# D3D Pro 3D Printer Assembly Instructions

## Table of Contents

# 1. Assemble 12.7mm x 450mm Rebar Stake

## 1.1. Tools

| Name | Description | Notes |
|---|---|---|
| Circular Saw | Circular Saw | |
| Cutoff Wheel | Metal Cutoff Wheel | Make sure that the cutoff wheel that you purchase is compatible with your cutting tool! |
| Vise | Metal Jaw Vise | |
| Measuring Tape | Measuring Tape | |
| Permanent Marker | Permanent Marker | |

## 1.2. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | rebar-stake-stock-length | Stock Length Rebar Stake | 12.7mm Rebar Stake Stock Length v1.0.0 | |

## 1.3. Precautions

- **Circular Saw:** Circular saws can cause permenent injury or death! Follow all manufacturer recommended safety precautions!

## 1.4. Procedure

### 1.4.1. Cut 12.7mm x 450mm Rebar Stake to Length

**Required Tools**

- Circular Saw
- Cutoff Wheel
- Vise
- Measuring Tape
- Permanent Marker

**Required Parts**

- Stock Length Rebar Stake

**Instructions**

1. While following the **Circular Saw** manufacturer's instructions, install the **Cutoff Wheel** into the **Circular Saw**.
2. Affix the **Stock Length Rebar Stake** into the **Vise**, leaving enough **Stock Length Rebar Stake** sticking out to make the cut.
3. Mark the 250mm length on the **Stock Length Rebar Stake** using the **Measuring Tape** and **Permanent Marker**. Make sure that there is enough space marked for the width of the cutting blade!
4. Using the **Circular Saw**, make the cut on the **Stock Length Rebar Stake** where previously marked.
5. Repeat the above steps for all of the needed lengths of **12.7mm x 450mm Rebar Stake**.

# 2. Assemble Universal Frame Top

## 2.1. Tools

| Name | Description | Notes |
|---|---|---|
| 5mm Allen Wrench | 5mm Allen Wrench | |
| Hobby Knife | Hobby Knife | |

## 2.2. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 4 part(s) | rebar-stake | Rebar Stake | 12.7mm x 450mm Rebar Stake v1.0.0 | |
| 12 part(s) | m6-20mm-screw | M6 x 20mm Screw | M6 x 20mm Socket Head Cap Screw v1.0.0 | |
| 12 part(s) | m6-thin-nut | M6 Thin Nut | M6 Thin Nut v1.0.0 | |
| 2 part(s) | corner-connector-left | Left Corner Connector | Universal Frame Corner Connector Left v1.0.0 | |
| 2 part(s) | corner-connector-right | Right Corner Connector | Universal Frame Corner Connector Right v1.0.0 | |

## 2.3. Procedure

### 2.3.1. Clean 3D Printed Parts

**Required Tools**

- Hobby Knife

**Required Parts**

- Left Corner Connector
- Right Corner Connector

**Instructions**

1. Use the **Hobby Knife** to clean any extra plastic off of the **Left Corner Connector** part(s) and **Right Corner Connector** part(s).

### 2.3.2. Prepare Left Corner Connector part(s) and Right Corner Connector part(s) for Rebar Stake part(s)

**Required Tools**

- 5mm Allen Wrench

**Required Parts**

- Left Corner Connector
- Right Corner Connector

- M6 x 20mm Screw
- M6 Thin Nut

**Instructions**

1. Insert an **M6 Thin Nut** into the slot of the **Left Corner Connector** so that the hole of the **M6 Thin Nut** aligns with the hole in the **Left Corner Connector**.
2. While holding the **M6 Thin Nut** in place with a finger, insert an **M6 x 20mm Screw** into the hole of the **Left Corner Connector**.
3. Using the **5mm Allen Wrench**, screw in the **M6 x 20mm Screw** enough to hold the **M6 x 20mm Screw** and **M6 Thin Nut** in place. Leave room for the **Rebar Stake** to be inserted later.
4. Repeat the above steps for each of the three slots on the **Left Corner Connector**.
5. Repeat each of the above steps for the **Left Corner Connector** part(s), and **Right Corner Connector** part(s).

### 2.3.3. Assemble Universal Frame Top

**Required Tools**

- 5mm Allen Wrench

**Required Parts**

- Left Corner Connector
- Right Corner Connector
- Rebar Stake

**Instructions**

1. Insert one **Rebar Stake** into a slot on a **Left Corner Connector**.
2. Press the **Rebar Stake** down hard into the slot so that the part(s) are flush with the bottom of the slot. This step is important to ensure squareness in the frame.
3. Using the **5mm Allen Wrench**, screw down the **M6 x 20mm Screw** in against the **Rebar Stake** until it is tight. If the plastic of the **Left Corner Connector** begins to strain or crack, unscrew the **M6 x 20mm Screw** slightly to reduce the pressure.
4. Insert the other end of the **Rebar Stake** into a **Right Corner Connector** and repeat the above steps to press and tighten down the **Right Corner Connector**.
5. Repeat the above steps so that there are two completed **Rebar Stake** part(s) with **Left Corner Connector** part(s) and **Right Corner Connector** part(s) on the ends.
6. Insert two **Rebar Stake** part(s) into the completed **Rebar Stake** part(s) from the previous step so that a square is formed.
7. Press the square together hard to seat the **Left Corner Connector** part(s) and **Right Corner Connector** part(s) onto the **Rebar Stake** part(s).
8. Tighten the four loose **M6 x 20mm Screw** part(s) down onto the **Rebar Stake** part(s) to

complete the **Universal Frame Top Top**. As above, if the plastic of the **Left Corner Connector** part(s) or **Right Corner Connector** part(s) begins to strain or crack, unscrew the **M6 x 20mm Screw** slightly to reduce the pressure.

# 3. Assemble 12.7mm x 450mm Rebar Stake

## 3.1. Tools

| Name | Description | Notes |
|---|---|---|
| Circular Saw | Circular Saw | |
| Cutoff Wheel | Metal Cutoff Wheel | Make sure that the cutoff wheel that you purchase is compatible with your cutting tool! |
| Vise | Metal Jaw Vise | |
| Measuring Tape | Measuring Tape | |
| Permanent Marker | Permanent Marker | |

## 3.2. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | rebar-stake-stock-length | Stock Length Rebar Stake | 12.7mm Rebar Stake Stock Length v1.0.0 | |

## 3.3. Precautions

- **Circular Saw:** Circular saws can cause permenent injury or death! Follow all manufacturer recommended safety precautions!

## 3.4. Procedure

### 3.4.1. Cut 12.7mm x 450mm Rebar Stake to Length

**Required Tools**

- Circular Saw
- Cutoff Wheel
- Vise
- Measuring Tape
- Permanent Marker

**Required Parts**

- Stock Length Rebar Stake

**Instructions**

1. While following the **Circular Saw** manufacturer's instructions, install the **Cutoff Wheel** into the **Circular Saw**.
2. Affix the **Stock Length Rebar Stake** into the **Vise**, leaving enough **Stock Length Rebar Stake** sticking out to make the cut.
3. Mark the 250mm length on the **Stock Length Rebar Stake** using the **Measuring Tape** and **Permanent Marker**. Make sure that there is enough space marked for the width of the cutting blade!
4. Using the **Circular Saw**, make the cut on the **Stock Length Rebar Stake** where previously marked.
5. Repeat the above steps for all of the needed lengths of **12.7mm x 450mm Rebar Stake**.

# 4. Assemble Universal Frame Base

## 4.1. Tools

| Name | Description | Notes |
|---|---|---|
| 5mm Allen Wrench | 5mm Allen Wrench | |
| Hobby Knife | Hobby Knife | |

## 4.2. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 4 part(s) | rebar-stake | Rebar Stake | 12.7mm x 450mm Rebar Stake v1.0.0 | |
| 12 part(s) | m6-20mm-screw | M6 x 20mm Screw | M6 x 20mm Socket Head Cap Screw v1.0.0 | |
| 12 part(s) | m6-thin-nut | M6 Thin Nut | M6 Thin Nut v1.0.0 | |
| 4 part(s) | corner-connector | Corner Connector | Universal Frame Corner Connector v1.0.0 | |

## 4.3. Procedure

### 4.3.1. Clean 3D Printed Parts

**Required Tools**

- Hobby Knife

**Required Parts**

- Corner Connector

**Instructions**

1. Use the **Hobby Knife** to clean any extra plastic off of the **Corner Connector** part(s).

### 4.3.2. Prepare Corner Connector part(s) for Rebar Stake part(s)

**Required Tools**

- 5mm Allen Wrench

**Required Parts**

- Corner Connector
- M6 x 20mm Screw
- M6 Thin Nut

**Instructions**

1. Insert an **M6 Thin Nut** into the slot of the **Corner Connector** so that the hole of the **M6 Thin Nut** aligns with the hole in the **Corner Connector**.
2. While holding the **M6 Thin Nut** in place with a finger, insert an **M6 x 20mm Screw** into the hole of the **Corner Connector**.
3. Using the **5mm Allen Wrench**, screw in the **M6 x 20mm Screw** enough to hold the **M6 x 20mm Screw** and **M6 Thin Nut** in place. Leave room for the **Rebar Stake** to be inserted later.
4. Repeat the above steps for each of the three slots on the **Corner Connector**.
5. Repeat each of the above steps for the **Corner Connector** part(s).

### 4.3.3. Assemble Universal Frame Base

**Required Tools**

- 5mm Allen Wrench

**Required Parts**

- Corner Connector
- Rebar Stake

**Instructions**

1. Insert one **Rebar Stake** into a slot on the **Corner Connector**.
2. Press the **Rebar Stake** down hard into the slot so that the part(s) are flush with the bottom of the slot. This step is important to ensure squareness in the frame.
3. Using the **5mm Allen Wrench**, screw down the **M6 x 20mm Screw** in against the **Rebar Stake** until it is tight. If the plastic of the **Corner Connector** begins to strain or crack, unscrew the **M6 x 20mm Screw** slightly to reduce the pressure.
4. Insert the other end of the **Rebar Stake** into another **Corner Connector** and repeat the above steps to press and tighten down the **Corner Connector**.
5. Repeat the above steps so that there are two completed **Rebar Stake** part(s) with **Corner Connector** part(s) on the ends.
6. Insert two **Rebar Stake** part(s) into the completed **Rebar Stake** part(s) from the previous step so that a square is formed.
7. Press the square together hard to seat the **Corner Connector** part(s) onto the **Rebar Stake** part(s).
8. Tighten the four loose **M6 x 20mm Screw** part(s) down onto the **Rebar Stake** part(s) to complete the **Universal Frame Base Base**. As above, if the plastic of the **Corner Connector** part(s) begins to strain or crack, unscrew the **M6 x 20mm Screw** slightly to reduce the pressure.

# 5. Assemble 12.7mm x 450mm Rebar Stake

## 5.1. Tools

| Name | Description | Notes |
|---|---|---|
| Circular Saw | Circular Saw | |
| Cutoff Wheel | Metal Cutoff Wheel | Make sure that the cutoff wheel that you purchase is compatible with your cutting tool! |
| Vise | Metal Jaw Vise | |
| Measuring Tape | Measuring Tape | |
| Permanent Marker | Permanent Marker | |

## 5.2. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | rebar-stake-stock-length | Stock Length Rebar Stake | 12.7mm Rebar Stake Stock Length v1.0.0 | |

## 5.3. Precautions

- **Circular Saw:** Circular saws can cause permenent injury or death! Follow all manufacturer recommended safety precautions!

## 5.4. Procedure

### 5.4.1. Cut 12.7mm x 450mm Rebar Stake to Length

**Required Tools**

- Circular Saw
- Cutoff Wheel
- Vise
- Measuring Tape
- Permanent Marker

**Required Parts**

- Stock Length Rebar Stake

**Instructions**

1. While following the **Circular Saw** manufacturer's instructions, install the **Cutoff Wheel** into the **Circular Saw**.
2. Affix the **Stock Length Rebar Stake** into the **Vise**, leaving enough **Stock Length Rebar Stake** sticking out to make the cut.
3. Mark the 250mm length on the **Stock Length Rebar Stake** using the **Measuring Tape** and **Permanent Marker**. Make sure that there is enough space marked for the width of the cutting blade!
4. Using the **Circular Saw**, make the cut on the **Stock Length Rebar Stake** where previously marked.
5. Repeat the above steps for all of the needed lengths of **12.7mm x 450mm Rebar Stake**.

# 6. Assemble Universal Frame Module

## 6.1. Tools

| Name | Description | Notes |
|---|---|---|
| 5mm Allen Wrench | 5mm Allen Wrench | |

# 6.2. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 4 part(s) | rebar-stake | Rebar Stake | 12.7mm x 450mm Rebar Stake v1.0.0 | |
| 1 module | universal-frame-base | Universal Frame Base | Universal Frame Base v1.0.0 | |
| 1 module | universal-frame-top | Universal Frame Top | Universal Frame Top v1.0.0 | |

# 6.3. Procedure

## 6.3.1. Assemble Universal Frame Module

**Required Tools**

- 5mm Allen Wrench

**Required Parts**

- Rebar Stake
- Universal Frame Top
- Universal Frame Base

**Instructions**

1. Orient the **Universal Frame Top** so that the open slots point upward.
2. Insert the four **Rebar Stake** part(s) into the slots of the **Universal Frame Top**.
3. Firmly press each **Rebar Stake** part(s) into the **Universal Frame Top** so that they are flush with the bottom of the slots in the **Universal Frame Top**.
4. Tighten down all of the remaining fasteners on the **Universal Frame Top** to secure the **Rebar Stake** part(s) in place. If the plastic of the **Universal Frame Top** begins to strain or crack, unscrew the fastener slightly to reduce the pressure.
5. Orient the **Universal Frame Base** so that the open slots point upward.
6. Insert the four **Rebar Stake** part(s) that are connected to the **Universal Frame Top** into the slots of the **Universal Frame Base**.
7. Firmly press the **Universal Frame Top** down onto the **Universal Frame Base** so that the **Rebar Stake** part(s) are properly seated.
8. Tighten down all of the remaining fasteners on the **Universal Frame Base** to secure the **Rebar Stake** part(s) in place. If the plastic of the **Universal Frame Base** begins to strain or crack, unscrew the fastener slightly to reduce the pressure.
9. The **Universal Frame Module** is complete.

# 7. Assemble Fast Heated Bed Top Plate

## 7.1. Tools

| Name | Description | Notes |
|---|---|---|
| Plate Jig | Fast Heated Bed Plate Jig | |
| Permanent Marker | Permanent Marker | |
| Vise Grip Pliers | Vise Grip Pliers | |
| Welder | Welder | |
| Welding Brush | Wire Welding Brush | |

## 7.2. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | steel-sheet | Steel Sheet | 16 Gauge 300mm x 300mm Steel Sheet v1.0.0 | |
| 4 part(s) | m6-25mm-screw | M6 x 25mm Screw | M6 x 25mm Socket Head Cap Screw v1.0.0 | |

## 7.3. Precautions

- **Welder:** DO NOT ATTEMPT TO WELD WITHOUT PROPER PERSONAL PROTECTIVE EQUIPMENT AND PROPER TRAINING. If necessary, have this part fabricated by someone who can safely perform the work.
- **Welder:** Welding is an operation that can be harmful or FATAL if done improperly. Follow all instructions and precautions included with the welder and use common sense!

## 7.4. Procedure

### 7.4.1. Prepare the Steel Sheet for Welding

**Required Tools**

- Plate Jig
- Welding Brush
- Permanent Marker

**Required Parts**

- Steel Sheet

**Instructions**

1. Use the **Welding Brush** on the **Steel Sheet** to scrape off any surface impurities near the corners where the welds will occur.
2. Align the **Plate Jig** to one of the corners of the **Steel Sheet**.
3. In each of the holes on the **Plate Jig**, mark a circle the size of the hole using the **Permanent Marker**.

### 7.4.2. Weld the M6 x 25mm Screw part(s) to the Steel Sheet

**Required Tools**

- Welder
- Vise Grip Pliers

**Required Parts**

- Steel Sheet
- M6 x 25mm Screw

**Instructions**

1. Using **Vise Grip Pliers**, secure a **M6 x 25mm Screw** over one of the **Plate Jig** circles drawn previously.
2. While wearing proper safety equipment, spot weld the **M6 x 25mm Screw** to the **Steel Sheet** using the **Welder**.
3. Repeat the above steps for the remaining **Plate Jig** marks until there are a total of four **M6 x 25mm Screw** part(s) in the locations indicated by the **Plate Jig**.
4. Clean off the welding marks on both sides of the **Steel Sheet** using the **Welding Brush**.

# 8. Assemble Fast Heated Bed Halogen Lightbulb Assembly

## 8.1. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 3 part(s) | halogen-lightbulb | Halogen Lightbulb | R7S 118mm Halogen Lightbulb v1.0.0 | |
| 3 part(s) | halogen-lightbulb-holder | Halogen Lightbulb Holder | R7S 118mm Halogen Lightbulb Holder v1.0.0 | |

## 8.2. Procedure

### 8.2.1. Assemble Fast Heated Bed Halogen Lightbulb Assembly

**Instructions**

.

# 9. Assemble 0.5 Inch Trade Size 250mm Long Metal Conduit

## 9.1. Tools

| Name | Description | Notes |
|---|---|---|
| Circular Saw | Circular Saw | |
| Cutoff Wheel | Metal Cutoff Wheel | Make sure that the cutoff wheel that you purchase is compatible with your cutting tool! |
| Vise | Metal Jaw Vise | |
| Measuring Tape | Measuring Tape | |
| Permanent Marker | Permanent Marker | |

## 9.2. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | conduit-stock-length | Stock Length Metal Conduit | 0.5 Inch Trade Size Stock Length Metal Conduit v1.0.0 | |

## 9.3. Precautions

- **Circular Saw:** Circular saws can cause permenent injury or death! Follow all manufacturer recommended safety precautions!

## 9.4. Procedure

### 9.4.1. Cut 0.5 Inch Trade Size 250mm Long Metal Conduit to Length

**Required Tools**

- Circular Saw

- Cutoff Wheel
- Vise
- Measuring Tape
- Permanent Marker

**Required Parts**

- Stock Length Metal Conduit

**Instructions**

1. While following the **Circular Saw** manufacturer's instructions, install the **Cutoff Wheel** into the **Circular Saw**.
2. Affix the **Stock Length Metal Conduit** into the **Vise**, leaving enough **Stock Length Metal Conduit** sticking out to make the cut.
3. Mark the 250mm length on the **Stock Length Metal Conduit** using the **Measuring Tape** and **Permanent Marker**. Make sure that there is enough space marked for the width of the cutting blade!
4. Using the **Circular Saw**, make the cut on the **Stock Length Metal Conduit** where previously marked.
5. Repeat the above steps for all of the needed lengths of **0.5 Inch Trade Size 250mm Long Metal Conduit**.

# 10. Assemble Fast Heated Bed Bottom Plate

## 10.1. Tools

| Name | Description | Notes |
|---|---|---|
| Plate Jig | Fast Heated Bed Plate Jig | |
| Permanent Marker | Permanent Marker | |
| Drill Press | Drill Press | |
| 7mm Drill Bit | 7mm Sheet Metal Drill Bit | |
| Metal File | Metal File | |

## 10.2. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | steel-sheet | Steel Sheet | 16 Gauge 300mm x 300mm Steel Sheet v1.0.0 | |

## 10.3. Precautions

- **Drill Press:** Drill presses can cause permanent injury or possibly death! Do not wear loose fitting clothing, put your hair up, and wear proper PPE including (but not limited to) safety glasses when operating the machine.

## 10.4. Procedure

### 10.4.1. Drill the Fast Heated Bed Bottom Plate

**Required Tools**

- Plate Jig
- Permanent Marker
- Drill Press
- 7mm Drill Bit
- Metal File

**Required Parts**

- Steel Sheet

**Instructions**

1. Align the **Plate Jig** to one of the corners of the **Steel Sheet**.
2. In each of the holes on the **Plate Jig**, mark a circle the size of the hole using the **Permanent Marker**.
3. Insert the **7mm Drill Bit** into the chuck of the **Drill Press** and secure it tightly per the manufacturer's instructions.
4. Turn on the drill press and drill holes through each of the marks made on the **Steel Sheet** in the earlier steps.
5. Using the **Metal File**, file down any metal burrs created by the **Drill Press** on the **Steel Sheet**.

# 11. Assemble Fast Heated Bed Module

## 11.1. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 2 part(s) | 8mm-rod | 8mm Rod | 8mm x 600mm Smooth Rod v1.0.0 | |
| 2 part(s) | autoparallel | Autoparallel | Autoparallel Part v1.0.0 | |

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | bottom-plate | Fast Heated Bed Bottom Plate | Fast Heated Bed Bottom Plate v1.0.0 | |
| 2 part(s) | clamp | Fast Heated Bed Clamp | Fast Heated Bed Clamp v1.0.0 | |
| 4 part(s) | conduit | Metal Conduit | 0.5 Inch Trade Size 250mm Long Metal Conduit v1.0.0 | |
| 2 part(s) | corner-brace | Corner Brace | 2 inch x 5/8 Inch Corner Brace (Four Holes) v1.0.0 | |
| 1 part | lightbulb-assembly | Halogen Lightbulb Assembly | Fast Heated Bed Halogen Lightbulb Assembly v1.0.0 | |
| 4 part(s) | m6-20mm-screw | M6 x 20mm Screw | M6 x 20mm Socket Head Cap Screw v1.0.0 | |
| 8 part(s) | m6-nut | M6 Nut | M6 Nut v1.0.0 | |
| 1 part | pei-sheet | PEI Sheet | 300mm x 300mm PEI Sheet v1.0.0 | |
| 4 part(s) | sleeve | Carbon Fiber Blanket Sleeve | Carbon Fiber Blanket Sleeve v1.0.0 | |
| 1 part | thermistor | Thermistor | NTC 100K ohm B3950 Thermistor Cartridge v1.0.0 | |
| 1 part | top-plate | Fast Heated Bed Top Plate | Fast Heated Bed Top Plate v1.0.0 | |

# 11.2. Procedure

## 11.2.1. Assemble Fast Heated Bed Module

**Instructions**

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# 12. Assemble Universal Axis Motor Side Module

## 12.1. Procedure

### 12.1.1. Assemble Universal Axis Motor Side Module

**Instructions**

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# 13. Assemble Universal Axis Idler Side Module

## 13.1. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | universal-axis-idler-side | Universal Axis Idler Side | Universal Axis Idler Side Part v1.0.0 | |

## 13.2. Procedure

### 13.2.1. Assemble Universal Axis Idler Side Module

**Instructions**

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# 14. Assemble Universal Z Axis Module

## 14.1. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 module | universal-axis-idler-side-assembly | Universal Axis Idler Side | Universal Axis Idler Side Module v1.0.0 | |
| 1 module | universal-axis-motor-side-assembly | Universal Axis Motor Side | Universal Axis Motor Side Module v1.0.0 | |

## 14.2. Procedure

### 14.2.1. Assemble Universal Z Axis Module

**Instructions**

.

# 15. Assemble Universal Axis Motor Side Module

## 15.1. Procedure

### 15.1.1. Assemble Universal Axis Motor Side Module

**Instructions**

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# 16. Assemble Universal Axis Idler Side Module

## 16.1. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | universal-axis-idler-side | Universal Axis Idler Side | Universal Axis Idler Side Part v1.0.0 | |

## 16.2. Procedure

### 16.2.1. Assemble Universal Axis Idler Side Module

**Instructions**

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# 17. Assemble Universal Y2 Axis Module

## 17.1. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 module | universal-axis-idler-side-assembly | Universal Axis Idler Side | Universal Axis Idler Side Module v1.0.0 | |
| 1 module | universal-axis-motor-side-assembly | Universal Axis Motor Side | Universal Axis Motor Side Module v1.0.0 | |

## 17.2. Procedure

### 17.2.1. Assemble Universal Y2 Axis Module

**Instructions**

.

# 18. Assemble Universal Axis Motor Side Module

## 18.1. Procedure

### 18.1.1. Assemble Universal Axis Motor Side Module

**Instructions**

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# 19. Assemble Universal Axis Idler Side Module

## 19.1. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | universal-axis-idler-side | Universal Axis Idler Side | Universal Axis Idler Side Part v1.0.0 | |

## 19.2. Procedure

### 19.2.1. Assemble Universal Axis Idler Side Module

**Instructions**

.

# 20. Assemble Universal Y1 Axis Module

## 20.1. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 module | universal-axis-idler-side-assembly | Universal Axis Idler Side | Universal Axis Idler Side Module v1.0.0 | |
| 1 module | universal-axis-motor-side-assembly | Universal Axis Motor Side | Universal Axis Motor Side Module v1.0.0 | |

## 20.2. Procedure

### 20.2.1. Assemble Universal Y1 Axis Module

**Instructions**

.

# 21. Assemble Universal Axis Motor Side Module

## 21.1. Procedure

### 21.1.1. Assemble Universal Axis Motor Side Module

**Instructions**

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# 22. Assemble Universal Axis Idler Side Module

## 22.1. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | universal-axis-idler-side | Universal Axis Idler Side | Universal Axis Idler Side Part v1.0.0 | |

## 22.2. Procedure

### 22.2.1. Assemble Universal Axis Idler Side Module

**Instructions**

.

# 23. Assemble Universal X Axis Module

## 23.1. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 module | universal-axis-idler-side-assembly | Universal Axis Idler Side | Universal Axis Idler Side Module v1.0.0 | |
| 1 module | universal-axis-motor-side-assembly | Universal Axis Motor Side | Universal Axis Motor Side Module v1.0.0 | |

## 23.2. Procedure

### 23.2.1. Assemble Universal X Axis Module

**Instructions**

.

# 24. Assemble Hot End Assembly

## 24.1. Tools

| Name | Description | Notes |
|---|---|---|
| 1mm Allen Wrench | 1mm Allen Wrench | |
| 24v Power Supply | 24V Industrial Power Supply Module | |
| 2mm Allen Wrench | 2mm Allen Wrench | |
| 7mm Socket Wrench | 7mm Socket Wrench | |
| Needle Nose Pliers | Needle Nose Pliers | |
| Slip Joint Pliers | Slip Joint Pliers | |
| Metal Jaw Vise | Metal Jaw Vise | The jaws of the vise must be metal for heat resistance. |

## 24.2. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | heat-break | Heat Break | 1.75mm Heat Break v1.0.0 | |
| 1 part | heater-cartridge | Heater Cartridge | 24V 70W 6mm Diameter Ceramic Heater Cartridge v1.0.0 | |
| 1 part | heatsink-block | Heatsink Block | Universal Gearless Extruder Heatsink Block v1.0.0 | |
| 2 parts | m3-10mm-screw | M3 x 10mm Cap Screw | M3 x 10mm Cap Screw v1.0.0 | |
| 1 part | m3-4mm-grub-screw | M3 x 4mm Grub Screw | M3 x 4mm Grub Screw v1.0.0 | |
| 1 part | m6-thin-nut | M6 Thin Nut | M6 Thin Nut v1.0.0 | |
| 1 part | nozzle | Volcano Nozzle | 1.75mm Volcano Style Filament Extrusion Nozzle (0.4mm) v1.0.0 | |
| 2 drop(s) | thermal-paste | Thermal Paste | Thermal Paste v1.0.0 | |
| 1 part | thermistor | Thermistor Cartridge | NTC 100K ohm B3950 Thermistor Cartridge v1.0.0 | |

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | volcano-heater-block | Volcano Style Heater Block | Volcano Style Heater Block v1.0.0 | |

# 24.3. Precautions

- **Heater Cartridge:** The Heater Cartridge gets very hot when powered! Use caution when handling.

# 24.4. Procedure

## 24.4.1. Assemble the Volcano Style Heater Block

**Required Tools**

- 1mm Allen Wrench
- 2mm Allen Wrench

**Required Parts**

- M3 x 4mm Grub Screw
- M3 x 10mm Cap Screw
- Volcano Style Heater Block

**Instructions**

1. Unpack required parts from bag.
2. Using the **2mm Allen Wrench**, lightly screw the **M3 x 10mm Cap Screw** parts into the two threaded holes on the side of the **Volcano Style Heater Block**.
3. Using the **1mm Allen Wrench**, lightly screw the **M3 x 4mm Grub Screw** into the single threaded hole on the side of the **Volcano Style Heater Block**. Be sure to leave enough room for the **Thermistor Cartridge** to be inserted later.
4. Insert the **Heater Cartridge** into the **Volcano Style Heater Block** with the wires coming out of the end with an indent.
5. Insert the **Thermistor Cartridge** with the wires coming out of the same side as the previous step.
6. Screw down the **M3 x 4mm Grub Screw** part lightly using a **1mm Allen Wrench** to fasten the **Thermistor Cartridge**, but very lightly as the part can go right through the **Thermistor Cartridge**.
7. Screw down the **M3 x 10mm Cap Screw** parts using a **2mm Allen Wrench**, so that the **Volcano Style Heater Block** is secured. Do this evenly by screwing down one **M3 x 10mm Cap Screw** then the other and alternating four times.

8. Screw the **Volcano Nozzle** into the end of the **Volcano Style Heater Block** that does not have wires, until there is 1/2 of a thread exposed.
9. Screw the short end of the **Heat Break** into the other side of the **Volcano Style Heater Block** until it bottoms out against the **Volcano Nozzle**.

## 24.4.2. Hot tighten the Volcano Nozzle and Heat Break

**Required Tools**

- 24v Power Supply
- 7mm Socket Wrench
- Needle Nose Pliers

**Required Parts**

- M6 Thin Nut
- Volcano Style Heater Block
- Heater Cartridge
- Thermistor Cartridge

**Instructions**

1. Gently secure the **Volcano Style Heater Block** in the **Metal Jaw Vise**, leaving enough clearance to tighten down the **Volcano Nozzle**.
2. Attach the **Heater Cartridge** wires onto the output of the **24v Power Supply** and power on the **24v Power Supply**.
3. Wait two minutes for the **Volcano Style Heater Block** to get hot.
4. Using **Needle Nose Pliers**, hold the **Heat Break** in place while tightening down the **Volcano Nozzle** using the **7mm Socket Wrench**. Make sure that the **Volcano Nozzle** bottoms out against the **Heat Break**, not against the **Volcano Style Heater Block** - the goal is to close the filament flow gap between the **Volcano Nozzle** and **Heat Break**.
5. Once tightened, disconnect the **Heater Cartridge** from the **24v Power Supply**.

## 24.4.3. Attach the Heatsink Block

**Required Tools**

- Slip Joint Pliers

**Required Parts**

- M6 Thin Nut
- Volcano Style Heater Block
- Thermal Paste
- Heatsink Block

**Instructions**

1. Wait at least five minutes for the **Volcano Style Heater Block** to cool down to a temperature that is safe to touch.
2. Reposition the **Volcano Style Heater Block** in the **Metal Jaw Vise** so that the long end of the **Heat Break** is accessible to tools.
3. Screw the **M6 Thin Nut** onto the **Heat Break** until the **M6 Thin Nut** is near the gap on the **Heat Break**.
4. Apply one drop(s) of **Thermal Paste** to the threads of the **Heat Break** and spread the **Thermal Paste** evenly across the threads.
5. Bend the **Heater Cartridge** wires out of the way so you can screw on the heat sink. Hold the bottom of the **Heater Cartridge** wire with **Needle Nose Pliers** so that when the wires are bent down they won't break from the **Heater Cartridge**.
6. Screw the **Heatsink Block** onto the **Heat Break** so that the **Heat Break** sticks out 2mm above the **Heatsink Block**.
7. Line up the wider sides of the **Heatsink Block** and the **Volcano Style Heater Block**.
8. Tighten the **M6 Thin Nut** against the **Heatsink Block** using **Slip Joint Pliers**.
9. Remove the completed **Hot End Assembly** from the **Metal Jaw Vise**.

# 25. Assemble Universal Gearless Extruder Module

## 25.1. Tools

| Name | Description | Notes |
|---|---|---|
| 1.75mm Filament | 1.75mm 3D Printer Filament | |
| 1mm Allen Wrench | 1mm Allen Wrench | |
| 2.5mm Allen Wrench | 2.5mm Allen Wrench | |
| 5mm Allen Wrench | 5mm Allen Wrench | |
| Hobby Knife | Hobby Knife | |

## 25.2. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | 40mm-fan | 40mm Fan | 24v 40mm x 40mm x 10mm Fan v1.0.0 | |
| 1 part | 40mm-heatsink | 40mm Heatsink Fins | Mk7/Mk8 40mm Heatsink v1.0.0 | |

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | 608-bearing | 608 ZZ Bearing | 608 ZZ Bearing v1.0.0 | |
| 1 part | active-cooling-height-sensor-plotter | Secondary Extruder Part | Universal Gearless Extruder Active Cooling Height Sensor Plotter Part v1.0.0 | 3D Printed Part |
| 1 part | blower-fan | Blower Fan | 24V 5015 Blower Fan v1.0.0 | |
| 1 part | extruder-gear | Filament Drive Gear | Mk7 Extruder Drive Gear v1.0.0 | |
| 1 part | extruder-spring | Extruder Spring | 10mm Outer Diameter 35mm Long 1.2mm Thick Compression Spring v1.0.0 | |
| 1 part | height-sensor | Height Sensor | LJ18A3-8-Z-BY-5V Proximity Switch v1.0.0 | |
| 1 part | hot-end-assembly | Hot End Assembly | Hot End Assembly v1.0.0 | |
| 4 part(s) | m3-20mm-screw | M3 x 20mm Screw | M3 x 20mm Socket Head Cap Screw v1.0.0 | |
| 2 part(s) | m3-30mm-screw | M3 x 30mm Screw | M3 x 30mm Socket Head Cap Screw v1.0.0 | |
| 4 part(s) | m3-8mm-screw | M3 x 8mm Screw | M3 x 8mm Socket Head Cap Screw v1.0.0 | |
| 1 part(s) | m6-25mm-screw | M6 x 25mm Screw | M6 x 25mm Socket Head Cap Screw v1.0.0 | |
| 1 part | m6-nut | M6 Nut | M6 Nut v1.0.0 | |
| 1 part | motor-mount | Motor Mount | Universal Gearless Extruder Motor Mount Part v1.0.0 | 3D Printed Part |
| 1 part | split-wire-loom | 2 Meter Split Wire Loom | 1/2 Inch Flame Retardant Split Wire Loom v1.0.0 | |

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 part | spring-tensioner | Spring Tensioner Arm | Universal Gearless Extruder Spring Tensioner Arm v1.0.0 | 3D printed part |
| 1 part | stepper-motor | Nema 17 Stepper Motor | Nema 17 0.5Nm Stepper Motor v1.0.0 | |
| 1 part | stepper-motor-cable | 2 Meter Stepper Motor Cable | Stepper Motor Wire 4 Pin Dupont to 6 Pin XH2.54 v1.0.0 | |
| 2 drop(s) | thermal-paste | Thermal Paste | Thermal Paste v1.0.0 | |
| 1 part | zip-tie-small | Small Zip Tie | 4 Inch Zip Tie v1.0.0 | |

# 25.3. Procedure

## 25.3.1. Assemble the Motor Mount

**Required Tools**

- 2.5mm Allen Wrench
- Hobby Knife

**Required Parts**

- Motor Mount
- Nema 17 Stepper Motor
- M3 x 8mm Screw
- M6 Nut

**Instructions**

1. Clean off any extra plastic on the **Motor Mount** using a **Hobby Knife**.
2. Insert the **M6 Nut** into the slot in the middle of the **Motor Mount**.
3. Insert the **Nema 17 Stepper Motor** into the **Motor Mount** with the mounting holes lined up.
4. In the top right corner, use the **2.5mm Allen Wrench** to screw an **M3 x 8mm Screw** through the **Motor Mount** and into the mounting hole on the **Nema 17 Stepper Motor**.

## 25.3.2. Add the Secondary Extruder Part

**Required Tools**

- 2.5mm Allen Wrench
- Hobby Knife

**Required Parts**

- Secondary Extruder Part
- Blower Fan
- M3 x 8mm Screw
- M3 x 20mm Screw

**Instructions**

1. Clean off any extra plastic on the **Secondary Extruder Part** using a **Hobby Knife**.
2. Line up the **Secondary Extruder Part** with the mounting holes on the left side of the **Motor Mount**.
3. Using the **2.5mm Allen Wrench**, screw an **M3 x 8mm Screw** into the furthest back mounting hole.
4. Insert the open end of the **Blower Fan** into the fan duct on the **Secondary Extruder Part**.
5. Using the **2.5mm Allen Wrench**, screw two **M3 x 20mm Screw** part(s) into the mounting holes of the **Blower Fan** to mount it to the **Secondary Extruder Part**.
6. Use the **2.5mm Allen Wrench** to screw **M3 x 8mm Screw** part(s) into the remaing open mounting holes in the **Secondary Extruder Part**.

## 25.3.3. Install Hot End Assembly

**Required Tools**

- 2.5mm Allen Wrench

**Required Parts**

- Secondary Extruder Part
- Hot End Assembly
- 40mm Heatsink Fins
- M3 x 30mm Screw
- Thermal Paste

**Instructions**

1. Apply one drop(s) of **Thermal Paste** to the flat area between the mounting holes on the **40mm Heatsink Fins**.

2. Place two **M3 x 30mm Screw** part(s) into the mounting holes of the **40mm Heatsink Fins** with the threads of the **M3 x 30mm Screw** part(s) sticking out of the flat side of the **40mm Heatsink Fins**.
3. Orient the **Hot End Assembly** with the longer side on the right.
4. Insert the **M3 x 30mm Screw** part(s) through the mounting holes of the **Hot End Assembly**. This should squish the **Thermal Paste** between the **Hot End Assembly** and the **40mm Heatsink Fins**.
5. Position the **Hot End Assembly** mounting holes against the bottom mounting holes of the **Nema 17 Stepper Motor** in the **Motor Mount**.
6. Lightly screw down the **M3 x 30mm Screw** part(s) using the **2.5mm Allen Wrench** to hold the **Hot End Assembly** against the **Nema 17 Stepper Motor** in the **Motor Mount**, but not too hard as the position of the **Hot End Assembly** will be adjusted later.

## 25.3.4. Install and adjust Filament Drive Gear / Adjust Hot End Assembly

**Required Tools**

- 1.75mm Filament
- 1mm Allen Wrench
- 2.5mm Allen Wrench

**Required Parts**

- Filament Drive Gear
- Hot End Assembly
- Motor Mount

**Instructions**

1. Put the **Filament Drive Gear** on the shaft of the **Nema 17 Stepper Motor** in the **Motor Mount**. Do not tighten it down yet.
2. Insert the **1.75mm Filament** into the top of the **Hot End Assembly** and align the **Filament Drive Gear** teeth with the **1.75mm Filament**.
3. Tighten down the screw on the **Filament Drive Gear** using the **1mm Allen Wrench**.
4. Using the **1.75mm Filament** as a guide, tighten down the **M3 x 30mm Screw** part(s) on the **Hot End Assembly** using a **2.5mm Allen Wrench**. Make sure that the **1.75mm Filament** is coming *straight* out of the top of the **Hot End Assembly** before tightening.

## 25.3.5. Install Spring Tensioner Arm

**Required Tools**

- 2.5mm Allen Wrench
- Hobby Knife

**Required Parts**

- Motor Mount
- Spring Tensioner Arm
- Extruder Spring
- 608 ZZ Bearing
- M3 x 20mm Screw

**Instructions**

1. Clean off any extra plastic on the **Spring Tensioner Arm** using a **Hobby Knife**.
2. Press the **608 ZZ Bearing** onto the peg on the **Spring Tensioner Arm**.
3. With the arm of the **Spring Tensioner Arm** pointing right, screw the **Spring Tensioner Arm** onto the top left mounting hole on the front of the **Motor Mount** using a **M3 x 20mm Screw** and a **2.5mm Allen Wrench**.
4. Insert the **Extruder Spring** between the arm of the **Spring Tensioner Arm** and the mounting slot on the **Motor Mount**.

## 25.3.6. Install Height Sensor

**Required Tools**

- 5mm Allen Wrench

**Required Parts**

- Secondary Extruder Part
- Height Sensor
- M6 x 25mm Screw

**Instructions**

1. Insert the **Height Sensor** into the slot on the left side of the **Secondary Extruder Part**.
2. Adjust the height of the **Height Sensor** so the bottom is 2mm above the bottom of the **Secondary Extruder Part**.
3. Using the **5mm Allen Wrench**, screw the **M6 x 25mm Screw** into the hole at the back of the slot. Tighten the **M6 x 25mm Screw** only enough to hold the **Secondary Extruder Part** in place and not damage it.

## 25.3.7. Install 40mm Fan

**Required Tools**

- 2.5mm Allen Wrench

**Required Parts**

- 40mm Heatsink Fins
- 40mm Fan
- M3 x 20mm Screw

**Instructions**

1. Orient the **40mm Fan** over the **40mm Heatsink Fins** so that the fan will blow air toward the **40mm Heatsink Fins**.
2. Place the **40mm Fan** directly over the front of the **40mm Heatsink Fins** and screw it into place using two **M3 x 20mm Screw** part(s) and the **2.5mm Allen Wrench** in the bottom mounting holes of the **40mm Fan**. The screws will be held in the **40mm Heatsink Fins**.

### 25.3.8. Install and manage cables

**Required Parts**

- 2 Meter Stepper Motor Cable
- 2 Meter Split Wire Loom
- Small Zip Tie

**Instructions**

1. Connect the **2 Meter Stepper Motor Cable** to the **Nema 17 Stepper Motor** in the **Motor Mount**. There should only be one cable orientation that fits in the **Nema 17 Stepper Motor**.
2. Bundle the **Universal Gearless Extruder Module** wires such that when looking at the front of the Universal Gearless Extruder Module, the wires are sent to the right hand side.
3. Use a **Small Zip Tie** to hold the wires together.
4. Take all 15 **Universal Gearless Extruder Module** wires and pull them through the **2 Meter Split Wire Loom**.

# 26. Assemble D3D Pro 3D Printer

## 26.1. Materials

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 module | universal-controller | Universal Controller | Universal Controller Assembly v1.0.0 | |
| 1 module | universal-gearless-extruder | Universal Gearless Extruder | Universal Gearless Extruder Module v1.0.0 | |
| 1 module | universal-axis-x | Universal X Axis | Universal X Axis Module v1.0.0 | |

| Quantity | ID | Name | Description | Notes |
|---|---|---|---|---|
| 1 module | universal-axis-y1 | Universal Y1 Axis | Universal Y1 Axis Module v1.0.0 | |
| 1 module | universal-axis-y2 | Universal Y2 Axis | Universal Y2 Axis Module v1.0.0 | |
| 2 module | universal-axis-z | Universal Z Axis | Universal Z Axis Module v1.0.0 | |
| 1 module | fast-heated-bed | Fast Heated Bed | Fast Heated Bed Module v1.0.0 | |
| 1 module | universal-frame | Universal Frame | Universal Frame Module v1.0.0 | |

# 26.2. Procedure

## 26.2.1. Throw Universal Gearless Extruder out the window

**Required Parts**

- Universal Gearless Extruder

**Instructions**

1. Hello World!