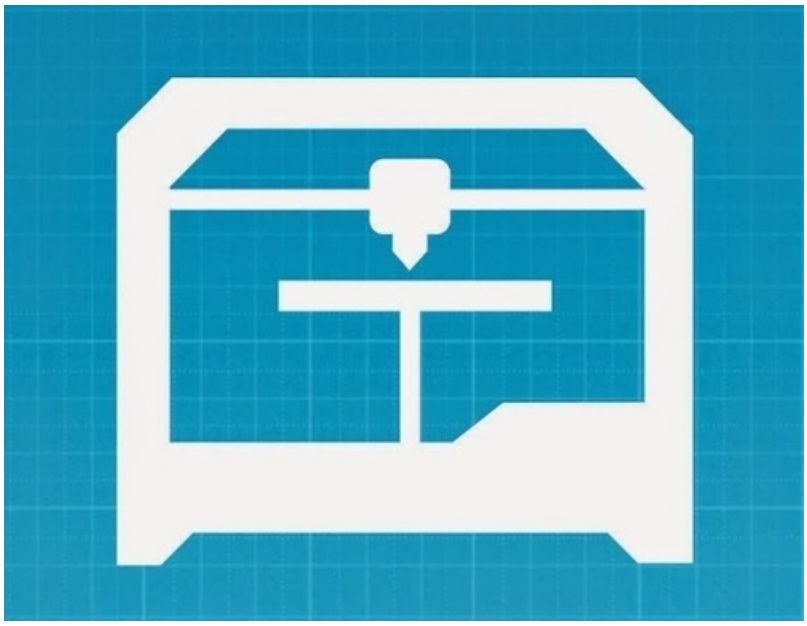
adafruit learning system

# Adafruit Desktop 3D Printer Buyers Guide

Created by Justin Cooper



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## Overview and Comparison Grid

Starting in 2012 Adafruit has stocked a handful of 3D printers, accessories, and supplies, and provide resources to help our community create better 3D printed project that integrate electronics.

We created this guide as a handy reference to help you compare and contrast the options we offer. While we no longer carry the MakerBot Adafruit Edition (http://adafru.it/1292) (the manufacturer has discontinued the Replicator 2 line), we included this model as a point of reference.

Have you considered building a 3D project around an Arduino (https://adafru.it/cEi) or other microcontroller? How about printing a bracket to mount your Raspberry Pi (https://adafru.it/aQw) to the back of your HD monitor? And don't forget the countless LED projects (https://adafru.it/ck6) that are possible when you are modeling your projects in 3D! The Adafruit Learning System (https://adafru.it/aPR) has dozens of great tools to get you well on your way to producing mechanisms, enclosures, interactive art, and design with your 3D printer.

| | | | | | |
|---|---|---|---|---|---|
| Manufacturer | Printrbot | Printrbot | SeeMeCNC | Printrbot Metal Plus | Type A Machines |
| Model | Printrbot Simple Kit - 1405 Model | PrintrBot Simple Metal 3D Printer - Black - Assembled | See-Me-CNC ORION™ Delta 3D Printer - Black | Printrbot Metal Plus | Series 1 |
| Print Technology | FFF/FDM | FFF/FDM | FFF/FDM | FFF/FDM | FFF/FDM |
| Layer Resolultion (Z) | 0.1mm | 0.1mm | 0.075mm-0.35mm | 0.0125mm | 0.1mm |
| Filament Material | PLA, *Flexible (*with mods in Adafruit Learn System) | PLA, *Flexible (*with mods in Adafruit Learn System) ABS with the purchase of a hot plate accessory | ABS, PLA, HIPS, PVA, and wood filaments, copperFill, BronzeFill, glowFill | ABS, PLA, HIPS, PVA, and wood filaments | PLA, *Flexible (*with mods in Adafruit Learn System) ABS with the purchase of a hot plate accessory, copperFill, BronzeFill, glowFill |
| Filament | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| Filament Diameter | 1.75mm | 1.75mm | 1.75mm | 1.75mm | 1.75mm |
| Nozzle Diameter | 0.4mm | 0.4mm | 0.35mm | 0.5mm | 0.4mm |
| Machine Size | 8" x 14" x 11" | 14" x 10" x 16" | 26.8" x 20.5" x 20.3" | 14" Diameter x 24" Tall | 419.1mm x 139.7mm x 431.8mm (Bed needs 431.8mm to move in the X & Y) |
| Print Volume | 4" x 4" x 4.5" | 6" x 6" x 6" | 11.7" x 10.8" x 9.8" | 6" diameter x 9.25" height (cylinder) | 10" x 10" x 10" |
| Top Speed | 60-65mm/s | 80mm/s | 200mm/sec | 300mm/s | 70mm/s |
| Machine Firmware | Marlin (Printrbot) | Marlin (Printrbot) | Repetier Firmware (Orion) | Marlin (Printrbot) | Marlin |
| **Hardware License** | Open source; most parts shared as CC BY-SA 3.0. | Open source; most parts shared as CC BY-SA 3.0 (professionally machined metal fold body elements excluded). | Open Source; most parts shared under GPLv3 and CC by SA 4.0. | Pending. | Pending. |
| **Unique Features** | Auto Level Sensor<br>Redesigned Chassis<br>1/4" acme drive rod<br>Metal print bed<br>Clearly labeled laser cut parts for easier assembly<br>New fan shroud design<br>GT2 Belts and Pulleys | Auto Level Sensor<br>Steel and Aluminum Body<br>Minimal Setup Needed<br>Metal Print Bed<br>GT2 Belts and Pulleys<br>Z-Axis Coupler | Heated Borosilicate glass bed covered with PET film<br>Designed to Print Experimental Feedstock<br>Awarded a RYF Certification from Free Software Foundation | Delta-style Printer<br>Fixed, heated bed<br>Tall printing area.<br>High speed positioning (up to 300mm/s)<br>LCD Display & Interface - print untethered | Auto Level Sensor<br>Redesigned Chassis<br>12mm Linear Rails<br>Aluminum print bed<br>GT2 Belts and Pulleys<br>Linear rails and carts |

| | | | | | |
|---|---|---|---|---|---|
| | Z-Axis Coupler<br><br>Requires Assembly | | | from SD! | |

## The Bottom Line - Collected!

- **Durability, modularity and one of the largest build volumes in its class.** Type A Machines Series 1 (http://adafru.it/2412) The Series 1 3D Printer features a sleek metal design, large build volume, and a new high-durability all-metal extruder for added reliability and the ability to print with a wider range of materials.
- **Our most affordable printer.** Printrbot Simple Kit (http://adafru.it/1735) offers an affordable introduction to 3D printing -- one that performs better than other printers in its price bracket. Now with more primo features from the Simple Metal kit, including auto leveler and GT2-based movement system. Ideal for the mechanically-inclined, who are eager to learn more about how printing works. *(Note: requires assembly.)*
- **Print big with** Printrbot Simple Metal (http://adafru.it/1760). Packing significant printing power into a small foot print weighing only 25 lbs. This affordable, assembled printer offers primo features such as the auto level sensor, milled metal print bed, linear rails and carts for stability and smooth movement of the print head and bed. The GT2 belt and aluminum pulley system facilitates precise movement of the print head and bed.
- **Meet the sleek new Simple Metal**. Now with a metal frame coated in our favorite color -- "Adafruit black" -- the Printrbot Simple Metal (http://adafru.it/1760) packs significant printing power into a small (and portable) printer. An affordable, assembled printer design that benefited from generations of Printrbots models, and offers primo features such as the auto level sensor, milled metal print bed, GT2 belts and pulleys, and z-axis coupler.
- **A Delta Printer Anyone Can Setup & Enjoy!** Easy to setup and operate -- and half the cost of many of the Delta printers available on the market --the ORION™ Delta 3D Printer (http://adafru.it/2259) is the first Delta suitable for first-time 3D printing hobbyists, teachers and students. Expert users who spend extra effort dialing in this machine and building their own custom slicing profiles using tools such as Cura and Simplify3D will raise the baseline of the print quality from good up to excellent.

## Type A Machines Series 1

https://adafru.it/Cdj

https://adafru.it/Cdj

https://adafru.it/eY5

https://adafru.it/eY5

## Type A Machines Series 1 (http://adafru.it/2412)

Built to last, and better than ever. The **Series 1 3D printer** from Type A Machines offers durability, modularity and one of the largest build volumes in its class.

Featuring a streamlined aluminum and acrylic body, a glass build surface and a precision laser cut CNC folded metal chassis, the Series 1 pushes the envelope in desktop 3D printing by matching a class leading one cubic foot of build volume with further improvements to the easy bed-leveling system and revolutionary interface for network 3D printing.

Thanks to the modular platform design, future users can look forward to easy in-the-field upgrades within the pipeline,including the introduction of embedded wifi connectivity, a heated glass bed, and an improved extruder with multi-material support.

The all new all-aluminum extruder is a game changer. The single piece melt path reduces clogging, allows for better temperature and print control, and works with a wider variety of printing materials, including PLA, High Carbon PLA and PET. It's easy to clean and easy to replace, so you're printing more and troubleshooting less.

The Series 1 is also ready to connect to a home network right out of the box. Using the free Meshmixer (https://adafru.it/eY6) application you can print with just one-click.

http://adafru.it/2412

http://adafru.it/2412

## Pros

- Open source hardware.
- Network and Wi-Fi Ready
- Friendly Warranty - Can be extensively customized and upgraded.
- Designed to handle the range of needs for the broadest range of printing materials, including experimental materials.
- Designed to survive for the longhaul. Streamlined aluminum and acrylic body, a glass build surface, and a precision laser cut CNC folded metal chassis.
- Designed for use with open source software. Can use a variety of control software run on a broad range of operating systems.

## Cons

- More expensive than many of the other open hardware options.
- Heavy, large footprint.

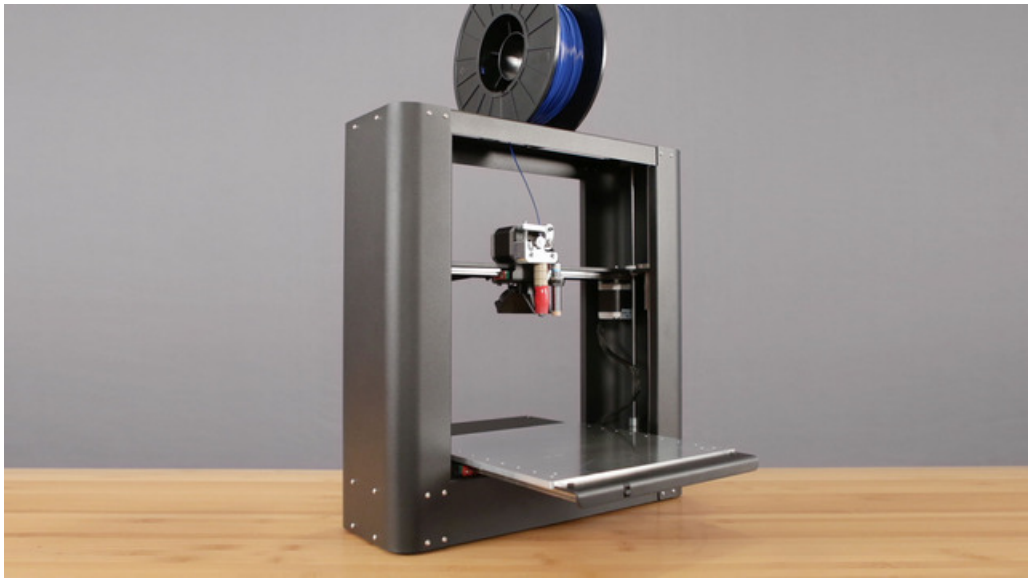
## Who is this machine for?

- Inventors/Innovators/Entrepreneurs
- Universities/Fab Labs
- Architects/Engineers/Industrial Designers
- Medical practices
- Manufacturers

## Bottom Line

Durability, modularity and one of the largest build volumes in its class. **Type A Machines Series 1 (http://adafru.it/2412)** 3D Printer features a sleek metal design, large build volume, and a new high-durability all-metal extruder for added reliability and the ability to print with a wider range of materials.

## Printrbot Models



## Printrbot Metal Plus (http://adafru.it/1735)

https://adafru.it/Cdk

https://adafru.it/Cdk

The new Printrbot Metal Plus is a simple minimalistic design that has a bigger build area, upgraded Linear rail System, and of course a sturdy power coated metal frame. Print objects as big as 10 x 10 x 10 (254mm x 254mm x 254mm) inches using 1.75mm PLA filament.

The linear rail and carts offer smooth stable movement of the print head and bed.

The machined aluminum bed is extremely flat, with a large build area that can produce prints up to 10 inch cube.

The extruder is an aluminum (direct drive) 1.75mm Metal Ubis Hot End with 0.4mm nozzle.

https://adafru.it/eun

https://adafru.it/eun

### Pros

- Our most affordable large 3D printer.
- Can print at resolutions to compete with more expensive printers.
- Auto Level Sensor makes setup (https://adafru.it/euo) for each print a snap.
- Fully customizable - can be modified with a heated bed for ABS prints or for special purposes such as printing with flexible filament.
- A great way to learn how 3D printers work.

### Cons

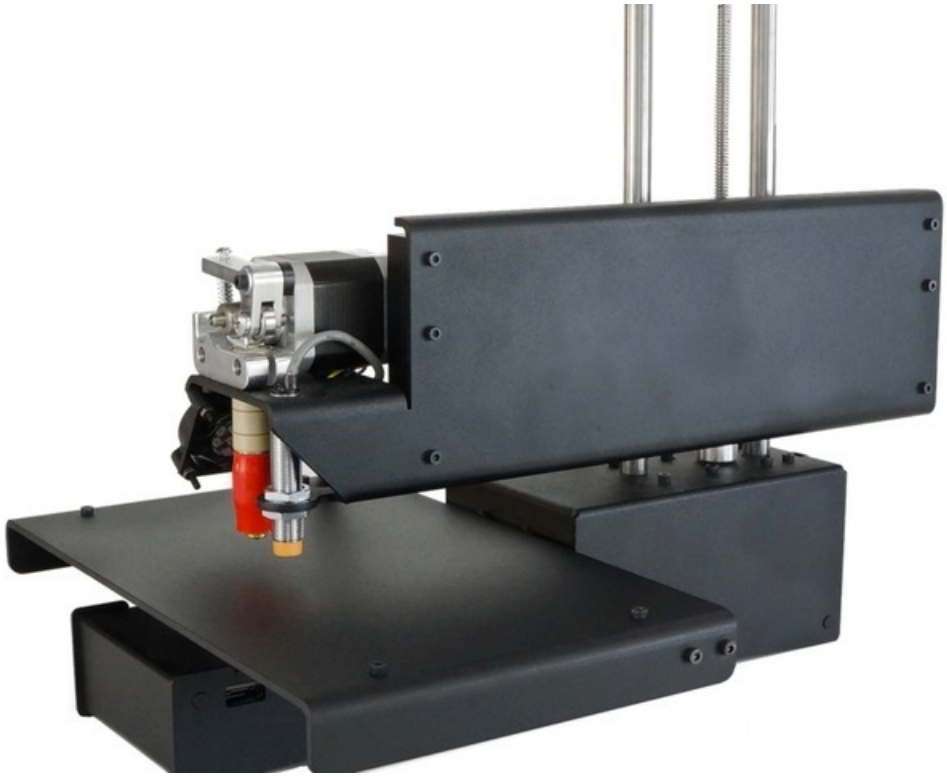
- While the metal case is mostly a benefit, it adds significant weight.
- Offers very little shielding from drafts, a liability when printing large objects.
- Not as easy to extend and modify as the wood/kit edition.

Who is this machine for?

- 3D printing newbies.
- Educators/students.
- Hobbyists, Crafters, Designers.

Bottom Line

The Printrbot Simple Metal (http://adafru.it/1760) packs significant printing power into a small foot print only weighing 25 lbs. An affordable, assembled printer design that benefited from generations of Printrbots models, and offers primo features such as the auto level sensor, milled metal print bed, linear rails and carts for stability and smooth movement of the print head and bed. The GT2 belt and aluminum pulley system facilitates precise movement of the print head and bed. The NEMA 17 stepper motors meet the National Electrical Manufacturers Association (NEMA) standard ICS 16-2001.



## PrintrBot Simple Metal 3D Printer - Black - Assembled (http://adafru.it/1760)

New from Printrbot, the Metal Simple is a brand new rock solid, all metal, fully-assembled Printrbot Simple! As opposed to the Printrbot Simple Kit (http://adafru.it/1735), all of the laser cut wood parts have been replaced by rock solid metal and assembled. In fact, the total number of parts have been reduced to just a fraction of the wooden model. The all-metal construction combined with a GT2 belt pulley system and aluminum direct-drive extruder produces a 3D print that rivals those of other manufacturers which cost thousands more!

The Printrbot Simple is an exercise in 3D printing minimalism. It includes only what is needed to get started in the world of 3D printing. With the All-metal Printrbot Simple you'll have a fully-functioning 3D printer that weighs only 12 lbs

and fits nicely on your desk!

http://adafru.it/1760

http://adafru.it/1760

**PROs**

- While higher cost than the Kit, still very affordable for an assembled printer!
- Can print at resolutions to compete with more expensive printers.
- Rigid enough to improve printing -- and to be your portable printer.
- Auto Level Sensor makes setup for each print a snap.

**CONs**

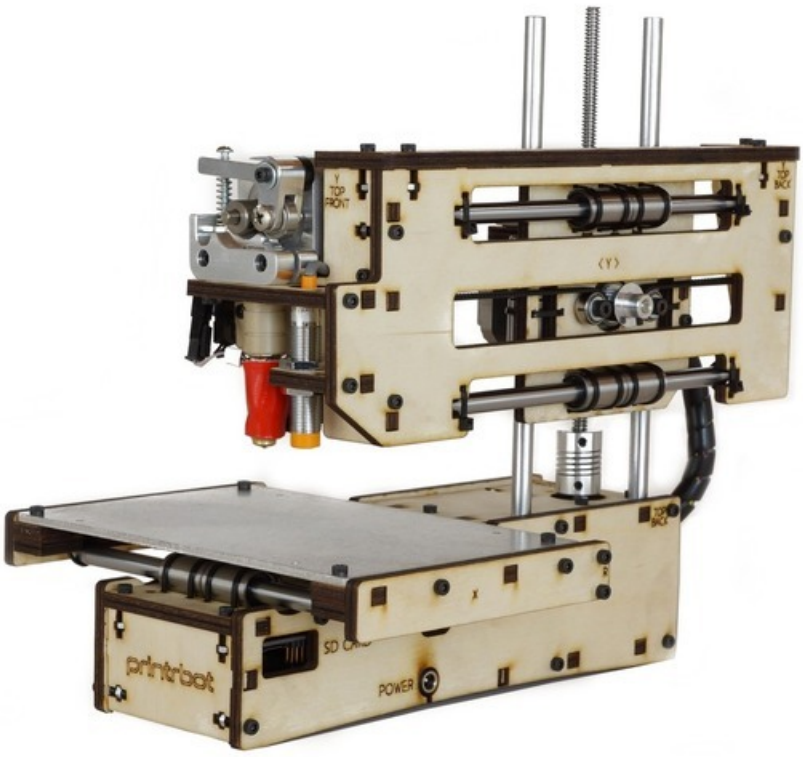
- While the metal case is mostly a benefit, it adds significant weight.
- Offers very little shielding from drafts, a liability when printing large objects.
- Not as easy to extend and modify as the wood/kit edition.

**Who is this machine for?**

- 3D printing newbies.
- Educators/students.
- Hobbyists, Crafters, Designers.

**Bottom Line**

With a sleek metal frame coated in our favorite color -- "Adafruit black" -- the Printrbot Simple Metal packs significant printing power into a small (and portable) printer. An affordable, assembled printer design that benefited from generations of Printrbots models, and offers primo features such as the auto level sensor, milled metal print bed, GT2 belts and pulleys, and z-axis coupler.



## Printrbot Simple Kit - 1405 Model (http://adafru.it/1735)

The Printrbot Simple is an exercise in 3D printing minimalism. It includes only what is needed to get started in the world of 3D printing. After building this kit you'll have a fully-functioning 3D printer that weighs only 10 lbs and fits nicely on your desk

As of October 17th, the 1405 Model update ships with a number of the new features introduced in the Simple Metal printer, including an auto level sensor, redesigned chassis, metal print bed, GT2 belts and pulleys, and Z-Axis Coupler.

http://adafru.it/1735

http://adafru.it/1735

**PROs?**

- Our most affordable 3D printer.
- Can print at resolutions to compete with more expensive printers.
- Fully customizable - can be modified for larger print surfaces or for special purposes such as printing flexible filament.
- A great way to learn how 3D printers work -- by assembling one.
- Auto Level Sensor makes setup for each print a snap.

**CONs?**

- Be prepared to apply a bit more elbow grease to dial in your printer for printing at higher resolutions.
- Small build platform. (Unless you modify and extend your machine.)
- Offers very little shielding from drafts, a liability when printing large objects.

**Who is this machine for?**

- 3D printing newbies.
- Educators/students.
- Hobbyists.
- Everyone. Seriously. We have had customers with 2-3 printers already purchasing this one because it is just so darned cute.

**Bottom Line**

Printrbot Simple Kit offers an affordable introduction to 3D printing -- one that performs better than other printers in its price bracket. And now with more of the primo features from the Simple Metal kits as well. Ideal for the mechanically-inclined, who are eager to learn more about how printing works. And it is so darned cute!

PLEASE NOTE: This model is a kit and not for beginners! You'll get all the parts to assemble your own 3D printer but it does require some technical expertise, time and effort to assemble.

## See-Me-CNC - Orion Delta Printer

https://adafru.it/ikd

https://adafru.it/ikd

### CURA Orion Delta Profiles

Our preferred software for slicing parts is CURA from Ultimaker. Below is our profiles for CURA slicer settings. You can import the .ini file by using the “Open Profile...” option in the File menu.

https://adafru.it/ike

https://adafru.it/ike

## ORION™ Delta 3D Printer Black (http://adafru.it/2259)

The ORION™ Delta 3D Printer is an exciting and attractive new 3D printer from the folks at SeeMe CNC that's designed to print ABS, PLA, and other materials from the very beginning.  There's no need to refine or do anything to your printer - so you really have a ton more options for material than you usually do with an unmodified 3D printer.

There's also an up-front LCD panel so you can see your printing status and an on-board SD card to store up to 4GB of files.  The printer runs with high speed positioning (up to 300mm/s) with high precision at 50 micron accuracy.

This printer doesn't require much set up or configuration and you can basically start printing right out of the box.  Comes with a 0.5mm nozzle and includes a 1lb spool of PLA filament.  And if you need more, we carry a wide variety of filament here. (http://adafru.it/2080)

http://adafru.it/2259

http://adafru.it/2259

**PROs**

- Excellent resolution for small prints at 100 microns
- The small foot print is very welcoming in cramped spaces, enclosing it for printing in ABS will also save on space.
- The drive gear is on the back, so it's also more faster due to less weight on the extruder.
- Great value for a pre-assembled Delta with professionally manufactured parts such as injection molded Delta arms and Universal Joint brackets.
- Aluminum extrusions provide sturdy vertical tracks for the carriages.
- Print completely untethered with an onboard LCD interface allowing for printing from SD card *and* printer calibration.
- It is really fun watching this delta printing!

**CONs**

- Adjusting the endstop trigger screws at the top of each carriage is crucial to good printing, but time consuming to dial in accurately. It's worth doing this carefully!
- If the carriages are not tightened appropriately to the tracks, backlash can produce radial deformation, more difficult to identify and troubleshoot than backlash on a Cartesian machine. Adjust the "eccentric cams" to dial in the right grip on the rails, and you are back in business!
- Many of the best prints we have seen with these printers are using custom configurations for Cura, MatterSlice, or Simply3D rather than the original Slic3R profiles -- reach out to the active See-Me-CNC community and support resources for the latest slicing suggestions. (They will be sharing more resources for us to link to here as well!)

**Who's the Machine For?**

- Educators and students.
- Shop-owners, hackerspaces, and entrepreneurs looking to mesmerize onlookers.
- Those looking to print tall narrow objects such as 3D portraits.
- 3D Hobbyists eager to try a Delta -- who have been scared off by high price tag and steep learning curve of earlier Delta kits.

**Bottom Line**

Easy to setup and operate -- and half the cost of many of the Delta printers available on the market -- the Orion is the first Delta suitable for first-time 3D printing hobbyists, teachers and students. Expert users who spend extra effort dialing in this machine and building their own custom slicing profiles using tools such as Cura and Simplify3D will raise the baseline of the print quality from good up to excellent.

ADULT SUPERVISION REQUIRED. CHILDREN
SURFACE BECOMES VERY HOT. AND MAY
DO NOT TOUCH UNTIL 10 MINUTES AFTER
USE THIS PRODUCT AT YOUR OWN RISK
RISK OF FIRE. DO NOT LEAVE UNATTENDED
SEEMECNC.COM
Model: ORION HB
Part #: 58744
REV1
HEAT ON
ORION
SeeMeCN
18.8/ 0°B 18/ 0°
Z: 0.00
Mul:100 Buf: 0
Printer ready.