

# Supplementary Materials: Sustainable Manufacturing Decisions through the Optimization of Printing Parameters in 3D Printing

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Table S1. Analysis of variance— $\triangle W$ .

Source	DF	Adj SS	Adj MS	F-Value	P-Value	Contribution
A	1	8.477	8.477	6.2	0.038	9.76%
B	2	6.737	3.369	2.46	0.147	7.76%
C	2	9.469	4.735	3.46	0.083	10.90%
D	2	5.355	2.678	1.96	0.203	6.17%
E	2	45.854	22.927	16.76	0.001	52.81%
Error	8	10.941	1.368			12.60%
Total	17	86.834				100.00%

Table S2. Analysis of variance— $\triangle OW$ .

Source	DF	Adj SS	Adj MS	F-Value	P-Value	Contribution
A	1	6.643	6.643	3.82	0.086	13.96%
B	2	7.166	3.583	2.06	0.19	15.06%
C	2	6.757	3.379	1.94	0.205	14.20%
D	2	3.449	1.724	0.99	0.412	7.25%
E	2	9.668	4.834	2.78	0.121	20.32%
Error	8	13.898	1.737			29.21%
Total	17	47.582				100.00%

Table S3. Analysis of variance— $\triangle OL$ .

Source	DF	Adj SS	Adj MS	F-Value	P-Value	Contribution
A	1	7.368	7.3685	5.21	0.052	19.35%
B	2	6.269	3.1347	2.22	0.172	16.47%
C	2	4.912	2.4562	1.74	0.237	12.90%
D	2	6.717	3.3587	2.37	0.155	17.64%
E	2	1.487	0.7434	0.53	0.61	3.91%
Error	8	11.32	1.415			29.73%
Total	17	38.074				100.00%

Table S4. Analysis of variance— $\Delta T$ .

Source	DF	Adj SS	Adj MS	F-Value	P-Value	Contribution
A	1	0.63	0.6297	0.03	0.862	0.18%
B	2	28.202	14.1009	0.72	0.515	8.15%
C	2	44.091	22.0453	1.13	0.37	12.74%
D	2	35.234	17.6172	0.9	0.443	10.18%
E	2	81.764	40.8819	2.09	0.186	23.63%
Error	8	156.14	19.5175			45.12%
Total	17	346.06				100.00%

Table S5. Analysis of variance—CO<sub>2e</sub>.

Source	DF	Adj SS	Adj MS	F-Value	P-Value	Contribution
A	1	3.066	3.066	2.23	0.174	0.69%
B	2	4.408	2.204	1.6	0.259	0.99%
C	2	1.078	0.539	0.39	0.688	0.24%
D	2	285.04	142.52	103.75	0	63.95%
E	2	141.134	70.567	51.37	0	31.66%
Error	8	10.989	1.374			2.47%
Total	17	445.715				100.00%

Table S6. Analysis of variance—material cost.

Source	DF	Adj SS	Adj MS	F-Value	P-Value	Contribution
A	1	0.009402	0.009402	4	0.081	7.14%
B	2	0.004701	0.00235	1	0.41	3.57%
C	2	0.004701	0.00235	1	0.41	3.57%
D	2	0.018803	0.009402	4	0.062	14.29%
E	2	0.075213	0.037606	16	0.002	57.14%
Error	8	0.018803	0.00235			14.29%
Total	17	0.131622				100.00%

Table S7. Analysis of variance—labor cost.

Source	DF	Adj SS	Adj MS	F-Value	P-Value	Contribution
A	1	10.911	10.911	6.67	0.032	2.02%
B	2	24.918	12.459	7.62	0.014	4.62%
C	2	2.657	1.329	0.81	0.477	0.49%
D	2	15.156	7.578	4.64	0.046	2.81%
E	2	473.032	236.516	144.68	0	87.64%
Error	8	13.078	1.635			2.42%
Total	17	539.752				100.00%

Table S8. Analysis of variance—electricity cost.

Source	DF	Adj SS	Adj MS	F-Value	P-Value	Contribution
A	1	3.066	3.066	2.23	0.174	0.69%
B	2	4.408	2.204	1.6	0.259	0.99%
C	2	1.078	0.539	0.39	0.688	0.24%
D	2	285.04	142.52	103.75	0	63.95%
E	2	141.134	70.567	51.37	0	31.66%
Error	8	10.989	1.374			2.47%
Total	17	445.715				100.00%

A: Fan rate (%).

B: Print speed (mm/s).

C: Nozzle temperature (°C).

D: Build plate temperature (°C).

E: Layer thickness (mm).