

Simplify3D Prusa i3 Mk3 Clint Goss Breath Flute Profile 20180504

This document describes a single Simplify3D (S3D) profile for the Prusa i3 Mk3 (Pi3Mk3). It is specific in a few respects to my Breath Flute project, but it can be used as a standard “core” profile for general use with PLA and a 0.40mm nozzle. This profile is based on the S3D-supplied profile for the Pi3Mk3 S3DProfile_Pi3Mk3_S3D_Pristine_20180412_Core.fff

This profile was developed from the 12 core profiles I assembled into the Simplify3D Profiles Comparison document, available at http://www.BreathFlute.com/pdf/S3D_ProfilesCG.pdf. That document is also bundled with copies of the 12 core profiles into a ZIP archive, available at http://www.BreathFlute.com/zip/S3D_Pi3Mk3_CoreProfiles_CG.zip.

You may also be interested in the document at http://www.BreathFlute.com/pdf/S3D_SettingsCG.pdf, which provides a collection of documentation on the myriad of S3D parameters and settings.

This document and its associated profile is available in the ZIP archive located at http://www.BreathFlute.com/zip/S3D_Pi3Mk3_CG_BF_20180504.zip.

I hope this is helpful!

— Clint Goss, Ph.D. [clint@goss.com], 5/8/2018

Background

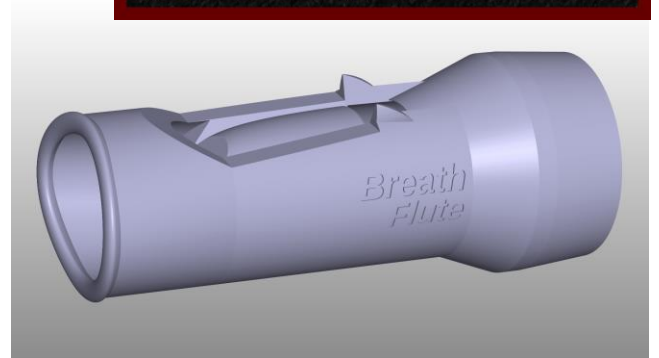
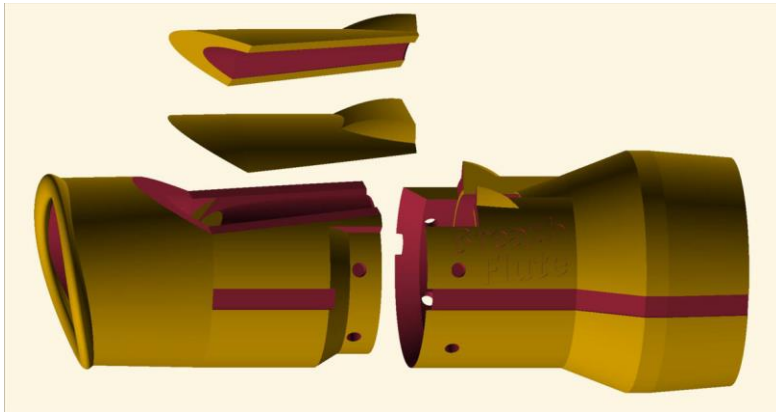
Since I am primarily concerned with printing PLA at 100µm layer heights, the comparisons of the settings below focus on the Auto-Configure settings for PLA at 100µm. For other settings, you can edit the _Core.fff files in a text editor (Notepad, vi, etc) or load them into Simplify3D and examine a specific Auto-Configure variant.

Note that the names of the .fff files as well as the names of the profiles (contained in XML fields in the .fff files) have been altered to provide better identification and organization. These modified files all end in *_Core.fff. The updates are:

- Files with <LF> line terminators have been modified to <CR><LF> by opening and saving in Microsoft WordPad.
- The XML <profile name=...> and <baseProfile> have been *edited*, so that these files import into Simplify3D with a clear and distinct name.

Impetus

This work was done as part of my main 3D printing effort – to develop a new style of flute called the **Breath Flute**. The flute consists of a 3D-printed headjoint and four feet of 1¼" tube. The OpenSCAD model currently runs about 7,000 lines of code (with comments). Here are some images from the current state of development:



Clint Goss Breath Flute-Specific Profile Pi3Mk3 – 5/8/2018

S3DProfile_Pi3Mk3_ClintGoss_BreathFlute_Pristine_20180504_Core.fff

File:	S3DProfile_Pi3Mk3_ClintGoss_BreathFlute_Pristine_20180504_Core.fff
Author:	Clint Goss
Created:	5/4/2018
Released on:	5/8/2018
Available at:	http://www.BreathFlute.com/zip/S3D_Pi3Mk3_CG_BF_20180508.zip
Src Dir:	/BreathFlute/S3D_Profiles/S3DProfile_Pi3Mk3_ClintGoss_BreathFlute_Pristine_20180504
Download Pkg:	S3D_Pi3Mk3_CG_BF_20180508.zip
Src File:	S3DProfile_Pi3Mk3_ClintGoss_BreathFlute_Pristine_20180504_Core.fff
Orig XML Prof:	<profile name="Pi3Mk3_BF_CG" version="2018-05-04 02:14:46" app="S3D-Software 4.0.1">
Orig XML Base:	<baseProfile>Pi3Mk3_S3D_Pristine_20180412_Core</baseProfile>
Core XML Prof:	<profile name="S3DProfile_Pi3Mk3_ClintGoss_BreathFlute_Pristine_20180504_Core" version="2018-05-04 02:14:46" app="S3D-Software 4.0.1">
Core XML Base:	<baseProfile>S3DProfile_Pi3Mk3_ClintGoss_BreathFlute_Pristine_20180504_Core</baseProfile>

On 5/2/2018, I began work on an S3D profile that is specifically for use with prints of the Breath Flute. It is based on the core profile S3DProfile_Pi3Mk3_S3D_Pristine_20180412_Core.fff / PLA / High. Here are all the parameters of that profile, with differences from the core profile – S3DProfile_Pi3Mk3_S3D_Pristine_20180412_Core.fff – are shown in red.

Profile: S3DProfile_Pi3Mk3_ClintGoss_BreathFlute_Pristine_20180504_Core / PLA / High

Extruder: E-List [PrimExtr], Index Tool 0: Noz 0.40, ExtMult 1.00, ExtWid Man 0.40,
Ooze Control: YES Retr, RetrDist 1.00, ExRestart 0.00, RVertLift 0.00, RSpeed 2400,
Yes Coast, CoastDist 0.20, Yes Wipe, WipeDist 2.00

Layer: L-Extr: PrimExtr,

*// Layer Height 0.1mm = 100um – good for visual quality. However, Infill=>Combine set to 2
// to print infill at 0.2mm, which has 24% better Yield Stress, [3DMATTER 2015]*

Ht 0.10,

TSolid 4, BSolid 4,

Shells 3, *// Highest Yield Stress, based on the [3DMATTER 2015] study*

Dir: InOut, No PISeq, No Vase,

FHt: 150%, *// S3D Default ... works well for me. Jo Prusa & Jeff Golden use 200%*

FWid 105%, *// A little extra extrusion to aid in sticking to the bed. Chris Warkocki uses 102%*

FSpeed 35% (1680mm/m = 28mm/s), *// Warkocki uses 25mm/s, other experienced use 30mm/s*

*// Start on the back. For the Bird component, the seam will be in critical areas (roof of the flue,
// top curved bevel edge), but those areas require sanding in any case.*

// Issue: As we move the print around on the bed to handle PEI bubbles ... this needs to be adjusted!

StartPts: Choose, X:125.0 / Y:210.0 *// Back of model!*

Additions: Yes Skirt, Sk-Extr PrimExtr, SkLayers 1, SkOffset 3.00, SkOutlines 2,

No Raft, R-Extr PrimExtr, Top 3, Base 2, ROffset 3.00, SepDist 0.14, TopInfill 100%, SpAbRaft 30%,

No Pillar, P-Extr AllExtr, PPWidth 12.00, PPLoc North-West, PPSPMult 100%,

No Ooze O-Extr AllExtr, OOffset 2.00, OPerims 1, OShape Waterfall, OAngle 30°, OSpMult 100%

Infill: I-Extr PrimExtr,

IntPat Rect, // Rectilinear for greatest Max Stress, based on the [3DMATTER 2015] study

ExtPat **Conc**, // Concentric, so that visible surfaces show arcs rather than lines

Infill **90%**, // Infill for greatest Yield Stress, based on the [3DMATTER 2015] study

OutOvr **25%**, // S3D is 20%, KeyboardWarrior 30%, Jo Prusa 25%

InWid 100%,

MinLen **2.00**, // S3D is 5, Jo Prusa is 2, Chris Warkocki is 1.00

Combine **2**, // Force infill to print at 0.2mm, which increases Yield Stress by 24% [3DMATTER 2015]

No IncSolid, DiaphEvery 20,

IntAng: **0 / +50 / -25 / +25 / -50 / 90**, // Best Max Stress along longitudinal axis, [3DMATTER 2015]

No EvAngle,

ExtAng: 45 / -45 // This should not have any effect on slicing, since ExtPat is Concentric

Support: No GenSupp, Sp-Extr PrimExtr, SuppInfill 40%, ExInflDist 0.00, BaseLayers 0, CombEvery 1,

DenseSupp D-Extr PrimExtr, DenseLayers 0, DenseInfill 70%,

APType Normal, APRes 4.00, APAngle 45°, HSep 0.30, UpLay 1, LowLay 1, SupAng 0

Temp: T-List [PrimExtr] T0, TType Extruder, No Layer, No Loop, Yes WaitStab,

SetP **1:210°C / 2:205°C**, // Somewhat arbitrary setting for PLA

T-List [HBed] T0, TType HBplat, No Layer, No Loop, Yes WaitStab,

SetP **1:65°C / 2:55°C** // Somewhat arbitrary setting for PLA

Cooling: FanSpeed 1:0 / 2:100,

No Blip, No Incr, ITime 45sec, MxFSp 100%, No Bridge, BrSpOvr 100%

G-Code: Yes 5D, No RelDist, Yes AllowZ, No Indep, No M101, Yes Sticky, No applyGOffsets,

GOffsets X:0.00 / Y:0.00 / Z:0.00, Yes UpMDef, MType Cart, Build X:250 / Y:210 / Z:210,

Orig X:0 / Y:0 / Z:0, Home X:Min / Y:Min / Z:Min, Flip No X, Yes Y, No Z,

THeadOffsets [Tool 0] X:0 / Y:0,

Yes UpdFirm, FType RepRap, GPX: Replicator 2, Baud 115200

Scripts: Starting Script and Ending Script are identical to

S3DProfile_Pi3Mk3_S3D_Pristine_20180412_Core.fff. Others are blank

ExpFmt: Standard G-Code, No AddCeleb, AddTermCmd: (none)

```
// Max Print Speed = Max Volume / (Extrusion Width × Layer Height)
//                      = 10 mm³/sec / (0.4 mm × 0.1 mm)
//                      = 250 mm/sec
// Min Print Speed = 6 mm/sec (based on "Bulge Jam" scenario)
```

Speeds: SpDefault 4800 mm/min (= 80mm/sec), // Core profiles range 1,800–12,000 mm/m

SpPerim 50% (2400mm/m = 40mm/s),

SpSolidIn 80% (3840mm/m = 64mm/s),

SpSupp 80% (3840mm/m = 64mm/s),

SpXY **4800** (= 80mm/s), // S3D was 12000. Don't really need to go blazing around ...

SpZ **600** (= 10mm/s), // S3D was 1000. Be kind to your Z axis ...

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Printed May 8, 2018 at 6:32 PM

Yes AdjBelow, AdjBelowSec 15,
AdjDown 30% (SpDefault: 1440mm/m = 24mm/s, SpPerim: 720mm/m = 12mm/s)

Other: Area 50,
ExInflat 1.00, // Extra support for bridging (Warkocki & Jo Prusa profiles)
BrExMult 100%, BrSpMult 100%, No FixedAngle 0°,
Yes BrPerim, // This seems like a smart idea ... not sure why S3D has it off
HComp 0.00, F-List [Tool 0] FilDiam 1.75, FilPrice 46.00, FilDen 1.25,
ChgRetDist 12, ChResDist -0.50, ChRetSp 600

Advanced: No Start 0.00, No Stop 0.00,
// Tried this, but it failed badly at the top (proximal) edge of the printed bird ... extruded a bunch of "grit".
// HOWEVER ... need to address how this could be used for the splitting edge – where we might
// want a single-wall extrusion.
// ExThinType AllowSingWall, // Allow a wall with only a single extrusion

ExThinType PerimOnly, // Force full perimeters to be printed (S3D Default)

InThinType AllowSingExtr, // Allow internal fills using a variable-width single extrusion
Overlap 40%, // Permit more combining of infills (default is 25%)
MinExLen 1.00, MinPWid 50%, MaxPWid 200%,
EndExtDist 0.40, // S3D was 0.20. Naver blog suggestions "usually = nozzle size"
Yes Open, Yes ForceRet, No MinTRetr 3.00, Yes RetWipe, Yes WipeOuter,
Yes AvoidCross, // Seems like a good idea
MaxDetour 5.0, // S3D was 3.0. Jo Prusa uses 5.0
NonManSeg Heal, No Merge