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LAMPIRAN

LAMPIRAN

Lampiran I. Tabel hasil pengamatan pengujian turbin air arus atas

No.	Pembukaan (Q)	Beban (Kg)	n (rpm)	Temperatur Air (C)	Volume (m^3)	Waktu (s)
1	Q1 (0.00057 m^3/s)	0.1	102	27	0.0042	7.41
2		0.2	93	27	0.0042	7.41
3		0.3	85	27	0.0042	7.41
4		0.4	77	27	0.0042	7.41
5		0.5	70	27	0.0042	7.41
6		0.6	62	27	0.0042	7.41
7		0.7	54	27	0.0042	7.41
8		0.8	45	27	0.0042	7.41
9		0.9	37	27	0.0042	7.41
10		1	28	27	0.0042	7.41
11		1.1	20	27	0.0042	7.41
12		1.2	10	27	0.0042	7.41
13	Q2 (0.00061 m^3/s)	0.1	105	27	0.0045	7.41
14		0.2	97	27	0.0045	7.41
15		0.3	90	27	0.0045	7.41
16		0.4	82	27	0.0045	7.41
17		0.5	75	27	0.0045	7.41
18		0.6	67	27	0.0045	7.41
19		0.7	59	27	0.0045	7.41
20		0.8	50	27	0.0045	7.41
21		0.9	41	27	0.0045	7.41
22		1	32	27	0.0045	7.41
23		1.1	23	27	0.0045	7.41
24		1.2	131	27	0.0045	7.41
25	Q3 (0.00073 m^3/s)	0.1	119	27	0.0054	7.41
26		0.2	113	27	0.0054	7.41
27		0.3	107	27	0.0054	7.41
28		0.4	101	27	0.0054	7.41
29		0.5	95	27	0.0054	7.41
30		0.6	88	27	0.0054	7.41
31		0.7	81	27	0.0054	7.41
32		0.8	73	27	0.0054	7.41
33		0.9	63	27	0.0054	7.41
34		1	55	27	0.0054	7.41
35		1.1	47	27	0.0054	7.41
		1.2	143	27	0.0054	7.41
	Q4 (0.00081 m^3/s)	0.1	131	27	0.0060	7.41
		0.2	125	27	0.0060	7.41
		0.3	121	27	0.0060	7.41
		0.4	115	27	0.0060	7.41

41		0.5	110	27	0.0060	7.41
42		0.6	103	27	0.0060	7.41
43		0.7	95	27	0.0060	7.41
44		0.8	88	27	0.0060	7.41
45		0.9	80	27	0.0060	7.41
46		1	72	27	0.0060	7.41
47		1.1	64	27	0.0060	7.41
48		1.2	149	27	0.0060	7.41
49	**Q5 (0.0009 m^3/s)**	0.1	144	27	0.0064	7.41
50		0.2	139	27	0.0064	7.41
51		0.3	135	27	0.0064	7.41
52		0.4	130	27	0.0064	7.41
53		0.5	125	27	0.0064	7.41
54		0.6	120	27	0.0064	7.41
55		0.7	116	27	0.0064	7.41
56		0.8	110	27	0.0064	7.41
57		0.9	105	27	0.0064	7.41
58		1	98	27	0.0064	7.41
59		1.1	90	27	0.0064	7.41
60		1.2	80	27	0.0064	7.41

Lampiran 2. Tabel hasil pengujian turbin arus atas dengan tiga belas sudu

Pembukaan	Beban (Kg)	Q (m^3/s)	v (m/s)	Pair (watt)	τ (Nm)	ω (rad/s)	P_{Turbin} (Watt)	η (%)
Q1 (0.00057 m^3/s)	0.1	0.00057	1.805	9.143	0.0441	10.676	0.4713	**5.15**
	0.2	0.00057	1.805	9.143	0.0883	9.734	0.8594	9.40
	0.3	0.00057	1.805	9.143	0.1324	8.897	1.1782	12.89
	0.4	0.00057	1.805	9.143	0.1766	8.059	1.4231	15.57
	0.5	0.00057	1.805	9.143	0.2207	7.327	1.6172	17.69
	0.6	0.00057	1.805	9.143	0.2649	6.489	1.7188	18.80
	0.7	0.00057	1.805	9.143	0.3090	5.652	1.7466	19.10
	0.8	0.00057	1.805	9.143	0.3532	4.710	1.6634	18.19
	0.9	0.00057	1.805	9.143	0.3973	3.873	1.5386	16.83
	1	0.00057	1.805	9.143	0.4415	2.931	1.2937	14.15
	1.1	0.00057	1.805	9.143	0.4856	2.093	1.0165	11.12
	1.2	0.00057	1.805	9.143	0.5297	1.047	0.5545	6.06
Q2 061 m^3/s)	0.1	0.00061	1.934	9.796	0.0441	11.723	0.5175	**5.28**
	0.2	0.00061	1.934	9.796	0.0883	10.990	0.9703	9.91
	0.3	0.00061	1.934	9.796	0.1324	10.153	1.3446	13.73
	0.4	0.00061	1.934	9.796	0.1766	9.420	1.6634	16.98
	0.5	0.00061	1.934	9.796	0.2207	8.583	1.8944	19.34
	0.6	0.00061	1.934	9.796	0.2649	7.850	2.0792	21.23
	0.7	0.00061	1.934	9.796	0.3090	7.013	2.1670	22.12
	0.8	0.00061	1.934	9.796	0.3532	6.175	2.1809	22.26
	0.9	0.00061	1.934	9.796	0.3973	5.233	2.0792	21.23

	1	0.00061	1.934	9.796	0.4415	4.291	1.8944	19.34
	1.1	0.00061	1.934	9.796	0.4856	3.349	1.6264	16.60
	1.2	0.00061	1.934	9.796	0.5297	2.407	1.2753	13.02
Q3 (0.00073 m^3/s)	0.1	0.00073	2.321	11.755	0.0441	13.083	0.5776	**4.91**
	0.2	0.00073	2.321	11.755	0.0883	12.455	1.0997	9.36
	0.3	0.00073	2.321	11.755	0.1324	11.827	1.5664	13.33
	0.4	0.00073	2.321	11.755	0.1766	11.199	1.9776	16.82
	0.5	0.00073	2.321	11.755	0.2207	10.571	2.3334	19.85
	0.6	0.00073	2.321	11.755	0.2649	9.943	2.6337	22.41
	0.7	0.00073	2.321	11.755	0.3090	9.211	2.8462	24.21
	0.8	0.00073	2.321	11.755	0.3532	8.478	2.9941	25.47
	0.9	0.00073	2.321	11.755	0.3973	7.641	3.0357	25.83
	1	0.00073	2.321	11.755	0.4415	6.594	2.9109	24.76
	1.1	0.00073	2.321	11.755	0.4856	5.757	2.7954	23.78
	1.2	0.00073	2.321	11.755	0.5297	4.919	2.6060	22.17
Q4 (0.00081 m^3/s)	0.1	0.00081	2.579	13.061	0.0441	14.339	0.6330	**4.85**
	0.2	0.00081	2.579	13.061	0.0883	13.711	1.2106	9.27
	0.3	0.00081	2.579	13.061	0.1324	13.083	1.7327	13.27
	0.4	0.00081	2.579	13.061	0.1766	12.665	2.2363	17.12
	0.5	0.00081	2.579	13.061	0.2207	12.037	2.6568	20.34
	0.6	0.00081	2.579	13.061	0.2649	11.513	3.0495	23.35
	0.7	0.00081	2.579	13.061	0.3090	10.781	3.3314	25.51
	0.8	0.00081	2.579	13.061	0.3532	9.943	3.5116	26.89
	0.9	0.00081	2.579	13.061	0.3973	9.211	3.6594	28.02
	1	0.00081	2.579	13.061	0.4415	8.373	3.6964	28.30
	1.1	0.00081	2.579	13.061	0.4856	7.536	3.6594	28.02
	1.2	0.00081	2.579	13.061	0.5297	6.699	3.5486	27.17
Q5 (0.0009 m^3/s)	0.1	0.0009	2.751	13.931	0.0441	15.072	0.6654	**4.78**
	0.2	0.0009	2.751	13.931	0.0883	14.549	1.2845	9.22
	0.3	0.0009	2.751	13.931	0.1324	14.130	1.8713	13.43
	0.4	0.0009	2.751	13.931	0.1766	13.607	2.4027	17.25
	0.5	0.0009	2.751	13.931	0.2207	13.083	2.8878	20.73
	0.6	0.0009	2.751	13.931	0.2649	12.560	3.3268	23.88
	0.7	0.0009	2.751	13.931	0.3090	12.141	3.7519	26.93
	0.8	0.0009	2.751	13.931	0.3532	11.513	4.0660	29.19
	0.9	0.0009	2.751	13.931	0.3973	10.990	4.3664	31.34
	1	0.0009	2.751	13.931	0.4415	10.257	4.5281	32.50
	1.1	0.0009	2.751	13.931	0.4856	9.420	4.5743	32.83
	1.2	0.0009	2.751	13.931	0.5297	8.373	4.4357	31.84

Lampiran 3. Tabel hasil perhitungan segitiga kecepatan turbin arus atas dengan tiga belas sudu

Pembukaan (Q)	Beban (kg)	V_{in} (m/s)	V_{out} (m/s)	ω (rad/s)
Q1 (0.00057 m^3/s)	0.1	1.831	0.229	1.601
	0.2	1.831	0.371	1.460
	0.3	1.831	0.496	1.335
	0.4	1.831	0.622	1.209
	0.5	1.831	0.732	1.099
	0.6	1.831	0.857	0.973
	0.7	1.831	0.983	0.848
	0.8	1.831	1.124	0.707
	0.9	1.831	1.250	0.581
	1.0	1.831	1.391	0.440
	1.1	1.831	1.517	0.314
	1.2	1.831	1.674	0.157
Q2 (0.00061 m^3/s)	0.1	1.934	0.176	1.758
	0.2	1.934	0.286	1.649
	0.3	1.934	0.411	1.523
	0.4	1.934	0.521	1.413
	0.5	1.934	0.647	1.287
	0.6	1.934	0.757	1.178
	0.7	1.934	0.882	1.052
	0.8	1.934	1.008	0.926
	0.9	1.934	1.149	0.785
	1.0	1.934	1.290	0.644
	1.1	1.934	1.432	0.502
	1.2	1.934	1.573	0.361
Q3 (0.00073 m^3/s)	0.1	2.321	0.358	1.963
	0.2	2.321	0.453	1.868
	0.3	2.321	0.547	1.774
	0.4	2.321	0.641	1.680
	0.5	2.321	0.735	1.586
	0.6	2.321	0.829	1.492
	0.7	2.321	0.939	1.382
	0.8	2.321	1.049	1.272
	0.9	2.321	1.175	1.146
	1.0	2.321	1.300	1.021
	1.1	2.321	1.426	0.895
	1.2	2.321	1.567	0.754
Q4)081 m^3/s)	0.1	2.579	0.428	2.151
	0.2	2.579	0.522	2.057
	0.3	2.579	0.616	1.963
	0.4	2.579	0.679	1.900
	0.5	2.579	0.773	1.806

	0.6	2.579	0.852	1.727
	0.7	2.579	0.962	1.617
	0.8	2.579	1.087	1.492
	0.9	2.579	1.197	1.382
	1.0	2.579	1.323	1.256
	1.1	2.579	1.448	1.130
	1.2	2.579	1.574	1.005
Q5 (0.0009 m^3/s)	0.1	2.751	0.490	2.261
	0.2	2.751	0.568	2.182
	0.3	2.751	0.631	2.120
	0.4	2.751	0.710	2.041
	0.5	2.751	0.788	1.963
	0.6	2.751	0.867	1.884
	0.7	2.751	0.929	1.821
	0.8	2.751	1.024	1.727
	0.9	2.751	1.102	1.649
	1.0	2.751	1.212	1.539
	1.1	2.751	1.338	1.413
	1.2	2.751	1.495	1.256

Lampiran 4. Tabel Densitas Air Berdasarkan Temperatur (Pell & Dunson, 1997)

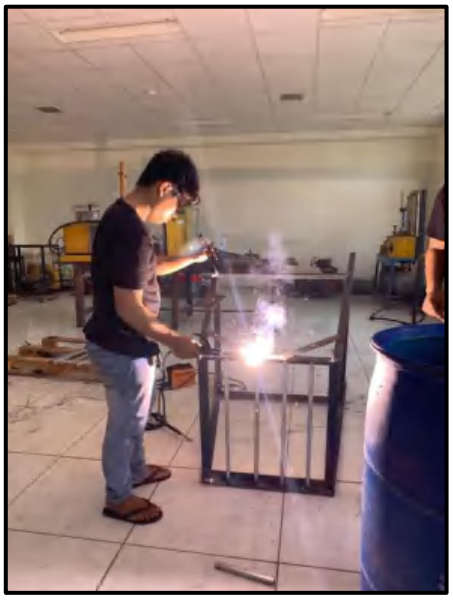
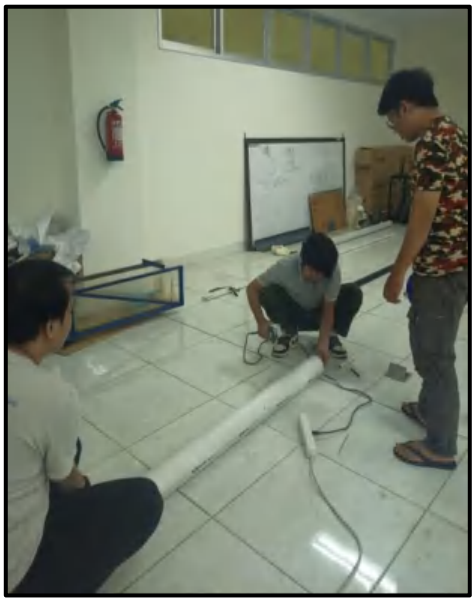
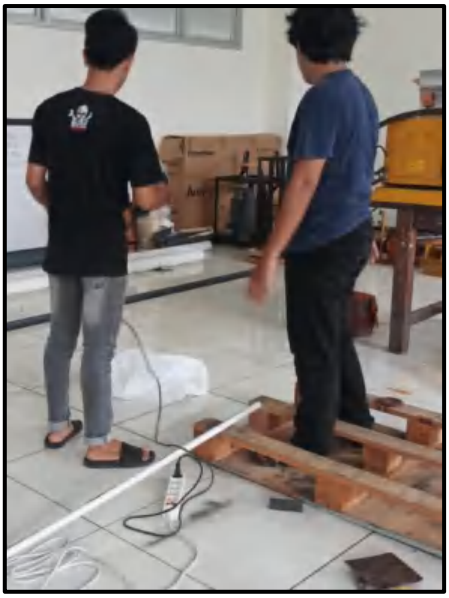
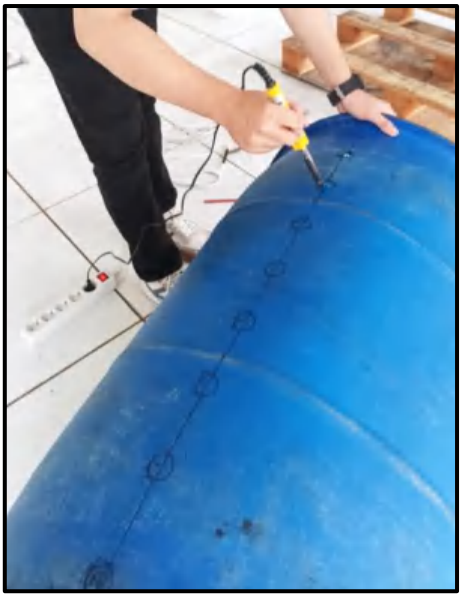
TABLE 2-28 Density (kg/m³) of Water from 0 to 100°C*

	ρ, kg/m³									
t, °C	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0	999.839	999.846	999.852	999.859	999.865	999.871	999.877	999.882	999.888	999.893
1	999.898	999.903	999.908	999.913	999.917	999.921	999.925	999.929	999.933	999.936
2	999.940	999.943	999.946	999.949	999.952	999.954	999.956	999.959	999.961	999.962
3	999.964	999.966	999.967	999.968	999.969	999.970	999.971	999.971	999.972	999.972
4	999.972	999.972	999.972	999.971	999.971	999.970	999.969	999.968	999.967	999.965
5	999.964	999.962	999.960	999.958	999.956	999.954	999.951	999.949	999.946	999.943
6	999.940	999.937	999.934	999.930	999.926	999.923	999.919	999.915	999.910	999.906
7	999.901	999.897	999.892	999.887	999.882	999.877	999.871	999.866	999.860	999.854
8	999.848	999.842	999.836	999.829	999.823	999.816	999.809	999.802	999.795	999.788
9	999.781	999.773	999.765	999.758	999.750	999.742	999.734	999.725	999.717	999.708
10	999.699	999.691	999.682	999.672	999.663	999.654	999.644	999.635	999.625	999.615
11	999.605	999.595	999.584	999.574	999.563	999.553	999.542	999.531	999.520	999.509
12	999.497	999.486	999.474	999.462	999.451	999.439	999.426	999.414	999.402	999.389
13	999.377	999.364	999.351	999.338	999.325	999.312	999.299	999.285	999.272	999.258
14	999.244	999.230	999.216	999.202	999.188	999.173	999.159	999.144	999.129	999.114
15	999.099	999.084	999.069	999.054	999.038	999.022	999.007	998.991	998.975	998.958
16	998.943	998.926	998.910	998.894	998.877	998.860	998.843	998.826	998.809	998.792
17	998.775	998.757	998.740	998.722	998.704	998.686	998.668	998.650	998.632	998.614
18	998.595	998.577	998.558	998.539	998.520	998.502	998.482	998.463	998.444	998.425
19	998.405	998.385	998.366	998.346	998.326	998.306	998.286	998.265	998.245	998.224
20	998.204	998.183	998.162	998.141	998.120	998.099	998.078	998.057	998.035	998.014
21	997.992	997.971	997.949	997.927	997.905	997.883	997.860	997.838	997.816	997.793
22	997.770	997.747	997.725	997.702	997.679	997.656	997.632	997.609	997.585	997.562
23	997.538	997.515	997.491	997.467	997.443	997.419	997.394	997.370	997.345	997.321
24	997.296	997.272	997.247	997.222	997.197	997.172	997.146	997.121	997.096	997.070
25	997.045	997.019	996.993	996.967	996.941	996.915	996.889	996.863	996.836	996.810
26	996.783	996.757	996.730	996.703	996.676	996.649	996.622	996.595	996.568	996.540
27	996.513	996.485	996.458	996.430	996.402	996.374	996.346	996.318	996.290	996.262
28	996.233	996.205	996.176	996.148	996.119	996.090	996.061	996.032	996.003	995.974
29	995.945	995.915	995.886	995.856	995.827	995.797	995.767	995.737	995.707	995.677
30	995.647	995.617	995.586	995.556	995.526	995.495	995.464	995.433	995.403	995.372
31	995.341	995.310	995.278	995.247	995.216	995.184	995.153	995.121	995.090	995.058
32	995.026	994.997	994.962	994.930	994.898	994.865	994.833	994.801	994.768	994.735
33	994.703	994.670	994.637	994.604	994.571	994.538	994.505	994.472	994.438	994.405
34	994.371	994.338	994.304	994.270	994.236	994.202	994.168	994.134	994.100	994.066
35	994.032	993.997	993.963	993.928	993.893	993.859	993.824	993.789	993.754	993.719
36	993.684	993.648	993.613	993.578	993.543	993.507	993.471	993.436	993.400	993.364
37	993.328	993.292	993.256	993.220	993.184	993.148	993.111	993.075	993.038	993.002
38	992.965	992.928	992.891	992.855	992.818	992.780	992.743	992.706	992.669	992.631
39	992.594	992.557	992.519	992.481	992.444	992.406	992.368	992.330	992.292	992.254
40	992.215	992.177	992.139	992.100	992.062	992.023	991.985	991.946	991.907	992.868
41	991.830	991.791	991.751	991.712	992.673	991.634	991.594	991.555	991.515	991.476
42	991.436	991.396	991.357	991.317	991.277	991.237	991.197	991.157	991.116	991.076
43	991.036	990.995	990.955	990.914	990.873	990.833	990.792	990.751	990.710	990.669
44	990.628	990.587	990.546	990.504	990.463	990.421	990.380	990.338	990.297	990.255
45	990.213	990.171	990.129	990.087	990.045	990.003	989.961	989.919	989.876	989.834
46	989.792	989.749	989.706	989.664	989.621	989.578	989.535	989.492	989.449	989.406
47	989.363	989.320	989.276	989.233	989.190	989.146	989.103	989.059	989.015	988.971
48	988.928	988.884	988.840	988.796	988.752	988.707	988.663	988.619	988.574	988.530
49	988.485	988.441	988.396	988.352	988.307	988.262	988.217	988.172	988.127	988.082

*From "Water: Density at Atmospheric Pressure and Temperatures from 0 to 100°C," *Tables of Standard Handbook Data*, Standartov, Moscow, 1978. To conserve space, only a few tables of density values are given. The reader is reminded that density values may be found as the reciprocal of the specific volume values tabulated in the "Thermodynamic Properties: Tables" subsection.

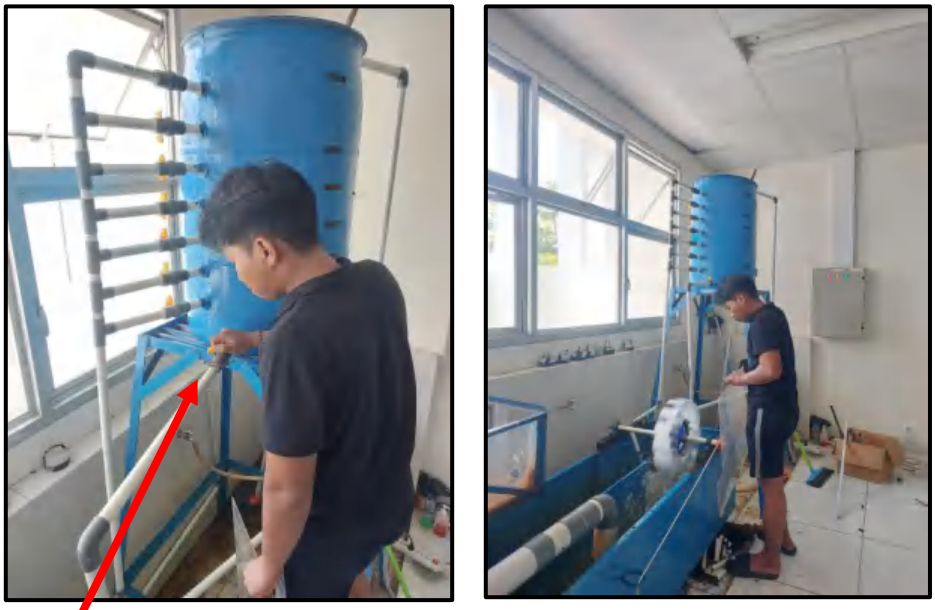
Lampiran 5. Dokumentasi

1. Pembuatan Alat

2. Pengukuran Head Aliran

3. Pengambilan Data



Pengaturan Pembukaan Katup (Q)