# Cookbook – steps only

# Cookbook for 3D printing waveguides using Asiga Pico 3D printer

## Printing

The printer receives print jobs from the “Asiga Composer” program, which in turn accepts the STL file format (both text and binary). To print, open the program; select your printer and layer thickness (100 microns) and then “Add parts”.

## Model

Start with a block 3 mm thick that is large enough to fit your project. The waveguides should be 100 microns high and 200 microns wide, and should be confined to a single layer (top and bottom of the guide at heights that are whole multiples of 100 microns).

The waveguides need supports 300 microns high, 200 microns wide, and at least 500 microns long. The supports should be spaced about 1 mm apart (flexible to extension if needed), and be perpendicular to the waveguides at the point where they touch.

Extend the waveguide 200-300 microns beyond the point where you would like them to end for laser cutting.

## Print settings

In “Asiga Composer”, Place your pieces in the build area (using “Add parts” and “Auto place”), and use “Auto-place” to move everything to 0.00 base height (under “z-leveling”). Then press print.

On the first screen press “next” (no setting to change). The program will warn you that your pieces do not have supports and may fall. Ignore this warning (press “continue”).

On the next screen, set “base plate thickness” to 0 and “Erosion” to 0. Press “next”.

Under “Advanced Parameters”, set “Separation Velocity” and “Approach Velocity” to 5 mm/s, “Normal Wait Time (After Separation)” to 2 seconds, “Normal Wait Time (After Approach)” to 3 seconds and set exposure time to 2.3 seconds.

In the next screen, set a name for the print and send it to the printer.

## Removing print from printer and cleaning

Always use gloves when removing prints from the printer and cleaning them (The plastic is non-toxic, but is very hard to get off your hands).

Remove the platform from the printer (using the screw at the top) and carefully pry the print off of the platform into a container (there is a metal tool for this that comes with the printer).

Sometimes, there will be some “strings” of slightly hardened plastic hanging off the sides of the model. Cut them off carefully (without damaging the important feature of the print).

Rinse the print thoroughly with Isopropanol making sure to squirt it under all the bridged parts of the waveguide (gently!), rinse the Isopropanol off with water and then dry the print carefully with absorbent paper. Make sure all the bridged parts of the waveguide look white – if they appear clear, they are not bridged (rinse with Iso/water/dry again).

Cure the print in the “Flash” box for 20 minutes.

Limiting the prints exposure to Isopropanol and curing it as soon as possible result in smoother waveguides. However, if the waveguides are connected to the substrate and not bridged, a lot of light will leak from them into the substrate.

## Laser cutting the edges

Calibrate the laser to your print by cutting short lines at an unimportant spot and comparing where they are with where you drew them on the computer. Do not assume that your model is parallel to the rulers! – While the rulers of the laser cutter are parallel to the laser cutter’s motion, the edge of the model may not be.

Set the laser cutter to vector mode, 500 DPI, full speed, 75% power, and cut three times without moving the model.

This means, once the laser is aligned, cut the ends (press “Run”), wait a moment, then cut again without moving the model.