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The start

I got my Saturn broken a few weeks ago : the LEDs were always on. When searching the internet for help, I was able to find necessary info at Jan Mrazeks website ⁽¹⁾.

It's a good source for this problem and much more. In the comment section a specific message is describing in depth about some design flaws for the controller board. As a sidenote ⁽²⁾, I read that an upgradekit for the Saturn is getting available at Tindie.

It peaked my interest because it mentions drastic faster printjobs. Asking several fora about it, nobody heard about it nor could provide in depth advice.

I decided to contact the seller to get info about the UV Blaster 30 kit. During the mail, the seller showed me he's really convinced about this kit. It resulted in an agreement. I would receive the kit for testing and post a review regardless the final verdict (negative, neutral or positive). If it turns out to be positive, I pay for the kit.

Spoiler alert: I paid

Installation

It took five days for a small white carton box to arrive. Inside were 3 pre-wired boards, a syringe with super thermal grease and a blue tip. In the meantime I arranged a beefier poweradapter, as was recommended by the seller.

Concerning the manual for the UV Blaster 30 Kit, I only printed the step-by-step instructions. Barely needed to touch the printed manual, except for the instruction about how to apply thermal grease to the boards. The whole process took less than an hour including inverting the fans and using a piece of tape to cover air inlet-gaps between the fans.

Without this mod the fans are in "suction"-mode. Air is directed from bottom-gaps, along the heatsink and exit at the back via the fans. In the modified setting, cold air enters at the back, passes LEDs and coolfins of heatsink and exits at the bottom-gaps. This reversed air-stream assures the controller board is cooled by cold air, not warm air.



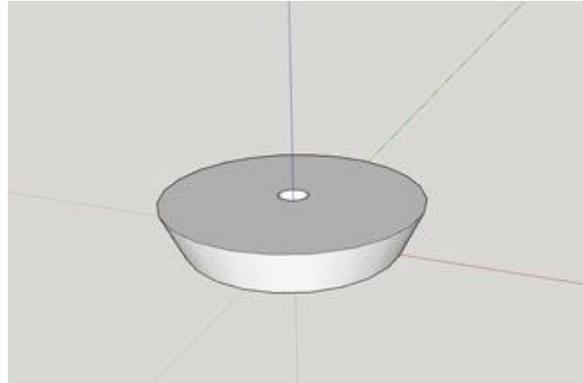
Settings

To give it a fair shot, the FEP-film got replaced and sprayed with a layer of PTFE-lubricant. The buildplate got cleaned by acetone. Then poured some Anycubic black resin in the resinVAT. In SketchUp a "coned disc" got created as model. Diameter at top is 50 mm, at the bottom 41 mm, while it has a height of 8 mm. This creates a reasonable sharp edge (about 65 degrees). Next step was to create a resin-profile for Lychee Slicer. It's best to tackle this as a 2 step process. First step is to get the optimum results for the "Burn-in" layers. When done, go for the "Normal layers".

As a start, I used the following settings in Lychee Slicer.

Burn-in Layer

Number of layers	: 4
Transition layers Count	: 0
Light-off delay	: 5 seconds
Lift distance	: 9 mm
Lift speed	: 120 mm / second

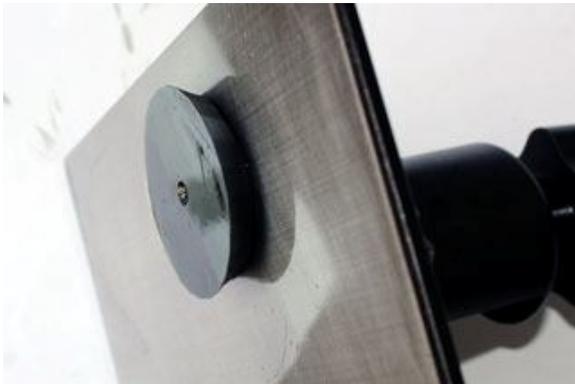


Without this kit I use 45 seconds exposuretime for Anycubics black resin. To go bold I selected 20 seconds.

First printjob

The printjob could start. The buildplate dipped into the resinVAT and after 20 seconds lifted up again. The familiar sound of detaching a cured layer from FEP-film or buildplate could be heard. It was the same for the next layers. After 16 minutes the complete printjob finished.

What struck me was the fact it felt as if the disc got glued to the buildplate. It proves even 20 seconds exposuretime is a safe choice. The object contains a sharp edge, which normally can deform a bit. This print got solid as a rock : no bending or denting, even at the sharp edge. All in all, top and bottom of disc is smooth and of solid material. To be honest, at first I wasn't expecting this overall result.



The coned side gives a slight waxy feeling. Cleaning and after-curing might solve this. For the initial process, this is not an important issue. I need to discover the safe limits for the exposuretime "Burn-in"-layers. The same object got printed over and over again while decreasing exposuretime. The minimum acceptable I can reach is a whopping 13.5 seconds. This low value is far from expected.

Normal layers

The second step is to discover values concerning the remaining layers. This process took a few hours. At the end I got the following profile for Lychee Slicer :

Burn-in Layers

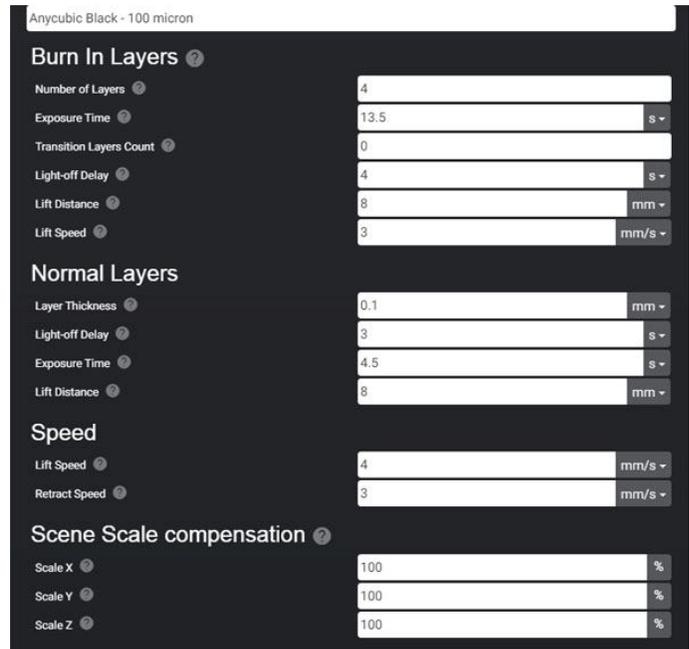
Number of layers : 4
Exposure time (s) : 13.5
Transition layers count : 0
Light-off Delay (s) : 4
Lift-distance (mm) : 8
Lift speed (mm/min) : 180

Normal Layers

Layer Thickness (um) : 100
Light-off Delay (s) : 3
Exposure Time (s) : 4.5
Lift Distance (mm) : 8

Speed

Lift Speed (mm/min) : 240
Retract Speed (mm/min) : 180



These settings were close to my unmodified Saturn for just 50 micron-layers. The most impressive factor is the incredible short exposure time as "burn-in" layers. Note, I used these values for 100 micron layers. Besides, these settings mean that you can print 39 mm / hour (*). Many resin printer-manufacturers claim a certain build height per hour, but never provide additional details about this. Like, what settings were used or for which color, type or even brand of resin.

(*) Design a shape which is 39 mm tall and use above mentioned settings in Lychee Slicer. Lychee Slicer will give an estimated print time of exactly 1 hour (1:00:00).

A resin is a mix of chemicals. One chemical forms "arms and legs" by the help of UV-light. When this process starts, it'll grab another chemical (short plastic molecule), bonding this to long chains of plastic. A resin often contains a color. This color is added as very tiny pigment or color particles. These particles are trapped between the long plastic chains of plastic. Depending on the color and size of the particles, it might absorb or block partly UV-light. Maybe you noticed transparent resin curing faster than a color-resin. Now you know why.

Finetuning

I'm pretty sure there's space for additional finetuning. The details should be found in exposure time versus the speed of lifting up and down the buildplate. I was focussed at quickly finding acceptable results for 100 micron layers. These settings and values stunned me already. I expect for 50 micron layers or less even better values.

VROOMing is also an interesting option. On YouTube you can find explanations about this type for "overclocking" the printer. VROOMing can speed up a printjob by 10 or 15%.

Reality is, it's not even close to what this kit can do.

Optimize more

I did notice some luke warm air exiting at the bottom of the Saturn. Inverting the cooling-fans at the back is a well thought strategy. According to the seller the cooling-process might improve by adding a few internal fans. When checking the alignment for the fins at the heatsink, it's odd the cooling-fans are not aside the Saturn. It would result in a better airflow for LEDs and heatsink. Well, the inverterboard got eliminated and leaves space for such fan-construction.



Another interesting option is optimizing electronic components located at the controller board. In the manual, instructions can be found as a free giveaway. All suggested modifications are explained in depth. Never seen such service in a manual before.

As the seller mentions, these modifications might void warranty and require some skills. In return, you get a more secure controller board which is less likely to malfunction.

Future

Between the lines in the emails with the seller, I learned resinprinters in general can be improved more. I hope we'll see these improvements rather sooner than later.

Final verdict

It's time for the final verdict. This kit really suprised me beyond expectations without exaggeration. The experiences were great and this experiment was seriously worth the ride. Besides, the newer Saturn S uses exactly the same UV-Matrix as the Saturn "without the S". This means, the kit is also applicable for "Saturn S"-owners.

Maybe you use different settings than settings I presented here. You might think your settings are already close to the value I presented. In that case I can confirm, for exposure time, now you can take half of that. I.e. you got 5 secs ? Go for 2.5 secs with this kit. And maybe you can also fiddle a bit extra about the speed to move up and down the buildplate. Or to make it easier to understand : If a normal

printjob took you 4 hours, you can reduced it now to 2 hours or less.

If you look for an interesting uprade or simply need to print faster, you can get it at Tindie or eBay⁽³⁾. To me, this upgrade-kit is a *real timekiller* and worth every single dollar I paid for it.

Internet links

⁽¹⁾ <https://blog.honzamrazek.cz/2021/06/fixing-the-backlight-always-on-problem-on-elegoo-saturn/>

⁽²⁾ <https://blog.honzamrazek.cz/2021/06/fixing-the-backlight-always-on-problem-on-elegoo-saturn/#comment-832>

⁽³⁾ Tindie : <https://www.tindie.com/products/smdking/uv-blaster-30-kit-elegoo-saturn-upgrade/>
eBay : <https://www.ebay.com/itm/304463848636>