# Single track scan tests

Using the "test_mode" feature documented in "DO MORE IN LESS TIME published 7/2020" and after reading some papers about single track tests:

"S*elective laser melting technology: From the single laser melted track stability to 3D parts of complex shape*" - http://dx.doi.org/10.1016/j.phpro.2010.08.083

"*A short study on the fabrication of single track deposits in SLM and characterization*" - Paper 27 th Solid Freeform Fabrication Symposium, Austin TX 2016 pag. 1644-1659
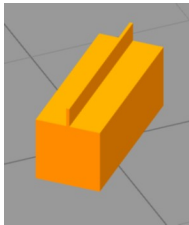


We decided to try to use this this method.
The object used as a test is a 5x2x2mm base on which a single laser pass is done for 0.6mm and is sliced with a 30um layer.

As it is small we can multiply it 5 times along the x axes and 6 times along the y axes, so we are able to test 30 different combinations of laser power and speed.

In 45 minutes we printed the full plate and the result is the following picture:
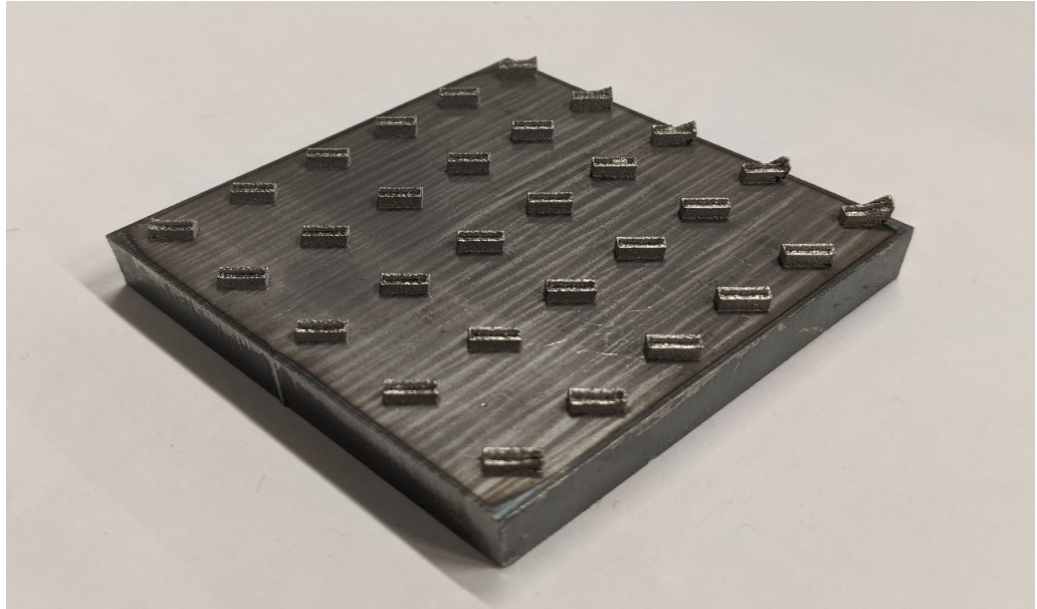


Then we looked at each and with a quick evaluation we had some preliminary responses about the parameters set that can be use for a bigger object.

**MetalONE update 7/2020**
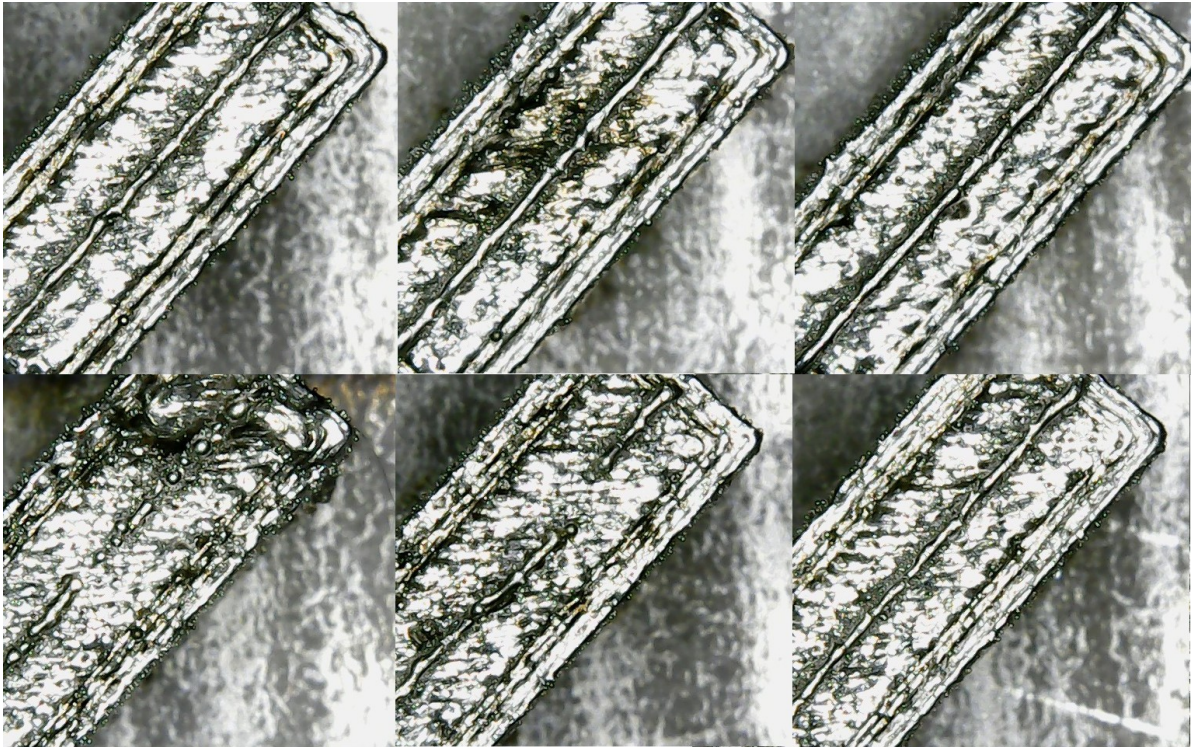


These are the pictures of the 60% power column, starting from the top left and moving clockwise the laser speed is 300, 350, 400, 450, 500, 550.
The usable settings are the first three, from 300 to 400 mm/s, the next ones have as more defect as the speed increase so for us they are not usable for building objects.

Then me arranged a summary of the results for this experiment.

| M13 | MT1910004 | | | evaluation grid | |
|---|---|---|---|---|---|
| **Power [%]** | 40 | 50 | 60 | 70 | 80 |
| **Speed [mm/s]** | | | | | |
| **550** | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| **500** | 0.0 | 0.7 | 0.0 | 0.8 | 0.9 |
| **450** | 0.0 | 0.8 | 0.8 | 0.8 | 1.0 |
| **400** | 0.8 | 0.8 | 0.9 | 0.9 | 1.0 |
| **350** | 0.0 | 0.8 | 1.0 | 1.0 | 0.8 |
| **300** | 0.7 | 0.9 | 1.0 | 1.0 | 0.8 |

| | |
|---|---|
| Continuous line | 1 |
| Small defects | 0.9 |
| Small errors | 0.8 |
| Unusable | 0.0 |

The Sharebot team