

 **MakerBot**  
**“METHOD METAL”**  
**BASF Ultrafuse 316L**


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February 2021



# Agenda

- METHOD Metal - Positioning
- Properties & Applications
- How to Print Ultrafuse 316L

 **MakerBot METHOD**  
Now with METAL

3D print solid metal parts with MakerBot METHOD

**Starting at \$4,999 \$3999**



**Solid 316L Stainless Steel Parts**

**Print Metals, Composites, and Polymers  
all on one machine**

# BASF Ultrafuse® 316L

Print solid metal parts on METHOD

BASF Ultrafuse 316L Stainless Steel parts combine the next level strength, rigidity, and durability needed for end-use parts and manufacturing tools.



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**550° C**  
**MAX TEMPERATURE**

**561 Mpa**  
**TENSILE STRENGTH**

**128 HV10**  
**HARDNESS**



**Gripper claws  
concave inserts**



**High torque planetary  
gear system**

# Properties & Applications

# Properties & Applications

## BASF 316 Ultrafuse

### Properties

- High heat resistance of up to 550°C
- Corrosion Resistance
- Tensile strength of up to 561 MPa

### Common Applications

- Custom Bracketry
- Jigs and Fixtures
- End Effectors
- Oil & Gas Industry Components
- Wastewater Processing Components

### Why 3D Print Stainless Steel

- Weight Savings over traditional machining
- Less expensive than outsourcing prototypes
- Lower cost for some low volume components

### Why METHOD

- Delamination in a print can lead to a failure during debinding and sintering. METHOD's heated chamber and rigid metal frame ensure strong layer adhesion and layer alignment.



# METAL vs. CARBON FIBER

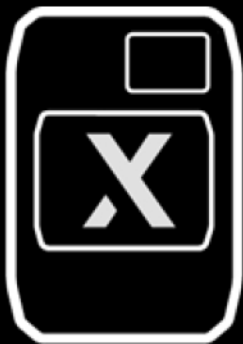
Metal 3D printing is a hot topic that will bring in interest from a wide range of 3D printing users. However, it is a significantly more complex and expensive process than using Nylon 12 Carbon Fiber or Nylon Carbon Fiber.

We should ensure that our customers have access to our composite offering as their primary material. Metal should be an experimental add on.

MakerBot Nylon Carbon Fiber	BASF Ultrafuse 316L (Stainless Steel)
<ul style="list-style-type: none"><li>+ Faster parts, fewer workflow steps</li><li>+ No design limitations, soluble support</li><li>+ Higher precision</li><li>+ Lower cost</li><li>+ More Integrated Workflow</li><li>- Lower strength, stiffness, and heat resistance</li></ul>	<ul style="list-style-type: none"><li>+ Higher strength, stiffness, and heat resistance</li><li>+ Better corrosion resistance</li><li>- Longer time to part and extra workflow steps (part removal, debinding sintering)</li><li>- Design limitations, no support material</li><li>- Lower precision due to shrinkage</li><li>- More expensive</li><li>- Less Integrated Workflow</li></ul>
Up to 184°C HDT	Up to 550°C Max Temp
Up to 110 MPa Tensile Strength	Up to 561 MPa Tensile Strength



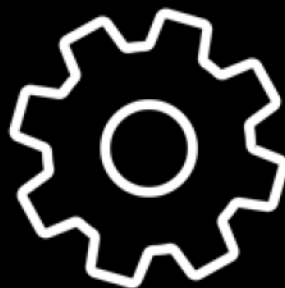
# How to Print Ultrafuse 316L



**Step 1**  
Print



**Step 2**  
Send in your green part



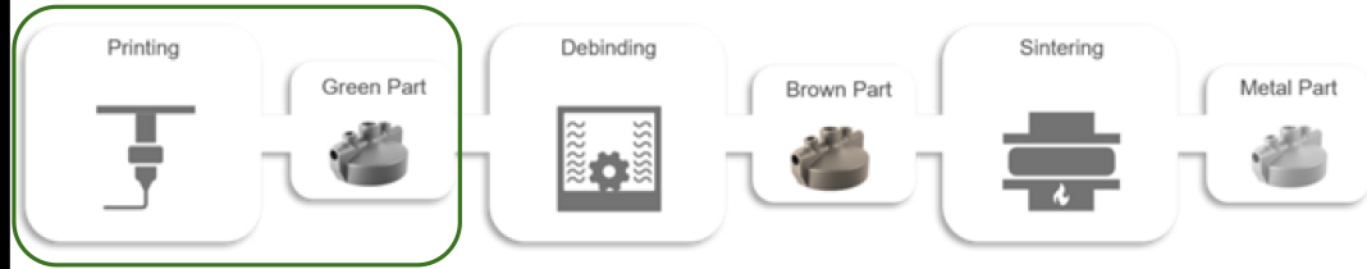
**Step 3**  
Receive solid metal part

# 316L Printing Process

## Printing Setup

You will need the following items to get started

- METHOD or METHOD X
- LABS Gen 2 Experimental Extruder
- BASF Ultrafuse 316L Filament
- A local Debinding and Sintering Partner
- Dimafix Glue for Build Plate Adhesion
- Polybox for material storage

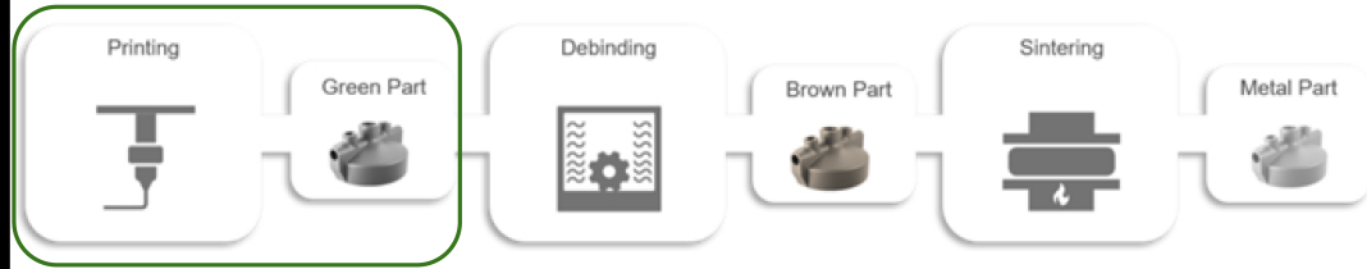


# 316L Printing Process

## Printing Setup

You should use extra caution when setting up to start your print.

- Completely purge your nozzle to ensure that no filament is left over in your extruder from a previous print. Foreign material in your part will cause it to fail during post processing.
- Ensure the nozzles on both extruders are completely clean. Again, any foreign material in the part will result in a failure during post processing.
- Calibrate

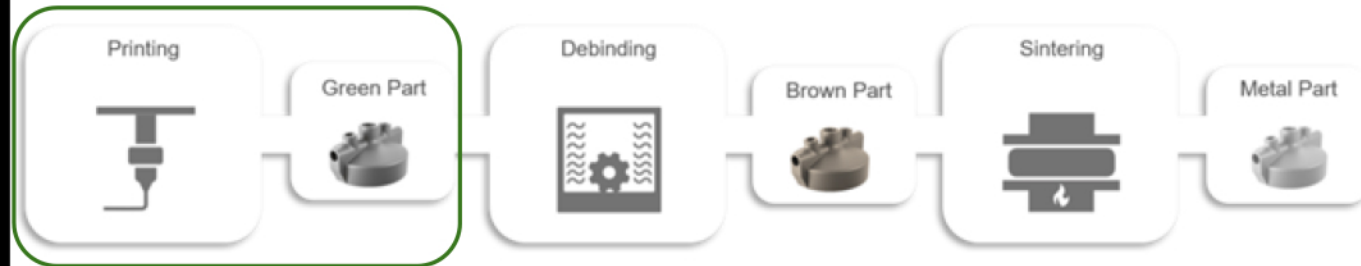


# 316L Printing Process

## Part Design and Orientation

There are a lot more restrictions on geometry than any METHOD material. We cannot use the same value props of Geometrical Freedom and part accuracy

- Parts should be flat on one side to help build plate adhesion
- Parts should have a high width to height ratio
  - Think short and wide rather than tall and narrow
- Thin walls will delaminate and fail in sintering
  - 1.5mm minimum
- Your parts should have the same thickness throughout to help the part shrink uniformly in sintering
- Avoid Overhangs which are likely to fail in sintering
  - There is no support material so users will need to design supports
- Recommended part dimensions no larger than 100mm cube

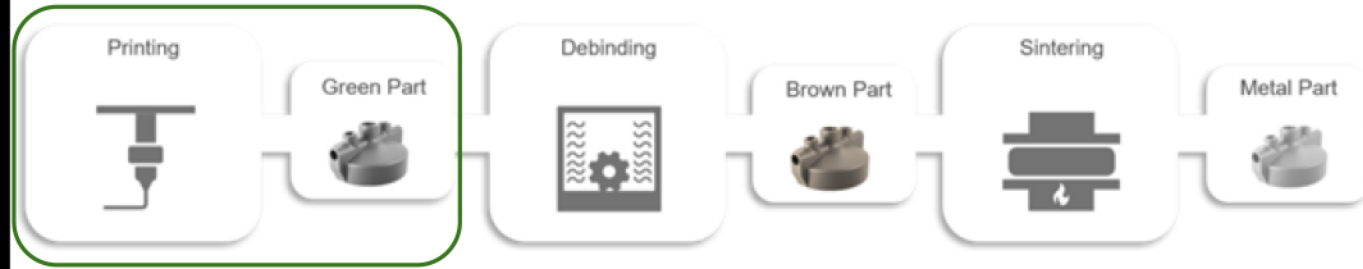


# 316L Printing Process

## Post Processing

In order to receive the best possible results, there are a few steps to follow

- Do not flex the build plate to remove your part. This can cause delamination of the bottom layers.
  - Submerge your build plate in water until the glue bond has broken.
- Clean any foreign substances from your part.
  - Fingerprints, adhesives, oils, etc.
- Remove any excess material such as rafts, blobs, and strings
- Clean up any blemishes through sanding. This will greatly improve your surface finish.
- Follow the instructions from your local sintering partner





**Thank You**