

# First Time Setup for Clay 3D Printer (New Machine)

## 1. Unboxing & Basic Checks

**Component Verification:** Cross-check against the packing list to ensure all parts are intact: main unit, extruder, 6L stainless steel clay hopper, nozzle (optional sizes: 1.0/1.2/1.5/1.7/2.0mm), feeding tube, power cord, USB cable, and SD card.

### Mechanical Calibration

- **Bed Leveling:** Use a spirit level to adjust the bed's bottom support screws until fully level (error  $\leq 0.1\text{mm}$ ) to avoid first-layer misalignment.
- **Axis Testing:** Manually move the X/Y/Z axes to confirm smooth motion (no jamming). Ensure the Z-axis dual ball screws operate synchronously.
- **Hopper Installation:** Fill the hopper with clay, compact tightly, and seal to prevent air gaps (which cause extrusion gaps).

## 2. System Initialization & Connection

### Power & Software Setup

- Connect to a single-phase AC 110V/220V power supply. Turn on the printer and confirm the 3.5-inch color touchscreen (or control panel) displays device info correctly.
- Install the included slicing software on your computer. Connect the printer via USB and test stable communication.

### Nozzle & Air Pressure Calibration

- **Auto Home:** Execute "Auto Home" via software or touchscreen to ensure the nozzle returns to the origin accurately.
- **Nozzle-Bed Gap:** Use a 0.1mm feeler gauge or A4 paper to set the gap to 1-2mm (optimal for first-layer adhesion).
- **Air Pressure Test:** Turn on the remote air-fed system (adjust to 0.2-0.4MPa). Check for no leaks in the feeding tube and test continuous extrusion with the proximal screw feeder.

# 3. Material Preparation & Parameter Settings

## Clay Preprocessing

- Use manufacturer-recommended clay (e.g., porcelain clay, purple sand clay) with moisture content 18%-22%. Adjust viscosity by adding water or desiccant—ensure it's extrudable (aggregate size  $\leq 1\text{mm}$  for 1.5mm nozzles).
- Cut clay into small pieces, fill the hopper, and connect the feeding tube to the nozzle (check for no clogs).

## Key Parameter Recommendations

Parameter	First Test Setting	Reason
Layer Height	0.3–0.5mm (0.2–0.3x nozzle diameter)	Prevents collapse from overly thick layers
Print Speed	20–40mm/s (gradually up to 80mm/s)	Ensures uniform extrusion
Extrusion Multiplier	105%–110%	Improves layer adhesion
Retraction Distance	2–5mm	Avoids clay dripping during nozzle movement

# 4. Test Printing & Real-Time Monitoring

**Test Model Preparation:** Import a simple STL/OBJ model (e.g., 10cm×10cm×5cm cube or thin-walled part). Generate G-code via slicing software.

## Printing Controls

- **First-Layer Check:** Ensure clay spreads evenly with no warping or air bubbles. For poor adhesion, brush a thin layer of clay slurry or spray water on the bed.
- **Layer Bonding:** Monitor tight connection between layers—reduce speed or layer height if collapse occurs.
- **On-the-Fly Adjustments:** Fine-tune extrusion volume ( $\pm 20\%$ ) or speed via software/touchscreen to match clay properties.

## Troubleshooting

- **Clay Runout:** The printer has runout detection—pause immediately, clean the nozzle, and reload clay.
- **Nozzle Clog:** Heat the nozzle to 30-50°C (if supported) and manually retract clay to clear blockages.

## 5. Post-Test Checks & Optimization

### Print Quality Inspection

- **Dimensional Accuracy:** Measure with calipers—error should be  $\leq 0.5\text{mm}$ . Calibrate mechanical parameters or extrusion multiplier if needed.
- **Surface Quality:** Fix stringing, bubbles, or gaps by adjusting retraction, temperature, or clay moisture.

### Equipment Maintenance

- **Cleaning:** Remove dry clay residue from the nozzle, hopper, and bed immediately to avoid pipe blockages.
- **Lubrication:** Apply grease to X/Y axis rails; clean and lubricate Z-axis ball screws with high-temperature grease.

### Parameter Logging

Save test parameters (e.g., layer height 0.4mm, speed 30mm/s, extrusion multiplier 108%) and print samples as a reference for future production.

