Output from design:

Command Window

Design Conditions:

D:14ft B:4 V:586.7ft/s RPM:1200 rho:1.27e-03lbf/ft^3 Desired CL:0.700

I	Radius	Chord	Beta
1	0.7500	0.0836	83.4046
2	1.0625	0.1614	79.9949
3	1.3750	0.2572	76.6678
4	1.6875	0.3645	73.4418
5	2.0000	0.4772	70.3319
6	2.3125	0.5894	67.3491
7	2.6250	0.6960	64.5009
8	2.9375	0.7928	61.7916
9	3.2500	0.8769	59.2225
10	3.5625	0.9459	56.7925
11	3.8750	0.9984	54.4986
12	4.1875	1.0334	52.3365
13	4.5000	1.0504	50.3008
14	4.8125	1.0486	48.3854
15	5.1250	1.0274	46.5838
16	5.4375	0.9856	44.8896
17	5.7500	0.9207	43.2960
18	6.0625	0.8285	41.7967
19	6.3750	0.6998	40.3853
20	6.6875	0.5100	39.0560
21	7.0000	0.0000	37.8031

Ct:0.102 Thrust:3435.4 Cp:0.112 Power(HP):4000.0 ETA:0.92 AR:2.10 AF:338.42

Output from analysis when geometry and conditions loaded from above:

I	R	CHORD	BETA	PHI	CCL	L/D	RN	MACH	A	AP
1	0.75	0.0836	85.33	81.822	0.90	93.94	168370.04	0.54	0.0022	0.1043
2	1.06	0.1614	80.89	78.393	0.82	90.54	329074.37	0.55	0.0041	0.0934
3	1.38	0.2572	77.28	75.027	0.78	86.28	532939.04	0.56	0.0064	0.0857
4	1.69	0.3645	73.88	71.773	0.75	84.59	770230.13	0.57	0.0092	0.0802
5	2.00	0.4772	70.68	68.646	0.74	83.88	1031599.92	0.58	0.0123	0.0760
6	2.31	0.5894	67.63	65.646	0.73	83.22	1306827.72	0.59	0.0156	0.0718
7	2.63	0.6960	64.73	62.787	0.72	82.74	1586104.02	0.61	0.0190	0.0679
8	2.94	0.7928	61.99	60.073	0.72	82.52	1854080.47	0.63	0.0226	0.0642
9	3.25	0.8769	59.42	57.501	0.72	82.61	2114790.44	0.65	0.0263	0.0609
10	3.56	0.9459	56.99	55.075	0.72	82.54	2355044.05	0.67	0.0299	0.0575
11	3.88	0.9984	54.70	52.781	0.72	82.56	2568274.73	0.69	0.0334	0.0543
12	4.19	1.0334	52.54	50.619	0.72	82.54	2748055.56	0.71	0.0368	0.0512
13	4.50	1.0504	50.50	48.584	0.72	82.55	2888439.96	0.74	0.0400	0.0482
14	4.81	1.0486	48.59	46.669	0.72	82.54	2982084.71	0.76	0.0431	0.0454
15	5.13	1.0274	46.79	44.867	0.72	82.55	3021550.24	0.79	0.0460	0.0427
16	5.44	0.9856	45.09	43.172	0.72	82.55	2997053.74	0.82	0.0487	0.0402
17	5.75	0.9207	43.50	41.578	0.72	82.56	2893960.59	0.84	0.0513	0.0379
18	6.06	0.8285	42.00	40.078	0.72	82.56	2690850.74	0.87	0.0537	0.0357
19	6.38	0.6998	40.59	38.666	0.72	82.57	2347512.38	0.90	0.0560	0.0336
20	6.69	0.5100	39.26	37.337	0.72	82.58	1766176.16	0.93	0.0581	0.0317
21	7.00	0.0000	40.06	33.706	1.09	96.60	0.00	0.96	0.0000	0.0000

Thrust: 3436.33 CT: 0.1765 Power: 2260276.7 CP: 0.4146 HP: 4109.59 AdvR: 2.095 ETA: 0.8919

Solidity: 0.116 AF: 338.42 dBeta: 0.00640

Part 2.

When compared the the Dago Red, the Rear Bear propeller has very similar specifications and properties. The maximum speed achieved with the Dago Red was 520mph, just under that of the Rear Bear at ~586mph. The geometry of the propellers are also similar because they are both 4 bladed Hamilton Standard propellers. It is mentioned that the Dago Red had paddle bladed propellers while the Rear Bear had a propeller front he DC-7 which was capable of feathering. Where they differ is in the powerplant, the Rear Bear has an 18-cylinder engine capable of 4000-4500HP while the Dago Red has a V12 capable of 3500-3800HP.

https://en.wikipedia.org/wiki/Dago_Red

Part 3.

Now that the analysis portion is complete, I'd like to experiment with a couple different variables that may affect propeller performance and efficiency. The first I'd like to test is whether a larger, slower moving propeller is more efficient than a smaller, faster turning propeller. In addition to these, I would want to see how increasing blade density/count would affect efficiency. And lastly, it would be interesting to note when prop feathering becomes important and when it may become inefficient or detrimental to the performance.