MonoPrinter.com

MonoWare Multi-Color & Grayscale Slicing

Rev. 1.0

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Revision History

Document number: MNWR-C04

Rev. 1.0	05-15-2024	Initial draft based on MonoWare **v0.47**

Please read thoroughly and contact us if you have any further questions or suggestions at info@monoprinter.com

MonoWare v0.47: link
Example 4-color grayscale model: SW2017 model, 3MF format

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1. Model preparation

- In this manual, we will use SolidWorks 2017 (SW2017) to prepare multi-color grayscale objects. The final output format is 3MF.
- Open SW2017 and design the model as usual with following exceptions.
- **Important rules for creating objects in SW2017 are as follows:**
  - The build surface of the printers from us is **X-Y plane** and Z-axis is out of screen. This is usually **FRONT PLANE** in Solidworks. If you start on a different plane, rotate the whole objects after you complete the design.

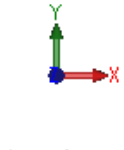

Fig. 1. Starting plane in SW2017

  - If you want different colors or different grayscale, objects shouldn't be merged together.

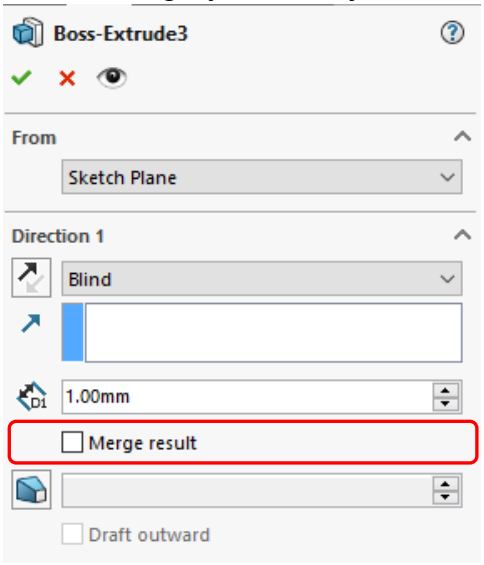

Fig. 2. SolidWorks extrude function with the merge option off

  - The color and grayscale information is stored as **APPEARANCE** of **BODY** or **FEATURES** (usually Extrude or Cut). If you have a single extrusion, either way will work. However, if you cut out the extruded feature, the newly created parts may not have a correct **APPEARANCE**. In this case, select all features and change their **APPEARANCE** of **BODY** to your desired color codes (for both color and grayscale).

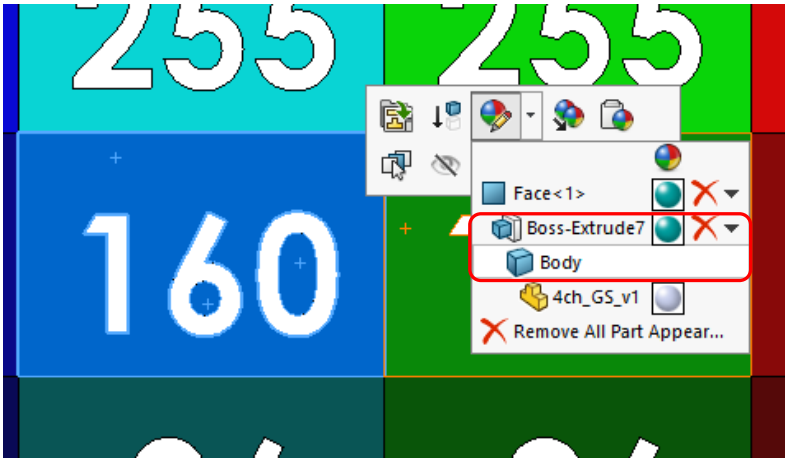

Fig. 3. Change Feature (extrude) or Body appearance to code the color and grayscale

- The color coding for correct import into MonoWare.
  - UV: (0, 0, **255**) :Zero for R and G
  - B: (0, **255**, **255**) :Zero for R. G & B should be identical
  - G: (0, **255**, 0) :Zero for R and B
  - R: (**255**, 0, 0) :Zero for G and B
- If you add grayscale (**GL**) information, you can change the color value to one of 1-255. For example:
  - (0, 0, 160) means UV color with GL 160
  - (0, 96, 96) means Blue color with GL 96
  - (196, 0, 0) means Red color with GL196

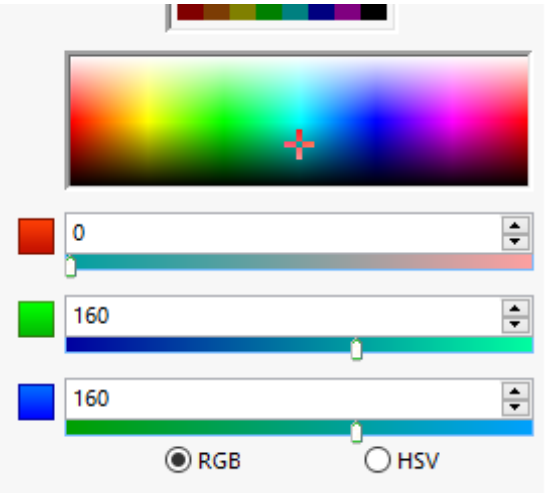

Fig. 4. Color coding for Blue (due to the identical G & B values) and Grayscale of 160

- When you export the design to 3MF format, make sure you include Appearance information.

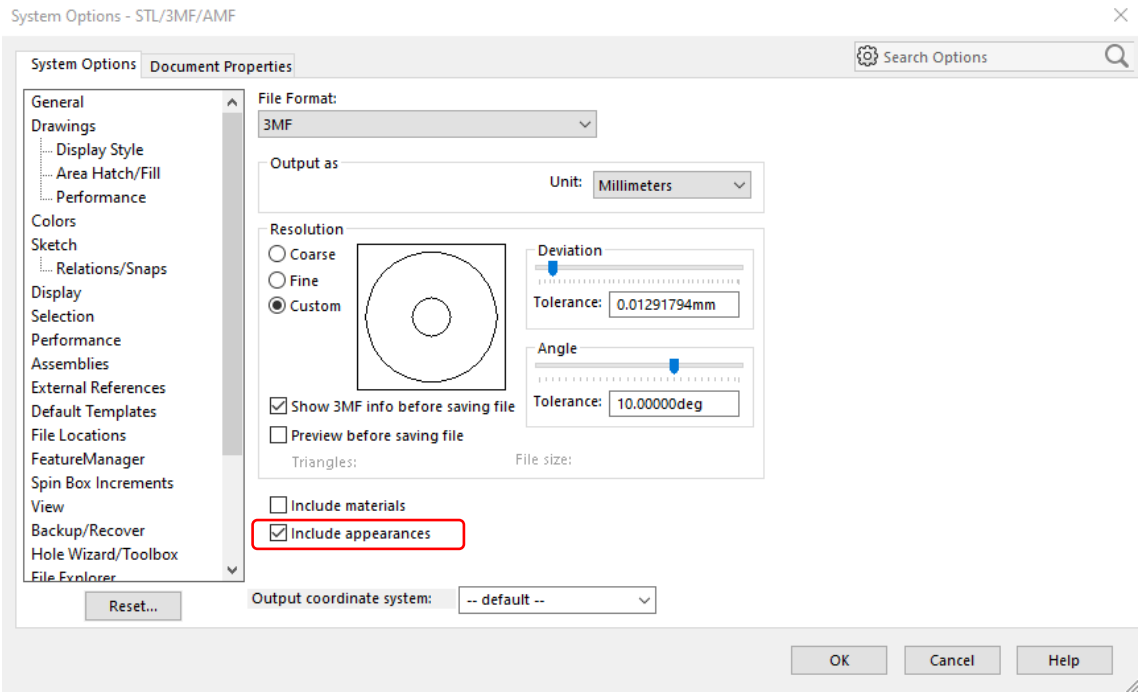

Fig. 5. Saving options when 3MF export

- The example file (4ch_GS_v1.SLDPRT) is as below

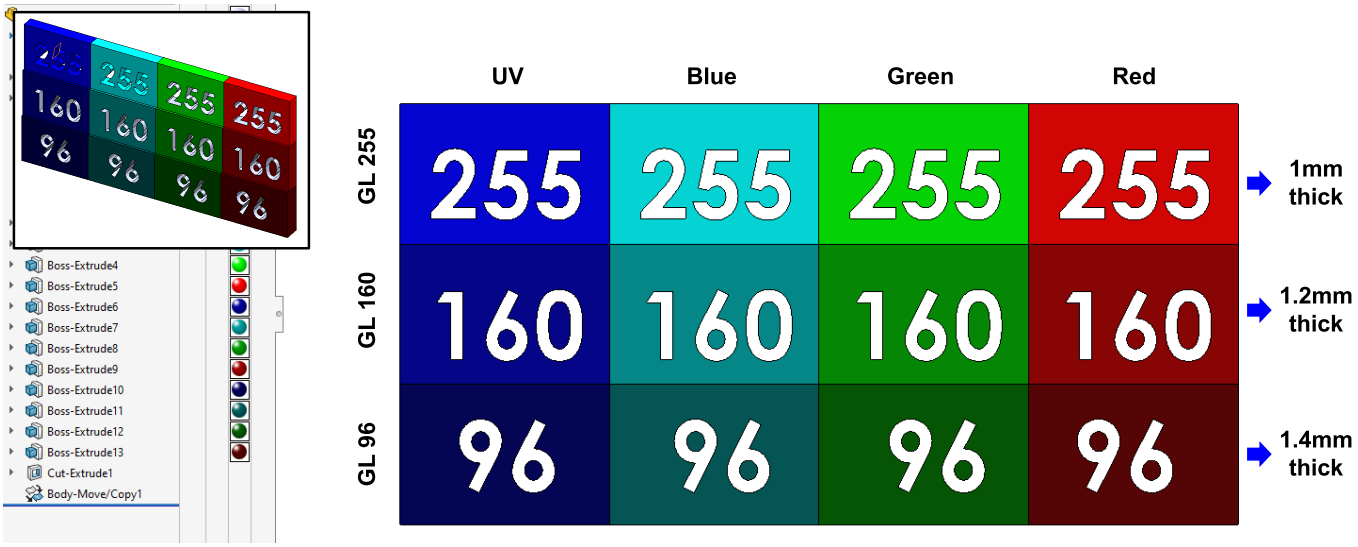

Fig. 6. This file includes 4-colors and 3 different grayscale, totaling 12 combinations

2. Model import into MonoWare

- If this is the first time to start MonoWare for 4CH printer, add a printer profile (Menu > Tools > Printer profiles)
- Pixel size is different by each printer. Consult us for your printer's pixel size if you're not sure.

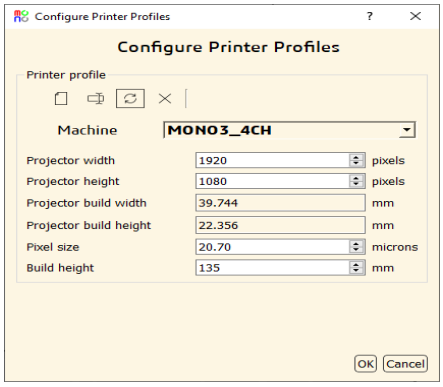

Fig. 7. 4-channel (Mono3Z4) printer profile

CAUTION *If you want to use Grayscale slicing, you need to turn on this option every time you start MonoWare. This option is always OFF when MonoWare starts.*

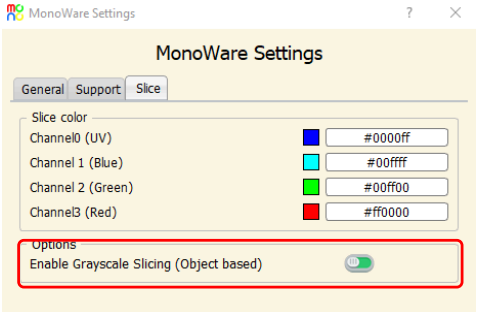

Fig. 8. Grayscale slicing enable button in MonoWare Options

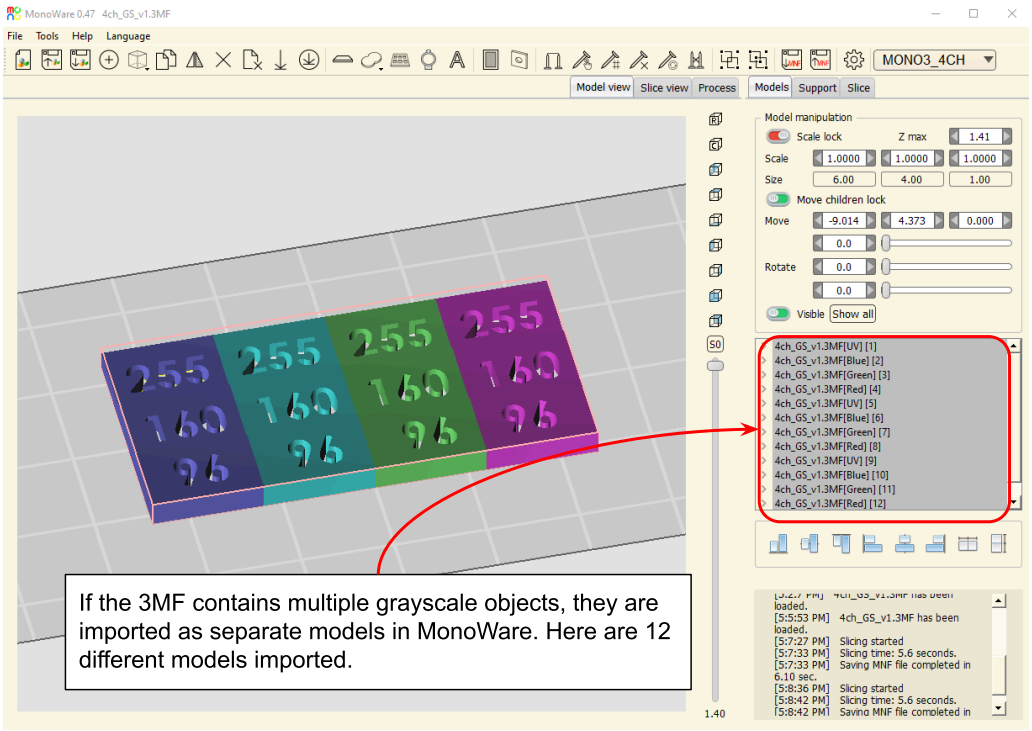

Fig. 9. 3MF import with 4-colors & 3 grayscales

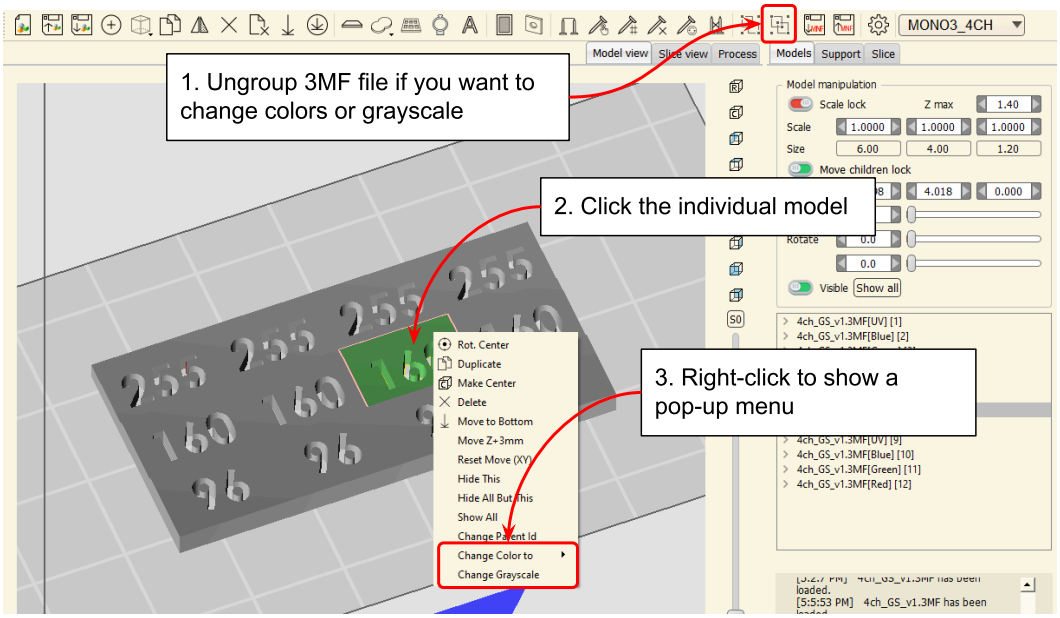

Fig. 10. How to change colors and grayscale after importing a file

INFO *Saving scene is not supported if you import 3MF files. We recommend encoding all color and grayscale information in the 3MF file before importing it.*

- You can create support structures and an adhesion base layer under the imported model.
- Note that all other structures inside MonoWare will be labeled as UV color, so prepare all other colored parts before 3MF export inside SW2017.

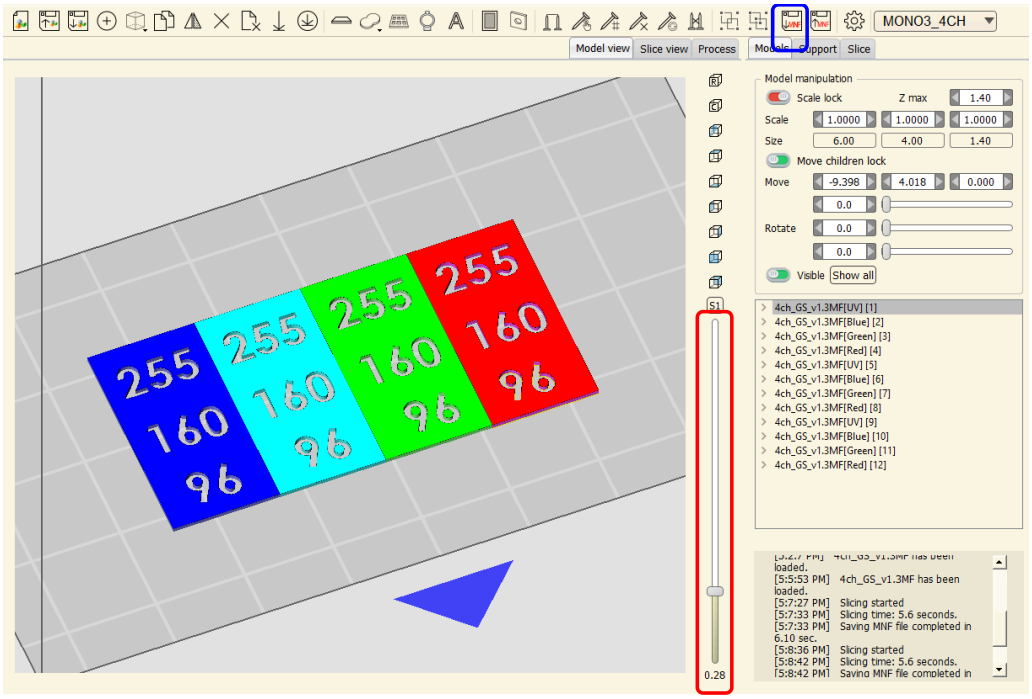

Fig. 11. Slice preview of multi-color model

- You can preview slices using a button above.
- As shown above, the UV and Blue parts are sliced separately, but overlapping areas won't be shown in this stage. Since the slice preview displays UV first and then Blue next, the overlapping Blue area is hidden for now. Actual printing slices will be shown after the slicing process.

3. Slicing

- Press the "Export MNF" button to start slicing (blue box in Fig. 11)
- With a printer name of "MONO3_4CH", the MNF configuration window will be different from 1CH printing.

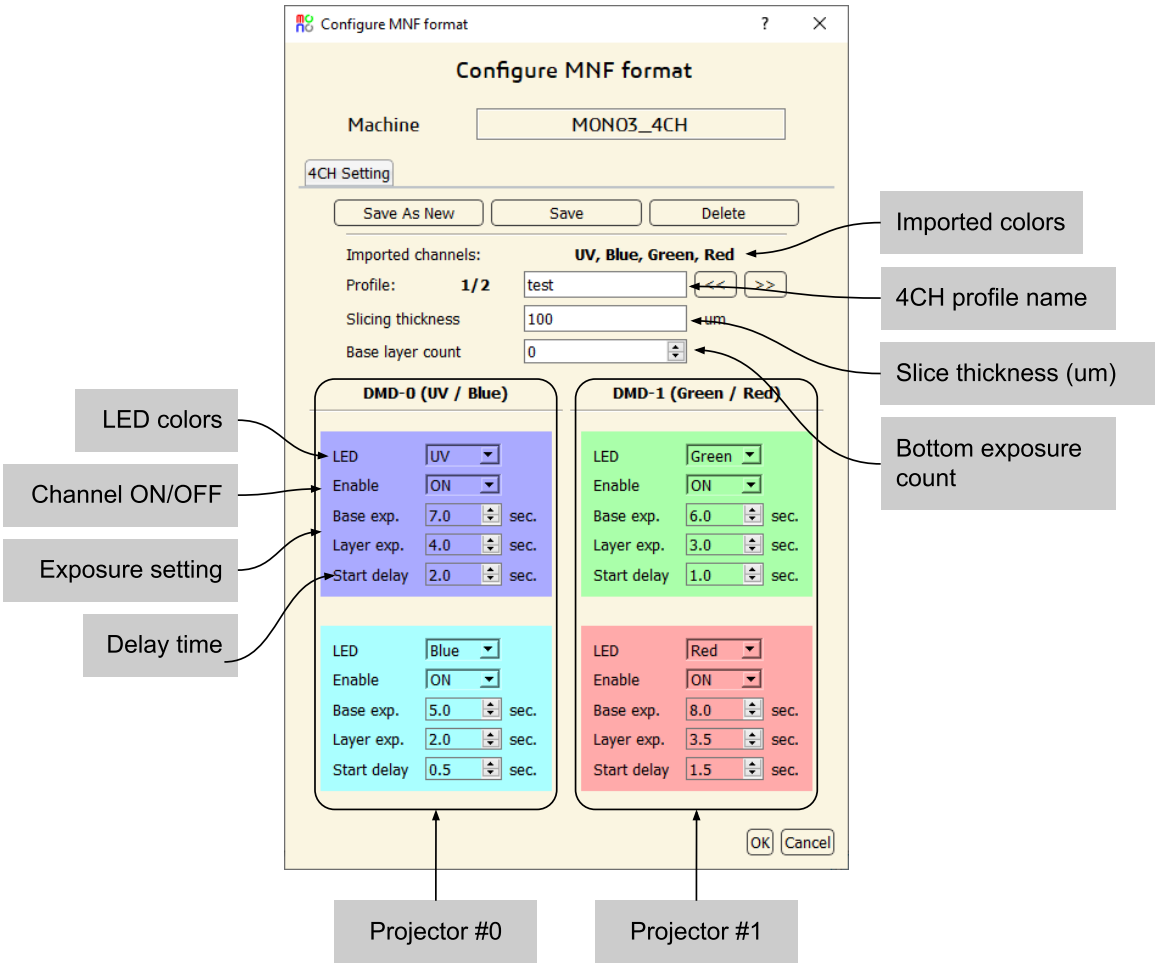

Fig. 12. MNF configuration window for 4CH printer

- The left column is for the projector 0 and the right is for the projector 1.
- The first row (UV and Green in Fig. 12) will be turned on at the same time, and the second row (Blue and Red) will be followed.
- The profile shown in Fig. 12 will turn on LEDs with a following sequence (1 step = 1 sec).

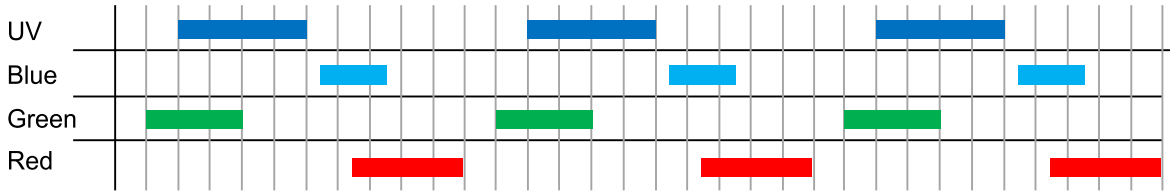

Fig. 13. LED timing diagram generated by the setting shown in Fig. 7

- When you finish editing the profile, press “OK” to export an MNF file (printing file).

Fig. 14. Slice view after slicing completed.

- After the slicing is finished, each slice will be shown on the “Slice view” tab.
- You can navigate through all slices and check slice information including exposure time, lift distance, slice type, and slice delay time.
- Note that the slice type parameter is for 1CH printing files, so leave them as they are.
- After you confirm everything is correct, you can send the MNF file to the printer via network or USB drive.

4. Single color grayscale printing

- It’s possible to create a single color grayscale 3MF file. In this case, use a single color (for example, UV (0,0,1) ~ (0,0,255)), but different grayscale.

- When you import multi-color in a single color printer profile (for example, Mono3_23um), then the color information will be ignored, but the grayscale information is still valid once you enable the grayscale slicing from the MonoWare option.

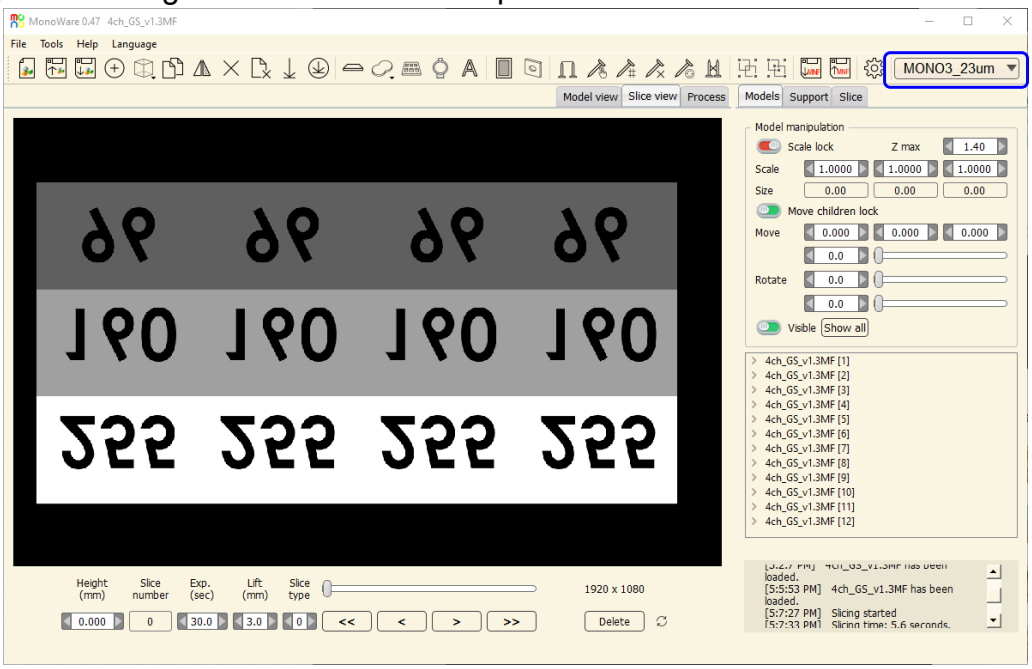

Fig. 15. Slice images of multi-color 3MF file using a single channel printer profile

5. Scene creating using STL files (without 3MF file)

- You can also create a scene using regular STL files without a 3MF file as shown in Fig. 16.

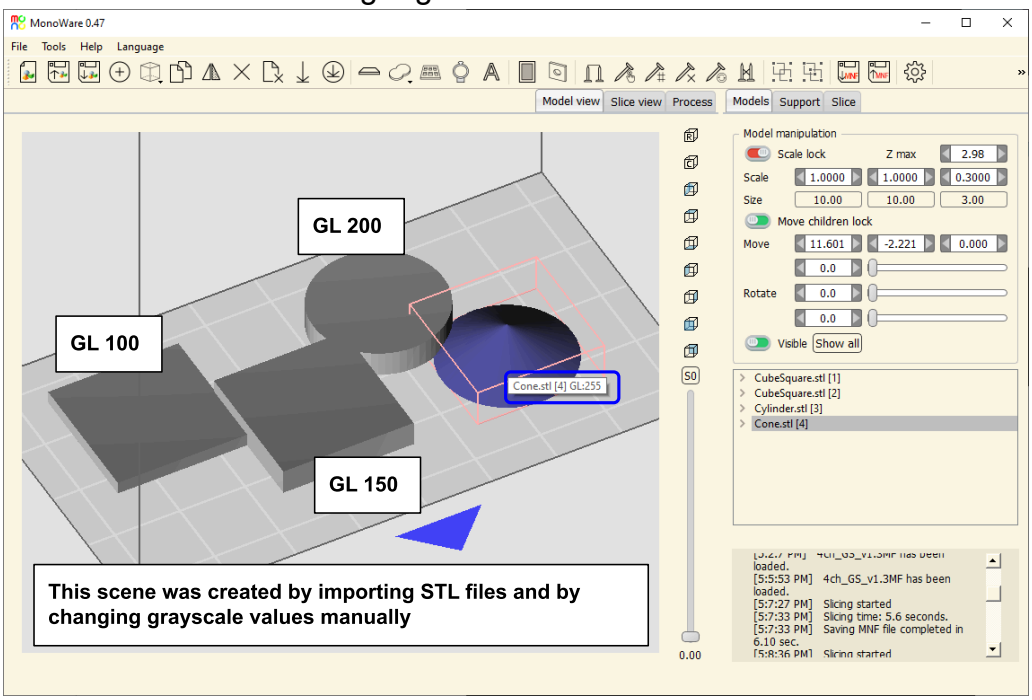

Fig. 16. Single color scene with 4 STL files with different grayscale

- Since a single color printer profile is selected, the imported STL files have a single color (UV).
- Once the grayscale slicing is enabled in the MonoWare option, you can see each model's grayscale when you click the model. The last part of the model information (ex. GL:255) means the grayscale value.

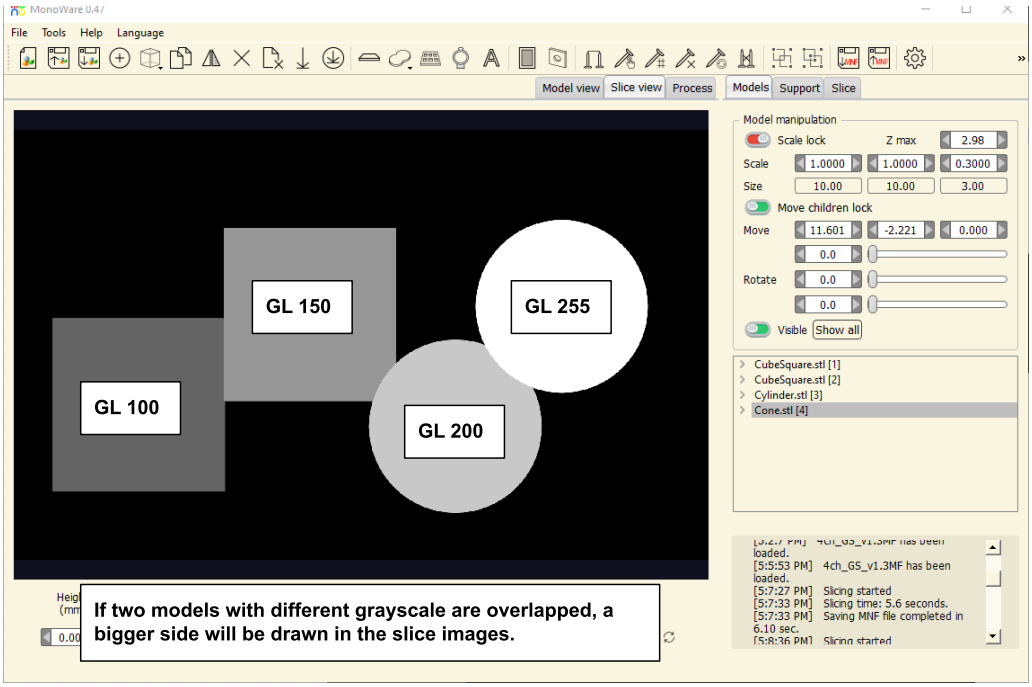

Fig. 17. Slicing of single color grayscale scenes

INFO *If you create a scene by importing STL files (for both colors and grayscale), you can save the scene with that information.*

INFO *As of MonoWare version 0.47, you can enable boundary smoothing for multi-color slicing and grayscale slicing, however, please note this option will lead to longer slicing time (up to 30% longer).*

6. Closing remarks

- If you have any issues while using the printer and software, please contact us at info@monoprinter.com