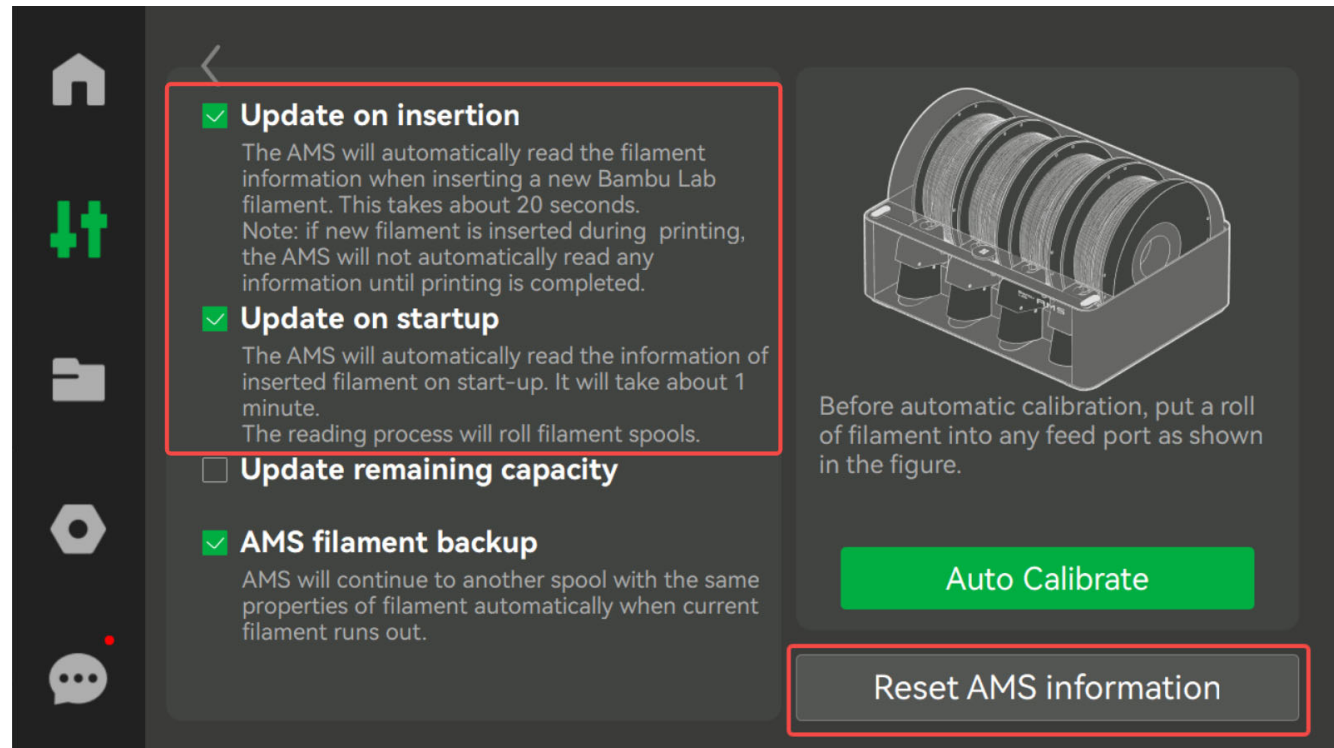


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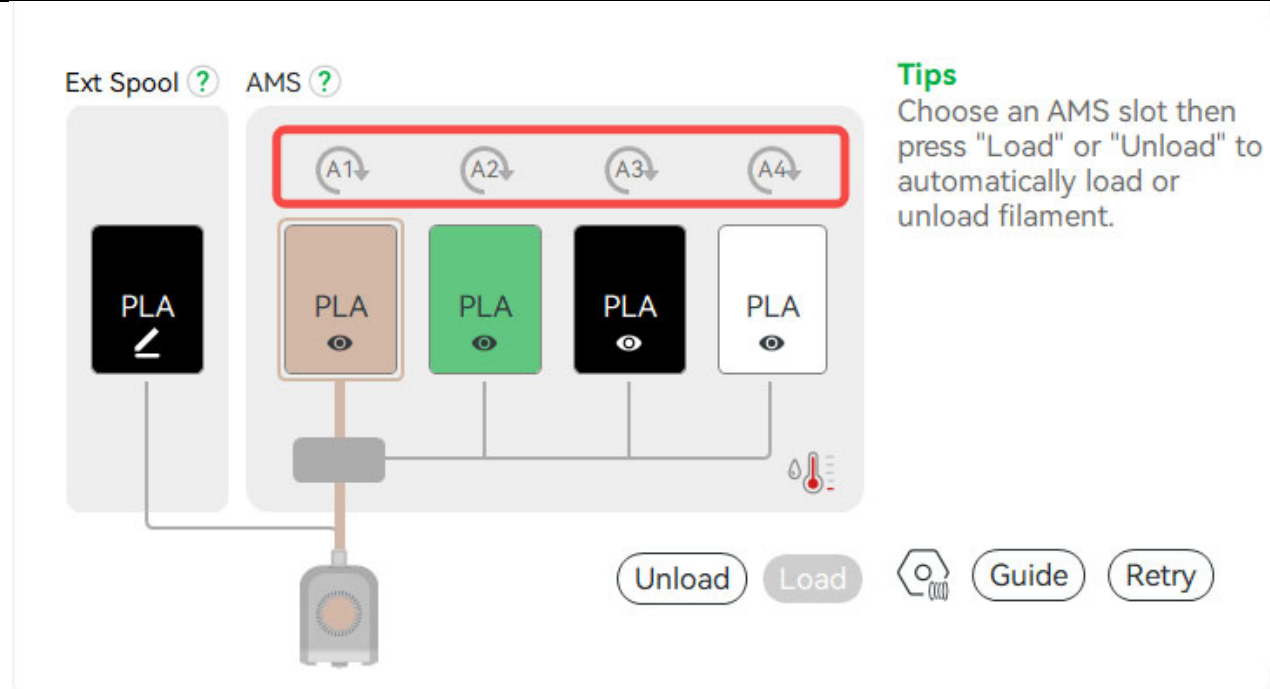
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RFID reading function can be set on the screen for updates on insertion/startup. If “Update on Insertion” is enabled, AMS starts to read the filament RFID after pre-loading. Similarly, with "Update on startup" enabled, after each restart of the printer, it will also start reading the RFID of each slot filament in turn.



You can also manually click the icon above each slot on the screen/slicer for RFID reading.

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**Click to read RFID**

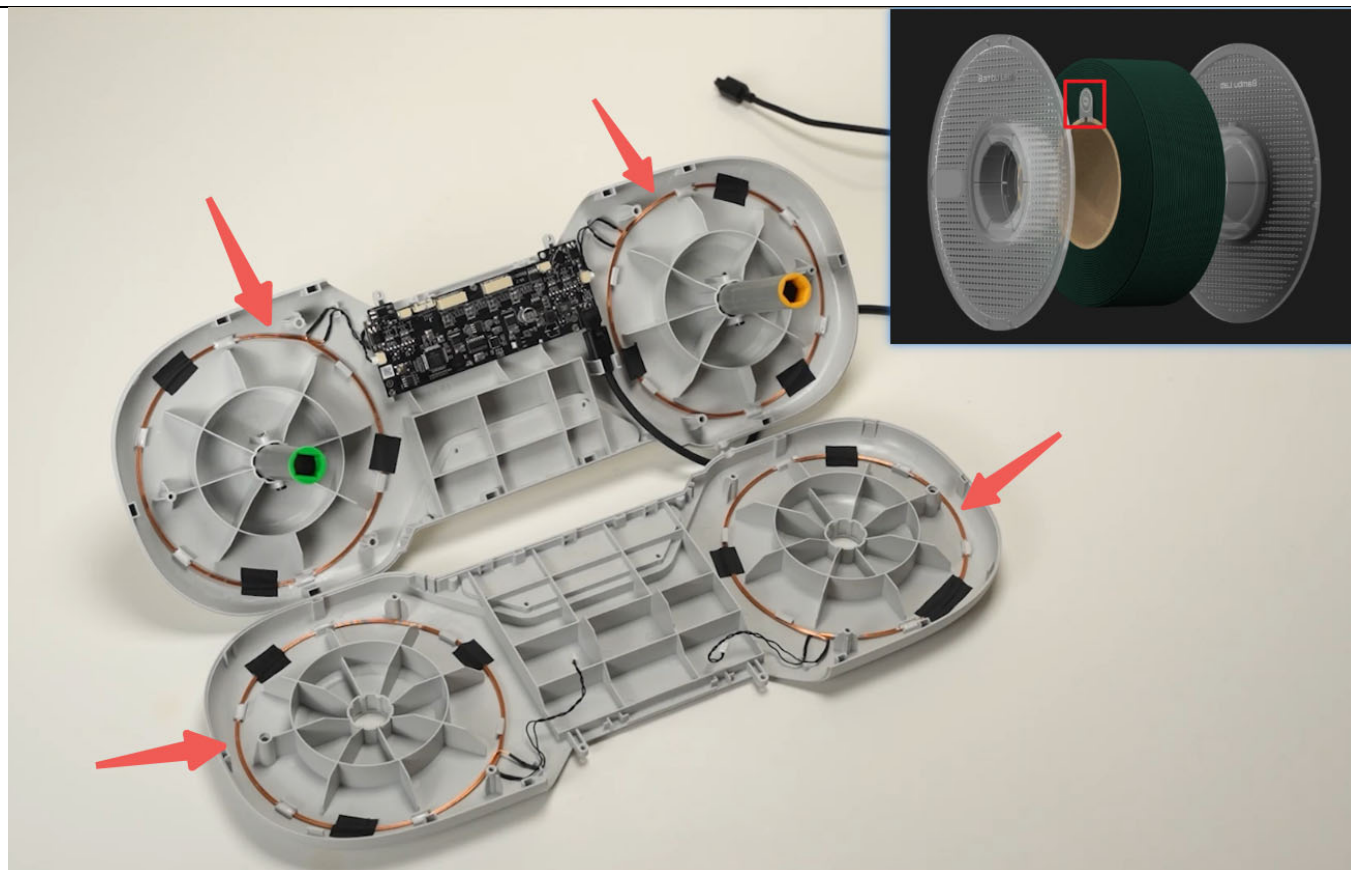
When AMS reads the RFID, it will preload first to tighten the filament roll. It then sends the filament out of AMS a section to turn the spool, allowing the circuit board to scan the RFID tag and read the RFID information.”

Regarding the AMS Lite, see <https://wiki.bambulab.com/en/ams-lite/manual/intro-ams-lite>:

**“Reading RFID**

Each slot in AMS lite has a corresponding RFID coil. You just need to place the spool on the rotary holder of each slot and insert the filament to read its information.

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RFID reading function can be set on the slicer for update on insertion/startup, or you can also manually click the icon beside each slot on the slicer for reading RFID.

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|  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |  |
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|  |  | <div data-bbox="716 201 1654 1446"><div data-bbox="1598 217 1629 250">✕</div><div data-bbox="764 289 968 326"><b>AMS Settings</b></div><div data-bbox="764 375 806 412">✓</div><div data-bbox="821 375 1056 412"><b>Insertion update</b></div><div data-bbox="810 428 1591 529"><p>The AMS will automatically read the filament information when inserting a new Bambu Lab filament spool. This takes about 20 seconds.</p><p>Note: if new filament is inserted during printing, the AMS will not automatically read any information until printing has finished.</p></div><div data-bbox="764 691 806 729">✓</div><div data-bbox="821 691 1081 729"><b>Update on startup</b></div><div data-bbox="810 745 1591 846"><p>The AMS will automatically read the information of inserted filament on start-up. It will take about 1 minute. The reading process will rotate the filament spools.</p></div><div data-bbox="764 891 806 928">✓</div><div data-bbox="821 891 1121 928"><b>AMS filament backup</b></div><div data-bbox="810 945 1581 1013"><p>AMS will continue to another spool with the same filament properties automatically when current filament runs out.</p></div><div data-bbox="774 1040 1591 1382"></div><div data-bbox="1646 1419 1667 1435">”</div></div> |  |
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The three dimensional printer includes a controller such as an SOC, CPU, and/or MCU.

The X1 has many electronic components inside, but here are the most important:

**Logic Board**

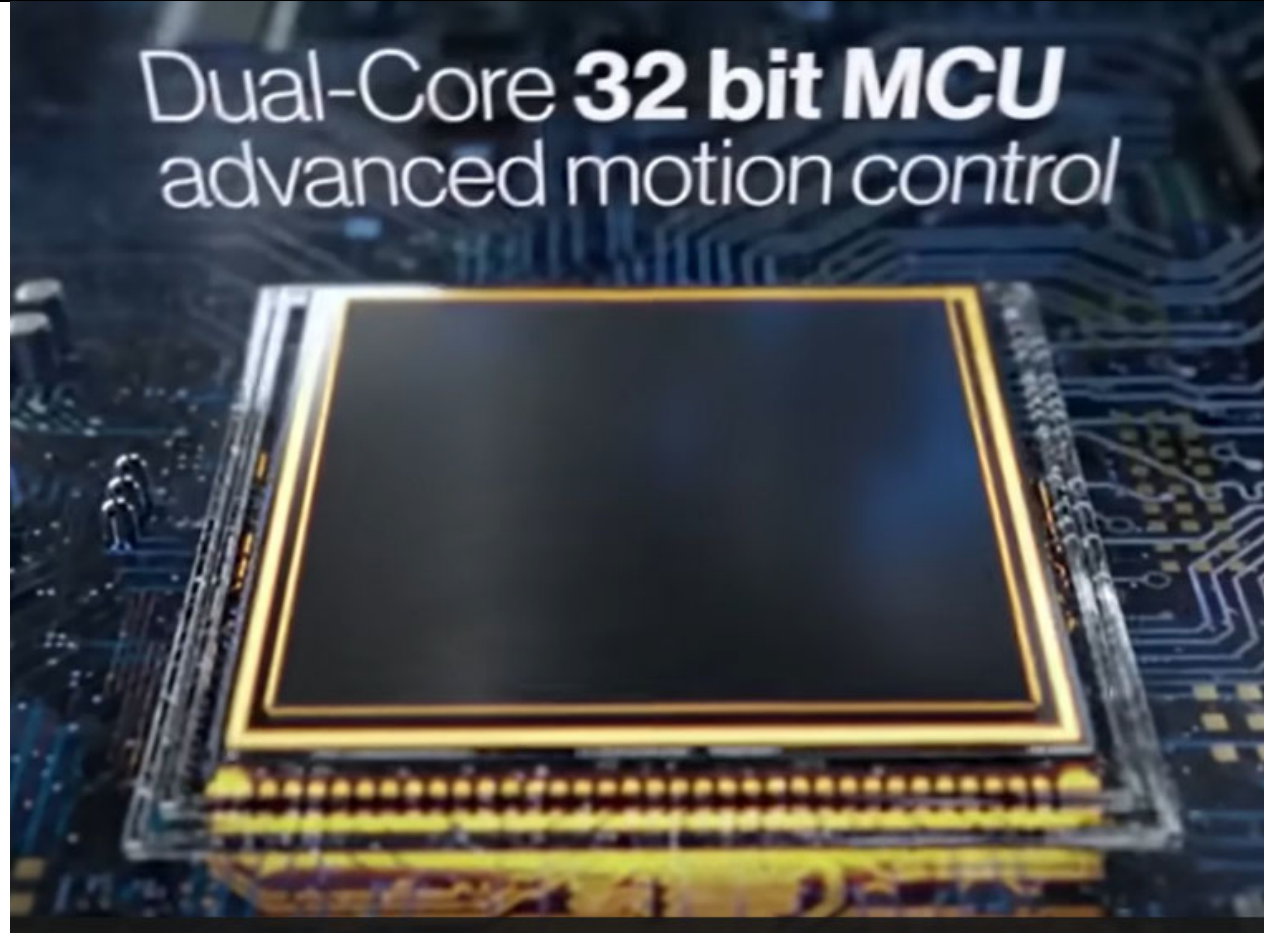
Every 3D printer comes with a logic board that has the CPU, stepper drivers, and the required connections for different electronics attached to the printer. In the case of the X1, the board has a quad-core CPU and a dual-core MCU.

The CPU handles the smart capabilities of the X1 including the AI spaghetti detection, flow calibration, vibration compensation, and the connection between the Slicer/App and the printer.

The MCU handles the actual movement of the printer after getting the stream of g-code from the CPU.

<https://wiki.bambulab.com/en/x1/manual/intro-x1>

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<https://bambulab.com/en/x1>

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See also <https://wiki.bambulab.com/en/a1/manual/intro-a1>:

### **Circuit board**

The main control board of the A1 printer consists of a low-power SoC (System-on-Chip) with a dual-core processor, Wi-Fi baseband, Bluetooth baseband, RF module, and other peripherals. It also includes a dual-core MCU (Microcontroller Unit) and a single-core MCU. Additionally, it incorporates stepper motor drivers and connectors required for connecting various electronic devices to the printer.

The SoC is primarily responsible for handling the user interface of the A1 printer and managing the connection between the slicing software/mobile application and the printer. On the other hand, the MCU controls the printer's heating and movement after receiving the CPU's G-code stream.

See also <https://wiki.bambulab.com/en/a1-mini/manual/intro-a1-mini>:

### **“Electrical Components**

The A1 mini incorporates various electronic components, and here is a brief overview of some of the most important components and their functions:

#### **Circuit board**

The mainboard contains a low-power SoC (System-on-Chip) with a dual-core processor, Wi-Fi baseband, Bluetooth baseband, RF module, and other peripherals. It also includes a dual-core MCU and a single-core MCU. Additionally, it features stepper motor drivers and connectors necessary for connecting different electronic devices to the printer. The SoC handles the user interaction and the communication between the slicing software/mobile application and the printer. The MCU controls the actual heating and movement of the printer after receiving G-code instructions from the CPU.

#### **Camera**



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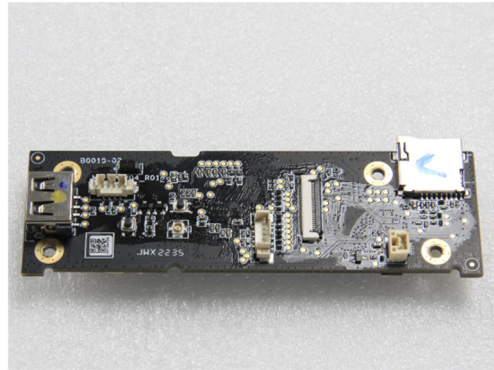
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>The printer integrates a camera used for spaghetti detection (to be supported in future firmware updates) and real-time monitoring of prints using the Bambu Slicer or Bambu Handy application. In addition to the monitoring function, the camera can record videos of the prints to the micro SD card and generate time-lapse videos. The machine is not equipped with night vision, but the camera module has an auxiliary light to illuminate the print.”</p> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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See also <https://wiki.bambulab.com/en/p1/maintenance/ap-board>:

### **AP Board**

The AP board is a circuit board that controls the printer and provides the required Wi-Fi connectivity and processing power.



Friendly reminder: The AP boards for P1S and P1P have the same appearance and installation method, but these two boards are not compatible. In other words, P1P can only use the AP board specifically designed for P1P, while P1S can only use the AP board specifically designed for P1S.

The article provided at <https://wiki.bambulab.com/en/x1/maintenance/replace-ap-board> discusses the Bambu Lab printers' AP mainboard as being an Application Board that controls the information flow within the printer:



## **What is the AP board?**

AP Board refers to the Application board, it is a circuit board that controls the interaction of information within the unit. It provides a self-contained operating environment that delivers all system capabilities needed to support the printer's applications, including memory management, system firmware, graphics processing and multimedia decoding.

## **Connectors on the AP board**

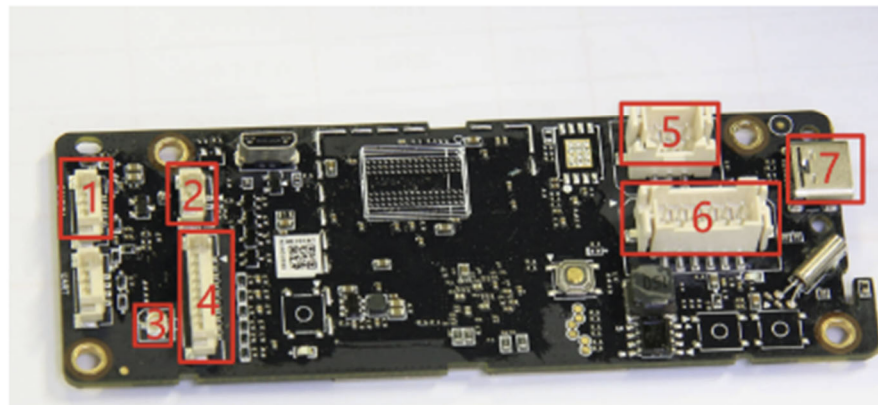


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|                                                                                                                                                                                                                                                                                                                                                           | NO. | Connect object     | NO. | Connect object           | NO. | Connect object          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------|-----|--------------------------|-----|-------------------------|
|                                                                                                                                                                                                                                                                                                                                                           | 1   | The chamber camera | 4   | Button PCBA              | 7   | USB-C cable to Toolhead |
|                                                                                                                                                                                                                                                                                                                                                           | 2   | The chamber LED    | 5   | MC board (Power)         |     |                         |
|                                                                                                                                                                                                                                                                                                                                                           | 3   | WIFI antenna       | 6   | MC board (Communication) |     |                         |
| <p>The AP motherboard is in communication with the RFID system (tag sensor). AP board interfaces with the MC board, as shown in the table above. The MC board interfaces with the AMS interface board.</p> <p><a href="https://wiki.bambulab.com/en/x1/maintenance/replace-mc-board">https://wiki.bambulab.com/en/x1/maintenance/replace-mc-board</a></p> |     |                    |     |                          |     |                         |

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

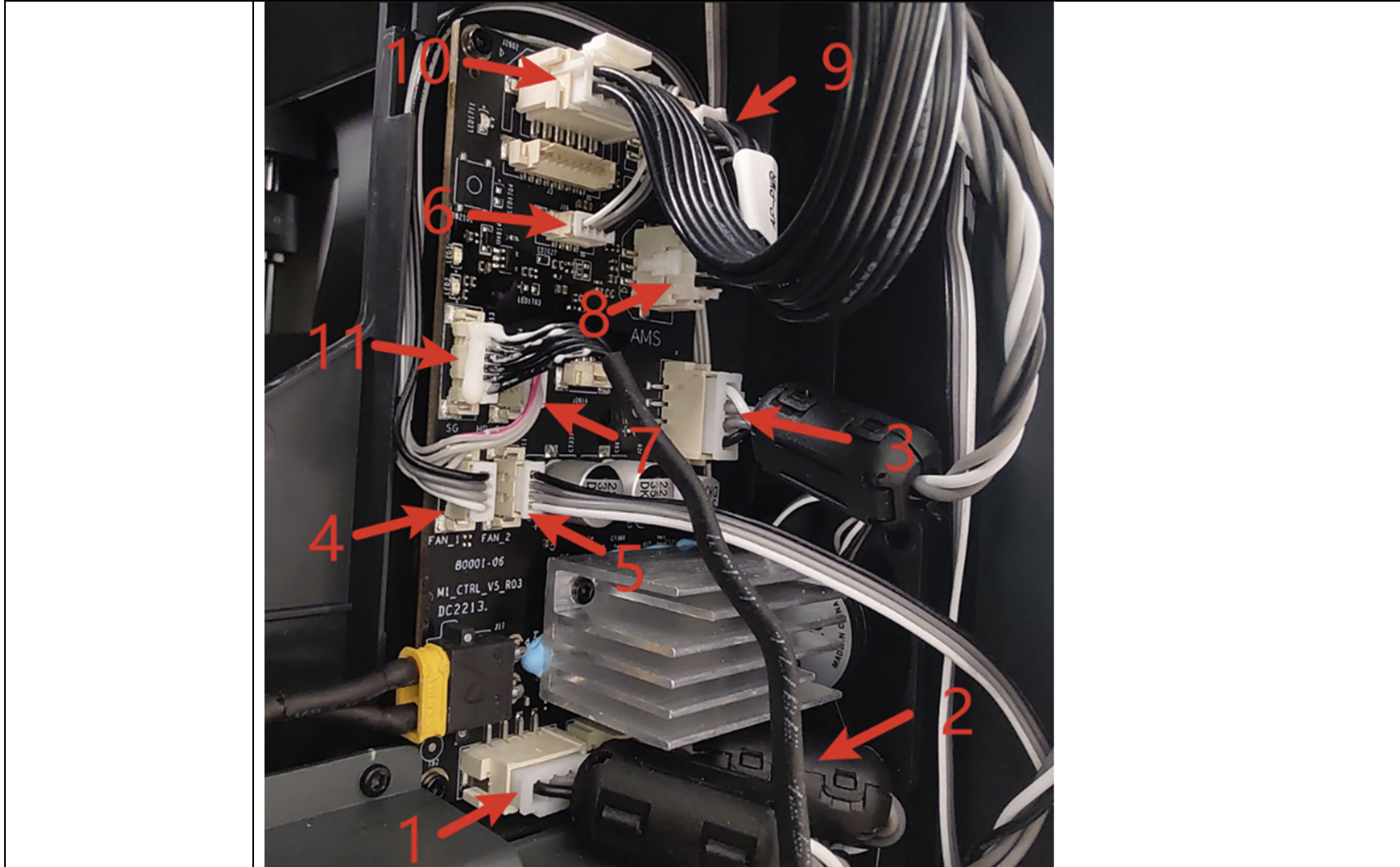


**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|                                                                                                                                                                                                                                                                      | NO. | Connect object                        | NO. | Connect object                        | NO. | Connect object                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------------|-----|---------------------------------------|-----|--------------------------------------|
|                                                                                                                                                                                                                                                                      | 1   | Motor Z                               | 5   | Auxiliary part cooling fan            | 9   | AP main board (Power cable)          |
|                                                                                                                                                                                                                                                                      | 2   | The right motor (view from the rear)  | 6   | MC board fan                          | 10  | AP main board (Communication cable ) |
|                                                                                                                                                                                                                                                                      | 3   | The left motor (view from the rear)   | 7   | MC board to AC board connecting cable | 11  | Heat bed (Communication cable)       |
|                                                                                                                                                                                                                                                                      | 4   | The chamber temperature regulator fan | 8   | AMS interface board                   |     |                                      |
| <p>The AMS interface or connector board handles communication between the AMS and the printer.<br/><a href="https://wiki.bambulab.com/en/x1/maintenance/replace-ams-interface-board">https://wiki.bambulab.com/en/x1/maintenance/replace-ams-interface-board</a></p> |     |                                       |     |                                       |     |                                      |



## How to verify completion/success

Connect the power cord and turn on the power. On the display screen, press the AMS label on the screen as shown below, it will display the AMS control panel. Press "Load" to run the filament loading process, if the process is completed without any error, the AMS interface board replacement is complete and successful.



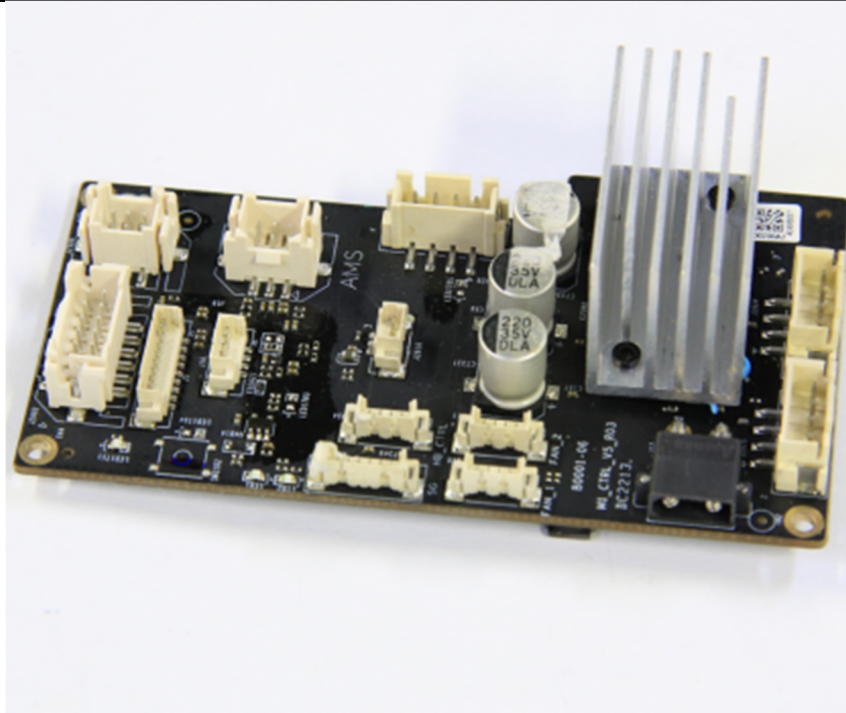
Furthermore, the Bambu Lab printers have a Machine Controller, which controls the various moving parts of the printer. See <https://wiki.bambulab.com/en/x1/maintenance/replace-mc-board>:

### **“What it is**

MC stands for Machine Controller, which is the unit that controls all the moving parts of the printer.



**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**



See also <https://wiki.bambulab.com/en/p1/maintenance/mc-board>:

“MC board of P series

A wiki page guide you how to remove and install the MC board of P series.

**MC Board of P series**

MC stands for Machine Controller, which is the unit that controls all the moving parts of the printer.

There are differences in the heatsink of the MC boards for P1P and P1S, but the boards are the same.”

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

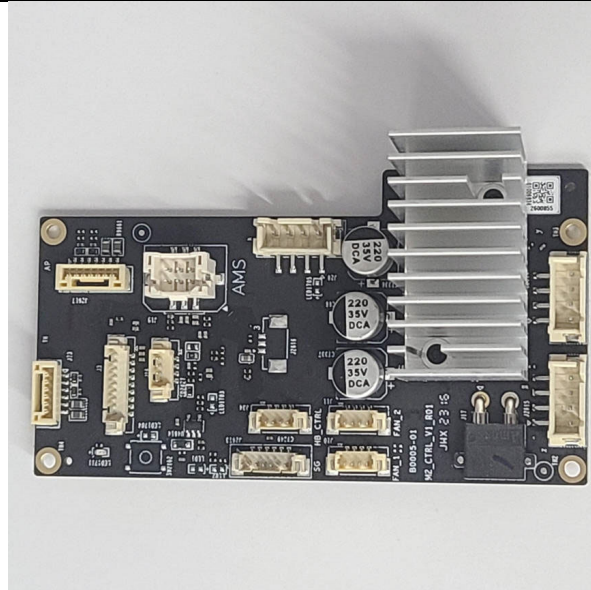




**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

See also <https://wiki.bambulab.com/en/a1/manual/intro-a1>:

**“Electrical Components**

The A1 incorporates various electronic components, and here is a brief overview of some of the most important components and their functions:

**Circuit board**

The main control board of the A1 printer consists of a low-power SoC (System-on-Chip) with a dual-core processor, Wi-Fi baseband, Bluetooth baseband, RF module, and other peripherals. It also includes a dual-core MCU (Microcontroller Unit) and a single-core MCU. Additionally, it incorporates stepper motor drivers and connectors required for connecting various electronic devices to the printer.

The SoC is primarily responsible for handling the user interface of the A1 printer and managing the connection between the slicing software/mobile application and the printer. On the other hand, the MCU controls the printer's heating and movement after receiving the CPU's G-code stream.”

See also <https://wiki.bambulab.com/en/a1-mini/manual/intro-a1-mini>:

**“Electrical Components**

The A1 mini incorporates various electronic components, and here is a brief overview of some of the most important components and their functions:

**Circuit board**

The mainboard contains a low-power SoC (System-on-Chip) with a dual-core processor, Wi-Fi baseband, Bluetooth baseband, RF module, and other peripherals. It also includes a dual-core MCU and a single-core MCU. Additionally, it features stepper motor drivers and connectors necessary for connecting different electronic devices to the printer. The SoC handles the user interaction and the communication between the slicing software/mobile application and the printer. The MCU controls the actual heating and movement of the printer after receiving G-code instructions from the CPU.

**Camera**

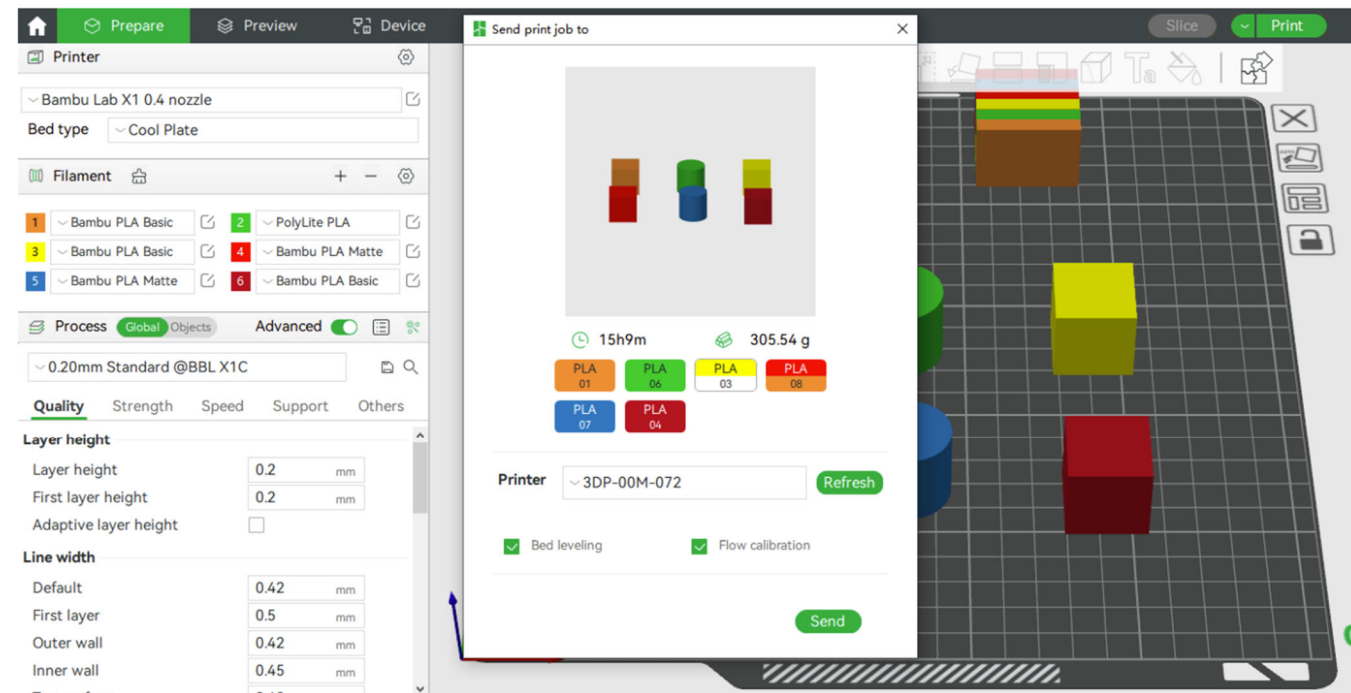
The printer integrates a camera used for spaghetti detection (to be supported in future firmware updates) and real-time monitoring of prints using the Bambu Slicer or Bambu Handy application. In addition to the monitoring function, the camera can record videos of the prints to the micro SD card and generate time-lapse videos. The machine is not equipped with night vision, but the camera module has an auxiliary light to illuminate the print.”

## **Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

The data from the tag is provided to Bambu Studio, which is coupled to the printer via a network connection. The data includes various properties of the build material, including the type of the build material. See <https://wiki.bambulab.com/en/ams/manual/ams-function-introduction>:

### **Automatic mapping function**

When you send a multi-color print task in the slicer, the model is automatically matched to the closest color filament in the AMS slots. You can also customize the filaments in the window.



### **“Load filaments to AMS and configure filament information**

Before starting multi-color printing, it is necessary to insert the (AMS) with the filament and set up the filament information. If you are using an official Bambulab filament, the AMS will automatically detect the filament type and color through RFID technology. However, if you are using a third-party filament, you will need to manually configure the relevant information. For details, please refer to [AMS setup and](#)

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

[loading filament.”](#)

<https://wiki.bambulab.com/en/x1/manual/multi-color-printing>

Also see <https://github.com/Bambu-Research-Group/RFID-Tag-Guide>:

Summary of what kind of data is stored in each block. Detailed info for each block is documented be

| sec | blk | Data                                                                                      |
|-----|-----|-------------------------------------------------------------------------------------------|
| 0   | 0   | <a href="#">Block 0</a> UID and Tag Manufacturer Data                                     |
| 0   | 1   | <a href="#">Block 1</a> Tray Info Index                                                   |
| 0   | 2   | <a href="#">Block 2</a> Filament Type                                                     |
| 0   | 3   | <a href="#">Block 3</a> MIFARE encryption keys, Unrelated to BambuLab                     |
| 1   | 0   | <a href="#">Block 4</a> Detailed Filament Type                                            |
| 1   | 1   | <a href="#">Block 5</a> Spool Weight, Color Code                                          |
| 1   | 2   | <a href="#">Block 6</a> Min/Max Hotend, Bed Temp, Bed Temp Type, Drying Time, Drying Temp |

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

**Block 6**

Example Data: AA AA BB BB CC CC DD DD EE EE FF FF \_ \_ \_ \_

| position | length | type        | Description                                   |
|----------|--------|-------------|-----------------------------------------------|
| 0 (AA)   | 2      | uint16 (LE) | Drying Temperature in °C                      |
| 2 (BB)   | 2      | uint16 (LE) | Drying time in hours                          |
| 4 (CC)   | 4      | uint16 (LE) | Bed Temperature Type ( <b>types unknown</b> ) |
| 6 (DD)   | 2      | uint16 (LE) | Bed Temperature in °C                         |
| 8 (EE)   | 2      | uint16 (LE) | Min Temperature for Hotend in °C              |
| 10 (FF)  | 2      | uint16 (LE) | Max Temperature for Hotend in °C              |

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

Also see <https://www.youtube.com/watch?v=SdHqzZnYCCs>:



Search



**How To Read Filament RFID Tags for BambuLab AMS**



**Mitch Davis**  
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## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464

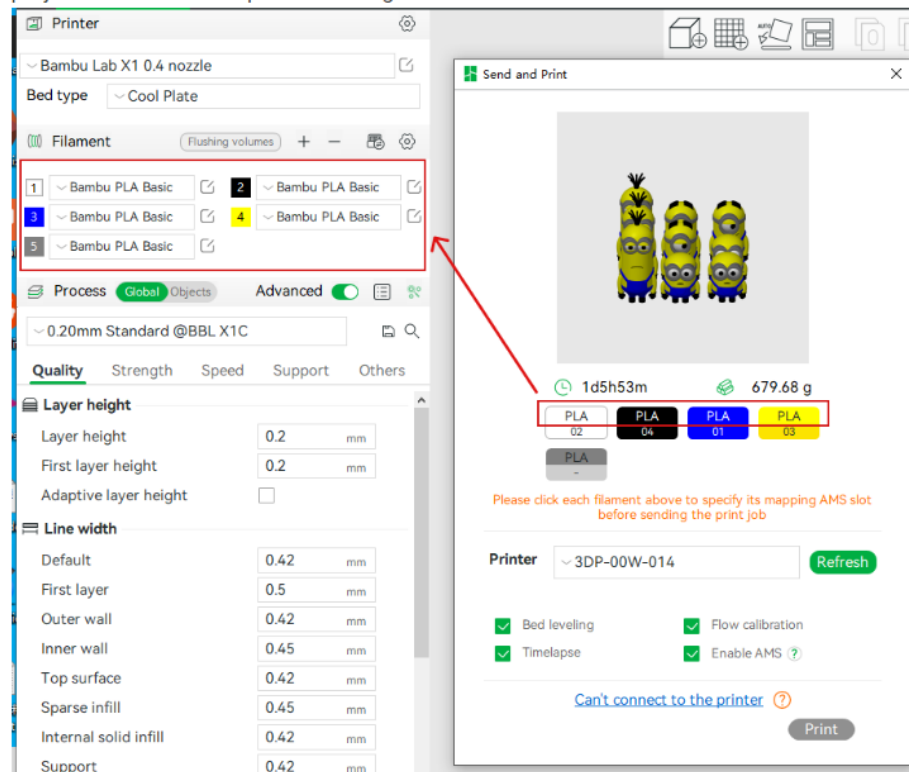
determining an operational parameter of a fabrication process using the three-dimensional printer based upon the data, the operational parameter including at least one of a build platform temperature, a build volume temperature, an infill requirement, a rafting requirement, a support structure requirement, and a cooling requirement;

The Accused Instrumentalities are each used for determining an operational parameter of a fabrication process using the three-dimensional printer based upon the data, the operational parameter including at least one of a build platform temperature, a build volume temperature, an infill requirement, a rafting requirement, a support structure requirement, and a cooling requirement.

For example, Bambu Studio maps the filaments detected in the AMS to a requested 3D printing job (see <https://wiki.bambulab.com/en/software/bambu-studio/use-ams-on-bambu-studio>):

### **Bambu Studio AMS mapping**

Bambu Studio will do AMS mapping (matching the filament type and color) to the current print job. The above part of the AMS mapping widget is the source color and type for the current project and the bottom part is the target index and color of the AMS slot.



## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464

For example, Bambu Studio determines whether a support structure requirement is required for a requested 3D printed part:

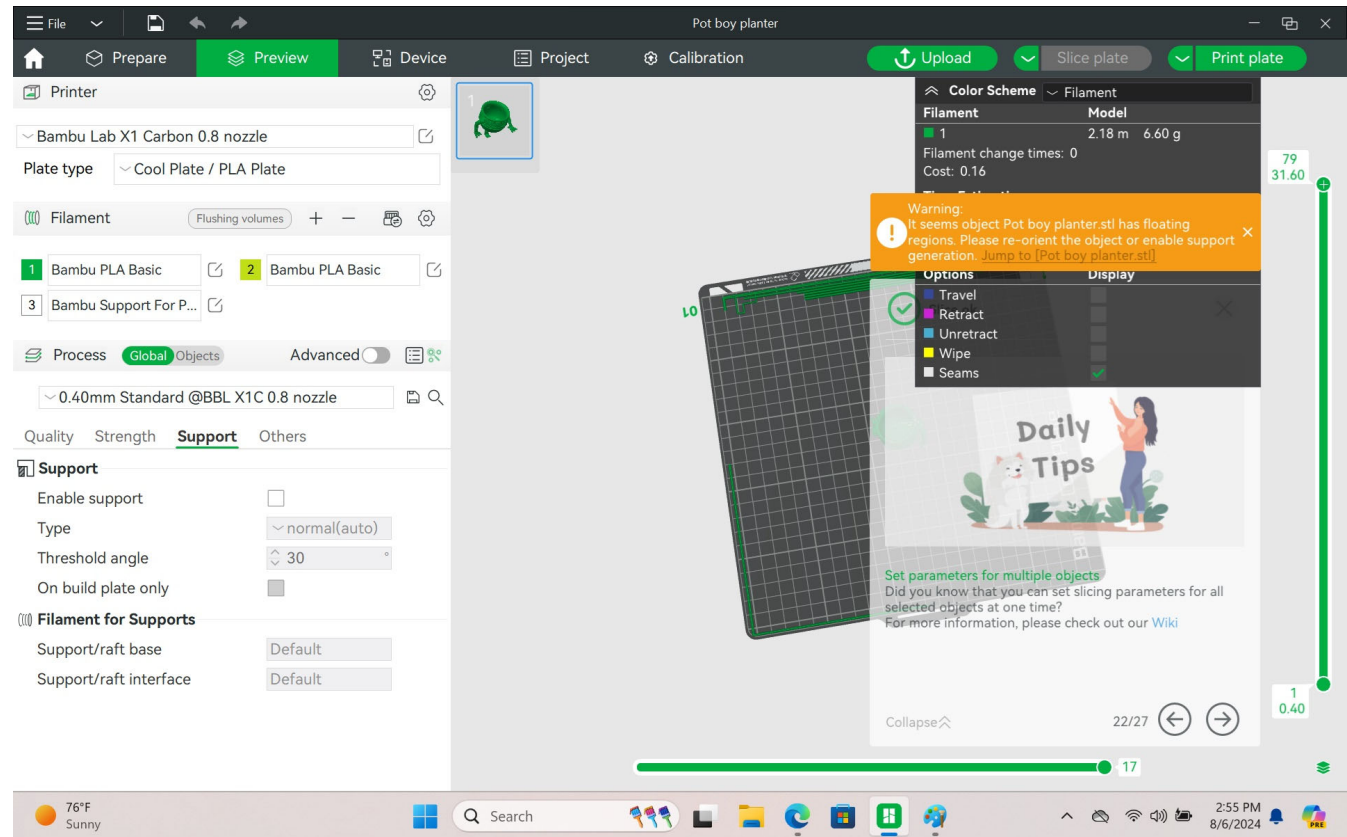




**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Support parameter configuration</b></p> <p>In Bambu Studio, there are 2 options when printing support with support filament:</p> <ul style="list-style-type: none"><li>▸ Use the support filament as both support/raft base and interface.<br/>This is more suitable when you need a large amount of support, but the print time will be longer.</li><li>▸ Use the model filament as support/raft base and support filament as support/raft interface.<br/>This is more suitable for models that only need a small amount of easy-to-remove support.</li></ul> <p><a href="https://wiki.bambulab.com/en/filament-acc/filament/pla-basic-and-petg-hf">https://wiki.bambulab.com/en/filament-acc/filament/pla-basic-and-petg-hf</a></p> <p>Further, Bambu Studio determines a build volume temperature based on the data for the filament.</p> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464

ambu Studio info



Current chamber temperature is higher than the material's safe temperature, it may result in material softening and clogging. The maximum safe temperature for the material is 45

OK

Vendor

Bambu Lab

Default color



Diameter

1.75 mm

Flow ratio

0.98

Density

1.26 g/cm<sup>3</sup>

Price

24.99 money/kg

Temperature of vitrification

55

Recommended nozzle temperature

Min 190 °C Max 240 °C

 **Print temperature**

Chamber temperature

60 °C 

Nozzle

First layer 220 °C Other layers 220 °C

Cool Plate / PLA Plate

First layer 35 °C Other layers 35 °C

Engineering Plate

First layer 0 °C Other layers 0 °C

Smooth PEI Plate / High Temp Plate

First layer 55 °C Other layers 55 °C

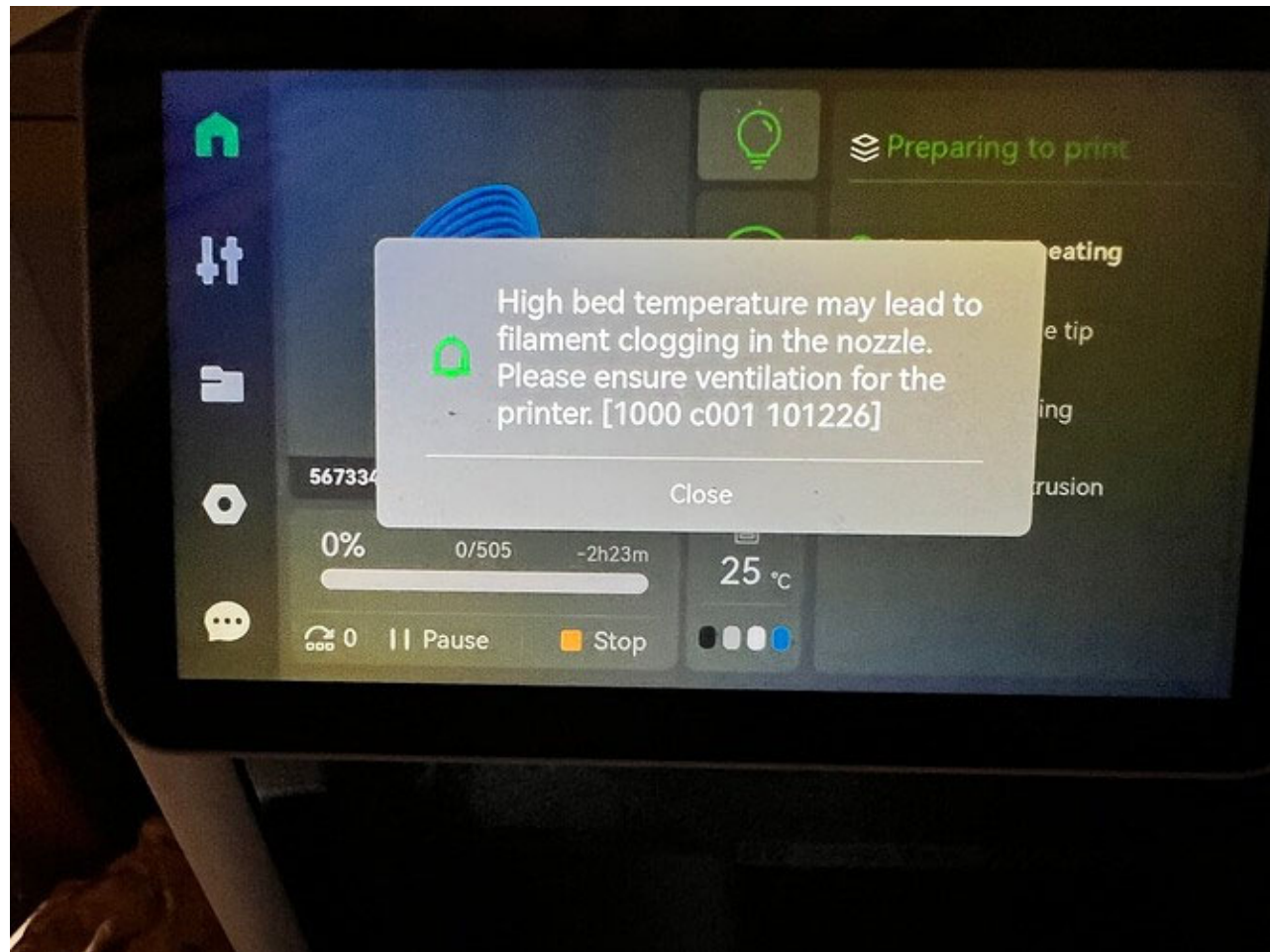
Textured PEI Plate

First layer 55 °C Other layers 55 °C

<https://wiki.bambulab.com/en/software/bambu-studio/chamber-temperature>

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

Further, Bambu Lab printers determine a build platform temperature based on the data for the filament.



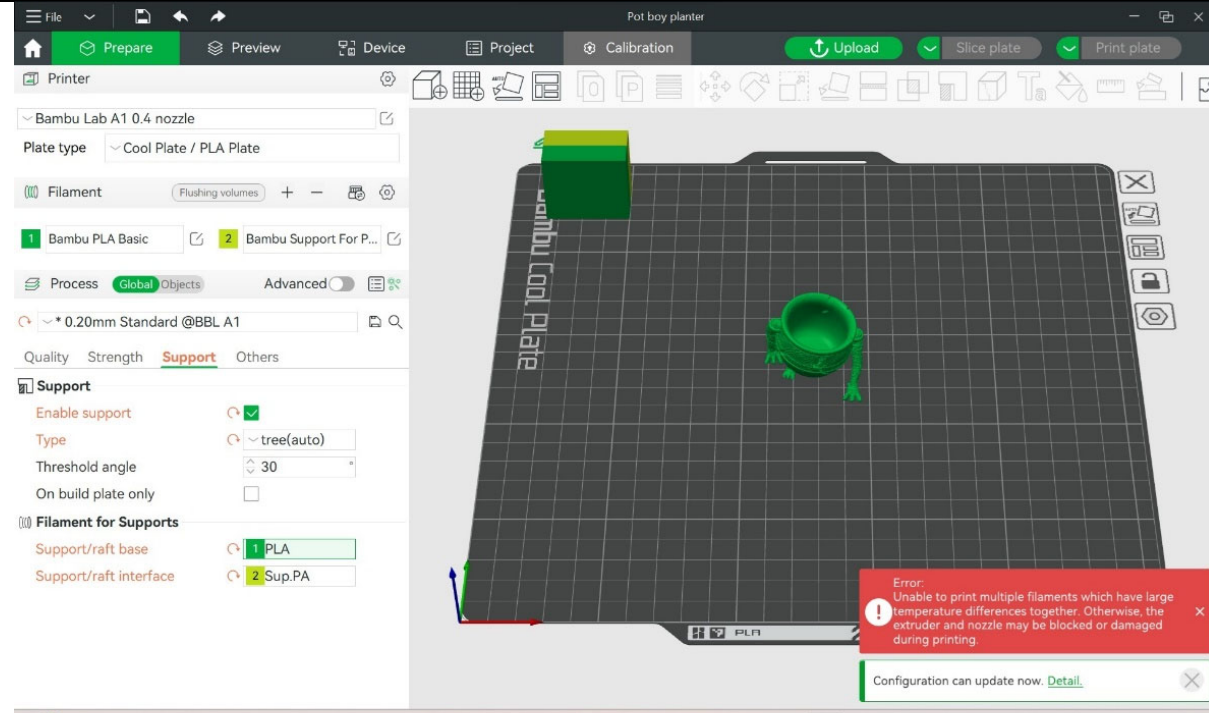
It's implemented after the last firmware update, depending of the used filament and build plate.

<https://forum.bambulab.com/t/new-error-message-about-temperature/38470>

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

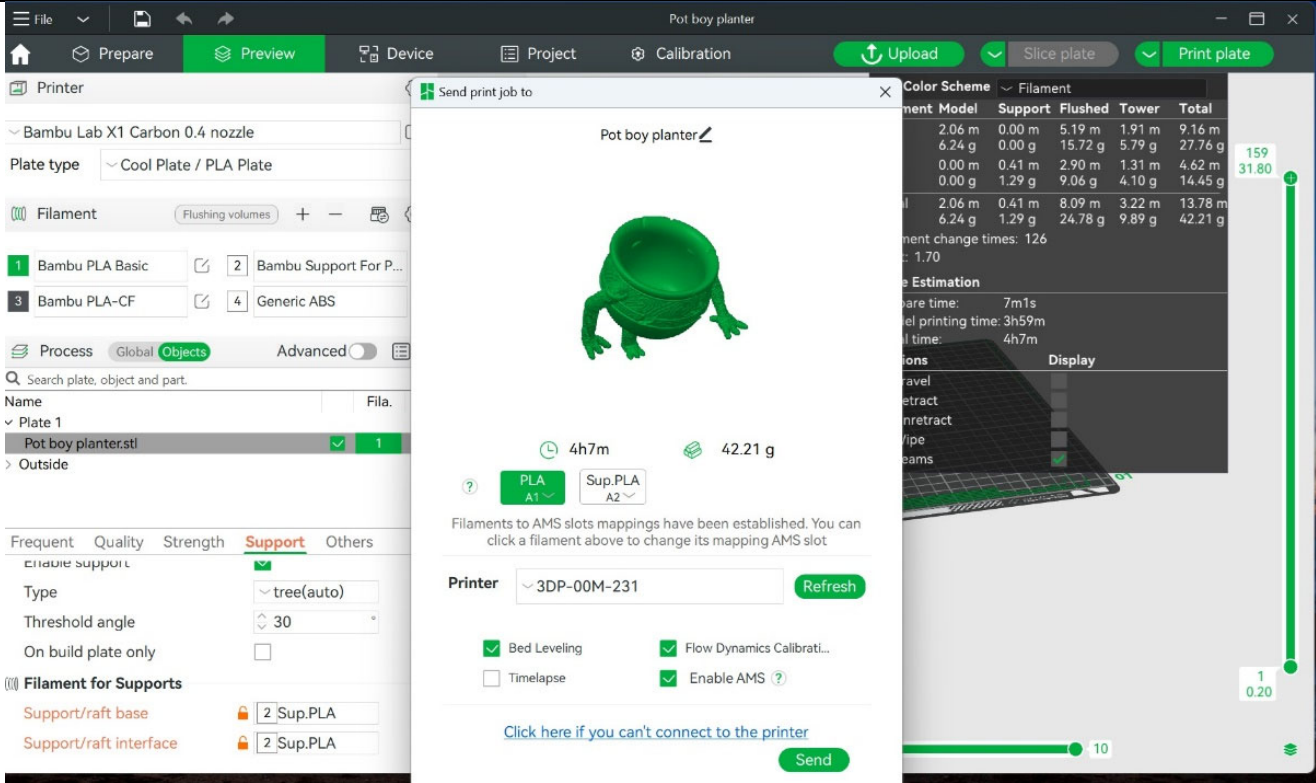
|                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| performing a diagnostic test to determine whether the operational parameter is suitable for the three-dimensional printer; and | <p>The Accused Instrumentalities are each used for performing a diagnostic test to determine whether the operational parameter is suitable for the three-dimensional printer.</p> <p>For example, Bambu Studio performs a diagnostic test to determine whether an operational parameter, such as a support structure requirement for the build, is suitable for the three-dimensional printer (e.g., whether the support structure filament detected in the AMS of the printer is compatible with the build material filament detected in the AMS).</p> <p>For example, if the detected build material is PLA and the detected support material is Support for PA/PET (<a href="https://us.store.bambulab.com/collections/support/products/support-for-pa-pet">https://us.store.bambulab.com/collections/support/products/support-for-pa-pet</a>) instead of Support for PLA (<a href="https://us.store.bambulab.com/products/support-for-pla">https://us.store.bambulab.com/products/support-for-pla</a>), the following error message is produced as a result of a diagnostic test comparing the required support structure to the support structure actually in the 3D printer:</p> |
|--------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## **Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**



However, if compatible Support for PLA is detected in the AMS, then the diagnostic test does not produce such an error:

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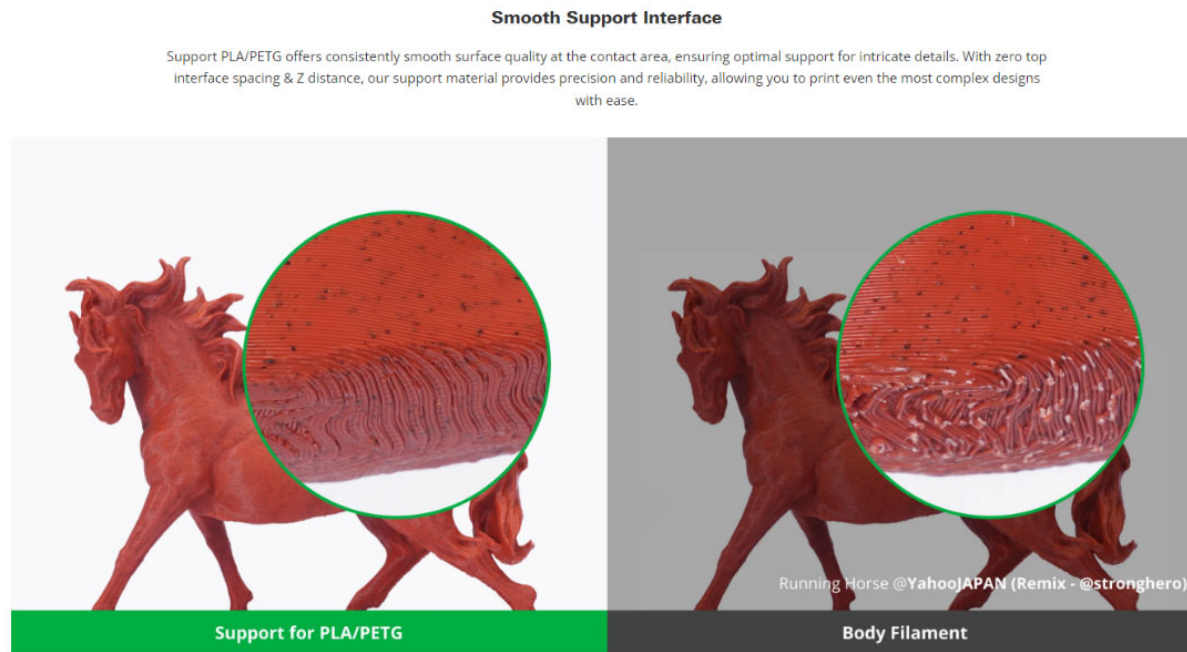
The screenshot displays the Bambu Studio software interface. The main window shows a 3D model of a green 'Pot boy planter' with a frog-like shape. The print job is titled 'Pot boy planter'. The print settings are as follows:

- Printer: Bambu Lab X1 Carbon 0.4 nozzle
- Plate type: Cool Plate / PLA Plate
- Filament: Bambu PLA Basic (1), Bambu Support For P... (2), Bambu PLA-CF (3), Generic ABS (4)
- Process: Global Objects, Advanced
- Name: Pot boy planter.stl
- Support: tree(auto), Threshold angle: 30, On build plate only: ☐
- Filament for Supports: Support/raft base: 2 Sup.PLA, Support/raft interface: 2 Sup.PLA

The print job summary shows a 4h7m print time and 42.21 g of material. The printer is identified as 3DP-00M-231. The interface also includes a 'Send print job to' dialog box and a 'Color Scheme' panel on the right.

Additionally, Bambu Studio changes the support offset setting if a compatible support material (e.g., Support for PLA/PETG) is used versus using the build material (e.g., PLA) as the support structure. See [Support for PLA/PETG | Bambu Lab US](#):

## **Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**



The default offset setting when using the same material for both the part and the support structure is 0.2mm. However, if a compatible support material is used, that offset is changed to 0 or no extra gap.

As another example, Bambu Studio performs a diagnostic test to determine whether an operational parameter, such as a build volume temperature is suitable for the three-dimensional printer (e.g., whether the build volume temperature is compatible with the maximum safe temperature for the build material filament detected in the AMS).

For example, if the detected build volume temperature setting is 60 degrees Celsius and the detected material's maximum safe temperature is 45 degrees Celsius, the following error message is produced as a result of a diagnostic test comparing the build volume temperature setting to the maximum safe build volume temperature of the material actually in the AMS or 3D printer.



## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464

ambu Studio info



Current chamber temperature is higher than the material's safe temperature, it may result in material softening and clogging. The maximum safe temperature for the material is 45

OK

Vendor

Bambu Lab

Default color



Diameter

1.75 mm

Flow ratio

0.98

Density

1.26 g/cm<sup>3</sup>

Price

24.99 money/kg

Temperature of vitrification

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Recommended nozzle temperature

Min 190 °C

Max 240 °C

 Print temperature

Chamber temperature

60 °C



Nozzle

First layer 220 °C

Other layers 220 °C

Cool Plate / PLA Plate

First layer 35 °C

Other layers 35 °C

Engineering Plate

First layer 0 °C

Other layers 0 °C

Smooth PEI Plate / High Temp Plate

First layer 55 °C

Other layers 55 °C

Textured PEI Plate

First layer 55 °C

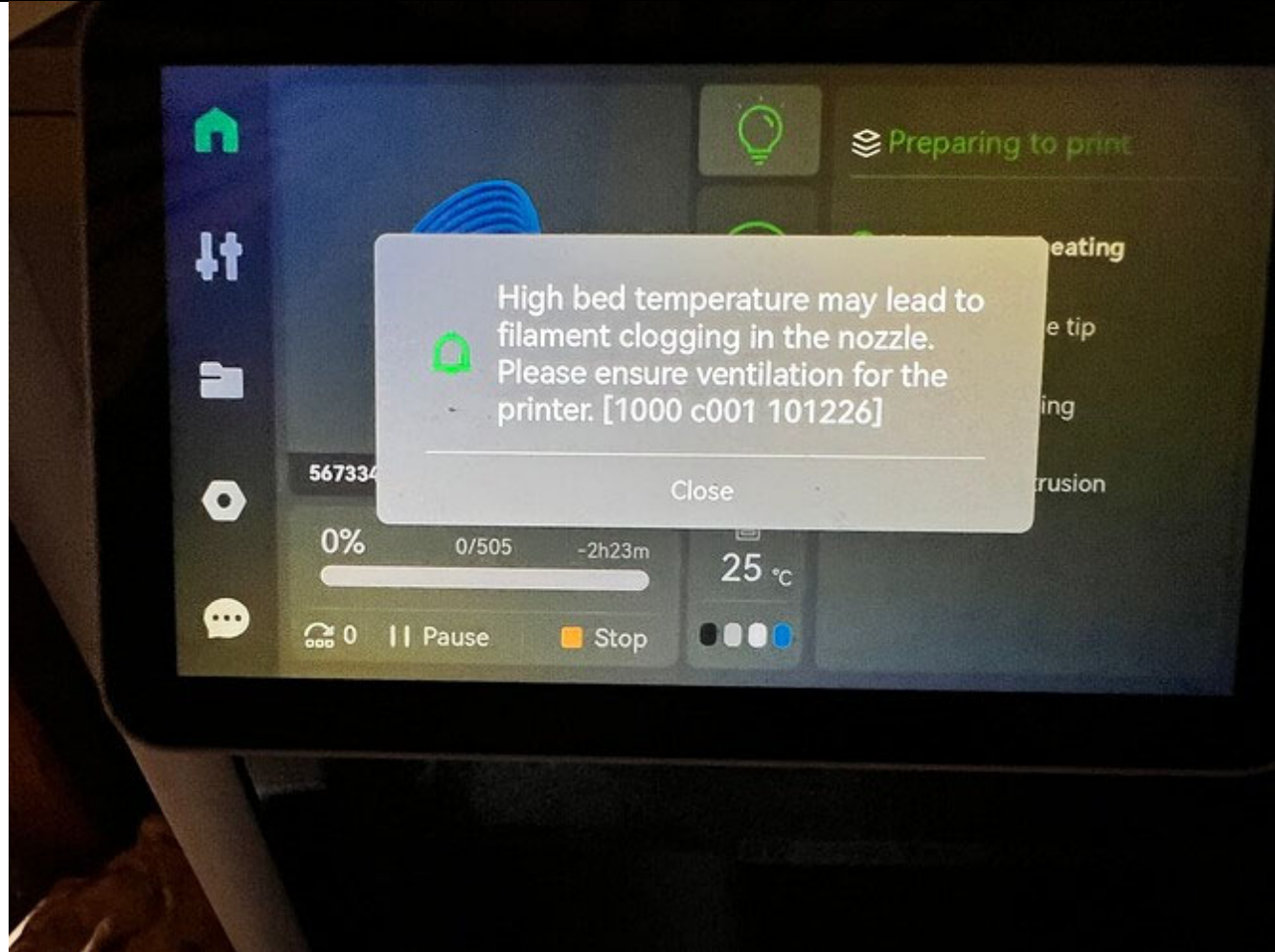
Other layers 55 °C

<https://wiki.bambulab.com/en/software/bambu-studio/chamber-temperature>

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>As yet another example, Bambu Lab printers perform a diagnostic test to determine whether an operational parameter, such as a build platform temperature for the build, is suitable for the three-dimensional printer (e.g., whether the filament detected in the AMS of the printer is compatible with the build platform temperature).</p> <p>For example, based on the filament detected in the AMS, the printer evaluates whether the build platform temperature is appropriate for the filament. If the build platform temperature is high, the following error message is produced as a result of a diagnostic testing comparing the build platform temperature for the filament in the AMS to the actual build platform temperature.</p> |
|--|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

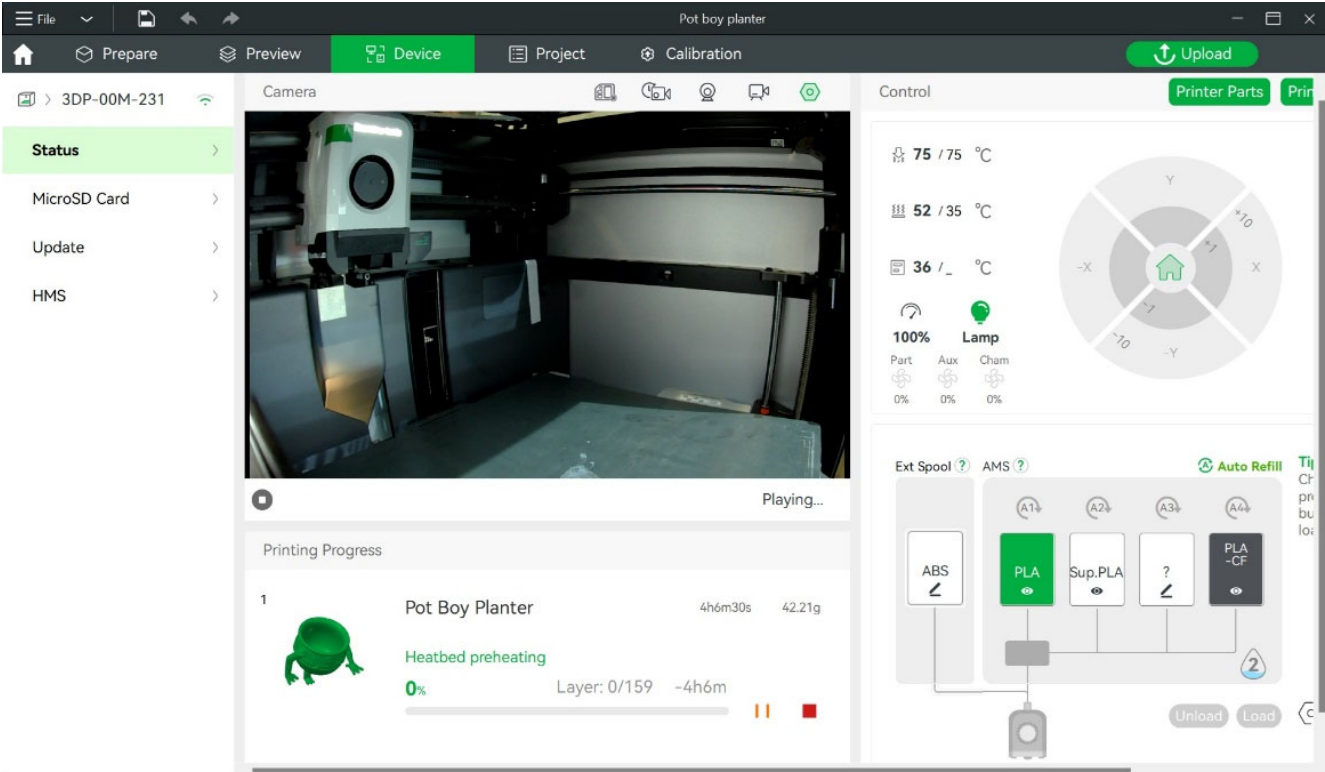
**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**



It's implemented after the last firmware update, depending of the used filament and build plate.

<https://forum.bambulab.com/t/new-error-message-about-temperature/38470>

## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464

|                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>when the operational parameter is suitable for the three-dimensional printer according to the diagnostic test, controlling operation of the three-dimensional printer during the fabrication process with the controller according to the operational parameter to fabricate an object with the three-dimensional printer.</p> | <p>When the operational parameter is suitable for the three-dimensional printer according to the diagnostic test, the Accused Instrumentalities control operation of the three-dimensional printer during the fabrication process with the controller according to the operational parameter to fabricate an object with the three-dimensional printer.</p> <p>When a compatible support structure is detected, then the 3D printer prints the requested part with the support structure:</p>  |
| <p>2. The method of claim 1, wherein the tag includes at least one of a radio</p>                                                                                                                                                                                                                                                 | <p>The tag of the Accused Instrumentalities includes at least one of a radio frequency identification (RFID) tag, an optically-identifiable tag, a magnetically-identifiable tag, and a mechanical feature of the supply.</p> <p>As noted for claim 1, the tag in each of the filament spools is a radio frequency identification (RFID) tag.</p>                                                                                                                                                                                                                                 |

## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464

frequency identification (RFID) tag, an optically-identifiable tag, a magnetically-identifiable tag, and a mechanical feature of the supply.

### RFID system

The **RFID System** can automatically identify the RFID tag on the Bambulab filament spools, which can then sync the filament information to the Bambulab slicer (Bambu Studio).



<https://wiki.bambulab.com/en/x1/manual/intro-ams>

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|  |                                                                                                                                                                                                                                                                                                                                                                                                             |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Automatic Filament Identification</b></p> <p>Bambu Lab filaments use RFID which is read by the AMS to automatically identify and apply the best settings for your material.</p> <p>The RFID tag is synchronized automatically to Bambu Studio.</p> <p><a href="https://us.store.bambulab.com/products/ams-multicolor-printing">https://us.store.bambulab.com/products/ams-multicolor-printing</a></p> |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

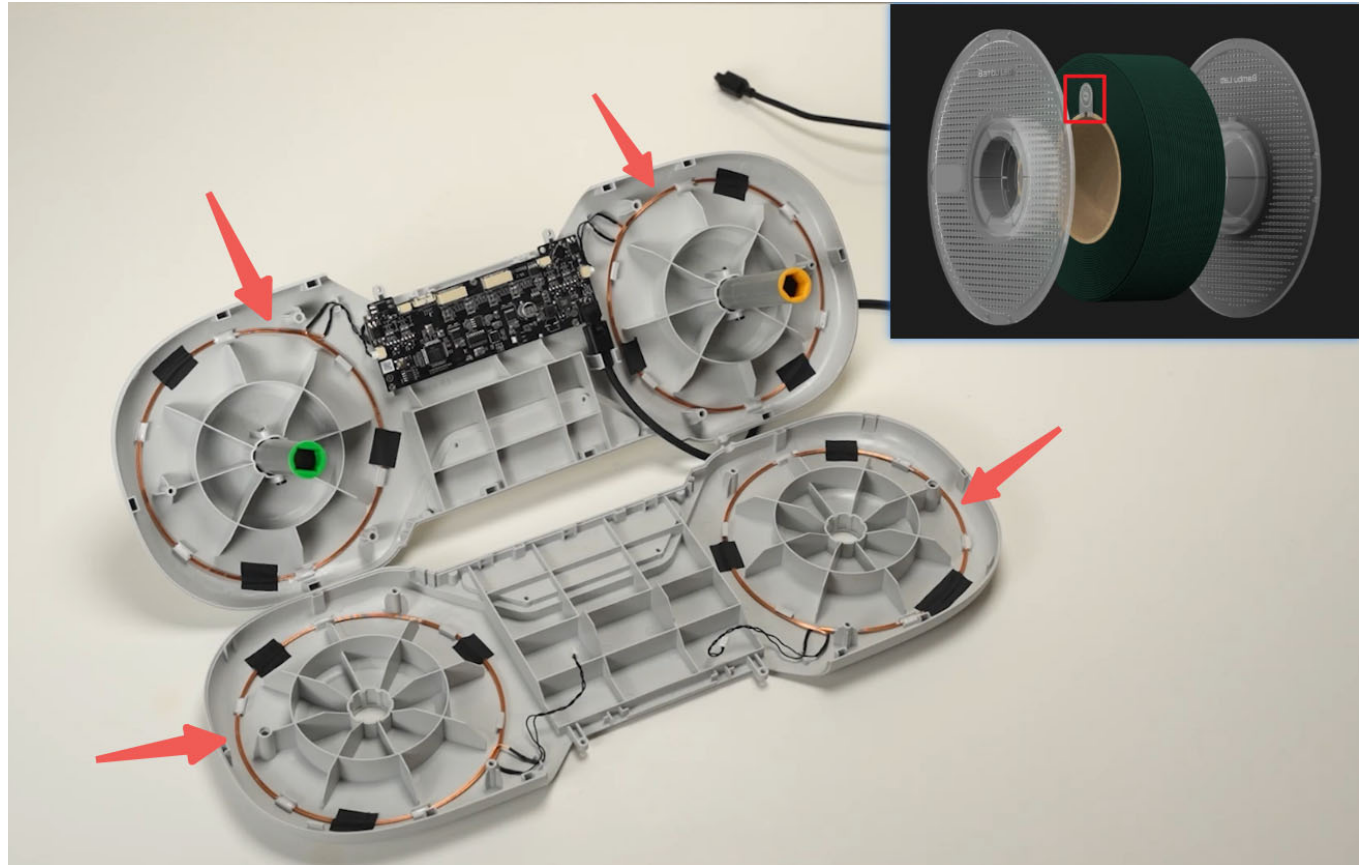


**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

Regarding the AMS Lite, see <https://wiki.bambulab.com/en/ams-lite/manual/intro-ams-lite>:

**“Reading RFID**

Each slot in AMS lite has a corresponding RFID coil. You just need to place the spool on the rotary holder of each slot and insert the filament to read its information.



RFID reading function can be set on the slicer for update on insertion/startup, or you can also manually click the icon beside each slot on the slicer for reading RFID.



**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |  |
|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |  | <div data-bbox="716 203 1654 1442"><div data-bbox="1598 219 1629 243">✕</div><div data-bbox="764 287 970 321"><b>AMS Settings</b></div><div data-bbox="764 373 806 407">✓</div><div data-bbox="823 373 1056 407"><b>Insertion update</b></div><div data-bbox="810 428 1591 524"><p>The AMS will automatically read the filament information when inserting a new Bambu Lab filament spool. This takes about 20 seconds.</p></div><div data-bbox="810 544 1600 639"><p>Note: if new filament is inserted during printing, the AMS will not automatically read any information until printing has finished.</p></div><div data-bbox="764 690 806 724">✓</div><div data-bbox="823 690 1081 724"><b>Update on startup</b></div><div data-bbox="810 743 1587 841"><p>The AMS will automatically read the information of inserted filament on start-up. It will take about 1 minute. The reading process will rotate the filament spools.</p></div><div data-bbox="764 888 806 922">✓</div><div data-bbox="823 888 1121 922"><b>AMS filament backup</b></div><div data-bbox="810 941 1581 1008"><p>AMS will continue to another spool with the same filament properties automatically when current filament runs out.</p></div><div data-bbox="774 1039 1591 1382"></div><div data-bbox="1646 1417 1667 1433">”</div></div> |  |
|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

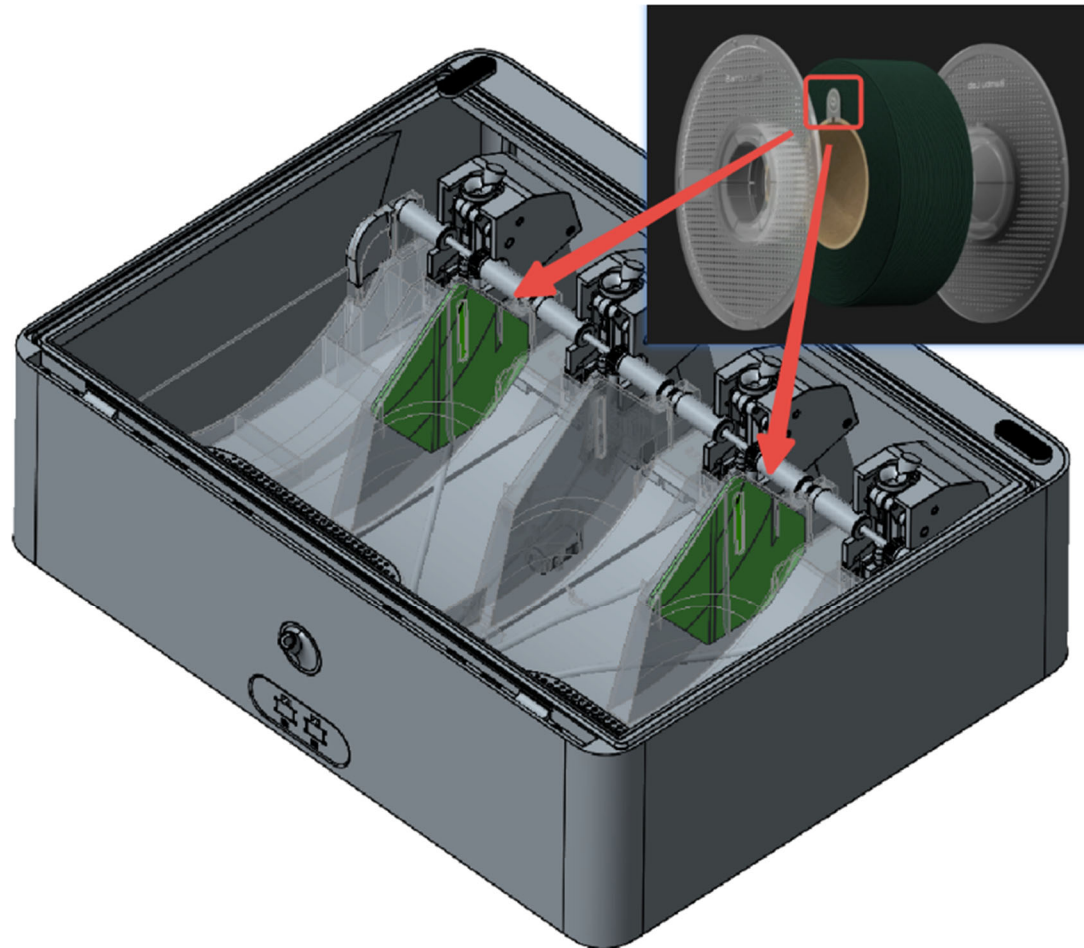
**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

3. The method of claim 1, wherein the tag sensor includes at least one of a radio frequency identification (RFID) reader, an optical scanner, a magnetic reader, and a contact point sensor.

The tag sensor of the Accused Instrumentalities includes at least one of a radio frequency identification (RFID) reader, an optical scanner, a magnetic reader, and a contact point sensor. The AMS of the Bambu 3D printers includes RFID readers:

**Reading RFID**

Bambu's official filament roll has RFID tags on both sides, and on AMS there are two RFID-reading circuit boards that can read the filament information.



## **Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

When AMS reads the RFID, it will preload first to tighten the filament roll. It then sends the filament out of AMS a section to turn the spool, allowing the circuit board to scan the RFID tag and read the RFID information.



When the filament in a slot has been sent out to AMS, or the extruder detects that there is a filament inside, the RFID reading function cannot be used. Click to read will show that AMS is busy and cannot read the filament information.

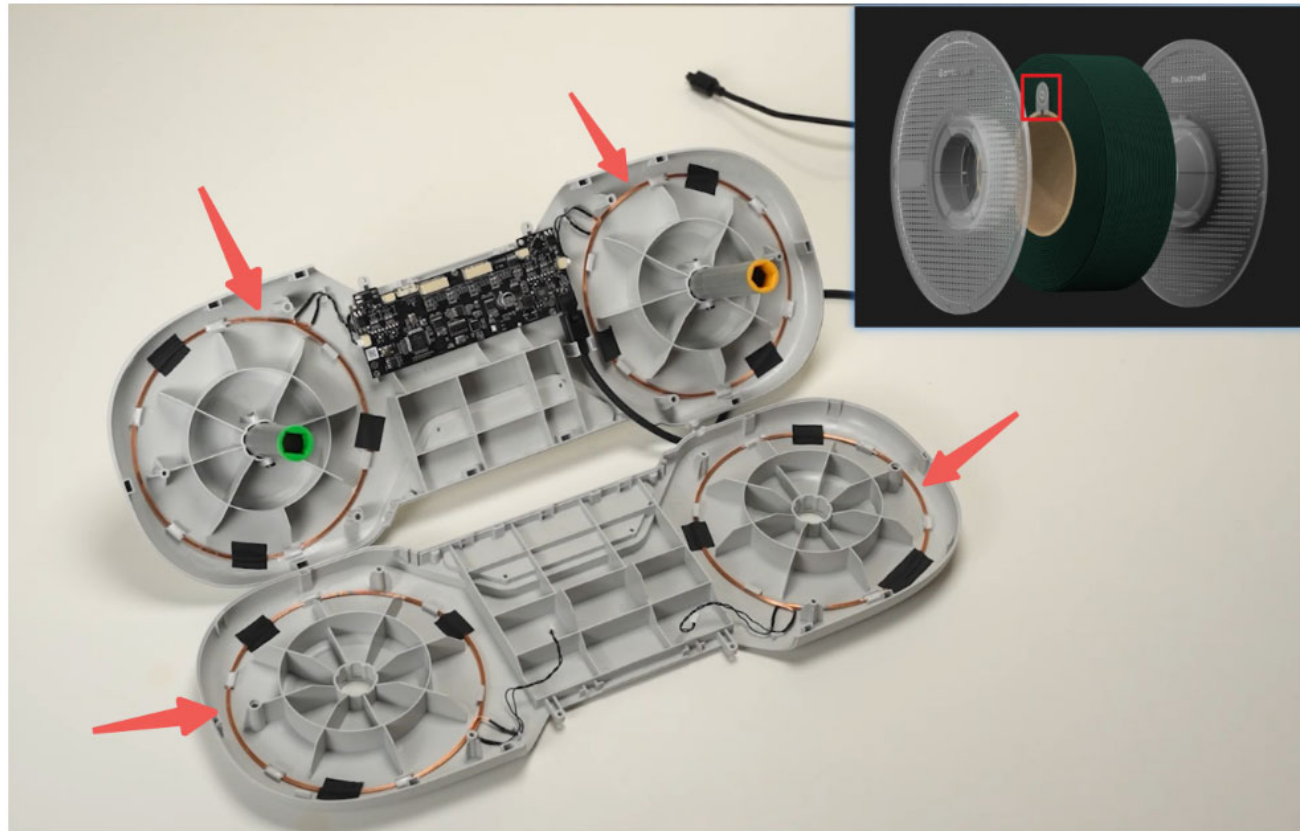
<https://wiki.bambulab.com/en/ams/manual/ams-function-introduction>

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

The AMS lite of the Bambu 3D printers includes RFID readers:

**Reading RFID**

Each slot in AMS lite has a corresponding RFID coil. You just need to place the spool on the rotary holder of each slot and insert the filament to read its information.



RFID reading function can be set on the slicer for update on insertion/startup, or you can also manually click the icon beside each slot on the slicer for reading RFID.

<https://wiki.bambulab.com/en/ams-lite/manual/intro-ams-lite>

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>4. The method of claim 1, wherein the data includes at least one of a material identification number, a build material type, a build material diameter, an extruder temperature requirement, a build material melting temperature, a build material color, a build material color lot number, a cost per unit of build material, a build material density, a build material tensile strength, a build material viscosity, a build material recycle code, and a build material expiration date.</p> | <p>The data read from the tag of the Accused Instrumentalities includes at least one of a material identification number, a build material type, a build material diameter, an extruder temperature requirement, a build material melting temperature, a build material color, a build material color lot number, a cost per unit of build material, a build material density, a build material tensile strength, a build material viscosity, a build material recycle code, and a build material expiration date.</p> <p>According to <a href="https://github.com/Bambu-Research-Group/RFID-Tag-Guide">https://github.com/Bambu-Research-Group/RFID-Tag-Guide</a>, the RFID tags used in the Bambu filament spools are MiFare tags that include blocks of data:</p> <p>MiFare tags also contain "Blocks" of data. Each block contains info about the spool, such as Material, Color, Manufacturing Date, etc. See <a href="#">Tag structure</a> section for details</p> <p>The blocks of data include the following data:</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464

| Block Overview                                                                                          |     |                                                                                           |
|---------------------------------------------------------------------------------------------------------|-----|-------------------------------------------------------------------------------------------|
| Summary of what kind of data is stored in each block. Detailed info for each block is documented below. |     |                                                                                           |
| sec                                                                                                     | blk | Data                                                                                      |
| 0                                                                                                       | 0   | <a href="#">Block 0</a> UID and Tag Manufacturer Data                                     |
| 0                                                                                                       | 1   | <a href="#">Block 1</a> Tray Info Index                                                   |
| 0                                                                                                       | 2   | <a href="#">Block 2</a> Filament Type                                                     |
| 0                                                                                                       | 3   | <a href="#">Block 3</a> MIFARE encryption keys, Unrelated to BambuLab                     |
| 1                                                                                                       | 0   | <a href="#">Block 4</a> Detailed Filament Type                                            |
| 1                                                                                                       | 1   | <a href="#">Block 5</a> Spool Weight, Color Code                                          |
| 1                                                                                                       | 2   | <a href="#">Block 6</a> Min/Max Hotend, Bed Temp, Bed Temp Type, Drying Time, Drying Temp |
| 1                                                                                                       | 3   | <a href="#">Block 7</a> MIFARE encryption keys, Unrelated to BambuLab                     |
| 2                                                                                                       | 0   | <a href="#">Block 8</a> X Cam Info                                                        |
| 2                                                                                                       | 1   | <a href="#">Block 9</a> Tray UID                                                          |
| 2                                                                                                       | 2   | <a href="#">Block 10</a> Unknown                                                          |
| 2                                                                                                       | 3   | <a href="#">Block 11</a> MIFARE encryption keys, Unrelated to BambuLab                    |
| 3                                                                                                       | 0   | <a href="#">Block 12</a> Production Date/Time                                             |

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

Block 2

Example Data: AA AA AA AA AA AA AA AA AA AA AA AA AA AA AA

| position | length | type   | Description   |
|----------|--------|--------|---------------|
| 0 (AA)   | 16     | string | Filament Type |



**Block 4**

Example Data: AA AA AA AA AA AA AA AA AA AA AA AA AA AA AA AA

| position | length | type   | description            |
|----------|--------|--------|------------------------|
| 0 (AA)   | 16     | string | Detailed Filament Type |

Known Values:

- PLA Basic
- PLA Tough
- Support for PLA
- PLA-CF
- PETG Basic

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|  |                                                         |        |                                           |
|--|---------------------------------------------------------|--------|-------------------------------------------|
|  | <b>Block 5</b>                                          |        |                                           |
|  | Example Data: AA AA AA AA BB BB _ _ CC CC CC CC _ _ _ _ |        |                                           |
|  | position                                                | length | type                                      |
|  | 0 (AA)                                                  | 4      | RGBA                                      |
|  | 4 (BB)                                                  | 2      | uint16 (LE)                               |
|  | 8 (CC)                                                  | 8      | float (LE)                                |
|  |                                                         |        | Description                               |
|  |                                                         |        | Color in hex RBGA                         |
|  |                                                         |        | Spool Weight in grams ( E8 03 --> 1000 g) |
|  |                                                         |        | Filament Diameter in millimeters          |

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

## Block 6

Example Data: AA AA BB BB CC CC DD DD EE EE FF FF \_ \_ \_ \_

| position | length | type        | Description                          |
|----------|--------|-------------|--------------------------------------|
| 0 (AA)   | 2      | uint16 (LE) | Drying Temperature in °C             |
| 2 (BB)   | 2      | uint16 (LE) | Drying time in hours                 |
| 4 (CC)   | 4      | uint16 (LE) | Bed Temperature Type (types unknown) |
| 6 (DD)   | 2      | uint16 (LE) | Bed Temperature in °C                |
| 8 (EE)   | 2      | uint16 (LE) | Min Temperature for Hotend in °C     |
| 10 (FF)  | 2      | uint16 (LE) | Max Temperature for Hotend in °C     |

<https://github.com/Bambu-Research-Group/RFID-Tag-Guide>

As annotated above, these blocks of data include UID (material identification number), filament type (build material type and detailed build material type), filament diameter (build material diameter), min/max hot end (extruder) temperature (an extruder temperature requirement), drying temperature (a build material melting temperature), and filament color (build material color).

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

5. The method of claim 1, wherein the supply includes at least one of a cartridge, a spool, a filament, a number of pellets, and a liquid.

The supply of a build material includes at least one of a cartridge, a spool, a filament, a number of pellets, and a liquid.

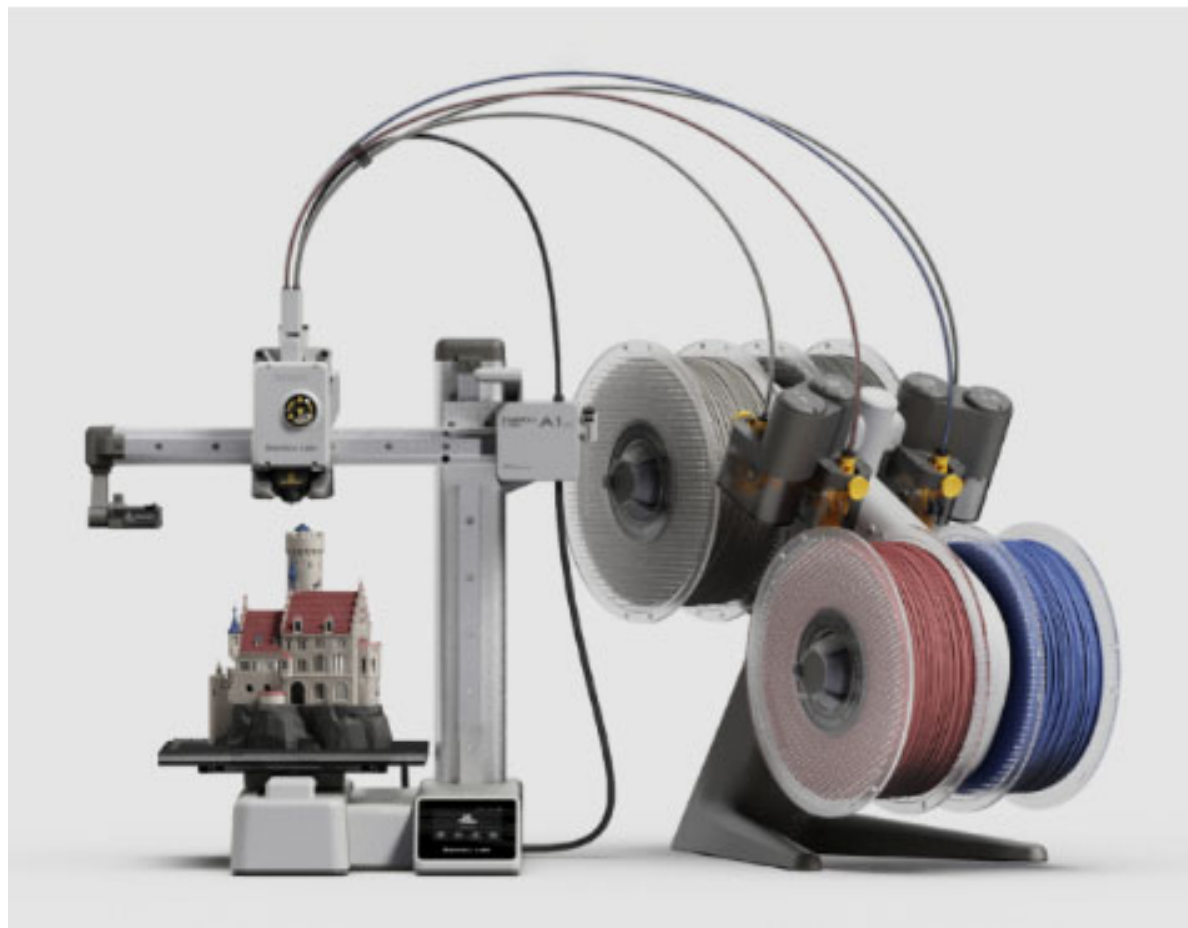
As discussed above with respect to claim 1 and as shown below, the supply of build material received by the AMS of the Bambu 3D printers is filament:



<https://wiki.bambulab.com/en/ams/manual/ams-function-introduction>

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

As discussed above with respect to claim 1 and as shown below, the supply of build material received by the AMS Lite of the Bambu 3D printers is filament:



<https://wiki.bambulab.com/en/ams-lite/manual/intro-ams-lite>

## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464

6. The method of claim 1, wherein the tag includes a radio frequency identification (RFID) tag, and the RFID tag is at least one of a passive RFID tag and an active RFID tag.

The tag of the Accused Instrumentalities includes a radio frequency identification (RFID) tag, and the RFID tag is at least one of a passive RFID tag and an active RFID tag.

The Bambu Lab filaments include a RFID tag coupled to the filament spool that is at least one of a passive RFID tag and an active RFID tag:

### **RFID system**

The **RFID System** can automatically identify the RFID tag on the Bambulab filament spools, which can then sync the filament information to the Bambulab slicer (Bambu Studio).





**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

<https://wiki.bambulab.com/en/x1/manual/intro-ams>

## **Automatic Filament Identification**

Bambu Lab filaments use RFID which is read by the AMS to automatically identify and apply the best settings for your material.

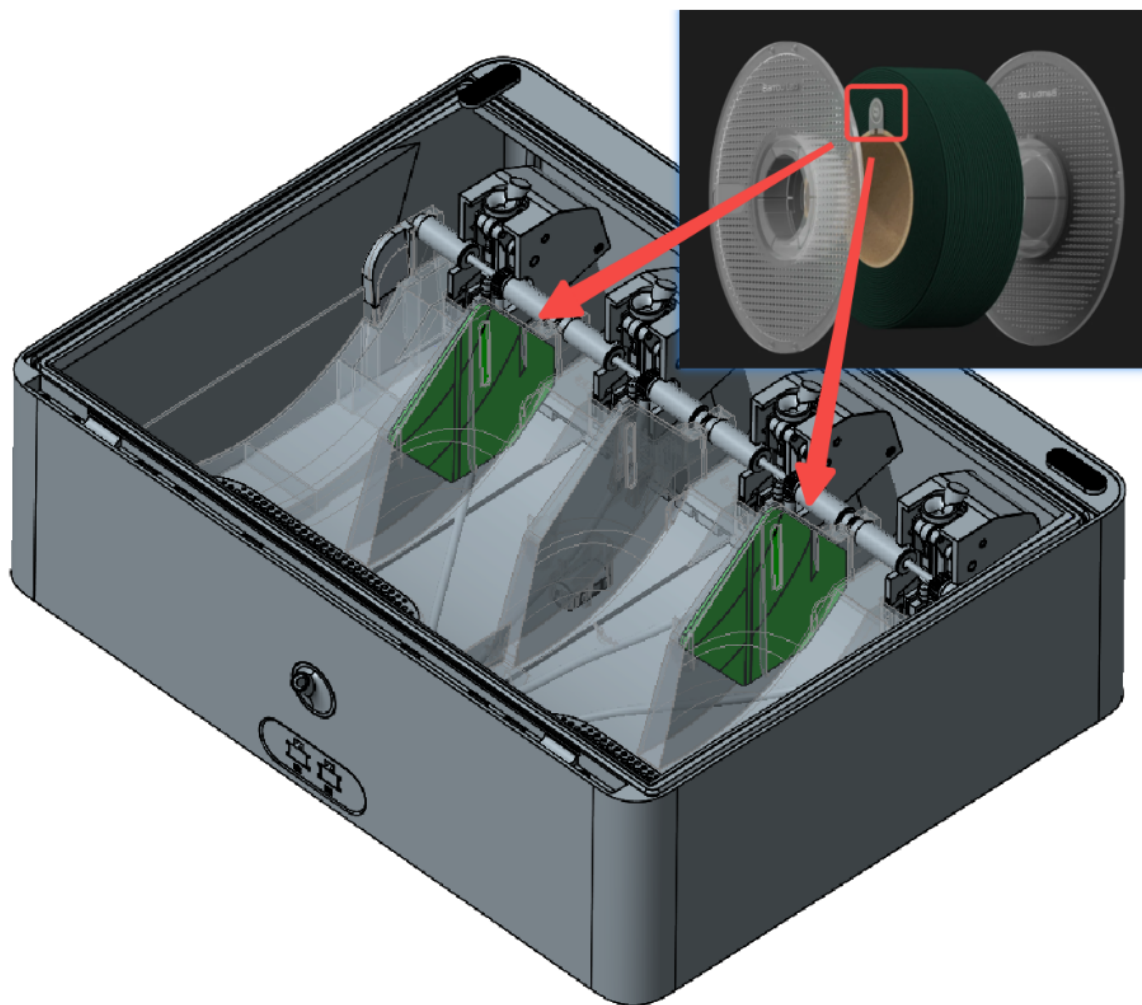
The RFID tag is synchronized automatically to Bambu Studio.

<https://store.bambulab.com/products/ams-multicolor-printing>



**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

Bambu's official filament roll has RFID tags on both sides, and on AMS there are two RFID-reading circuit boards that can read the filament information.

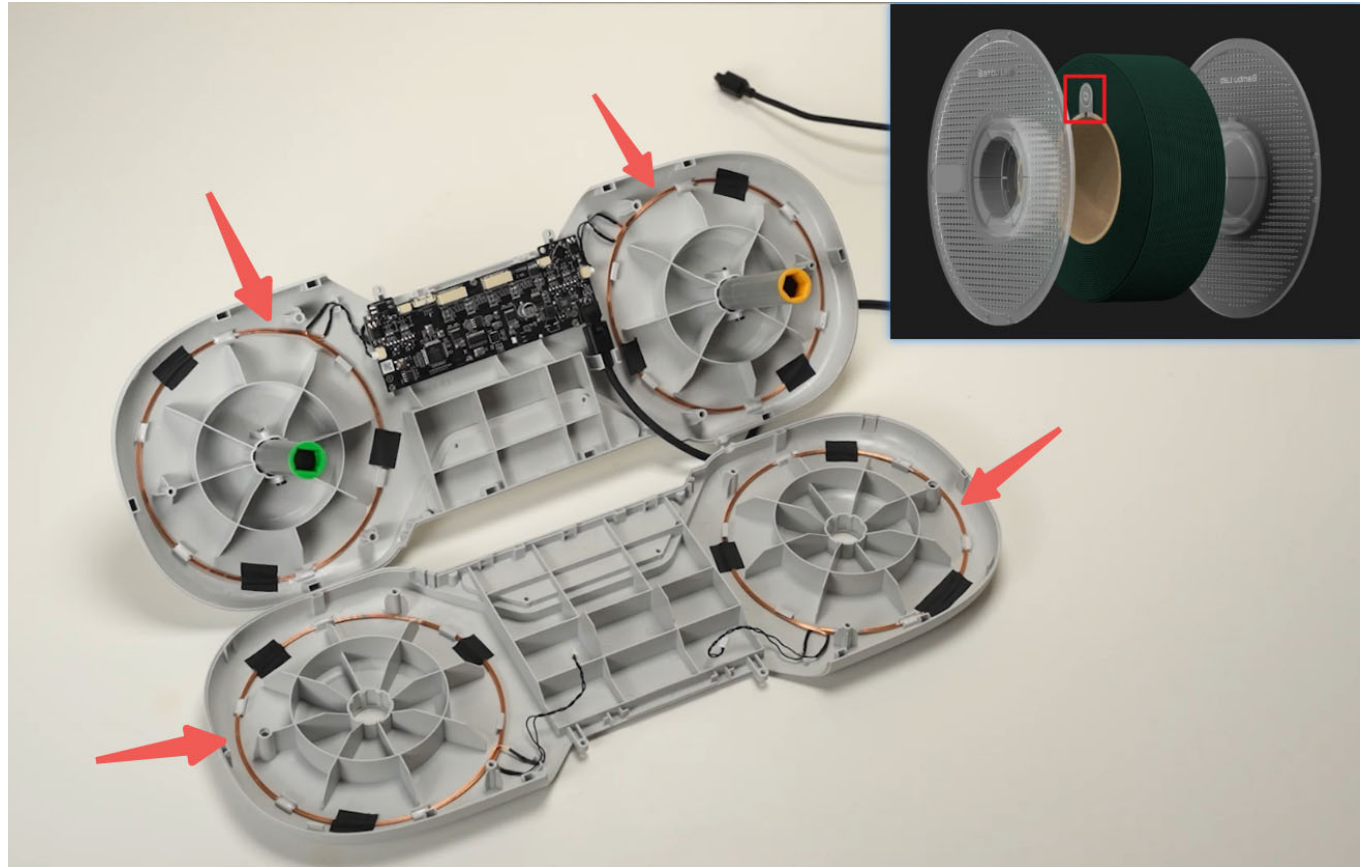


<https://wiki.bambulab.com/en/x1/manual/intro-ams>

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

**“Reading RFID**

Each slot in AMS lite has a corresponding RFID coil. You just need to place the spool on the rotary holder of each slot and insert the filament to read its information.



RFID reading function can be set on the slicer for update on insertion/startup, or you can also manually click the icon beside each slot on the slicer for reading RFID.

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |  |
|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |  | <div data-bbox="716 201 1654 1446"><div data-bbox="762 289 970 326"><b>AMS Settings</b></div><div data-bbox="762 375 806 412"></div><div data-bbox="819 375 1056 412"><b>Insertion update</b></div><div data-bbox="806 430 1596 529"><p>The AMS will automatically read the filament information when inserting a new Bambu Lab filament spool. This takes about 20 seconds.</p><p>Note: if new filament is inserted during printing, the AMS will not automatically read any information until printing has finished.</p></div><div data-bbox="762 691 806 729"></div><div data-bbox="819 691 1083 729"><b>Update on startup</b></div><div data-bbox="806 743 1591 846"><p>The AMS will automatically read the information of inserted filament on start-up. It will take about 1 minute. The reading process will rotate the filament spools.</p></div><div data-bbox="762 889 806 927"></div><div data-bbox="819 889 1123 927"><b>AMS filament backup</b></div><div data-bbox="806 941 1583 1011"><p>AMS will continue to another spool with the same filament properties automatically when current filament runs out.</p></div><div data-bbox="774 1040 1591 1382"></div></div> <div data-bbox="1638 1416 1659 1433" data-label="Text"><p>”</p></div> |  |
|--|--|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|                                                                                                                                       |
|---------------------------------------------------------------------------------------------------------------------------------------|
| <a href="https://wiki.bambulab.com/en/ams-lite/manual/intro-ams-lite">https://wiki.bambulab.com/en/ams-lite/manual/intro-ams-lite</a> |
|---------------------------------------------------------------------------------------------------------------------------------------|

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

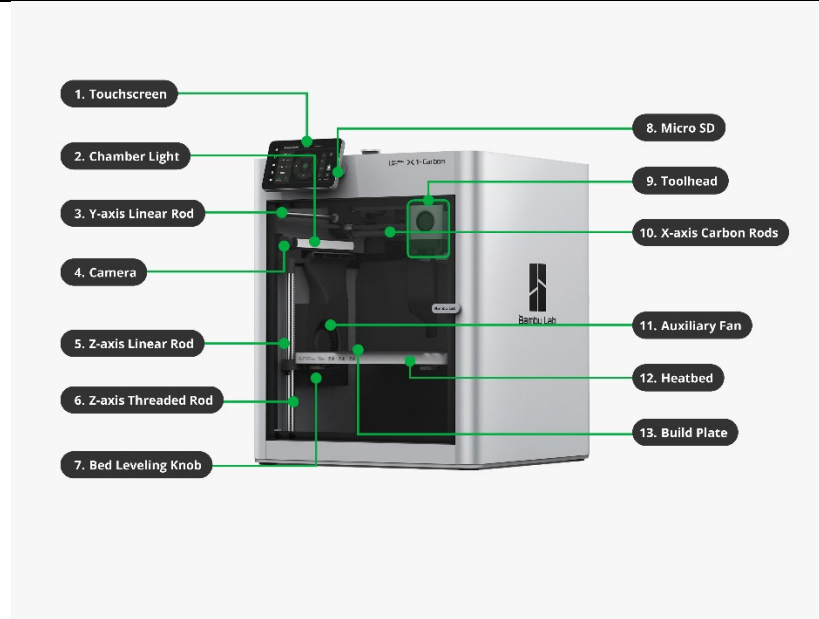
12. A system, comprising:  
a three-dimensional printer;

To the extent the preamble of the claim is limiting, the Accused Instrumentalities each include a three-dimensional printer.

For example, Bambu Lab provides systems that include 3D printers, such as the X1C, X1E, and P1S, P1P, A1 and A1 mini. See, e.g., <https://bambulab.com/en/x1>:



## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464



<https://wiki.bambulab.com/en/x1>

### **“How does X1 work?”**

The X1 3D printer is a machine that uses plastic filament as the material for creating 3D objects.

Most of the time, the printable objects are files with the .stl extension that hold the 3D model which needs to be processed before it's ready to be printed with a piece of software called a slicer.

The slicer, in our case the Bambu Lab Studio, takes that .stl file and slices it into layers which are then printed by the X1. All these slices are then converted into code, a type of language which tells the machine how to move its axis to print the model.

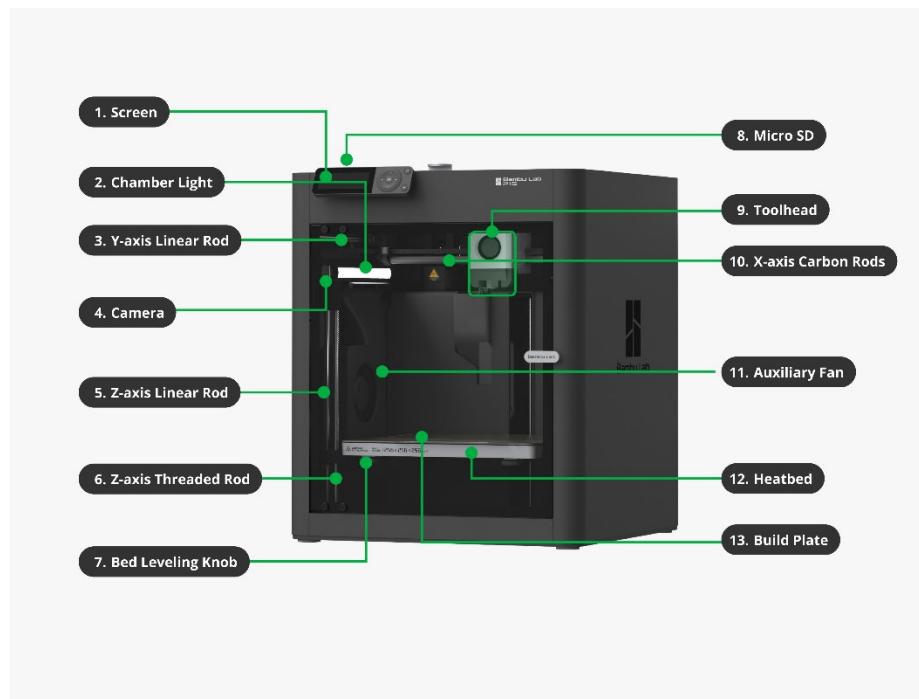
Besides the movement, the slicer is also able to integrate various other settings inside the generated file, like the temperatures of the filament, printing speeds, and generate supports for some sections of the print.”

## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464

<https://wiki.bambulab.com/en/x1/manual/intro-x1>

The Bambu Lab X1C and X1E are largely the same; the X1E includes several upgrades over the X1C, including an active heating chamber, an ethernet socket, and certain air purification filters.

<https://bambulab.com/en/x1e>. The X1E is also better for certain filament types and has a higher max temperature for the toolhead. *Id.* Accordingly, references to components or functionality of either the X1C or X1E in this chart—other than the heating chamber, ethernet socket, and certain air purification filters that are only in the X1E—apply to both printers.



<https://wiki.bambulab.com/en/p1>

““How does the P1 series work?”



**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

The Bambu Lab P1 inherits the X1 series' renowned kinematics and motion control technology and the wealth of sensors that ensure its reliability. It can connect the automatic material system (AMS) for multi-color printing. Great for beginners, professionals, or others who enjoy the fun of being creative, the P1P has been designed for easy setup and use in minutes. Additionally, it allows upgrading and customizing hardware with mod-friendly features for people to enjoy the fun of making their one-of-a-kind 3D printer.”

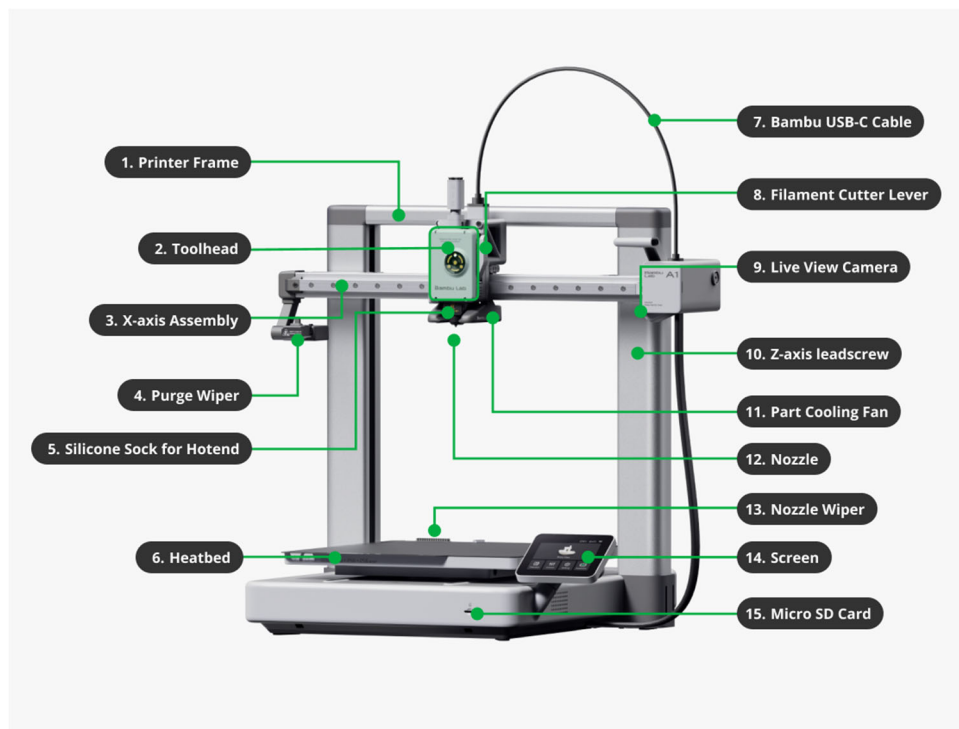
<https://wiki.bambulab.com/en/p1/manual/intro-p1p>



[https://us.store.bambulab.com/products/p1p?gad\\_source=1&gclid=Cj0KCQiAIsy5BhDeARIsABRc6Zui1LA-KILBpMwww10C9BEnkbXOizh2T2VXHke9YId\\_ufwLMvZND0AaAjzfEALw\\_wcB](https://us.store.bambulab.com/products/p1p?gad_source=1&gclid=Cj0KCQiAIsy5BhDeARIsABRc6Zui1LA-KILBpMwww10C9BEnkbXOizh2T2VXHke9YId_ufwLMvZND0AaAjzfEALw_wcB)

## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464

The Bambu Lab P1S and P1P are largely the same; the P1S includes several upgrades over the P1P, including an enclosure, air filter, and cooling fans. See <https://us.store.bambulab.com/collections/3d-printer/products/p1s> (comparing P1P to P1S). The P1P is also ideal for certain filament types. *Id.* Accordingly, references to components or functionality of either the P1S or P1P in this chart—other than the enclosure, air filter, and cooling fans that are only in the P1S—apply to both printers.



<https://wiki.bambulab.com/en/a1>

### **“How does the A1 work?”**

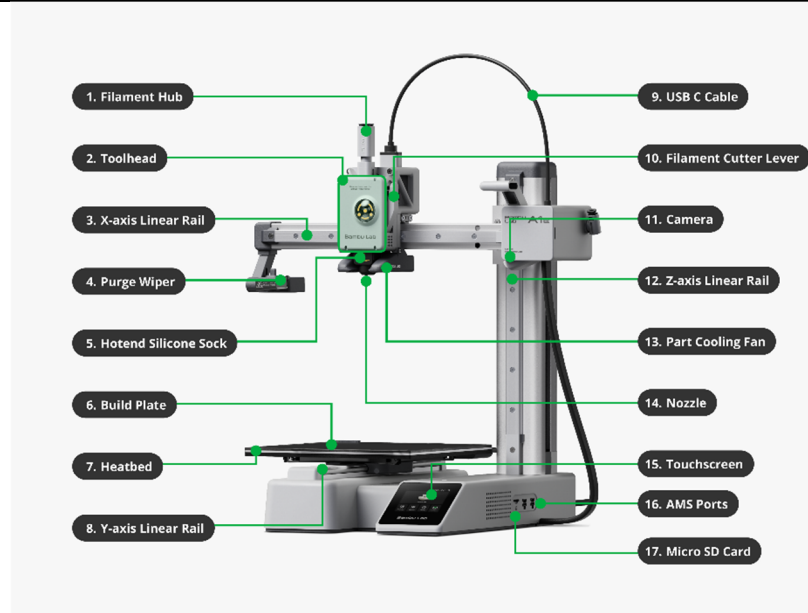
The A1 3D printer is a machine that uses plastic filament to create 3D objects. It can transform digital models into physical objects. The working principle of the A1 typically involves the following steps:

#### **Creation or acquisition of a digital model**

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>First, generate a 3D model or obtain an existing digital model using computer-aided design software, online resources, or other means.</p> <p><b>Slicing</b><br/>Next, Bambu Studio slices the digital model into multiple thin layers. Each layer's information is converted into "G-code," a language understood by the printer. The G-code provides instructions to the printer regarding movement paths and speeds of the different axes during the printing process.</p> <p><b>Preparing the printer</b><br/>Before initiating the printing process, the printer needs to be prepared. This involves loading the printing filament, positioning the build plate, and calibrating the printer's parameters to ensure optimal print quality.</p> <p><b>Printing</b><br/>Once all preparations are complete, the A1 printer gradually constructs the object layer by layer on the print platform.”<br/><a href="https://wiki.bambulab.com/en/a1/manual/intro-a1">https://wiki.bambulab.com/en/a1/manual/intro-a1</a></p> |
|--|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464



<https://wiki.bambulab.com/en/a1-mini>

### **“How does the A1 mini work?”**

The A1 mini 3D printer is a machine that uses plastic filament to create 3D objects. It can transform digital models into physical objects. The working principle of the A1 mini typically involves the following steps:

#### **Creation or acquisition of a digital model:**

First, you need to create a 3D model or acquire an existing digital model. This can be done through computer-aided design software, online resources, or other sources.

#### **Slicing**

Next, Bambu Studio slices the digital model into multiple thin layers. The information for each layer is automatically converted into a language that the printer can understand, known as "G-code." This code instructs the printer on the movement paths and speeds of the various axes during the printing process.

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

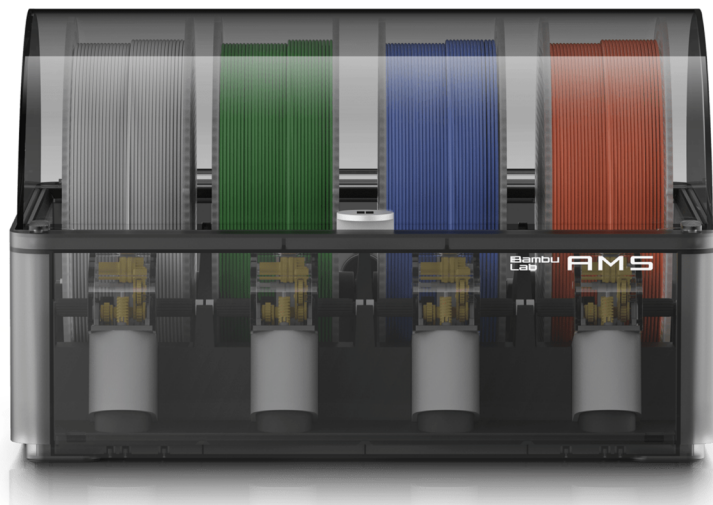
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p><b>Preparing the printer</b><br/>Before starting the printing process, you must prepare the printer. This includes loading the printing filament, placing the build plate, and calibrating the printer's parameters to ensure print quality.</p> <p><b>Printing</b><br/>Once everything is prepared, the A1 mini gradually prints layer by layer onto the print platform, gradually building the object.”<br/><a href="https://wiki.bambulab.com/en/a1-mini/manual/intro-a1-mini">https://wiki.bambulab.com/en/a1-mini/manual/intro-a1-mini</a></p> |
|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

a coupling adapted to receive a supply of a build material;

The Accused Instrumentalities each include a coupling adapted to receive a supply of a build material.

Bambu Lab sells an Automatic Material System (AMS) for use with its X1 and P1 series 3D printers, which includes four filament slots (couplings) that receive spools of filament. See, e.g., <https://bambulab.com/en/x1>:



Color, the ultimate expression of emotions, is brought to you by Bambu Lab's Automatic Material System (AMS). You can now enjoy printing freely in multiple colors and materials, a 3D Printing Maestro.

      
Airtight Humidity Sensor Parallel 4\*4 2-Stage Feeding Filament Buffer

See also <https://wiki.bambulab.com/en/x1/manual/connect-ams> (explaining how to connect the AMS to the X1 series).

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

See also <https://wiki.bambulab.com/en/p1/manual/connect-ams> (explaining how to connect the AMS to the P1 series):

“Connect AMS to P1 series

How to connect the AMS (automated material system) to the P1P

The Bambu Lab P1 series inherits the X1 series' renowned kinematics and motion control technology, including AMS compatibility.



After connecting the AMS to the P1P, controlling and operating the AMS on Bambu Studio and Bambu Handy is essentially the same as on the X1. This article simply covers the instructions for connecting AMS to P1P; for AMS control and operation, please see the wiki videos and text tutorials of the X1 series listed below.”

Also, see <https://us.store.bambulab.com/products/ams-lite> for the AMS Lite used with the A1 and A1 mini



**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

printers, which has four spindles (couplings) that receive spools of filament:



\*The filaments in the picture are sold seperately

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a tag sensor communicatively associated with the three-dimensional printer, the tag sensor configured to read data from a data tag associated with the supply of the build material, the data including at least one property of the build material;</p> | <p>The Accused Instrumentalities each include a tag sensor communicatively associated with the three-dimensional printer, in which the tag sensor is configured to read data from a data tag associated with the supply of the build material, in which the data includes at least one property of the build material.</p> <p>There are RFID tag sensors in the AMS (and AMS Lite), and Bambu Lab filament spools include RFID tags on both sides of the filament roll. When a tagged spool is placed in a filament slot of the AMS, a tag sensor in the AMS reads the data stored on the tag. See, e.g., <a href="https://us.store.bambulab.com/products/ams-rfid-board">https://us.store.bambulab.com/products/ams-rfid-board</a>:</p> |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464

AMS RFID Board | Bambu Lab U

us.store.bambulab.com/products/ams-rfid-board

Bambu Lab

Store

Printers

Filament

Maker's Supply

Accessories

Spare Parts

Support



The image shows a black, rectangular AMS RFID Board. It has a white label on the left side with the text "AMS01-01", "1202", "120418 B01", and "No. 42001-0". The board has various electronic components, including a microcontroller, resistors, and a large rectangular antenna area at the bottom.

### AMS RFID Board

\$9.99 USD

 [Pay in 4 interest-free payments on purchases of \\$30-\\$1,500. Learn more](#)

Shop now. Pay with Klarna. [Learn more](#) 

#### Compatibility

AMS

#### Quantity:

- 1 +

#### Order Info

- Order will be shipped out from USA warehouse in 1-3 business days once being processed.
- Free shipping on orders over \$49.
- Free shipping on orders over \$199 to remote areas including Alaska, Hawaii, Puerto Rico, Guam and Northern Mariana Islands.

#### Overview

The RFID sensor is used to identify Bambu Lab filament from the spool and set printing parameters accordingly.

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

Also, see <https://wiki.bambulab.com/en/x1/manual/intro-ams> regarding the AMS:

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**Bambulab AMS RFID readers and sniffing**

The Bambulab AMS RFID readers are located between slot 1&2 and slot 3&4



**“RFID system**

The **RFID System** can automatically identify the RFID tag on the Bambulab filament spools, which can then sync the filament information to the Bambulab slicer (Bambu Studio).”

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**



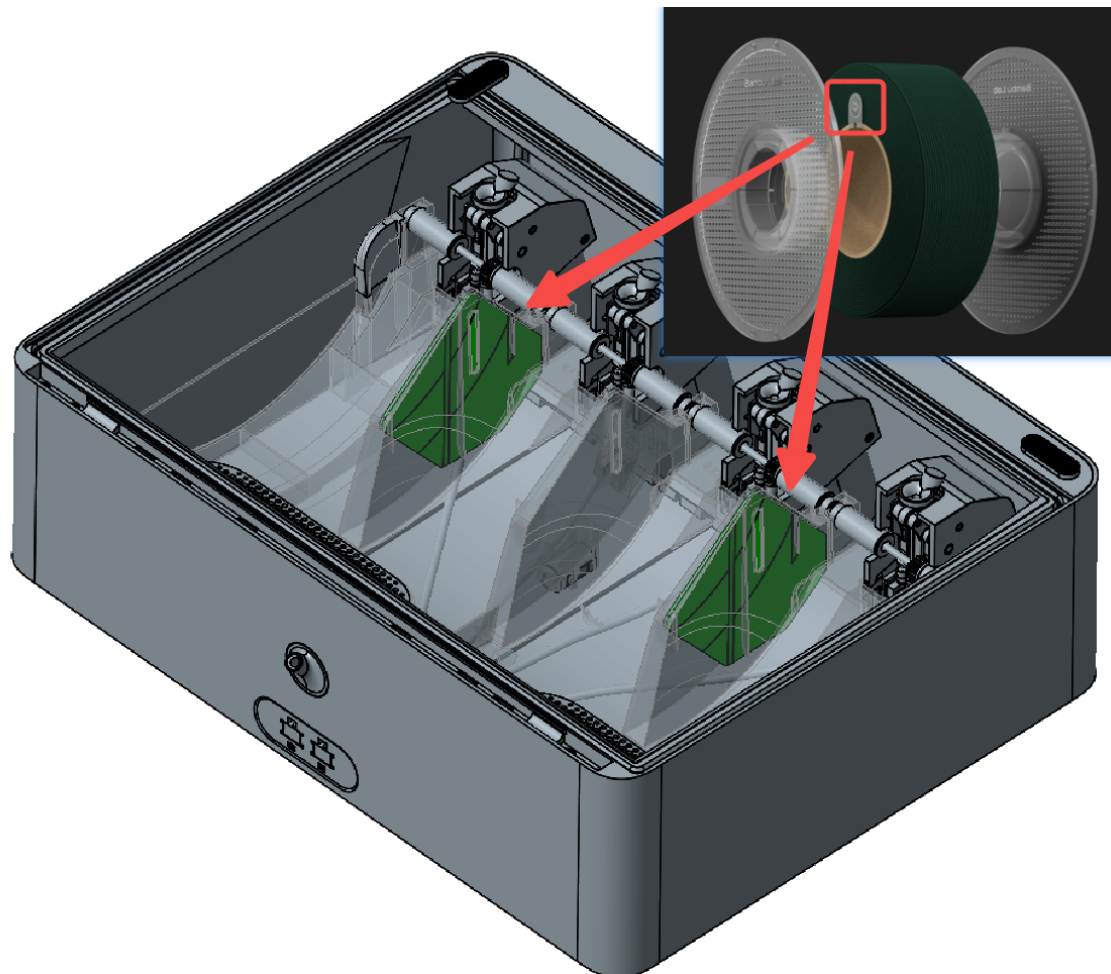


**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

Also see <https://wiki.bambulab.com/en/ams/manual/ams-function-introduction>:

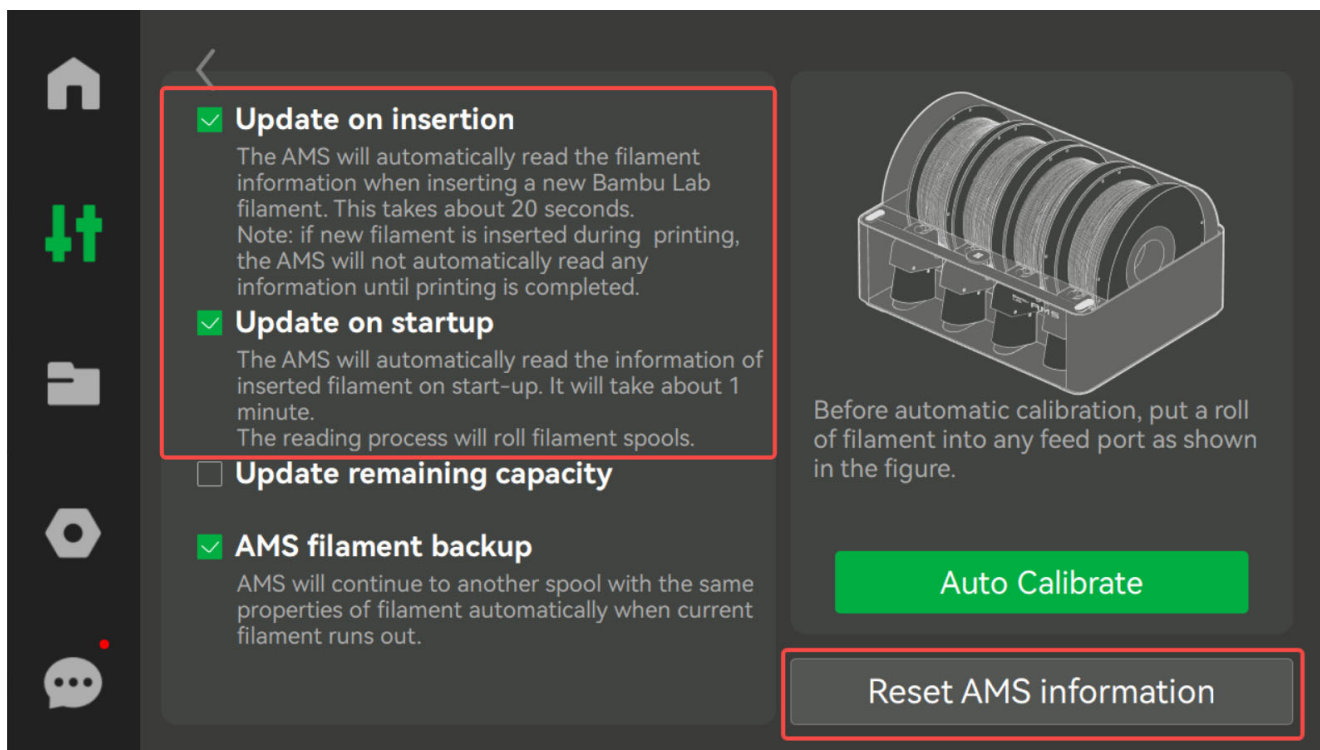
**“Reading RFID**

Bambu's official filament roll has RFID tags on both sides, and on AMS there are two RFID-reading circuit boards that can read the filament information.



## Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464

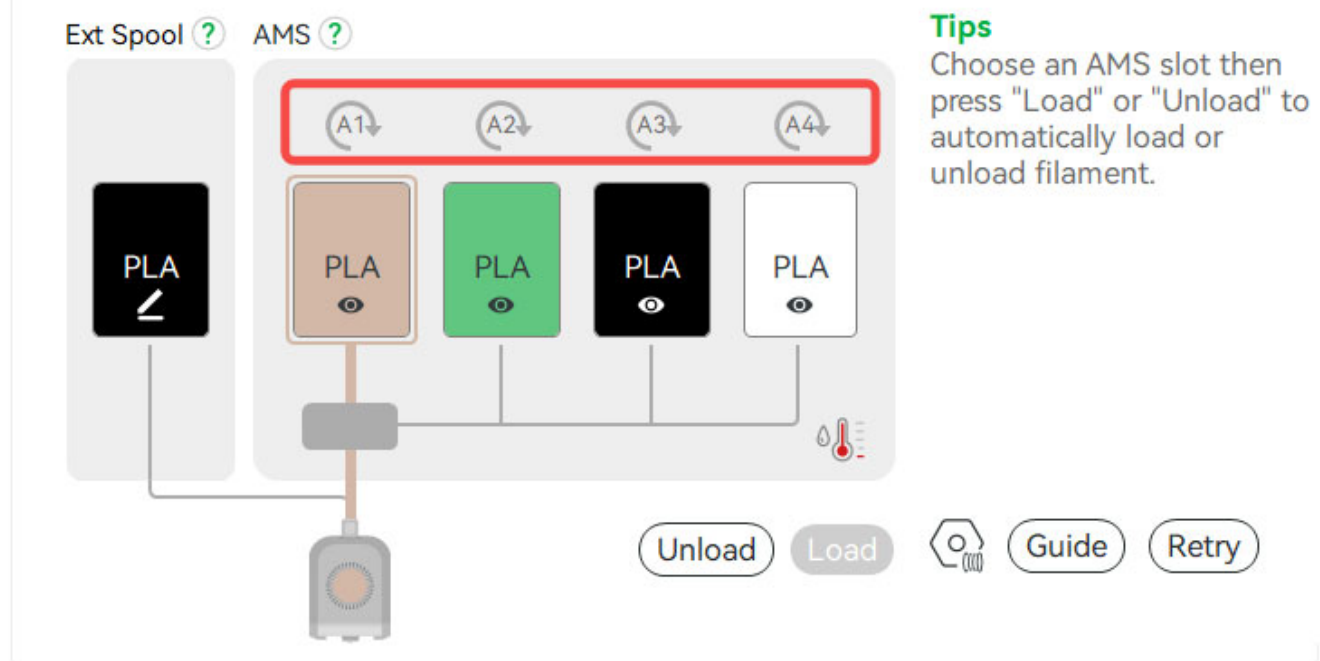
RFID reading function can be set on the screen for updates on insertion/startup. If “Update on Insertion” is enabled, AMS starts to read the filament RFID after pre-loading. Similarly, with "Update on startup" enabled, after each restart of the printer, it will also start reading the RFID of each slot filament in turn.



You can also manually click the icon above each slot on the screen/slicer for RFID reading.



**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**



**Click to read RFID**

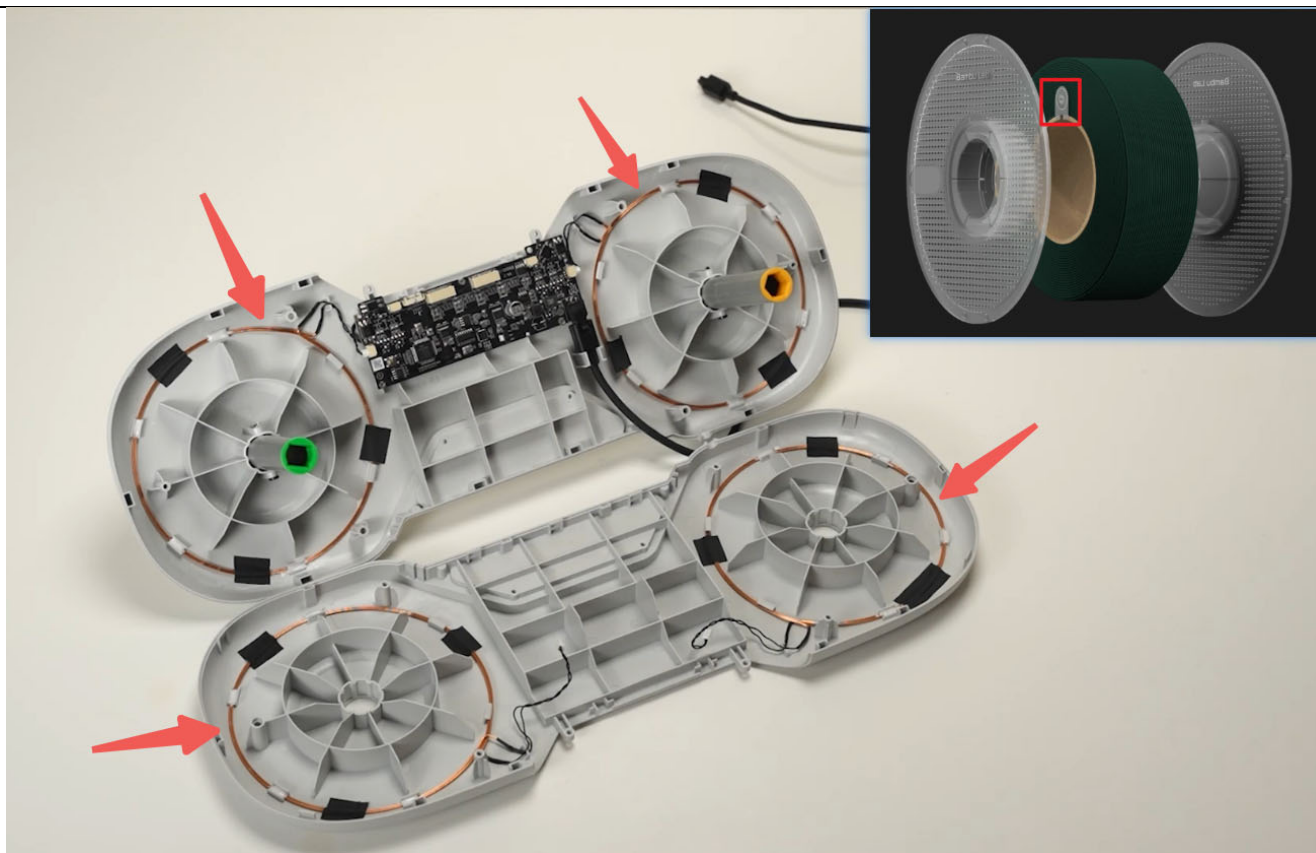
When AMS reads the RFID, it will preload first to tighten the filament roll. It then sends the filament out of AMS a section to turn the spool, allowing the circuit board to scan the RFID tag and read the RFID information.”

Regarding the AMS Lite, see <https://wiki.bambulab.com/en/ams-lite/manual/intro-ams-lite>:

**“Reading RFID**

Each slot in AMS lite has a corresponding RFID coil. You just need to place the spool on the rotary holder of each slot and insert the filament to read its information.

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RFID reading function can be set on the slicer for update on insertion/startup, or you can also manually click the icon beside each slot on the slicer for reading RFID.

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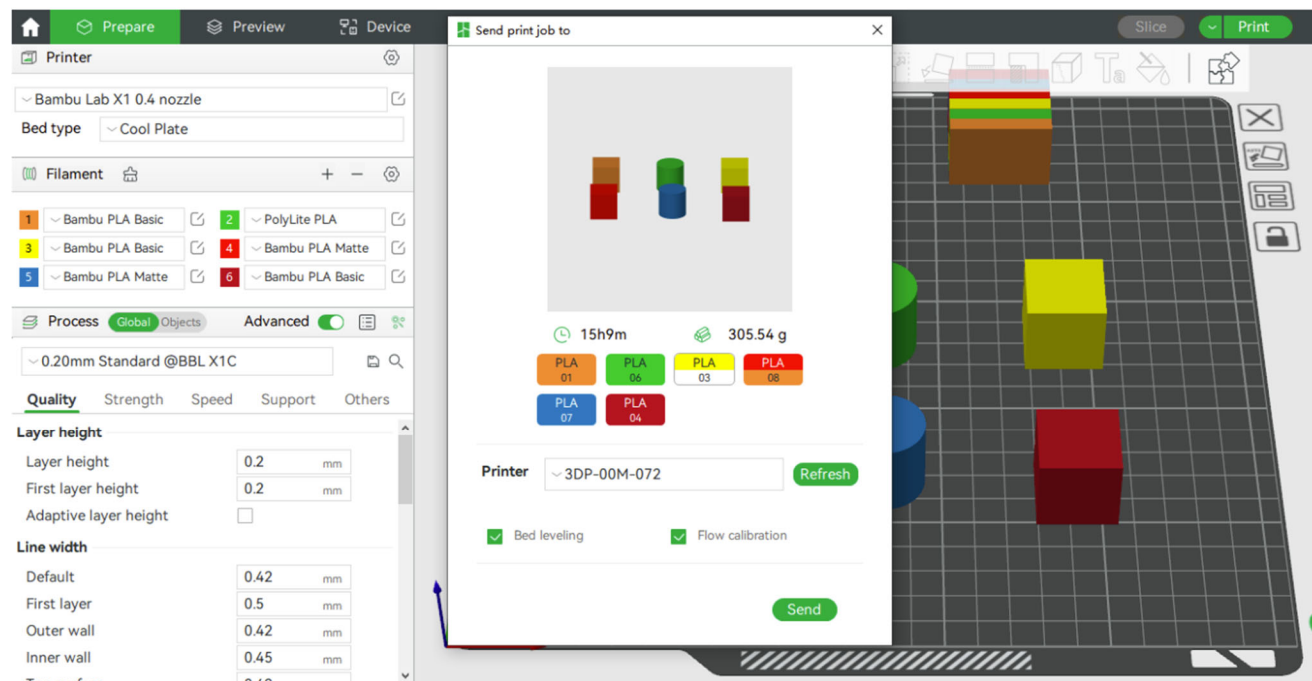
|  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |  |
|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |  | <div data-bbox="735 201 1633 1398"><div data-bbox="1585 219 1612 243">✕</div><div data-bbox="781 284 978 319"><b>AMS Settings</b></div><div data-bbox="781 370 823 406"><input checked="" type="checkbox"/></div><div data-bbox="835 370 1062 402"><b>Insertion update</b></div><div data-bbox="825 422 1577 516"><p>The AMS will automatically read the filament information when inserting a new Bambu Lab filament spool. This takes about 20 seconds.</p></div><div data-bbox="825 532 1585 626"><p>Note: if new filament is inserted during printing, the AMS will not automatically read any information until printing has finished.</p></div><div data-bbox="781 673 823 709"><input checked="" type="checkbox"/></div><div data-bbox="835 673 1085 706"><b>Update on startup</b></div><div data-bbox="825 724 1575 820"><p>The AMS will automatically read the information of inserted filament on start-up. It will take about 1 minute. The reading process will rotate the filament spools.</p></div><div data-bbox="781 865 823 901"><input checked="" type="checkbox"/></div><div data-bbox="835 865 1125 898"><b>AMS filament backup</b></div><div data-bbox="825 915 1566 979"><p>AMS will continue to another spool with the same filament properties automatically when current filament runs out.</p></div><div data-bbox="791 1008 1575 1336"></div><div data-bbox="1627 1372 1648 1388">”</div></div> |  |
|--|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|

## **Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

The data from the tag is provided to Bambu Studio, which is coupled to the printer via a network connection. The data includes various properties of the build material, including the type of the build material. See <https://wiki.bambulab.com/en/ams/manual/ams-function-introduction>:

### **Automatic mapping function**

When you send a multi-color print task in the slicer, the model is automatically matched to the closest color filament in the AMS slots. You can also customize the filaments in the window.



### **“Load filaments to AMS and configure filament information**

Before starting multi-color printing, it is necessary to insert the (AMS) with the filament and set up the filament information. If you are using an official Bambulab filament, the AMS will automatically detect the filament type and color through RFID technology. However, if you are using a third-party filament, you will need to manually configure the relevant information. For details, please refer to [AMS setup and loading filament.](#)”

<https://wiki.bambulab.com/en/x1/manual/multi-color-printing>

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Also see <https://github.com/Bambu-Research-Group/RFID-Tag-Guide>:

Summary of what kind of data is stored in each block. Detailed info for each block is documented be

| sec | blk | Data                                                                                      |
|-----|-----|-------------------------------------------------------------------------------------------|
| 0   | 0   | <a href="#">Block 0</a> UID and Tag Manufacturer Data                                     |
| 0   | 1   | <a href="#">Block 1</a> Tray Info Index                                                   |
| 0   | 2   | <a href="#">Block 2</a> Filament Type                                                     |
| 0   | 3   | <a href="#">Block 3</a> MIFARE encryption keys, Unrelated to BambuLab                     |
| 1   | 0   | <a href="#">Block 4</a> Detailed Filament Type                                            |
| 1   | 1   | <a href="#">Block 5</a> Spool Weight, Color Code                                          |
| 1   | 2   | <a href="#">Block 6</a> Min/Max Hotend, Bed Temp, Bed Temp Type, Drying Time, Drying Temp |

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**Block 6**

Example Data: AA AA BB BB CC CC DD DD EE EE FF FF \_\_ \_\_ \_\_ \_\_

| position | length | type        | Description                                   |
|----------|--------|-------------|-----------------------------------------------|
| 0 (AA)   | 2      | uint16 (LE) | Drying Temperature in °C                      |
| 2 (BB)   | 2      | uint16 (LE) | Drying time in hours                          |
| 4 (CC)   | 4      | uint16 (LE) | Bed Temperature Type ( <b>types unknown</b> ) |
| 6 (DD)   | 2      | uint16 (LE) | Bed Temperature in °C                         |
| 8 (EE)   | 2      | uint16 (LE) | Min Temperature for Hotend in °C              |
| 10 (FF)  | 2      | uint16 (LE) | Max Temperature for Hotend in °C              |

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Also see <https://www.youtube.com/watch?v=SdHqzZnYCCs>:



Search

The video player displays three panels of filament specifications and RFID tags. Each panel lists the following details: Color, Diameter (1.75mm), Material (PLA), Weight (1000g), Nozzle Temp (220), and Bed Temp (60). Below the specifications, three RFID tag IDs are shown: C33C01793531B538, 4B0A3F1D24CBFD0E, and 4D4A853D4D151519. The first two panels have a teal background for the tags, while the third panel has a red background. A red progress bar is visible at the bottom of the video frame, with a play button icon and the text 'Invalid Signature' on the right side.

**How To Read Filament RFID Tags for BambuLab AMS**



**Mitch Davis**  
37K subscribers

**Subscribe**

👍 362



➦ Share





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|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>a processor configured to determine an operational parameter of a fabrication process using the three-dimensional printer based upon the data and to perform a diagnostic test to determine whether the operational parameter is suitable for the three-dimensional printer, the operational parameter including at least one of a build platform temperature, a build volume temperature, an infill requirement, a rafting requirement, a support structure requirement, and a cooling requirement; and</p> | <p>The Accused Instrumentalities each include a processor configured to determine an operational parameter of a fabrication process using the three-dimensional printer based upon the data and to perform a diagnostic test to determine whether the operational parameter is suitable for the three-dimensional printer, the operational parameter including at least one of a build platform temperature, a build volume temperature, an infill requirement, a rafting requirement, a support structure requirement, and a cooling requirement.</p> <p>For example, Bambu Studio maps the filaments detected in the AMS to a requested 3D printing job (see <a href="https://wiki.bambulab.com/en/software/bambu-studio/use-ams-on-bambu-studio">https://wiki.bambulab.com/en/software/bambu-studio/use-ams-on-bambu-studio</a>):</p> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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### Bambu Studio AMS mapping

Bambu Studio will do AMS mapping (matching the filament type and color) to the current print job. The above part of the AMS mapping widget is the source color and type for the current project and the bottom part is the target index and color of the AMS slot.

The screenshot displays the Bambu Studio interface. On the left, the 'Printer' settings panel is visible, showing 'Bambu Lab X1 0.4 nozzle' and 'Cool Plate' bed type. The 'Filament' section is highlighted with a red box, showing a list of filaments: 1. Bambu PLA Basic (blue), 2. Bambu PLA Basic (black), 3. Bambu PLA Basic (blue), 4. Bambu PLA Basic (yellow), and 5. Bambu PLA Basic (grey). Below this, the 'Process' tab is selected, showing '0.20mm Standard @BBL X1C' and various settings like 'Layer height' (0.2 mm) and 'Line width' (0.42 mm).

On the right, the 'Send and Print' dialog is open. It features a 3D model of three Minion figures. Below the model, the estimated time is '1d5h53m' and the weight is '679.68 g'. A red box highlights the filament selection area, showing four slots: 'PLA 02' (black), 'PLA 04' (black), 'PLA 01' (blue), and 'PLA 03' (yellow). Below these slots, a message reads: 'Please click each filament above to specify its mapping AMS slot before sending the print job'. The 'Printer' dropdown is set to '3DP-00W-014'. At the bottom, there are checkboxes for 'Bed leveling', 'Flow calibration', 'Timelapse', and 'Enable AMS'. A 'Print' button is at the bottom right.

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For example, a processor on a device running Bambu Studio is configured to determine whether a support structure requirement is required for a requested 3D printed part.

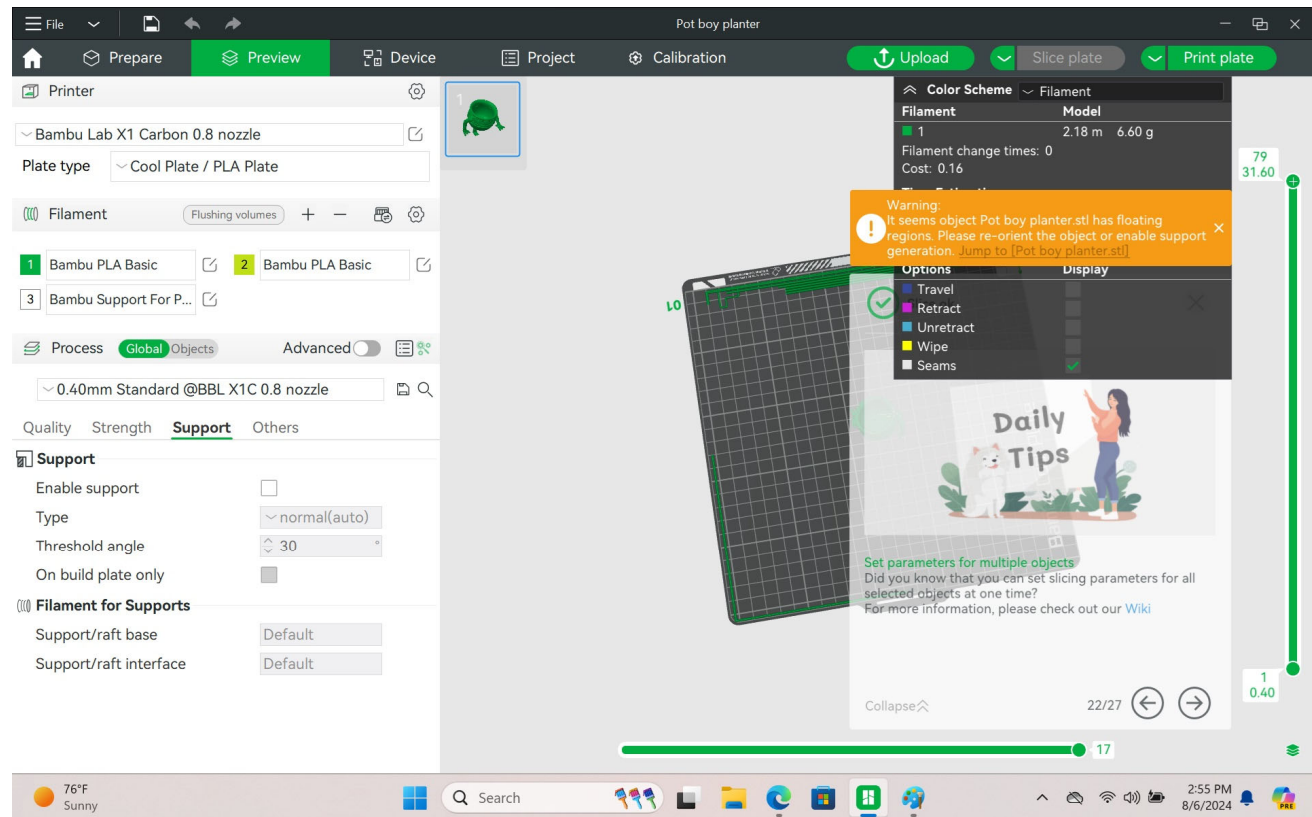


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**Support parameter configuration**

In Bambu Studio, there are 2 options when printing support with support filament:

- Use the support filament as both support/raft base and interface.  
This is more suitable when you need a large amount of support, but the print time will be longer.
- Use the model filament as support/raft base and support filament as support/raft interface.  
This is more suitable for models that only need a small amount of easy-to-remove support.

<https://wiki.bambulab.com/en/filament-acc/filament/pla-basic-and-petg-hf>

As another example, a processor on a device running Bambu Studio is configured to determine a build volume temperature based on the data for the filament.

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nbu Studio info



Current chamber temperature is higher than the material's safe temperature, it may result in material softening and clogging. The maximum safe temperature for the material is 45

OK

Vendor

Bambu Lab

Default color



Diameter

1.75 mm

Flow ratio

0.98

Density

1.26 g/cm<sup>3</sup>

Price

24.99 money/kg

Temperature of vitrification

55

Recommended nozzle temperature

Min 190 °C Max 240 °C

 **Print temperature**

Chamber temperature

60 °C 

Nozzle

First layer 220 °C Other layers 220 °C

Cool Plate / PLA Plate

First layer 35 °C Other layers 35 °C

Engineering Plate

First layer 0 °C Other layers 0 °C

Smooth PEI Plate / High Temp Plate

First layer 55 °C Other layers 55 °C

Textured PEI Plate

First layer 55 °C Other layers 55 °C

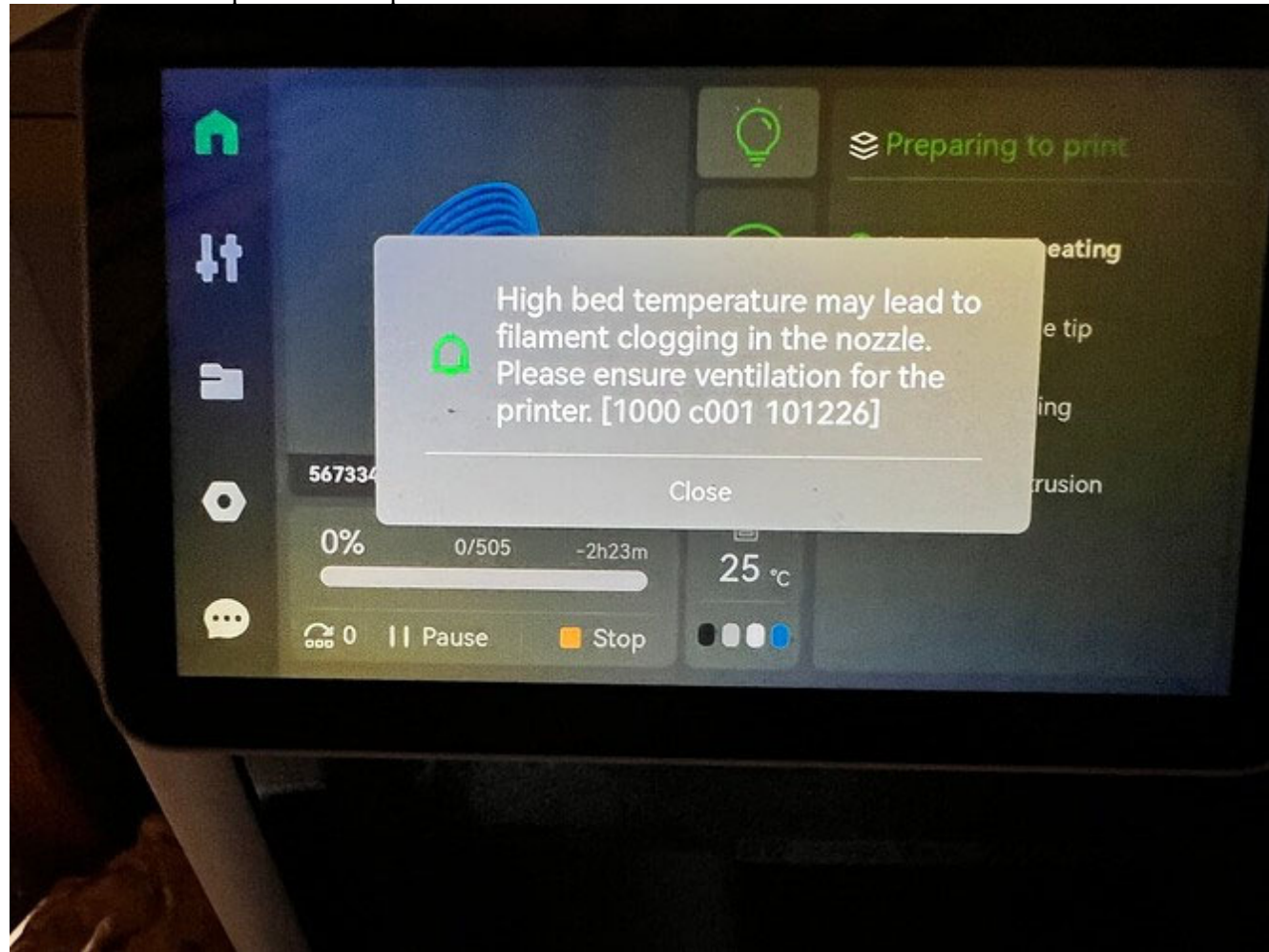
<https://wiki.bambulab.com/en/software/bambu-studio/chamber-temperature>

As yet another example, a processor on Bambu Lab printers, such as the X1 series, is configured to

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determine a build platform temperature based on the data for the filament.



It's implemented after the last firmware update, depending of the used filament and build plate.

<https://forum.bambulab.com/t/new-error-message-about-temperature/38470>

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The article provided at <https://wiki.bambulab.com/en/x1/maintenance/replace-ap-board> discusses the Bambu Lab's AP mainboard as being an Application Board that controls the interaction of information in the printer. See also the following screenshot image of the article:

### **What is the AP board?**

---

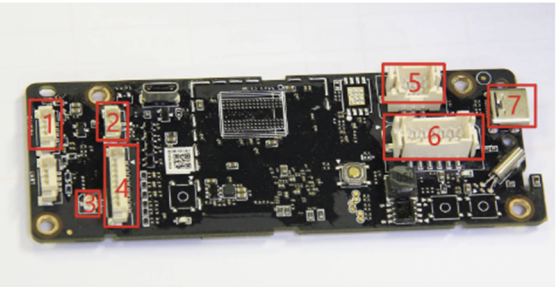
AP Board refers to the Application board, it is a circuit board that controls the interaction of information within the unit. It provides a self-contained operating environment that delivers all system capabilities needed to support the printer's applications, including memory management, system firmware, graphics processing and multimedia decoding.

The AP board is connected to an MC board.



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**Connectors on the AP board**

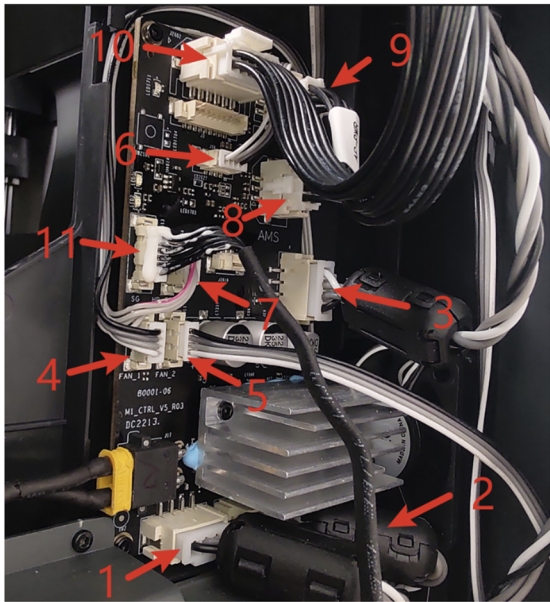


| NO. | Connect object     | NO. | Connect object           | NO. | Connect object          |
|-----|--------------------|-----|--------------------------|-----|-------------------------|
| 1   | The chamber camera | 4   | Button PCBA              | 7   | USB-C cable to Toolhead |
| 2   | The chamber LED    | 5   | MC board (Power)         |     |                         |
| 3   | WIFI antenna       | 6   | MC board (Communication) |     |                         |

<https://wiki.bambulab.com/en/x1/maintenance/replace-ap-board>

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The MC board is connected to the AMS interface board.



| NO. | Connect object                        | NO. | Connect object                        | NO. | Connect object                       |
|-----|---------------------------------------|-----|---------------------------------------|-----|--------------------------------------|
| 1   | Motor Z                               | 5   | Auxiliary part cooling fan            | 9   | AP main board (Power cable)          |
| 2   | The right motor (view from the rear)  | 6   | MC board fan                          | 10  | AP main board (Communication cable ) |
| 3   | The left motor (view from the rear)   | 7   | MC board to AC board connecting cable | 11  | Heat bed (Communication cable)       |
| 4   | The chamber temperature regulator fan | 8   | AMS interface board                   |     |                                      |

<https://wiki.bambulab.com/en/x1/maintenance/replace-mc-board>

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The AMS interface board handles communication between the AMS and printer.

### **AMS Interface Board**

#### **What it is**

The AMS interface board is a circuit board that provides 24V power and also handles communication between the AMS and the printer. For X1E, this board also carries a network cable port for Ethernet connection.



<https://wiki.bambulab.com/en/x1/maintenance/x1e-ams-interface-board>

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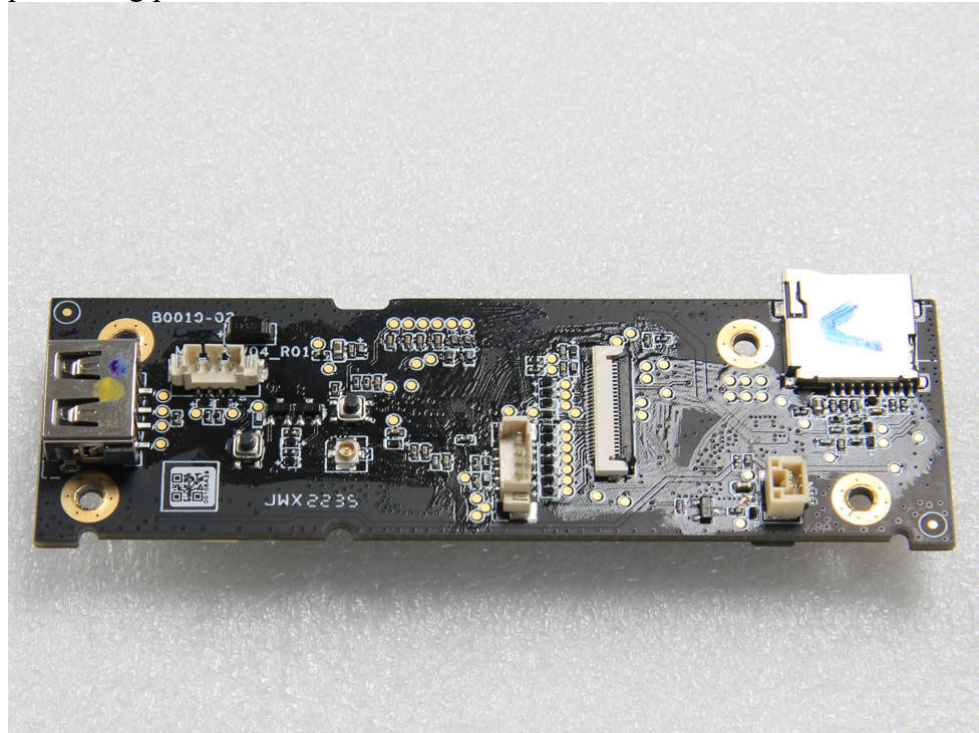
See also <https://wiki.bambulab.com/en/p1/maintenance/ap-board:>

“Replace the AP Board for P1 Series

This guide shows how to remove and install the AP board for P1 Series

**AP Board**

The AP board is a circuit board that controls the printer and provides the required Wi-Fi connectivity and processing power.



Friendly reminder: The AP boards for P1S and P1P have the same appearance and installation method, but these two boards are not compatible. In other words, P1P can only use the AP board specifically designed for P1P, while P1S can only use the AP board specifically designed for P1S.”

See also <https://wiki.bambulab.com/en/p1/maintenance/mc-board:>

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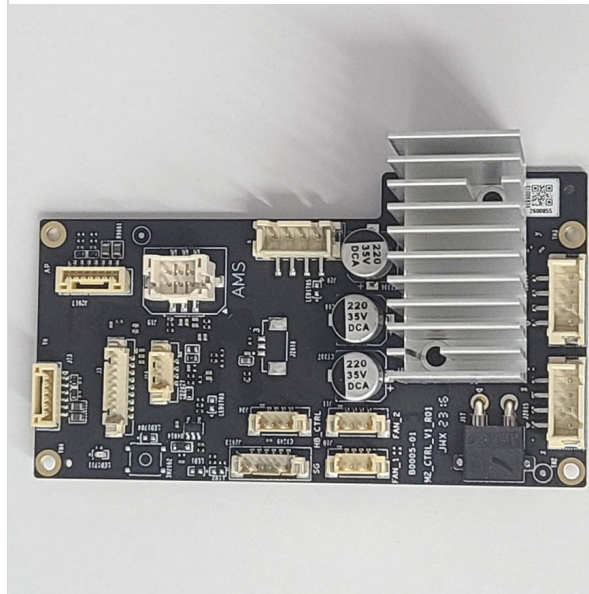
“MC board of P series

A wiki page guide you how to remove and install the MC board of P series.

### **MC Board of P series**

MC stands for Machine Controller, which is the unit that controls all the moving parts of the printer.

There are differences in the heatsink of the MC boards for P1P and P1S, but the boards are the same.”



MC board for P1S

See also <https://wiki.bambulab.com/en/a1/manual/intro-a1>:

### **“Electrical Components**

The A1 incorporates various electronic components, and here is a brief overview of some of the most important components and their functions:

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**Circuit board**

The main control board of the A1 printer consists of a low-power SoC (System-on-Chip) with a dual-core processor, Wi-Fi baseband, Bluetooth baseband, RF module, and other peripherals. It also includes a dual-core MCU (Microcontroller Unit) and a single-core MCU. Additionally, it incorporates stepper motor drivers and connectors required for connecting various electronic devices to the printer.

The SoC is primarily responsible for handling the user interface of the A1 printer and managing the connection between the slicing software/mobile application and the printer. On the other hand, the MCU controls the printer's heating and movement after receiving the CPU's G-code stream.”

See also <https://wiki.bambulab.com/en/a1-mini/manual/intro-a1-mini>:

**“Electrical Components**

The A1 mini incorporates various electronic components, and here is a brief overview of some of the most important components and their functions:

**Circuit board**

The mainboard contains a low-power SoC (System-on-Chip) with a dual-core processor, Wi-Fi baseband, Bluetooth baseband, RF module, and other peripherals. It also includes a dual-core MCU and a single-core MCU. Additionally, it features stepper motor drivers and connectors necessary for connecting different electronic devices to the printer. The SoC handles the user interaction and the communication between the slicing software/mobile application and the printer. The MCU controls the actual heating and movement of the printer after receiving G-code instructions from the CPU.

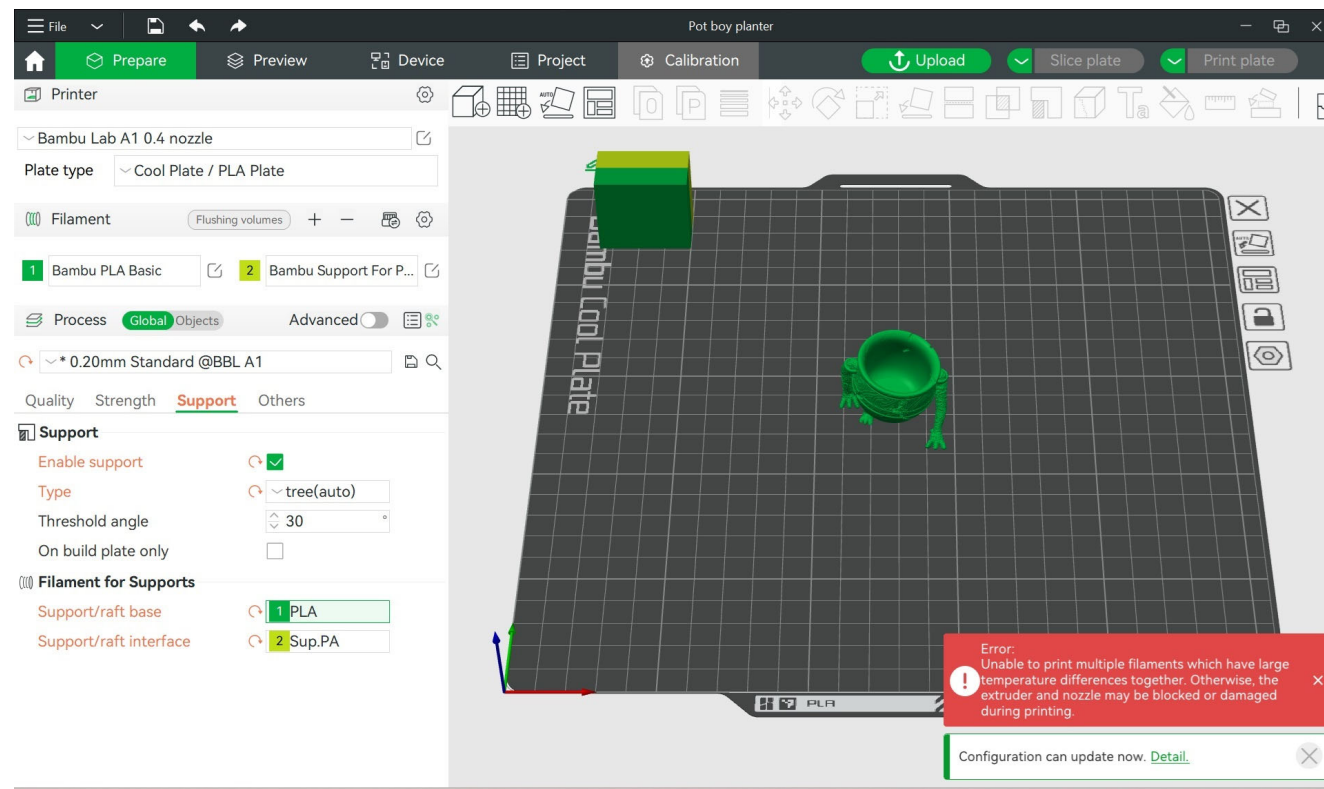
**Camera**

The printer integrates a camera used for spaghetti detection (to be supported in future firmware updates) and real-time monitoring of prints using the Bambu Slicer or Bambu Handy application. In addition to the monitoring function, the camera can record videos of the prints to the micro SD card and generate time-lapse videos. The machine is not equipped with night vision, but the camera module has an auxiliary light to illuminate the print.”



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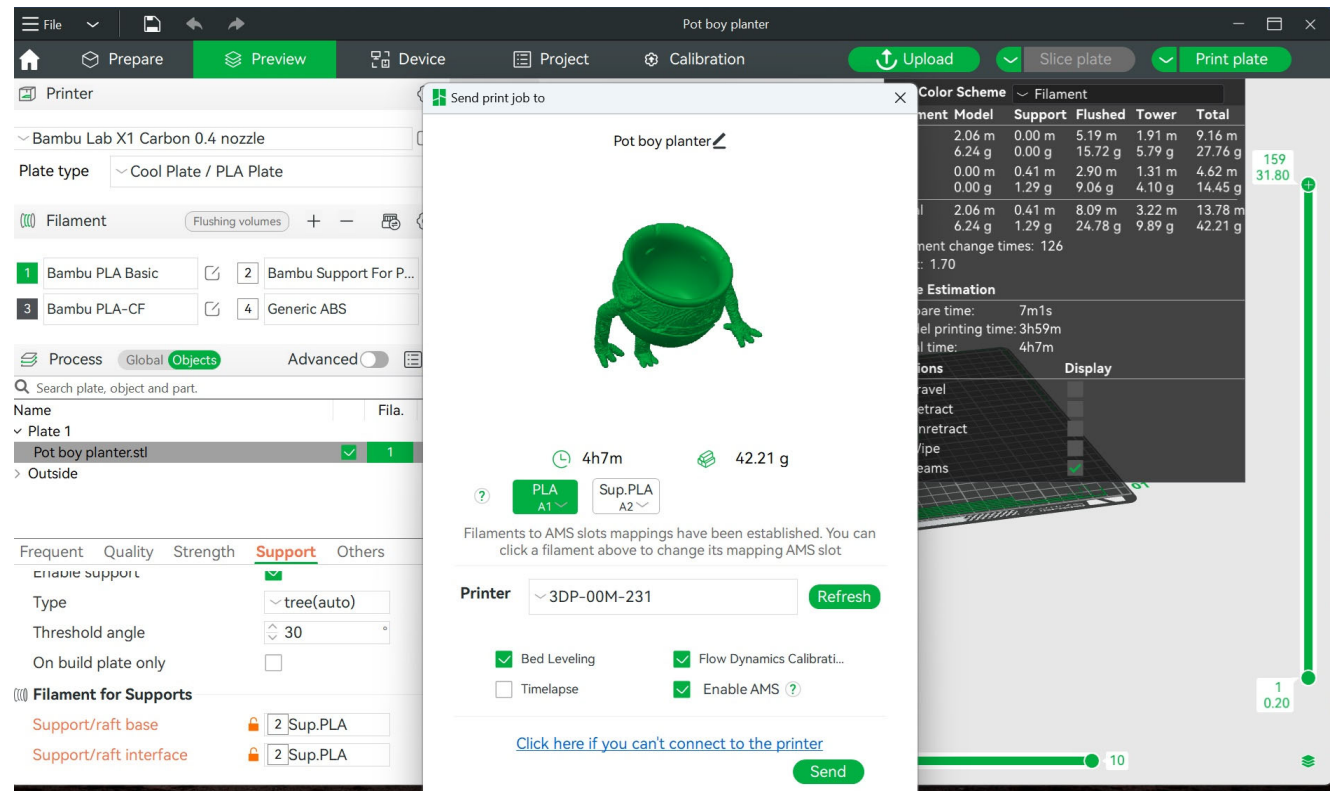
Further, a processor on a device running Bambu Studio is configured to perform a diagnostic test to determine whether an operational parameter, such as a support structure requirement for the build, is suitable for the three-dimensional printer (e.g., whether the support structure filament detected in the AMS of the printer is compatible with the build material filament detected in the AMS). For example, if the detected build material is PLA and the detected support material is Support for PA/PET (<https://us.store.bambulab.com/collections/support/products/support-for-pa-pet>) instead of Support for PLA (<https://us.store.bambulab.com/products/support-for-pla>), the following error message is produced as a result of a diagnostic test comparing the required support structure to the support structure actually in the 3D printer:





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However, if compatible Support for PLA is detected in the AMS, then the diagnostic test does not produce such an error:



Additionally, Bambu Studio changes the support offset setting if a compatible support material (e.g., Support for PLA/PETG) is used versus using the build material (e.g., PLA) as the support structure. See [Support for PLA/PETG | Bambu Lab US](#):

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### **Smooth Support Interface**

Support PLA/PETG offers consistently smooth surface quality at the contact area, ensuring optimal support for intricate details. With zero top interface spacing & Z distance, our support material provides precision and reliability, allowing you to print even the most complex designs with ease.



The default offset setting when using the same material for both the part and the support structure is 0.2mm. However, if a compatible support material is used, that offset is changed to 0 or no extra gap.

As another example, a processor on a device running Bambu Studio is configured to perform a diagnostic test to determine whether an operational parameter, such as a build volume temperature is suitable for the three-dimensional printer (e.g., whether the build volume temperature is compatible with the maximum safe temperature for the build material filament detected in the AMS).

For example, if the detected build volume temperature setting is 60 degrees Celsius and the detected materials maximum safe temperature is 45 degrees Celsius, the following error message is produced as a result of a diagnostic test comparing the build volume temperature setting to the maximum safe build volume temperature of the material actually in the AMS or 3D printer.

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ambu Studio info



Current chamber temperature is higher than the material's safe temperature, it may result in material softening and clogging. The maximum safe temperature for the material is 45

OK

Vendor

Bambu Lab

Default color



Diameter

1.75 mm

Flow ratio

0.98

Density

1.26 g/cm<sup>3</sup>

Price

24.99 money/kg

Temperature of vitrification

55

Recommended nozzle temperature

Min 190 °C Max 240 °C

 **Print temperature**

Chamber temperature

60 °C 

Nozzle

First layer 220 °C Other layers 220 °C

Cool Plate / PLA Plate

First layer 35 °C Other layers 35 °C

Engineering Plate

First layer 0 °C Other layers 0 °C

Smooth PEI Plate / High Temp Plate

First layer 55 °C Other layers 55 °C

Textured PEI Plate

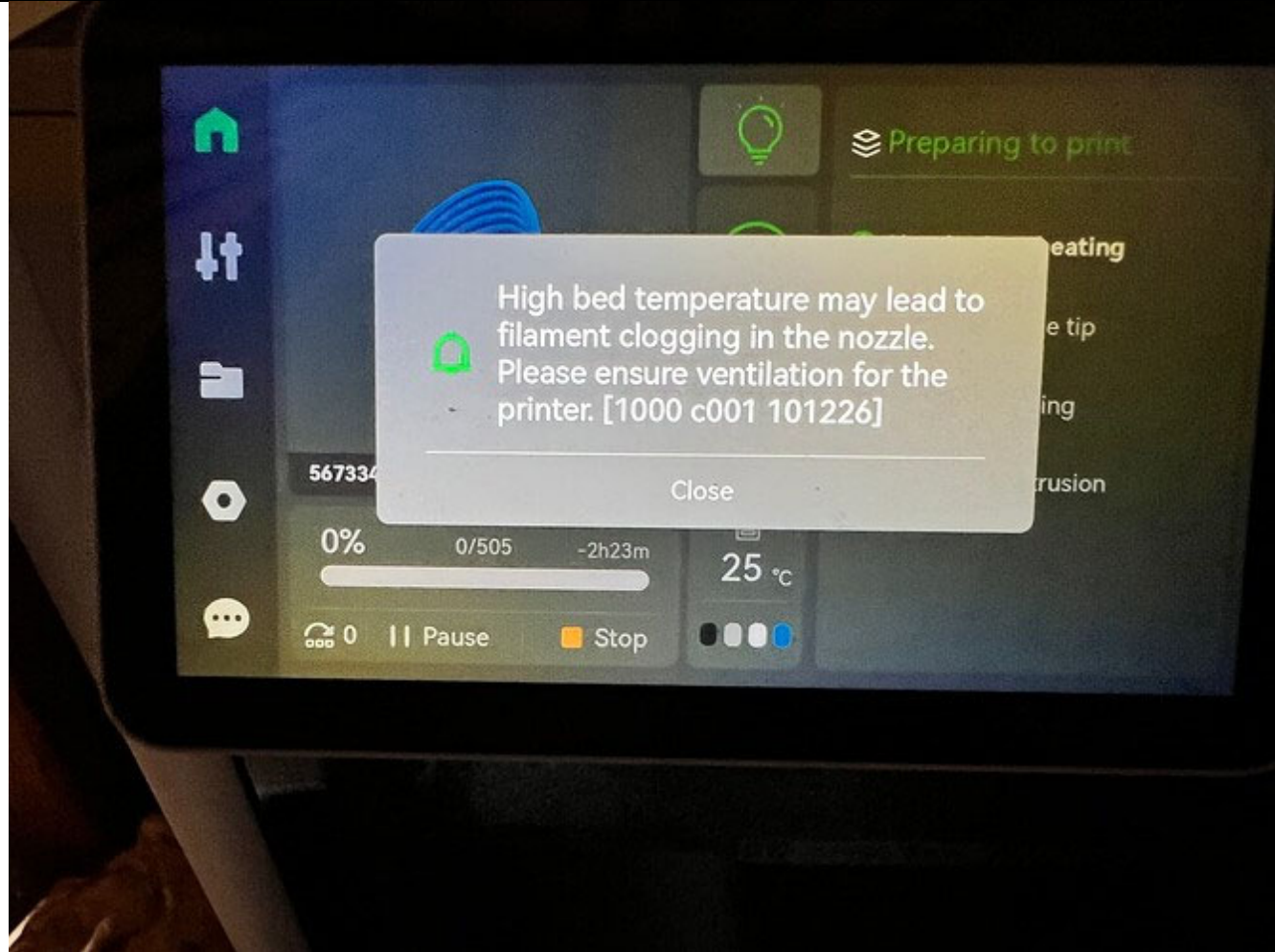
First layer 55 °C Other layers 55 °C

<https://wiki.bambulab.com/en/software/bambu-studio/chamber-temperature>

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|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>As yet another example, a processor on Bambu Lab printers (e.g., AP) is configured to perform a diagnostic test to determine whether an operational parameter, such as a build platform temperature for the build, is suitable for the three-dimensional printer (e.g., whether the filament detected in the AMS of the printer is compatible with the build platform temperature).</p> <p>For example, based on the filament detected in the AMS, the printer evaluates whether the build platform temperature is appropriate for the filament. If the build platform temperature is high, the following error message is produced as a result of a diagnostic testing comparing the build platform temperature for the filament in the AMS to the actual build platform temperature.</p> |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

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It's implemented after the last firmware update, depending of the used filament and build plate.

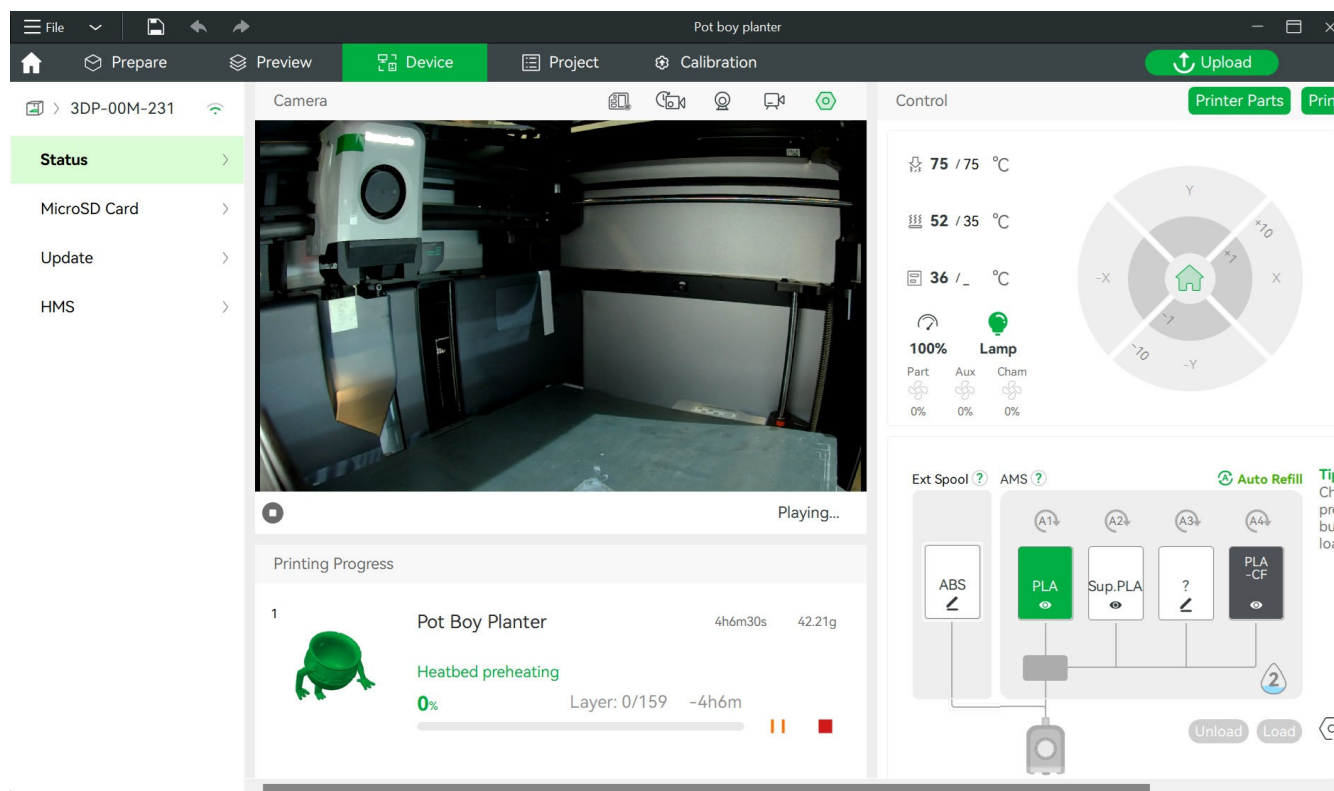
<https://forum.bambulab.com/t/new-error-message-about-temperature/38470>

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a controller for the three-dimensional printer, the controller configured to, when the operational parameter is suitable for the three-dimensional printer according to the diagnostic test, control operation of the three-dimensional printer during the fabrication process according to the operational parameter to fabricate an object with the three-dimensional printer.

The Accused Instrumentalities each include a controller for the three-dimensional printer, the controller configured to, when the operational parameter is suitable for the three-dimensional printer according to the diagnostic test, control operation of the three-dimensional printer during the fabrication process according to the operational parameter to fabricate an object with the three-dimensional printer.

For example, when a compatible support structure is detected, then the 3D printer prints the requested part with the support structure:



As another example, when a compatible build volume temperature is set for the filament material, then the 3D printer prints the requested part at that build volume temperature.



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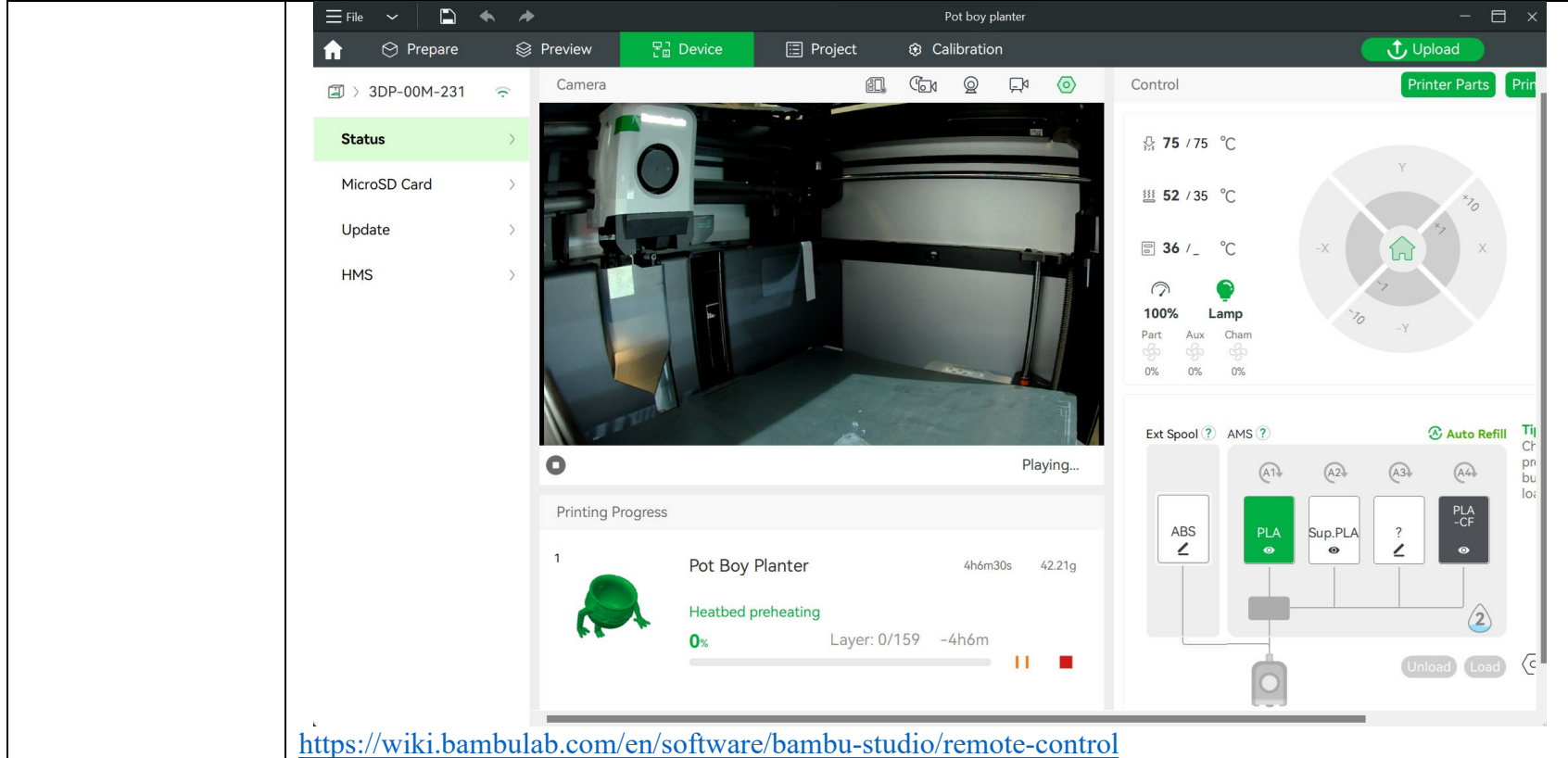




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**Control printer**

---

After the printer is selected, we can use the 'Control' widgets in the right panel of the 'Device' Page for the following controls:

- X/Y/Z/E move
- Bed temperature
- Nozzle temperature
- Lamp
- Aux Cooling Fan
- Part Cooling Fan
- Speed Level

As yet another example, when a compatible build platform temperature is set for the filament material, then the 3D printer prints the requested part at that build platform temperature.

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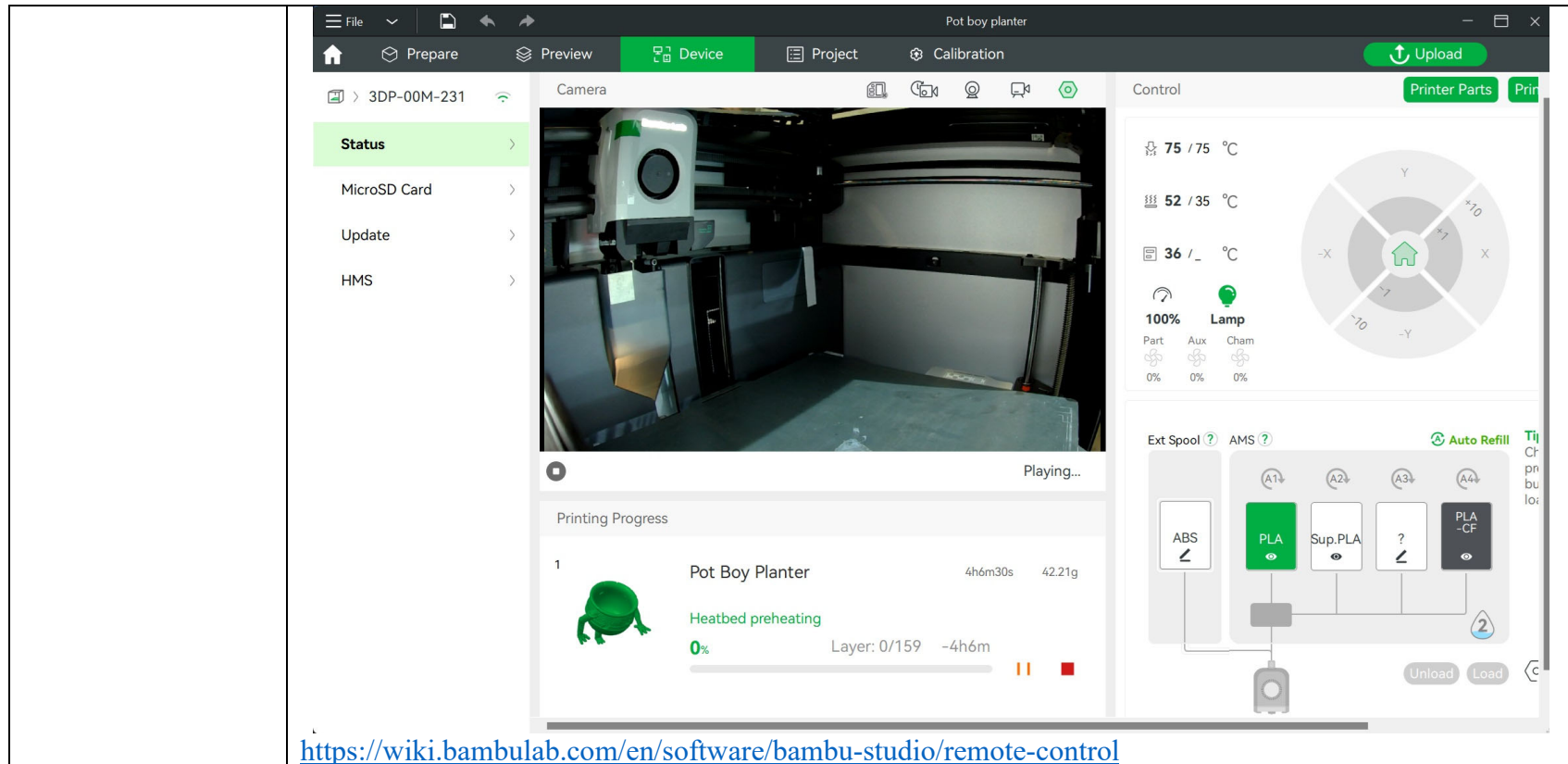


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**Control printer**

---

After the printer is selected, we can use the 'Control' widgets in the right panel of the 'Device' Page for the following controls:

- X/Y/Z/E move
- Bed temperature
- Nozzle temperature
- Lamp
- Aux Cooling Fan
- Part Cooling Fan
- Speed Level

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The three dimensional printer includes a controller, such as an SOC, CPU, MCU, and/or associated circuitry, that is configured to, when the operational parameter is suitable for the 3-D printer according to the diagnostic test, as discussed above, control operation of the three-dimensional printer during the fabrication process according to the operational parameter to fabricate an object with the three-dimensional printer.

The X1 has many electronic components inside, but here are the most important:

**Logic Board**

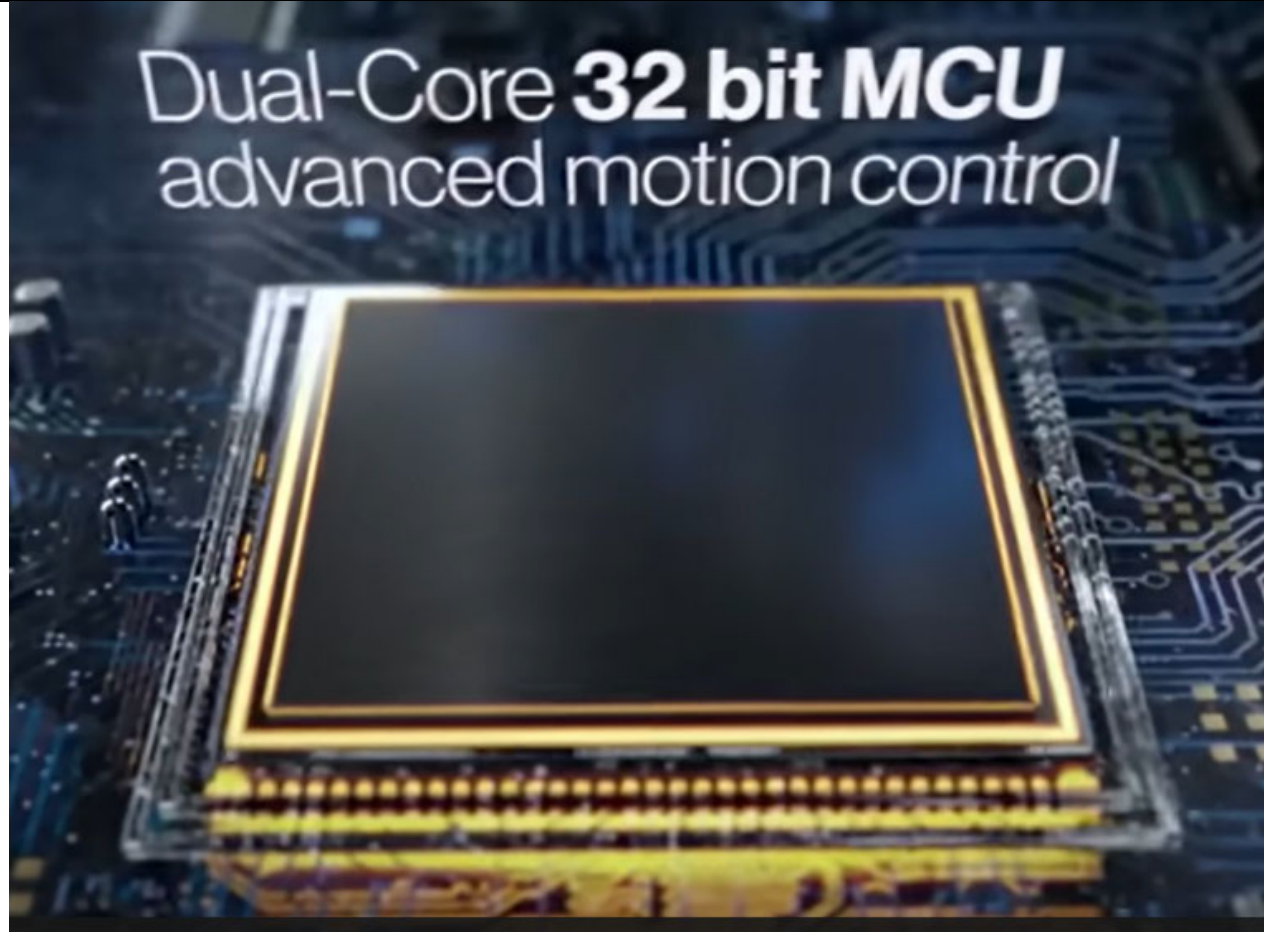
Every 3D printer comes with a logic board that has the CPU, stepper drivers, and the required connections for different electronics attached to the printer. In the case of the X1, the board has a quad-core CPU and a dual-core MCU.

The CPU handles the smart capabilities of the X1 including the AI spaghetti detection, flow calibration, vibration compensation, and the connection between the Slicer/App and the printer.

The MCU handles the actual movement of the printer after getting the stream of g-code from the CPU.

<https://wiki.bambulab.com/en/x1/manual/intro-x1>

Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464



<https://bambulab.com/en/x1>

## **Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

The article provided at <https://wiki.bambulab.com/zh/x1/maintenance/replace-ap-board> discusses the Bambu Lab printers' AP mainboard as being an Application Board that controls the information flow within the printer:

### **What is the AP board?**

AP Board refers to the Application board, it is a circuit board that controls the interaction of information within the unit. It provides a self-contained operating environment that delivers all system capabilities needed to support the printer's applications, including memory management, system firmware, graphics processing and multimedia decoding.

...

### **Connectors on the AP board**

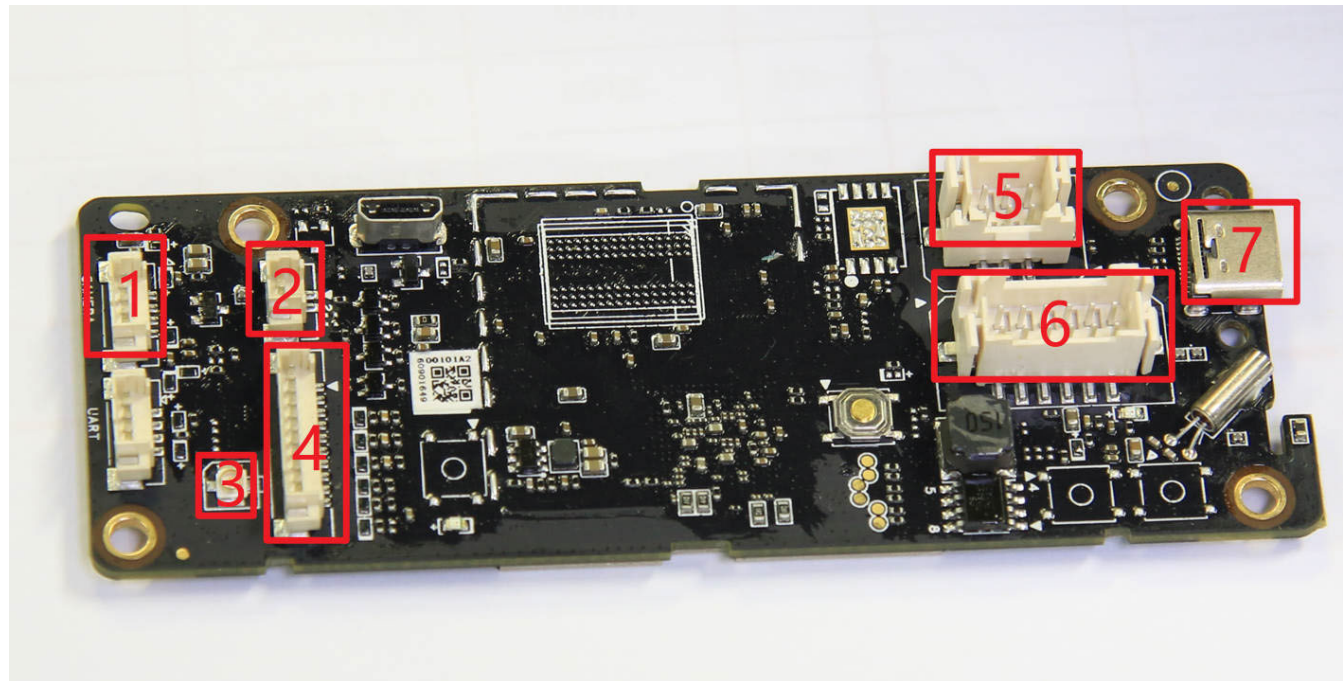


**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|            |                       |            |                          |            |                         |
|------------|-----------------------|------------|--------------------------|------------|-------------------------|
|            |                       |            |                          |            |                         |
|            |                       |            |                          |            |                         |
| <b>NO.</b> | <b>Connect object</b> | <b>NO.</b> | <b>Connect object</b>    | <b>NO.</b> | <b>Connect object</b>   |
| 1          | The chamber camera    | 4          | Button PCBA              | 7          | USB-C cable to Toolhead |
| 2          | The chamber LED       | 5          | MC board (Power)         |            |                         |
| 3          | WIFI antenna          | 6          | MC board (Communication) |            |                         |

The AP motherboard is in communication with the RFID system (tag sensor) and Machine Controller (MC) board.

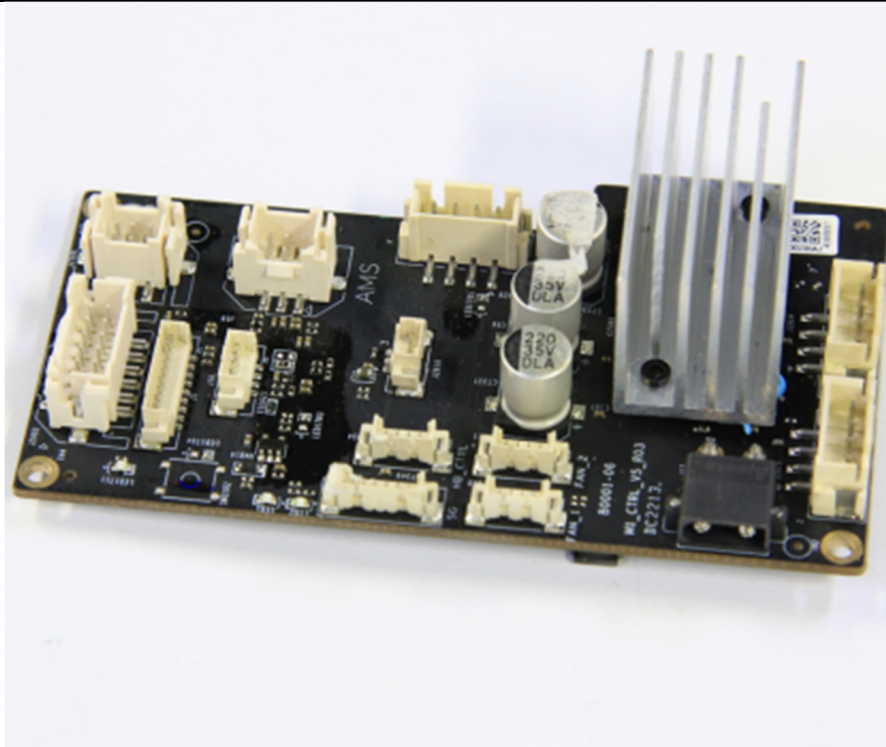
Furthermore, the Bambu Lab printers have a Machine Controller, which controls the various moving parts of the printer (see <https://wiki.bambulab.com/en/x1/maintenance/replace-mc-board>):

**What it is**

MC stands for Machine Controller, which is the unit that controls all the moving parts of the printer.



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Further, the main control board of the Bambu Lab A1 printer includes an SoC with a dual-core processor, Wi-Fi baseband, Bluetooth baseband, RF module, other peripherals, a dual-core MCU, and a single-core MCU. The MCU controls the printer's heating and movement after receiving the CPU's G-code stream.

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

See also, <https://wiki.bambulab.com/en/a1/manual/intro-a1>:

**Circuit board**

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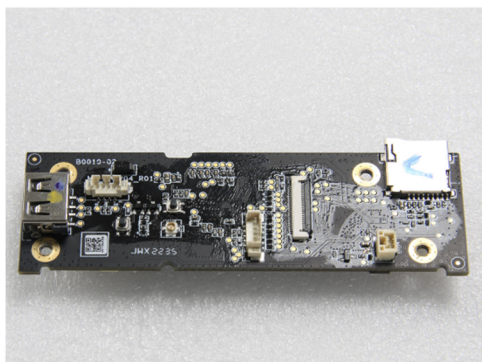
The main control board of the A1 printer consists of a low-power SoC (System-on-Chip) with a dual-core processor, Wi-Fi baseband, Bluetooth baseband, RF module, and other peripherals. It also includes a dual-core MCU (Microcontroller Unit) and a single-core MCU. Additionally, it incorporates stepper motor drivers and connectors required for connecting various electronic devices to the printer.

The SoC is primarily responsible for handling the user interface of the A1 printer and managing the connection between the slicing software/mobile application and the printer. On the other hand, the MCU controls the printer's heating and movement after receiving the CPU's G-code stream.

See also <https://wiki.bambulab.com/en/p1/maintenance/ap-board>:

## **AP Board**

The AP board is a circuit board that controls the printer and provides the required Wi-Fi connectivity and processing power.



Friendly reminder: The AP boards for P1S and P1P have the same appearance and installation method, but these two boards are not compatible. In other words, P1P can only use the AP board specifically designed for P1P, while P1S can only use the AP board specifically designed for P1S.

See also <https://wiki.bambulab.com/en/a1-mini/manual/intro-a1-mini>:

### **“Electrical Components**

The A1 mini incorporates various electronic components, and here is a brief overview of some of the most important components and their functions:

#### **Circuit board**

The mainboard contains a low-power SoC (System-on-Chip) with a dual-core processor, Wi-Fi baseband, Bluetooth baseband, RF module, and other peripherals. It also includes a dual-core MCU and a single-core MCU. Additionally, it features stepper motor drivers and connectors necessary for connecting

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

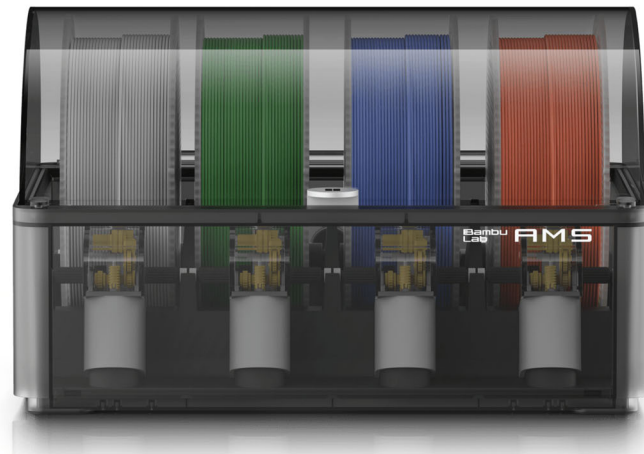
|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>different electronic devices to the printer. The SoC handles the user interaction and the communication between the slicing software/mobile application and the printer. The MCU controls the actual heating and movement of the printer after receiving G-code instructions from the CPU.</p> <p><b>Camera</b></p> <p>The printer integrates a camera used for spaghetti detection (to be supported in future firmware updates) and real-time monitoring of prints using the Bambu Slicer or Bambu Handy application. In addition to the monitoring function, the camera can record videos of the prints to the micro SD card and generate time-lapse videos. The machine is not equipped with night vision, but the camera module has an auxiliary light to illuminate the print.”</p> |
|--|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

13. The system of claim 12, further comprising a container holding the supply of the build material, wherein the container is configured to connect to the coupling, and wherein the container includes the data tag.

The Accused Instrumentalities each include a container holding the supply of the build material, wherein the container is configured to connect to the coupling, and wherein the container includes the data tag.

Bambu Lab sells an Automatic Material System (AMS) for use with its X1 and P1 series 3D printers, that includes four slots (couplings) that receive spools (containers) of filament. See, e.g., <https://bambulab.com/en/x1:>



Color, the ultimate expression of emotions, is brought to you by Bambu Lab's Automatic Material System (AMS). You can now enjoy printing freely in multiple colors and materials, a 3D Printing Maestro.



**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**



**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

Also, see <https://us.store.bambulab.com/products/ams-lite> for the AMS Lite used with the A1 and A1 mini printers, which includes four spindles (couplings) that receive spools (containers) of filament:



Bambu Lab filament spools (containers) include RFID tags on both sides of the filament roll (the filament roll being included by the container).



**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

**“RFID system**

The **RFID System** can automatically identify the RFID tag on the Bambulab filament spools, which can then sync the filament information to the Bambulab slicer (Bambu Studio).”

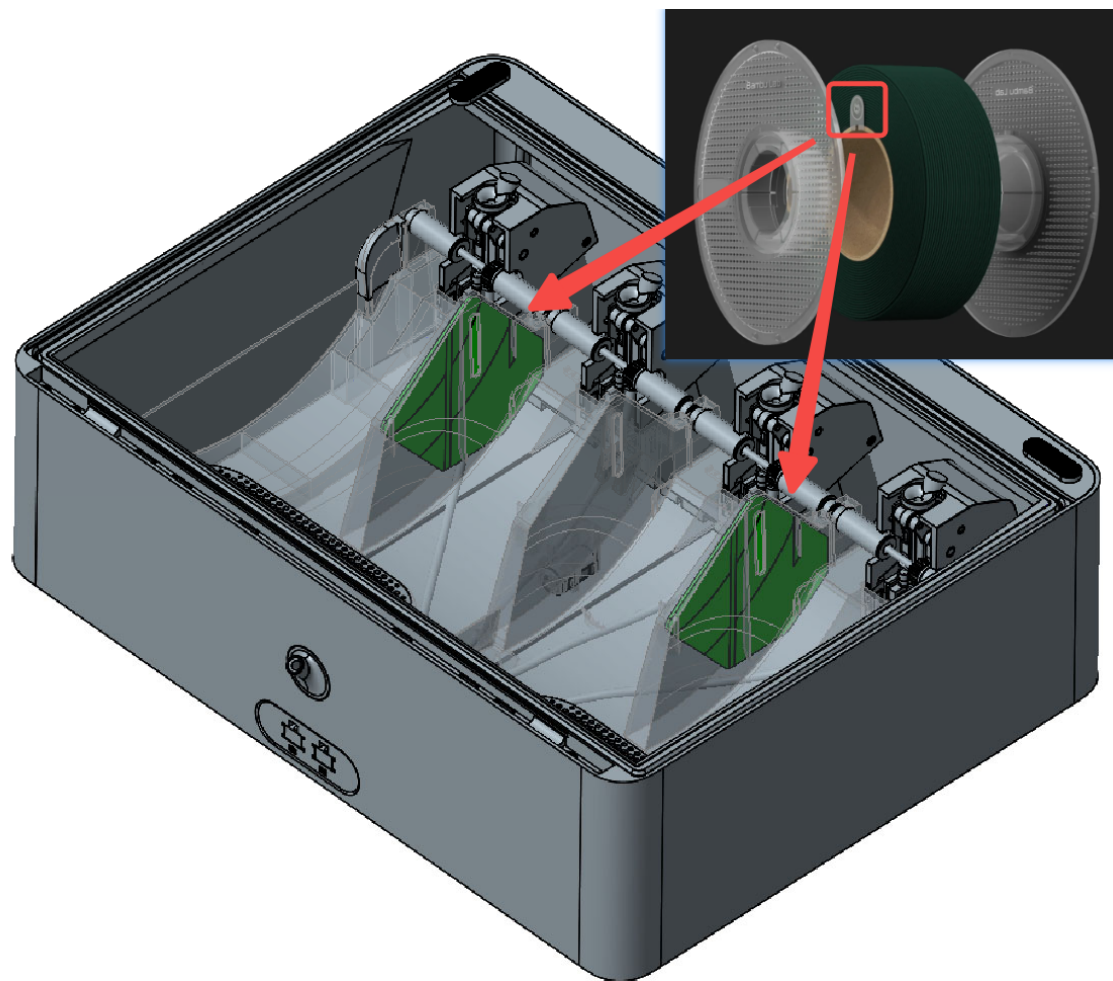


Also see <https://wiki.bambulab.com/en/ams/manual/ams-function-introduction>:

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

**“Reading RFID**

Bambu's official filament roll has RFID tags on both sides, and on AMS there are two RFID-reading circuit boards that can read the filament information.

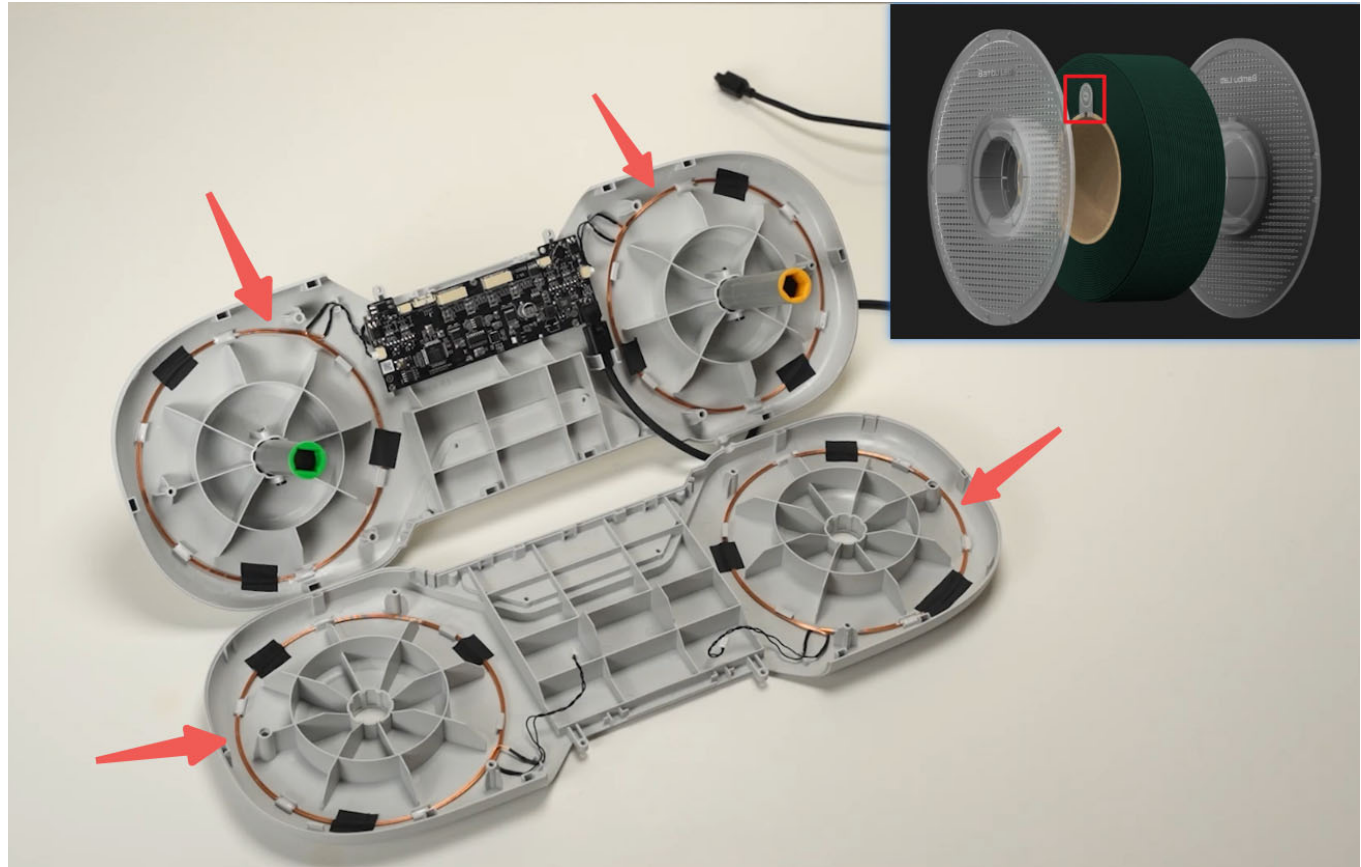


Regarding the AMS Lite, see <https://wiki.bambulab.com/en/ams-lite/manual/intro-ams-lite>:

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

**“Reading RFID**

Each slot in AMS lite has a corresponding RFID coil. You just need to place the spool on the rotary holder of each slot and insert the filament to read its information.



RFID reading function can be set on the slicer for update on insertion/startup, or you can also manually click the icon beside each slot on the slicer for reading RFID.

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|  |  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |  |
|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|
|  |  | <div data-bbox="716 201 1654 1446"><div data-bbox="1598 220 1629 245">✕</div><div data-bbox="762 289 968 326"><b>AMS Settings</b></div><div data-bbox="762 375 806 412"><input checked="" type="checkbox"/></div><div data-bbox="821 375 1056 412"><b>Insertion update</b></div><div data-bbox="808 430 1593 529"><p>The AMS will automatically read the filament information when inserting a new Bambu Lab filament spool. This takes about 20 seconds.</p><p>Note: if new filament is inserted during printing, the AMS will not automatically read any information until printing has finished.</p></div><div data-bbox="762 691 806 729"><input checked="" type="checkbox"/></div><div data-bbox="821 691 1081 729"><b>Update on startup</b></div><div data-bbox="808 743 1589 846"><p>The AMS will automatically read the information of inserted filament on start-up. It will take about 1 minute. The reading process will rotate the filament spools.</p></div><div data-bbox="762 889 806 927"><input checked="" type="checkbox"/></div><div data-bbox="821 889 1121 927"><b>AMS filament backup</b></div><div data-bbox="808 941 1583 1011"><p>AMS will continue to another spool with the same filament properties automatically when current filament runs out.</p></div><div data-bbox="774 1040 1589 1382"></div><div data-bbox="1644 1419 1665 1435">”</div></div> |  |
|--|--|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|



**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

14. The system of claim 13, wherein the container includes at least one of a cartridge and a spool.

The container of the Accused Instrumentalities includes at least one of a cartridge and a spool.

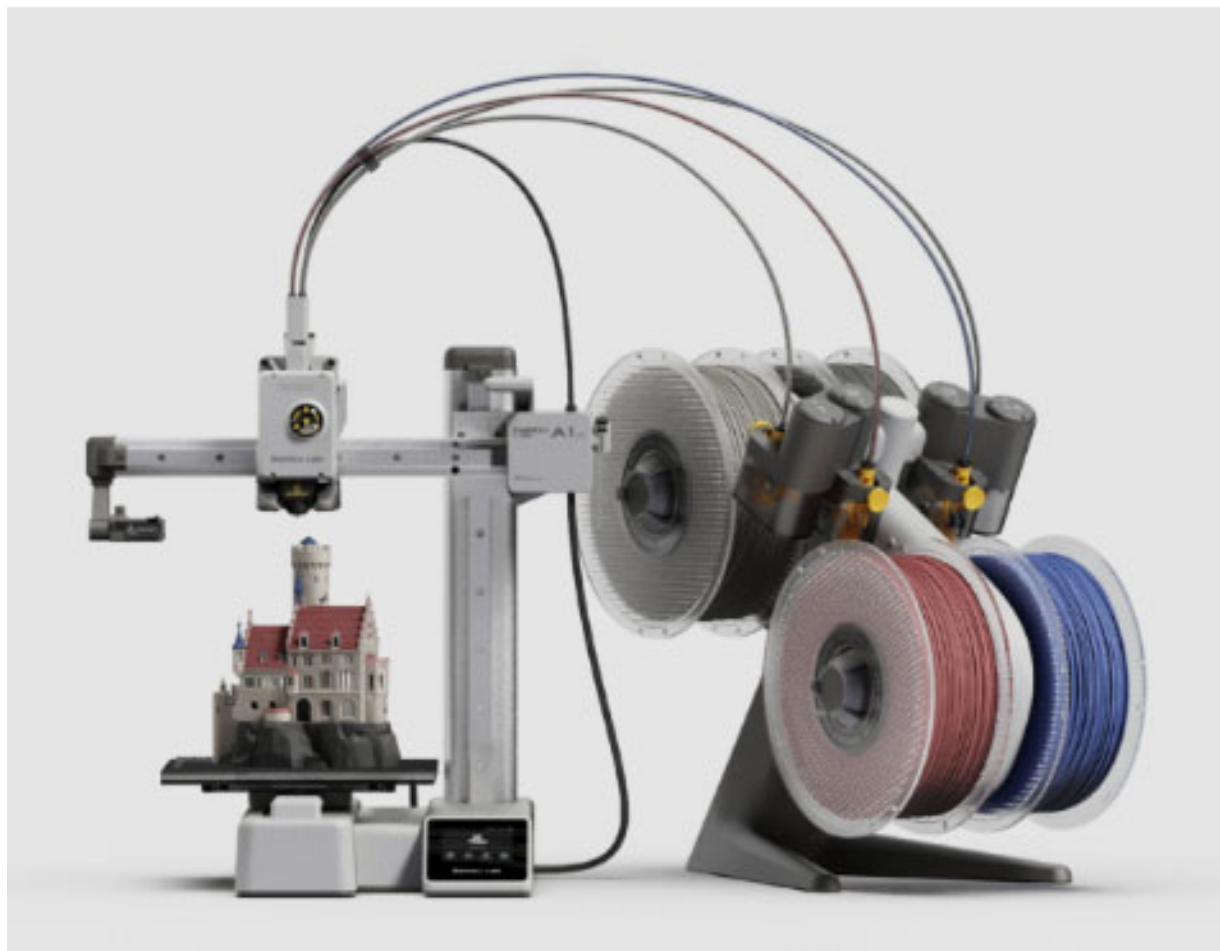
As discussed above with respect to claim 1 and as shown below, the supply of build material received by the AMS of the Bambu 3D printers is a spool of filament:



<https://wiki.bambulab.com/en/ams/manual/ams-function-introduction>

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

As discussed above with respect to claim 1 and as shown below, the supply of build material received by the AMS Lite of the Bambu 3D printers is a spool of filament:



<https://wiki.bambulab.com/en/ams-lite/manual/intro-ams-lite>

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

15. The system of claim 12, wherein the build material includes at least one of a filament, a number of pellets, and a liquid.

The build material of the Accused Instrumentalities includes at least one of a filament, a number of pellets, and a liquid.

As discussed above with respect to claim 1 and as shown below, the supply of build material received by the AMS of the Bambu 3D printers is filament:

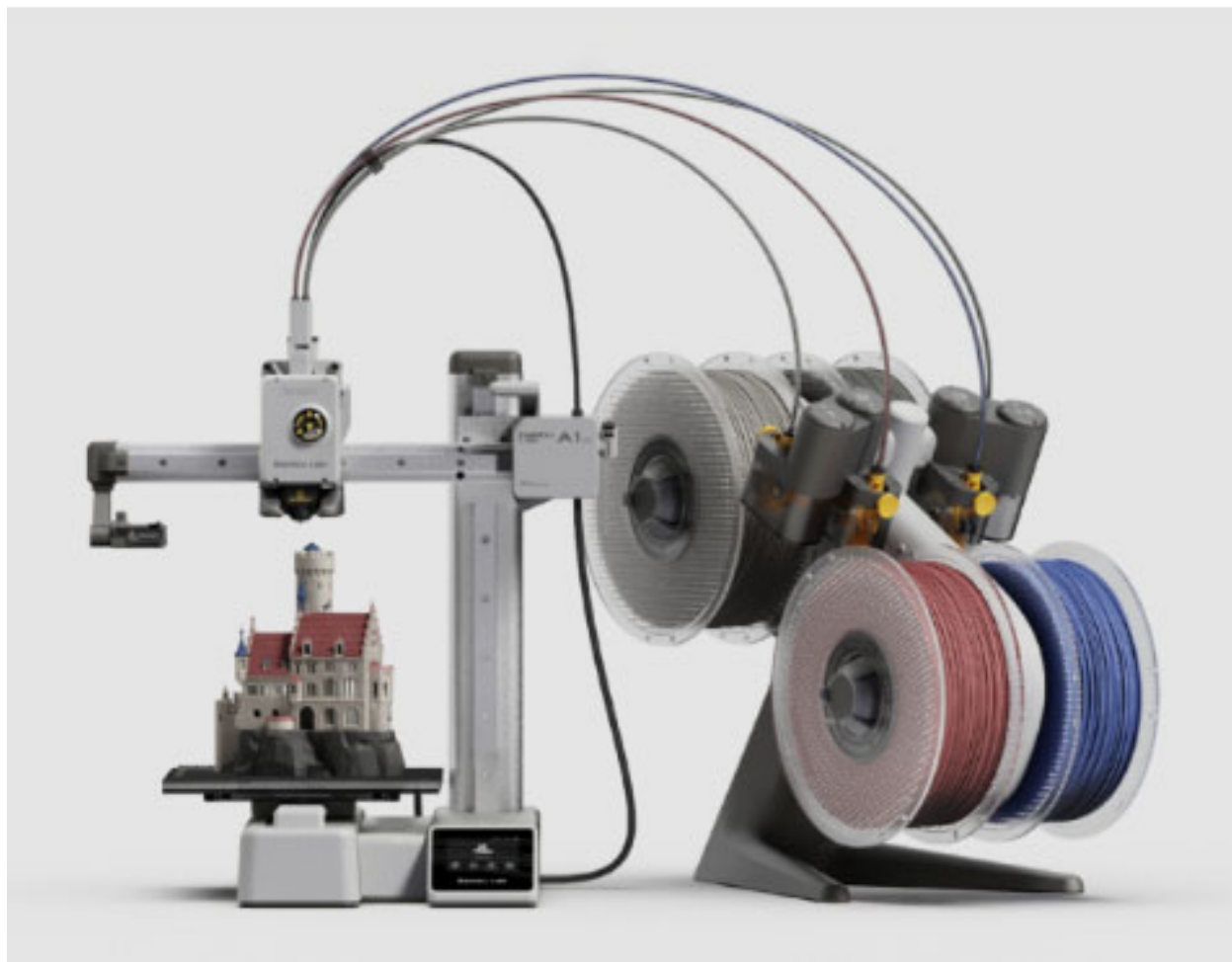


<https://wiki.bambulab.com/en/ams/manual/ams-function-introduction>



**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

As discussed above with respect to claim 1 and as shown below, the supply of build material received by the AMS Lite of the Bambu 3D printers is filament:

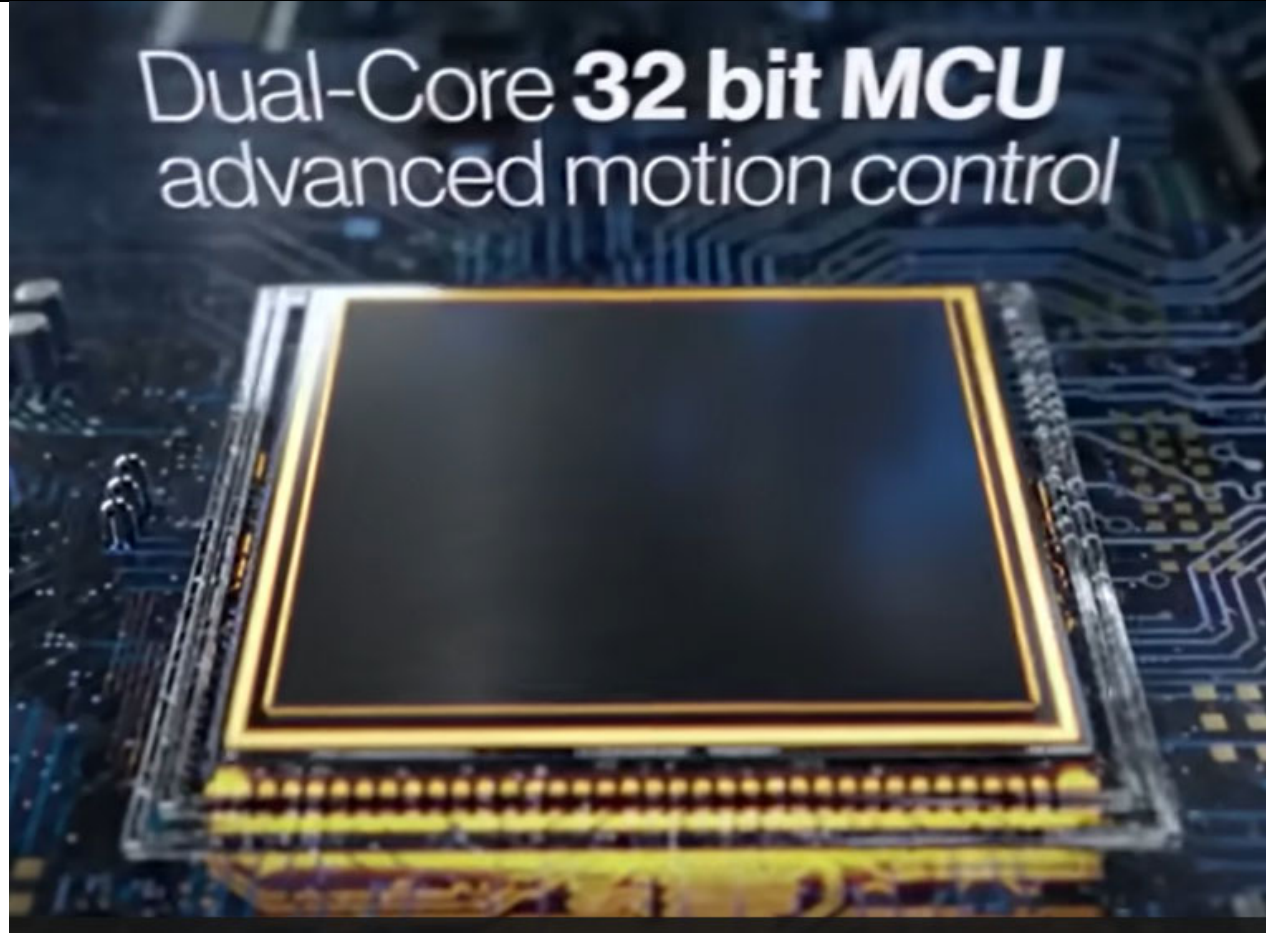


<https://wiki.bambulab.com/en/ams-lite/manual/intro-ams-lite>

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>17. The system of claim 12, wherein the processor is included on one or more of the controller and the three-dimensional printer.</p> | <p>The processor of the Accused Instrumentalities is included in one or more of the controller and the three-dimensional printer.</p> <p>For example, the three dimensional printer includes a controller such as a System on Chip (SOC), CPU (central processing unit), and/or MCU (microcontroller unit). The MCU handles the actual movement of the printer after getting a stream of g-code from the CPU. A processor (e.g., CPU) is therefore included in the three-dimensional printer and/or the processor is included in the controller (e.g., in an SOC that also includes an MCU).</p> <p>The X1 has many electronic components inside, but here are the most important:</p> <p><b><u>Logic Board</u></b></p> <p>Every 3D printer comes with a logic board that has the CPU, stepper drivers, and the required connections for different electronics attached to the printer. In the case of the X1, the board has a quad-core CPU and a dual-core MCU.</p> <p>The CPU handles the smart capabilities of the X1 including the AI spaghetti detection, flow calibration, vibration compensation, and the connection between the Slicer/App and the printer.</p> <p>The MCU handles the actual movement of the printer after getting the stream of g-code from the CPU.</p> <p><a href="https://wiki.bambulab.com/en/x1/manual/intro-x1">https://wiki.bambulab.com/en/x1/manual/intro-x1</a></p> |
|------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464



<https://bambulab.com/en/x1>

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See also, <https://wiki.bambulab.com/en/a1/manual/intro-a1>:

**Circuit board**

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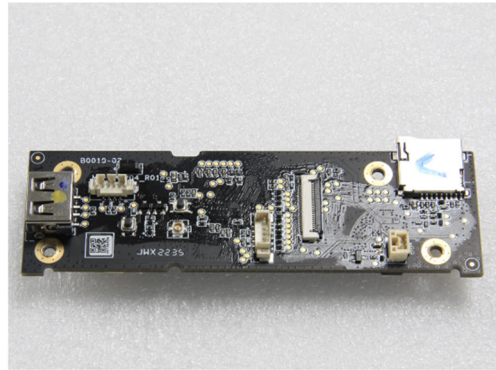
The main control board of the A1 printer consists of a low-power SoC (System-on-Chip) with a dual-core processor, Wi-Fi baseband, Bluetooth baseband, RF module, and other peripherals. It also includes a dual-core MCU (Microcontroller Unit) and a single-core MCU. Additionally, it incorporates stepper motor drivers and connectors required for connecting various electronic devices to the printer.

The SoC is primarily responsible for handling the user interface of the A1 printer and managing the connection between the slicing software/mobile application and the printer. On the other hand, the MCU controls the printer's heating and movement after receiving the CPU's G-code stream.

See also, <https://wiki.bambulab.com/en/p1/maintenance/ap-board>:

## **AP Board**

The AP board is a circuit board that controls the printer and provides the required Wi-Fi connectivity and processing power.



Friendly reminder: The AP boards for P1S and P1P have the same appearance and installation method, but these two boards are not compatible. In other words, P1P can only use the AP board specifically designed for P1P, while P1S can only use the AP board specifically designed for P1S.

See also <https://wiki.bambulab.com/en/a1-mini/manual/intro-a1-mini>:

### **“Electrical Components**

The A1 mini incorporates various electronic components, and here is a brief overview of some of the most important components and their functions:

#### **Circuit board**

The mainboard contains a low-power SoC (System-on-Chip) with a dual-core processor, Wi-Fi baseband, Bluetooth baseband, RF module, and other peripherals. It also includes a dual-core MCU and a single-

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>core MCU. Additionally, it features stepper motor drivers and connectors necessary for connecting different electronic devices to the printer. The SoC handles the user interaction and the communication between the slicing software/mobile application and the printer. The MCU controls the actual heating and movement of the printer after receiving G-code instructions from the CPU.</p> <p><b>Camera</b></p> <p>The printer integrates a camera used for spaghetti detection (to be supported in future firmware updates) and real-time monitoring of prints using the Bambu Slicer or Bambu Handy application. In addition to the monitoring function, the camera can record videos of the prints to the micro SD card and generate time-lapse videos. The machine is not equipped with night vision, but the camera module has an auxiliary light to illuminate the print.”</p> |
|--|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

## **Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

The article provided at <https://wiki.bambulab.com/en/x1/maintenance/replace-ap-board> discusses the Bambu Lab printers' AP mainboard as being an Application Board that controls the information flow within the printer:

### **What is the AP board?**

AP Board refers to the Application board, it is a circuit board that controls the interaction of information within the unit. It provides a self-contained operating environment that delivers all system capabilities needed to support the printer's applications, including memory management, system firmware, graphics processing and multimedia decoding.

### **Connectors on the AP board**

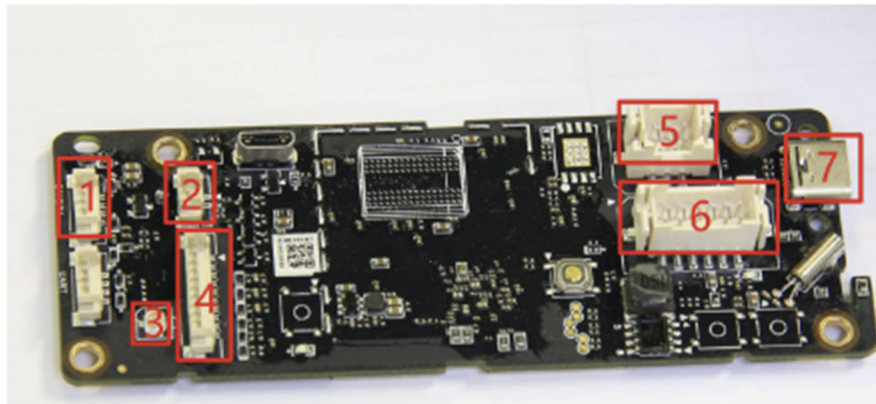




**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|                                                                                                                                                                                                                                                                                                                                                                      | NO. | Connect object     | NO. | Connect object           | NO. | Connect object          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|--------------------|-----|--------------------------|-----|-------------------------|
|                                                                                                                                                                                                                                                                                                                                                                      | 1   | The chamber camera | 4   | Button PCBA              | 7   | USB-C cable to Toolhead |
|                                                                                                                                                                                                                                                                                                                                                                      | 2   | The chamber LED    | 5   | MC board (Power)         |     |                         |
|                                                                                                                                                                                                                                                                                                                                                                      | 3   | WIFI antenna       | 6   | MC board (Communication) |     |                         |
| <p>The AP motherboard is in communication with the RFID system (tag sensor). AP board interfaces with the MC board, as shown in the table above. The MC board interfaces with the AMS interface board.</p> <p>See also, <a href="https://wiki.bambulab.com/en/x1/maintenance/replace-mc-board">https://wiki.bambulab.com/en/x1/maintenance/replace-mc-board</a>:</p> |     |                    |     |                          |     |                         |

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

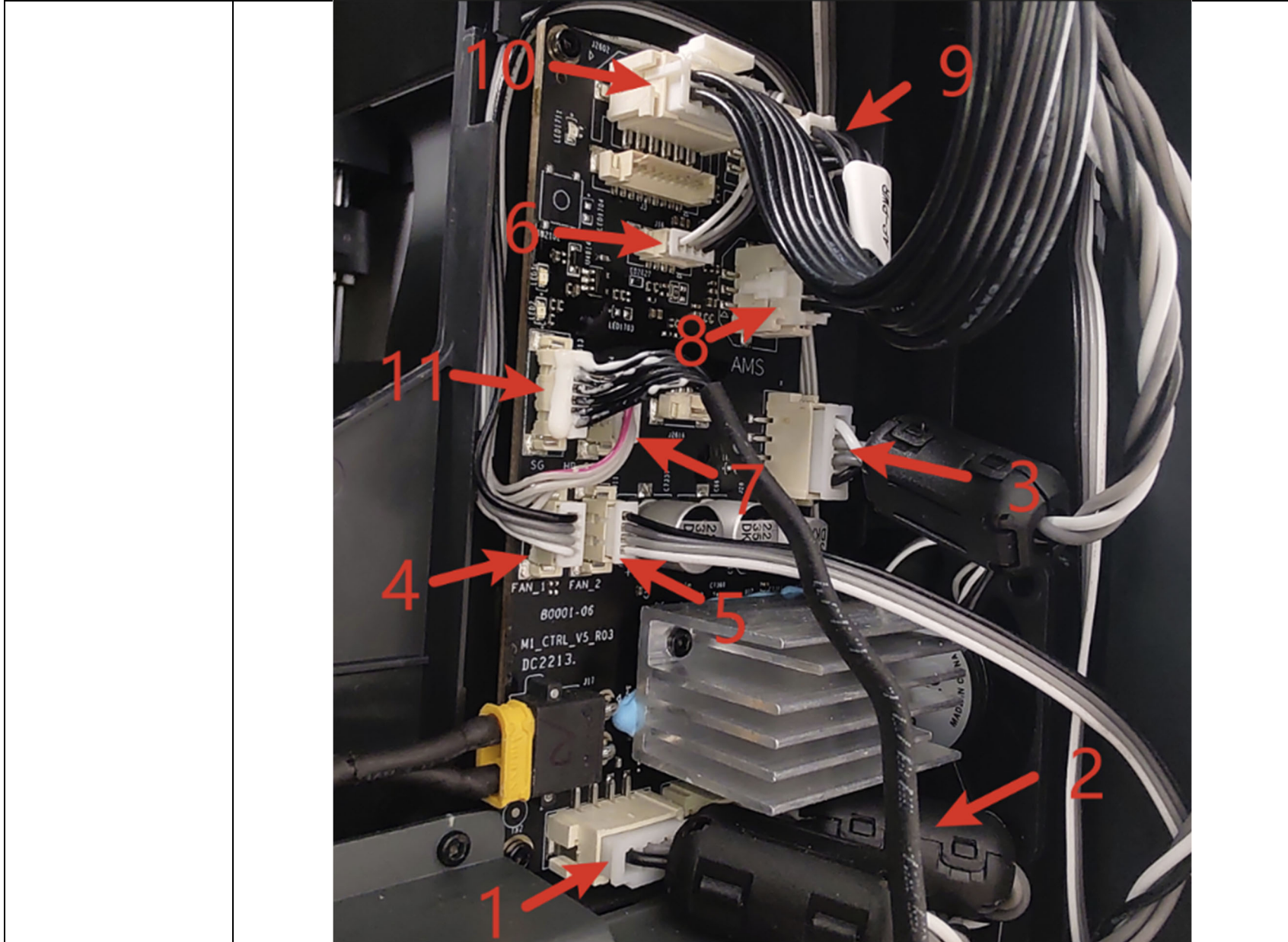
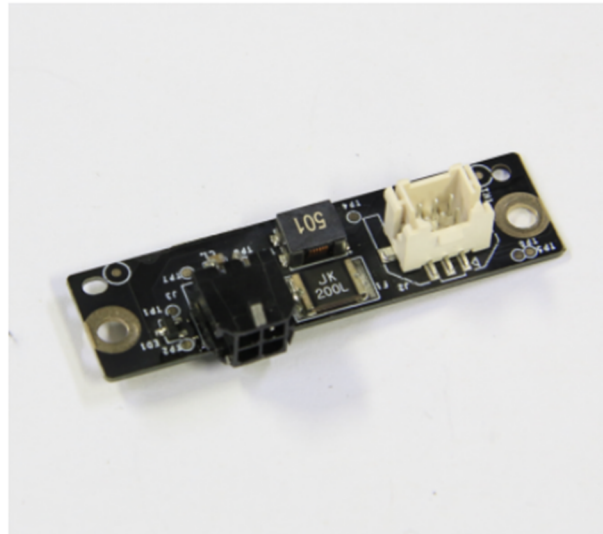


**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

|                                                                                                                                                                                                                                                                          | NO. | Connect object                        | NO. | Connect object                        | NO. | Connect object                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|---------------------------------------|-----|---------------------------------------|-----|--------------------------------------|
|                                                                                                                                                                                                                                                                          | 1   | Motor Z                               | 5   | Auxiliary part cooling fan            | 9   | AP main board (Power cable)          |
|                                                                                                                                                                                                                                                                          | 2   | The right motor (view from the rear)  | 6   | MC board fan                          | 10  | AP main board (Communication cable ) |
|                                                                                                                                                                                                                                                                          | 3   | The left motor (view from the rear)   | 7   | MC board to AC board connecting cable | 11  | Heat bed (Communication cable)       |
|                                                                                                                                                                                                                                                                          | 4   | The chamber temperature regulator fan | 8   | AMS interface board                   |     |                                      |
| The AMS interface or connector board handles communication between the AMS and the printer.<br>See also, <a href="https://wiki.bambulab.com/en/x1/maintenance/replace-ams-interface-board">https://wiki.bambulab.com/en/x1/maintenance/replace-ams-interface-board</a> : |     |                                       |     |                                       |     |                                      |

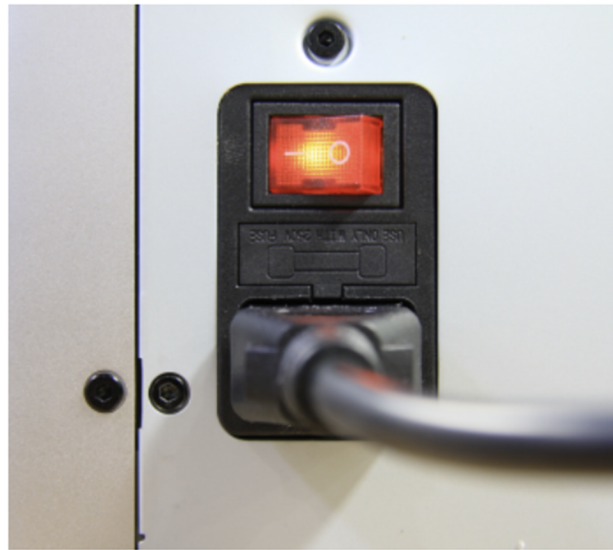
## **AMS Connector Board**

The AMS Connector Board is a circuit board that provides 24V power and also handles communication between the AMS and the printer.



## How to verify completion/success

Connect the power cord and turn on the power. On the display screen, press the AMS label on the screen as shown below, it will display the AMS control panel. Press "Load" to run the filament loading process, if the process is completed without any error, the AMS interface board replacement is complete and successful.

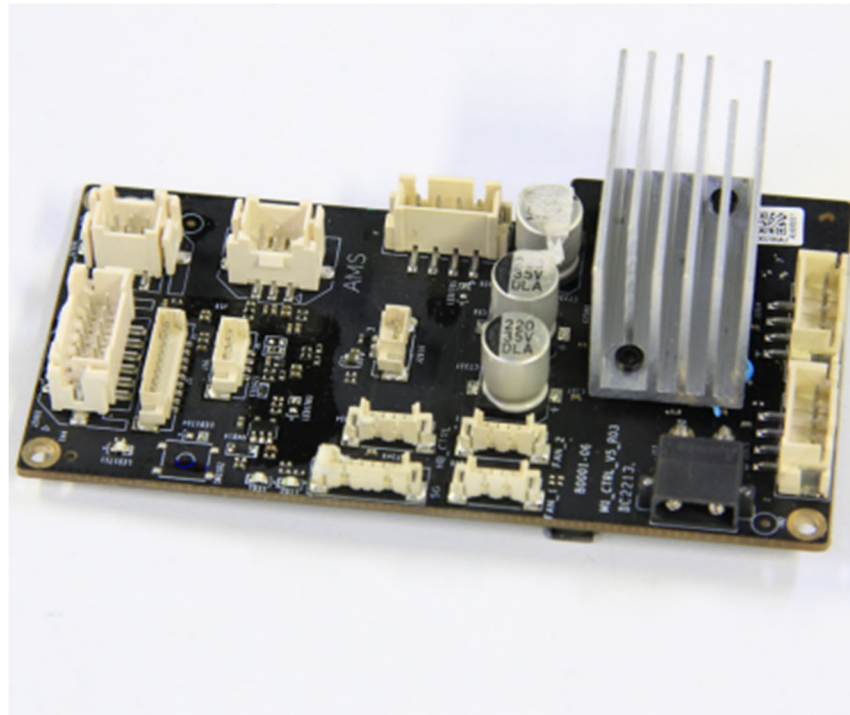


Furthermore, the Bambu Lab printers have a Machine Controller, which controls the various moving parts of the printer (see <https://wiki.bambulab.com/en/x1/maintenance/replace-mc-board>):

### **What it is**

MC stands for Machine Controller, which is the unit that controls all the moving parts of the printer.

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**



See also <https://wiki.bambulab.com/en/p1/maintenance/mc-board>:

“MC board of P series

A wiki page guide you how to remove and install the MC board of P series.

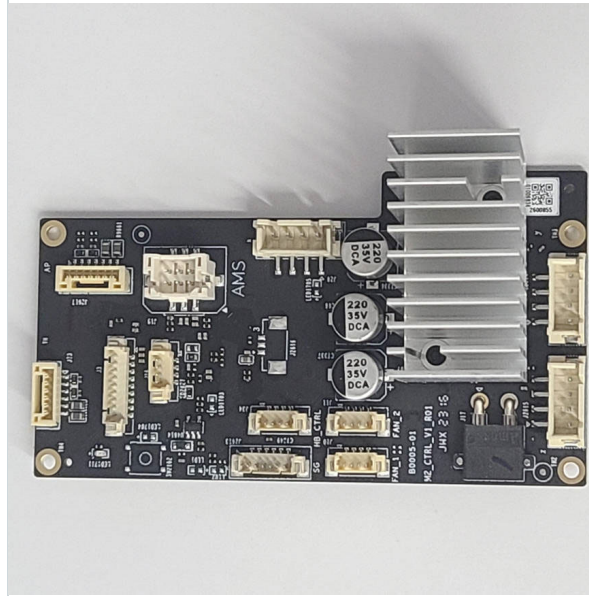
**MC Board of P series**

MC stands for Machine Controller, which is the unit that controls all the moving parts of the printer.

There are differences in the heatsink of the MC boards for P1P and P1S, but the boards are the same.”



**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**



MC board for P1S



**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

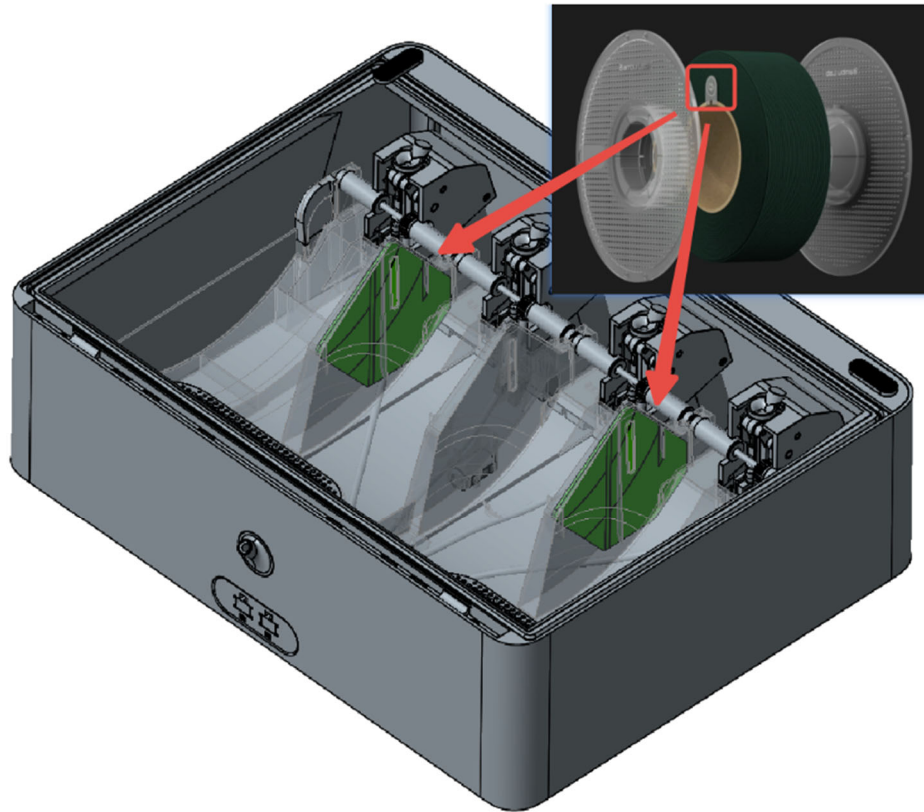
18. The system of claim 12, wherein the tag sensor includes at least one of a radio frequency identification (RFID) reader, an optical scanner, a magnetic reader, and a contact point sensor.

The tag sensor of the Accused Instrumentalities includes at least one of a radio frequency identification (RFID) reader, an optical scanner, a magnetic reader, and a contact point sensor.

The AMS of the Bambu 3D printers includes RFID readers:

**Reading RFID**

Bambu's official filament roll has RFID tags on both sides, and on AMS there are two RFID-reading circuit boards that can read the filament information.



## **Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

When AMS reads the RFID, it will preload first to tighten the filament roll. It then sends the filament out of AMS a section to turn the spool, allowing the circuit board to scan the RFID tag and read the RFID information.



When the filament in a slot has been sent out to AMS, or the extruder detects that there is a filament inside, the RFID reading function cannot be used. Click to read will show that AMS is busy and cannot read the filament information.

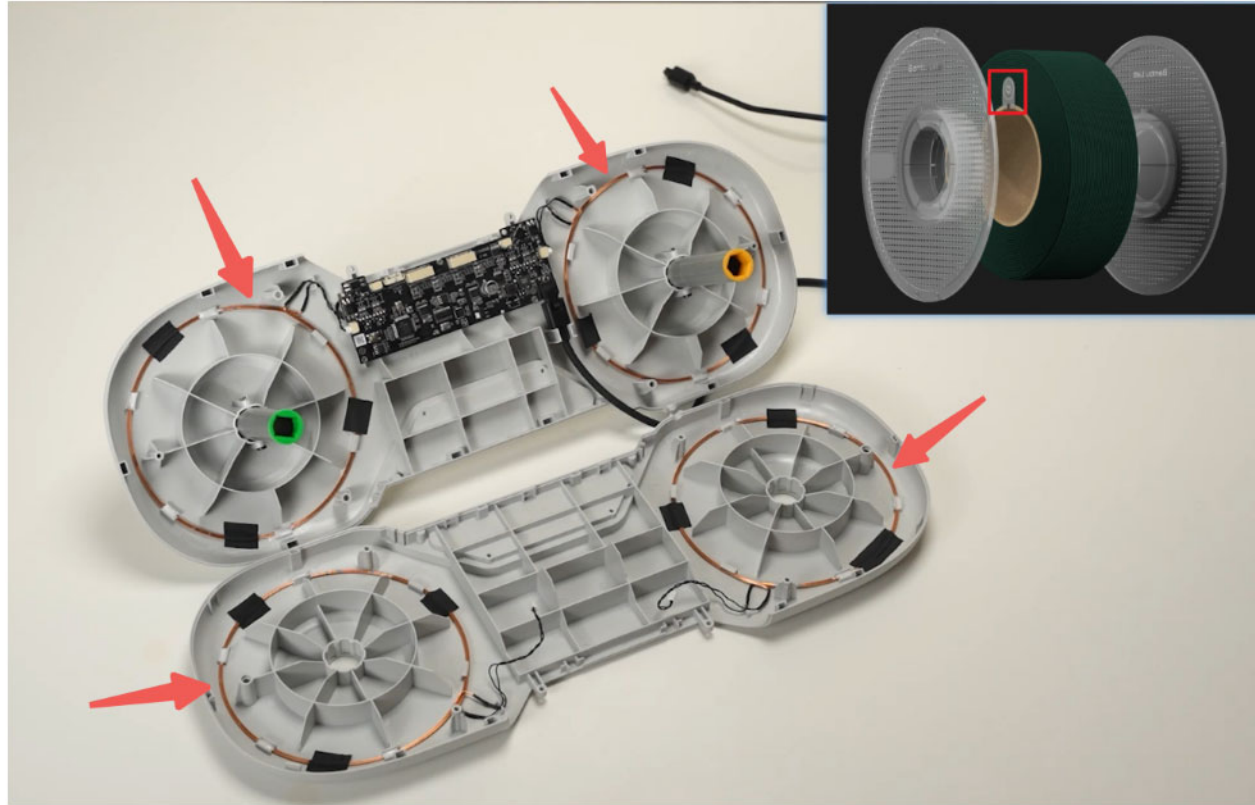
<https://wiki.bambulab.com/en/ams/manual/ams-function-introduction>

**Exhibit G - Exemplary Infringement Evidence for U.S. Patent No. 11,167,464**

The AMS lite of the Bambu 3D printers includes RFID readers:

**Reading RFID**

Each slot in AMS lite has a corresponding RFID coil. You just need to place the spool on the rotary holder of each slot and insert the filament to read its information.



RFID reading function can be set on the slicer for update on insertion/startup, or you can also manually click the icon beside each slot on the slicer for reading RFID.

<https://wiki.bambulab.com/en/ams-lite/manual/intro-ams-lite>