electronic supplementary information for A self-driving laboratory designed to accelerate the discovery of adhesive materials

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Figure S1 | Photograph of the robotic adhesives testing system



Figure S2 | Details of the modified strength testing tool and docking station

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Figure S3 | Graphical user interface screenshots



Figure S4 | Simulated optimization campaigns using the same optimizer configuration described in the manuscript. The experiment was emulated using a noisy approximation to the experimental data given by $S = 0.2 + 8 (0.7 + 0.3 U_{[0,1]}) exp(-\frac{1}{2} (\frac{R-0.4}{0.05})^2)$ where *S* is the maximum recorded tensile stress (in Mpa), *R* is the resin fraction and U_[0,1] indicates a sample drawn from the uniform random distribution over the interval [0,1]. 100 replicate optimization campaigns were simulated. After the completion of each simulated optimization round, the running maximum tensile stress observed across all completed rounds was recorded. For each round, the mean of the running maxima across all fifty replicates is indicated by the grey bar. The violin plot shows a kernel density estimate computed from the running maxima across all fifty replicates. The Python code for executing and plotting these simulations can be found at https://github.com/berlinguette/ada

Cure time (h)		2	3	5	6
	replicate 1	250	1470	5081	6424
(reported from DeFelsko Head)	replicate 2	309	1186	4789	5552
	replicate 3	no data ^a	1460	5072	4543
Sample stress (MPa)	replicate 1	0.80	4.68	16.17	20.45
(computed from strength and	replicate 2	0.98	3.78	15.24	17.67
dolly bond area)	replicate 3	no data ^a	4.65	16.14	14.46
Mean stress across replicates (MPa)		0.89	4.37	15.85	17.53
Standard deviation across replicates (MPa)		0.13	0.51	0.53	3.00

 Table S1 | DP420 pull-off data. Dollies with a 20-mm diameter bond area were used for these experiments.

"No data was obtained for the third replicate sample for the 2h cure time due to an instrumentation error

 Table S2 | DP190 pull-off data. Dollies with a 10-mm diameter bond area were used for these experiments.

Cure time (d)		1	2	5
	replicate 1	1089	1423	1629
(reported from DeFelsko Head)	replicate 2	815	1441	1703
	replicate 3	1063	1377	1678
Sample stress (MPa)	replicate 1	13.87	18.12	20.74
(computed from strength and	replicate 2	10.38	18.35	21.68
dolly bond area)	replicate 3	13.53	17.53	21.36
Mean stress across replicates (MPa)		12.59	18.00	21.26
Standard deviation across replicates (MPa)		1.93	0.42	0.48

Cure time (d)		1	2	5
	replicate 1	537.8	651.8	789.6
(reported from universal tester)	replicate 2	484.7	703.3	777.5
	replicate 3	531.1	654.5	815.2
	replicate 1	7.42	8.99	10.89
Sample stress (MPa)	replicate 2	6.68	9.70	10.72
	replicate 3	7.32	9.03	11.24
Mean stress across replicates (MPa)		7.14	9.24	10.95
Standard deviation across replicates (MPa)		0.40	0.40	0.27

Table S3 | DP190 lap shear data. Lap-shear specimens with a 0.5 in² bond area were used for these experiments.

Table S4| optimization pull-off tests (round 1). Dollies with a 20-mm diameter bond area were used for these experiments.

Round	Resin/Total Epoxy Fraction	Replicate	Pull-Off Test Force (N)	Pull-Off Test Force (KN)	Pull-Off Stress (MPa)
		1	82.0	0.082	0.26
	0.0891	2	87.0	0.087	0.28
		3	0.0	0.000	0.00
-		1	0.0	0.000	0.00
	0.7500	2	0.0	0.000	0.00
		3	0.0	0.000	0.00
-		1	479.0	0.479	1.52
1	0.5905	2	319.0	0.319	1.02
		3	315.0	0.315	1.00
-		1	2115.0	2.115	6.73
	0.4059	2	2115.0	2.115	6.73
		3	2117.0	2.117	6.74
-		1	2418.0	2.418	7.70
	0.4095	2	2424.0	2.424	7.72
		3	2729.0	2.729	8.69

Round	Resin/Total Epoxy Fraction	Replicate	Pull-Off Test Force (N)	Pull-Off Test Force (KN)	Pull-Off Stress (MPa)
		1	766.0	0.766	2.44
	0.3305	2	819.0	0.819	2.61
		3	1017.0	1.017	3.24
-		1	0.0	0.000	0.00
	1.0000	2	79.0	0.079	0.25
		3	65.0	0.065	0.21
-		1	1156.0	1.156	3.68
2	0.4369	2	1122.0	1.122	3.57
		3	1169.0	1.169	3.72
-		1	1109.0	1.109	3.53
	0.3719	2	1367.0	1.367	4.35
		3	1596.0	1.596	5.08
_		1	385.0	0.385	1.23
	0.2762	2	441.0	0.441	1.40
		3	450.0	0.450	1.43

Table S5| optimization pull-off tests (round 2). Dollies with a 20-mm diameter bond area were used for these experiments.

Round	Resin/Total Epoxy Fraction	Replicate	Pull-Off Test Force (N)	Pull-Off Test Force (KN)	Pull-Off Stress (MPa)
		1	1341.0	1.341	4.27
	0.4340	2	1215.0	1.215	3.87
		3	1242.0	1.242	3.95
-		1	71.0	0.071	0.23
	0.0000	2	71.0	0.071	0.23
		3	70.0	0.070	0.22
-		1	643.0	0.643	2.05
3	0.5500	2	613.0	0.613	1.95
		3	604.0	0.604	1.92
-		1	1898.0	1.898	6.04
	0.4257	2	1910.0	1.910	6.08
		3	1991.0	1.991	6.34
_		1	1957.0	1.957	6.23
	0.3725	2	1725.0	1.725	5.49
		3	1975.0	1.975	6.29

Table S6| optimization pull-off tests (round 3). Dollies with a 20-mm diameter bond area were used for these experiments.

Round	Resin/Total Epoxy Fraction	Replicate	Pull-Off Test Force (N)	Pull-Off Test Force (KN)	Pull-Off Stress (MPa)
		1	1249.0	1.249	3.98
	0.3892	2	1273.0	1.273	4.05
		3	1367.0	1.367	4.35
-		1	1220.0	1.220	3.88
	0.4594	2	1241.0	1.241	3.95
		3	1300.0	1.300	4.14
-		1	1326.0	1.326	4.22
4	0.4633	2	1612.0	1.612	5.13
		3	1597.0	1.597	5.08
-		1	0.0	0.000	0.00
	0.8848	2	96.0	0.096	0.31
		3	0.0	0.000	0.00
_		1	1674.0	1.674	5.33
	0.3666	2	1951.0	1.951	6.21
		3	2226.0	2.226	7.09

Table S7| optimization pull-off tests (round 4). Dollies with a 20-mm diameter bond area were used for these experiments.

Video S1 | Video of the robotic workflow

A video showing the robotic workflow can be found at https://youtu.be/LxWiLR13hkc