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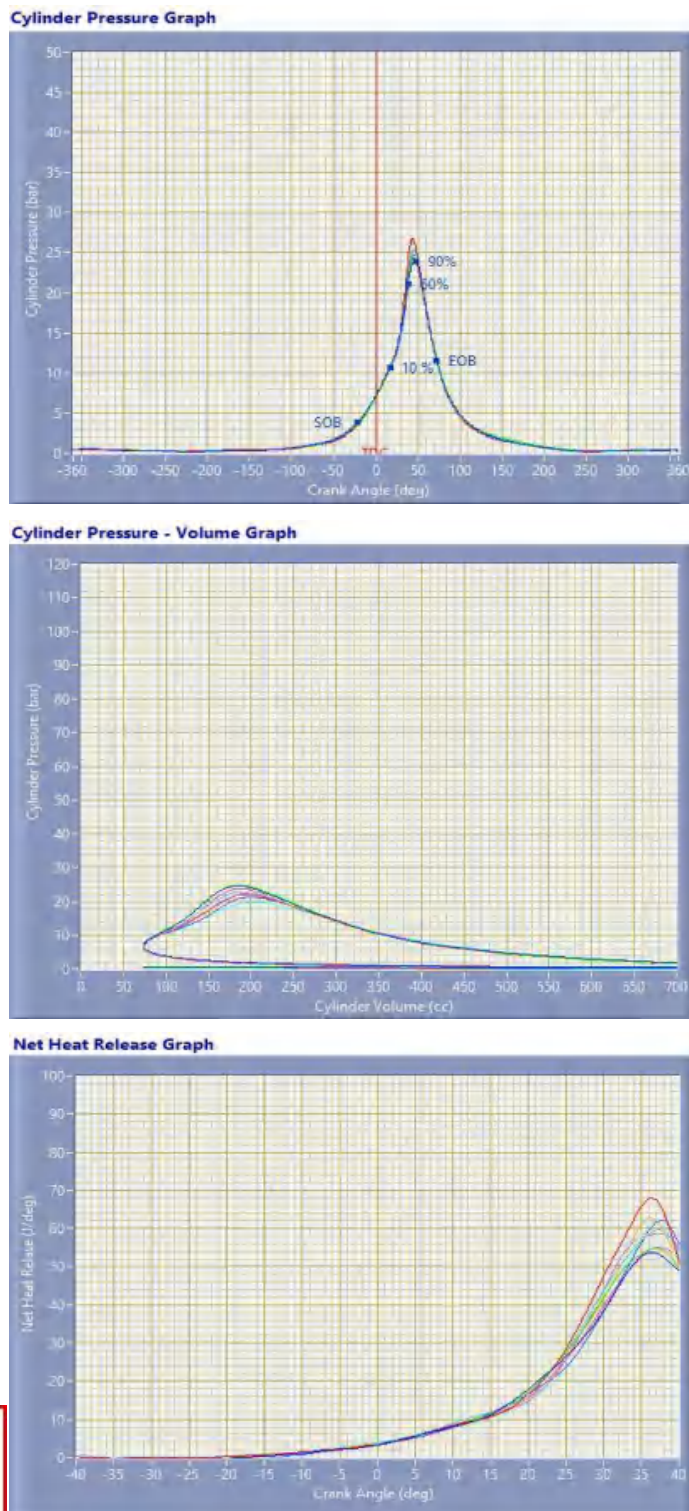
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LAMPIRAN

Lampiran 1. Data Kinerja Pembakaran (Pertamax E5 beban 12 kg)



Lampiran 2. Data Perhitungan

PERTALITE																								
Rasio Kompresi	RPM	Beban (kg)	Putaran (rpm)	Torsi (Nm)	BP (Kw)	FC (kg/h)	SFC (kg/kW.h)	IP	IMEP	Ma (kg/h)	Mth (kg/h)	AFR	η_{vo} (%)	η_{th} (%)	η_{mech} (%)	fuel (cc/min)	10^{-3}	pf	ho	pud	LHVbb	vs	$vsx10^{-3}$	Qtot
10	1500	6.09	1547	11.052	1.790	0.622	0.347	4.730	5.550	7.111	35.892	11.441	19.814	23.497	0.378	14	0.014	0.74	4.790	1.17	44110	0.661	0.00066	7.616
		9.08	1551	16.479	2.675	0.932	0.349	6.101	7.140	9.807	35.985	10.518	27.254	23.416	0.438	21	0.021	0.74	9.110	1.17	44110	0.661	0.00066	11.424
		12.07	1544	21.905	3.540	1.021	0.288	7.332	8.620	13.207	35.822	12.933	36.867	28.292	0.483	23	0.023	0.74	16.520	1.17	44110	0.661	0.00066	12.513
	1800	6.06	1817	10.998	2.092	0.844	0.403	5.746	5.740	9.845	42.156	11.670	23.353	20.235	0.364	19	0.019	0.74	9.180	1.17	44110	0.661	0.00066	10.336
		9.06	1816	16.443	3.125	0.977	0.313	6.733	6.730	11.584	42.133	11.859	27.494	26.113	0.464	22	0.022	0.74	12.710	1.17	44110	0.661	0.00066	11.969
		12.05	1812	21.869	4.148	1.110	0.268	8.416	8.430	14.957	42.040	13.475	35.579	30.496	0.493	25	0.025	0.74	21.190	1.17	44110	0.661	0.00066	13.601

E5																								
Rasio Kompresi	RPM	Beban (kg)	Putaran (rpm)	Torsi (Nm)	BP (Kw)	FC (kg/h)	SFC (kg/kW.h)	IP	IMEP	Ma (kg/h)	Mth (kg/h)	AFR	η_{vo} (%)	η_{th} (%)	η_{mech} (%)	fuel (cc/min)	10^{-3}	pf	ho	pud	LHVbb	vs	$vsx10^{-3}$	Qtot
10	1500	6.08	1561	11.034	1.803	0.644	0.357	4.807	5.590	7.251	36.217	11.255	20.021	23.289	0.375	14	0.014	0.767	4.980	1.17	43255	0.661	0.00066	7.741
		9.09	1568	16.497	2.707	0.920	0.340	6.021	6.970	9.069	36.379	9.853	24.929	24.482	0.450	20	0.02	0.767	7.790	1.17	43255	0.661	0.00066	11.059
		12.02	1574	21.814	3.594	1.012	0.282	7.414	8.550	13.778	36.519	13.609	37.729	29.543	0.485	22	0.022	0.767	17.980	1.17	43255	0.661	0.00066	12.165
	1800	6.08	1810	11.034	2.090	0.782	0.374	5.465	5.480	9.276	41.994	11.857	22.089	22.238	0.383	17	0.017	0.767	8.150	1.17	43255	0.661	0.00066	9.400
		9.08	1815	16.479	3.130	1.058	0.338	6.850	6.850	11.391	42.110	10.762	27.051	24.615	0.457	23	0.023	0.767	12.290	1.17	43255	0.661	0.00066	12.718
		12.07	1811	21.905	4.152	1.104	0.266	8.361	8.380	15.171	42.017	13.736	36.107	31.288	0.497	24	0.024	0.767	21.800	1.17	43255	0.661	0.00066	13.271



E10																								
Rasio Kompresi	RPM	Beban (kg)	Putaran (rpm)	Torsi (Nm)	BP (Kw)	FC (kg/h)	SFC (kg/kW.h)	IP	IMEP	Ma (kg/h)	Mth (kg/h)	AFR	η_{vo} (%)	η_{th} (%)	η_{mech} (%)	fuel (cc/min)	10^{-3}	pf	ho	pud	LHVbb	vs	$vsx10^{-3}$	Qtot
10	1500	6.05	1560	10.980	1.793	0.645	0.360	5.045	5.870	7.523	36.194	11.661	20.785	23.596	0.355	14	0.014	0.768	5.360	1.17	42399	0.661	0.00066	7.598
		9.07	1567	16.461	2.700	0.968	0.358	6.129	7.100	9.759	36.356	10.085	26.842	23.689	0.440	21	0.021	0.768	9.020	1.17	42399	0.661	0.00066	11.397
		12.07	1559	21.905	3.574	0.922	0.258	7.266	8.460	13.030	36.171	14.138	36.023	32.931	0.492	20	0.02	0.768	16.080	1.17	42399	0.661	0.00066	10.854
	1800	6.08	1815	11.034	2.096	0.783	0.374	5.140	5.140	9.202	42.110	11.747	21.852	22.720	0.408	17	0.017	0.768	8.020	1.17	42399	0.661	0.00066	9.226
		9.08	1820	16.479	3.139	0.968	0.308	7.069	7.050	12.140	42.226	12.546	28.751	27.544	0.444	21	0.021	0.768	13.960	1.17	42399	0.661	0.00066	11.397
		12.09	1817	21.942	4.173	1.244	0.298	8.639	8.630	15.185	42.156	12.205	36.021	28.477	0.483	27	0.027	0.768	21.840	1.17	42399	0.661	0.00066	14.653

E15																								
Rasio Kompresi	RPM	Beban (kg)	Putaran (rpm)	Torsi (Nm)	BP (Kw)	FC (kg/h)	SFC (kg/kW.h)	IP	IMEP	Ma (kg/h)	Mth (kg/h)	AFR	η_{vo} (%)	η_{th} (%)	η_{mech} (%)	fuel (cc/min)	10^{-3}	pf	ho	pud	LHVbb	vs	$vsx10^{-3}$	Qtot
10	1500	6.08	1563	11.034	1.805	0.696	0.385	4.960	5.760	7.316	36.263	10.517	20.176	22.485	0.364	15	0.015	0.773	5.070	1.17	41544	0.661	0.00066	8.028
		9.07	1565	16.461	2.696	1.020	0.378	6.130	7.110	9.507	36.310	9.317	26.182	22.899	0.440	22	0.022	0.773	8.560	1.17	41544	0.661	0.00066	11.775
		12.05	1566	21.869	3.584	0.928	0.259	7.368	8.540	13.366	36.333	14.409	36.787	33.486	0.486	20	0.02	0.773	16.920	1.17	41544	0.661	0.00066	10.705
	1800	6.06	1817	10.998	2.092	0.881	0.421	5.746	5.740	9.845	42.156	11.172	23.353	20.568	0.364	19	0.019	0.773	9.180	1.17	41544	0.661	0.00066	10.169
		9.08	1811	16.479	3.124	1.206	0.386	7.034	7.050	12.132	42.017	10.061	28.873	22.446	0.444	26	0.026	0.773	13.940	1.17	41544	0.661	0.00066	13.916
		12.04	1814	21.851	4.149	1.252	0.302	8.535	8.540	15.199	42.087	12.137	36.114	28.709	0.486	27	0.027	0.773	21.880	1.17	41544	0.661	0.00066	14.451

PERTAMAX																								
Rasio Kompresi	RPM	Beban (kg)	Putaran (rpm)	Torsi (Nm)	BP (Kw)	FC (kg/h)	SFC (kg/kW.h)	IP	IMEP	Ma (kg/h)	Mth (kg/h)	AFR	η_{vo} (%)	η_{th} (%)	η_{mech} (%)	fuel (cc/min)	10^{-3}	pf	ho	pud	LHVbb	vs	$vsx10^{-3}$	Qtot
		6.08	1540	11.034	1.779	0.710	0.399	4.862	5.730	7.565	35.730	10.649	21.172	20.369	0.366	16	0.016	0.740	5.420	1.17	44250	0.661	0.00066	8.732
		9.09	1572	16.497	2.714	0.844	0.311	5.517	6.370	8.461	36.472	10.029	23.198	26.177	0.492	19	0.019	0.740	6.780	1.17	44250	0.661	0.00066	10.369
		11.99	1547	21.760	3.523	0.977	0.277	6.486	7.610	11.602	35.892	11.878	32.326	29.346	0.543	22	0.022	0.740	12.750	1.17	44250	0.661	0.00066	12.007
		6.08	1809	11.034	2.089	0.888	0.425	5.531	5.550	10.865	41.971	12.235	25.886	19.141	0.378	20	0.020	0.740	11.180	1.17	44250	0.661	0.00066	10.915
		9.06	1813	16.443	3.120	1.021	0.327	6.043	6.050	11.652	42.064	11.410	27.702	24.857	0.516	23	0.023	0.740	12.860	1.17	44250	0.661	0.00066	12.552
		12.08	1803	21.923	4.137	1.110	0.268	7.778	7.830	14.837	41.832	13.367	35.468	30.323	0.532	25	0.025	0.740	20.850	1.17	44250	0.661	0.00066	13.644



E5																								
Rasio Kompresi	RPM	Beban (kg)	Putaran (rpm)	Torsi (Nm)	BP (Kw)	FC (kg/h)	SFC (kg/kW.h)	IP	IMEP	Ma (kg/h)	Mth (kg/h)	AFR	η_{vo} (%)	η_{th} (%)	η_{mech} (%)	fuel (cc/min)	10^{-3}	pf	ho	pud	LHVbb	vs	$vsx10^{-3}$	Qtot
10	1500	6.07	1576	11.016	1.817	0.736	0.405	4.932	5.680	9.617	36.565	13.061	26.301	20.477	0.368	16	0.016	0.767	8.760	1.17	43388	0.661	0.00066	8.874
		9.09	1572	16.497	2.714	0.966	0.356	5.794	6.690	10.286	36.472	10.643	28.201	23.304	0.468	21	0.021	0.767	10.020	1.17	43388	0.661	0.00066	11.648
		12.02	1582	21.814	3.612	1.104	0.306	7.539	8.650	14.201	36.704	12.857	38.690	27.135	0.479	24	0.024	0.767	19.100	1.17	43388	0.661	0.00066	13.311
	1800	6.08	1816	11.034	2.097	0.920	0.439	5.413	5.410	13.342	42.133	14.496	31.666	18.907	0.387	20	0.020	0.767	16.860	1.17	43388	0.661	0.00066	11.093
		9.08	1821	16.479	3.141	1.012	0.322	6.561	6.540	13.271	42.249	13.108	31.410	25.740	0.479	22	0.022	0.767	16.680	1.17	43388	0.661	0.00066	12.202
		12.09	1814	21.942	4.166	1.197	0.287	8.165	8.170	15.175	42.087	12.682	36.056	28.889	0.510	26	0.026	0.767	21.810	1.17	43388	0.661	0.00066	14.421

E10																								
Rasio Kompresi	RPM	Beban (kg)	Putaran (rpm)	Torsi (Nm)	BP (Kw)	FC (kg/h)	SFC (kg/kW.h)	IP	IMEP	Ma (kg/h)	Mth (kg/h)	AFR	η_{vo} (%)	η_{th} (%)	η_{mech} (%)	fuel (cc/min)	10^{-3}	pf	ho	pud	LHVbb	vs	$vsx10^{-3}$	Qtot
10	1500	6.06	1578	10.998	1.816	0.737	0.406	4.755	5.470	8.572	36.611	11.627	23.414	20.857	0.382	16	0.016	0.768	6.960	1.17	42525	0.661	0.00066	8.709
		9.07	1565	16.461	2.696	0.876	0.325	5.535	6.420	9.705	36.310	11.084	26.727	26.071	0.487	19	0.019	0.768	8.920	1.17	42525	0.661	0.00066	10.342
		11.99	1556	21.760	3.544	1.014	0.286	6.738	7.860	12.920	36.101	12.745	35.788	29.594	0.526	22	0.022	0.768	15.810	1.17	42525	0.661	0.00066	11.975
	1800	6.07	1816	11.016	2.094	0.968	0.462	4.942	4.940	14.308	42.133	14.786	33.959	18.318	0.424	21	0.021	0.768	19.390	1.17	42525	0.661	0.00066	11.431
		9.08	1824	16.479	3.146	1.014	0.322	6.321	6.290	14.227	42.319	14.034	33.618	26.271	0.498	22	0.022	0.768	19.170	1.17	42525	0.661	0.00066	11.975
		12.09	1817	21.942	4.173	1.198	0.287	8.118	8.110	15.778	42.156	13.170	37.428	29.485	0.514	26	0.026	0.768	23.580	1.17	42525	0.661	0.00066	14.152

E15																								
Rasio Kompresi	RPM	Beban (kg)	Putaran (rpm)	Torsi (Nm)	BP (Kw)	FC (kg/h)	SFC (kg/kW.h)	IP	IMEP	Ma (kg/h)	Mth (kg/h)	AFR	η_{vo} (%)	η_{th} (%)	η_{mech} (%)	fuel (cc/min)	10^{-3}	pf	ho	pud	LHVbb	vs	$vsx10^{-3}$	Qtot
	1500	6.08	1574	11.034	1.818	0.835	0.459	4.925	5.680	8.597	36.519	10.298	23.541	18.815	0.369	18	0.018	0.773	7.000	1.17	41663	0.661	0.00066	9.662
		9.08	1566	16.479	2.701	0.974	0.361	5.090	5.900	10.624	36.333	10.908	29.240	23.962	0.531	21	0.021	0.773	10.690	1.17	41663	0.661	0.00066	11.272
		12.1	1584	21.960	3.641	1.160	0.318	6.737	7.720	13.227	36.751	11.407	35.991	27.131	0.540	25	0.025	0.773	16.570	1.17	41663	0.661	0.00066	13.419
	1800	6.07	1804	11.016	2.080	1.020	0.491	5.059	5.090	13.314	41.855	13.049	31.811	17.615	0.411	22	0.022	0.773	16.790	1.17	41663	0.661	0.00066	11.809
		9.08	1813	16.479	3.127	1.206	0.386	6.492	6.500	13.492	42.064	11.188	32.074	22.407	0.482	26	0.026	0.773	17.240	1.17	41663	0.661	0.00066	13.956
		12.08	1808	21.923	4.149	1.252	0.302	7.829	7.860	15.344	41.948	12.253	36.580	28.627	0.530	27	0.027	0.773	22.300	1.17	41663	0.661	0.00066	14.492



Lampiran 3. Data Kinerja Performa Mesin

Daya Efektif									
Putaran	Beban (kg)	Pertalite E0	Pertalite E5	Pertalite E10	Pertalite E15	Pertamax E0	Pertamax E5	Pertamax E10	Pertamax E15
1500 rpm	6	1.790	1.803	1.793	1.805	1.779	1.817	1.816	1.818
	9	2.675	2.707	2.700	2.696	2.714	2.714	2.696	2.701
	12	3.540	3.594	3.574	3.584	3.523	3.612	3.544	3.641
1800 rpm	6	2.092	2.090	2.096	2.092	2.089	2.097	2.094	2.080
	9	3.125	3.130	3.139	3.124	3.120	3.141	3.146	3.127
	12	4.148	4.152	4.173	4.149	4.137	4.166	4.173	4.149

Torsi									
Putaran	Beban (kg)	Pertalite E0	Pertalite E5	Pertalite E10	Pertalite E15	Pertamax E0	Pertamax E5	Pertamax E10	Pertamax E15
1500 rpm	6	11.052	11.034	10.980	11.034	11.034	11.016	10.998	11.034
	9	16.479	16.497	16.461	16.461	16.497	16.497	16.461	16.479
	12	21.905	21.814	21.905	21.869	21.760	21.814	21.760	21.960
1800 rpm	6	10.998	11.034	11.034	10.998	11.034	11.034	11.016	11.016
	9	16.443	16.479	16.479	16.479	16.443	16.479	16.479	16.479
	12	21.869	21.905	21.942	21.851	21.923	21.942	21.942	21.923

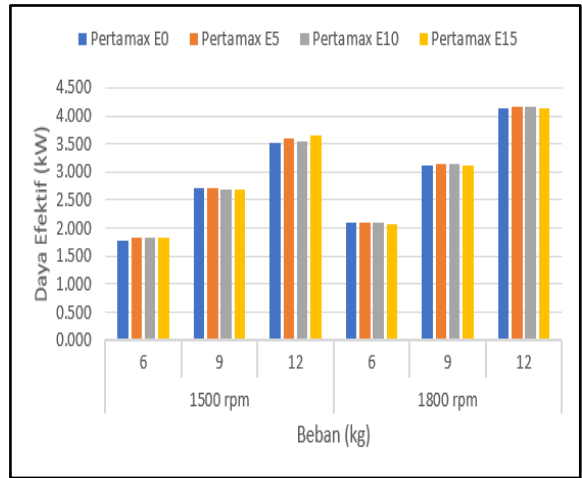
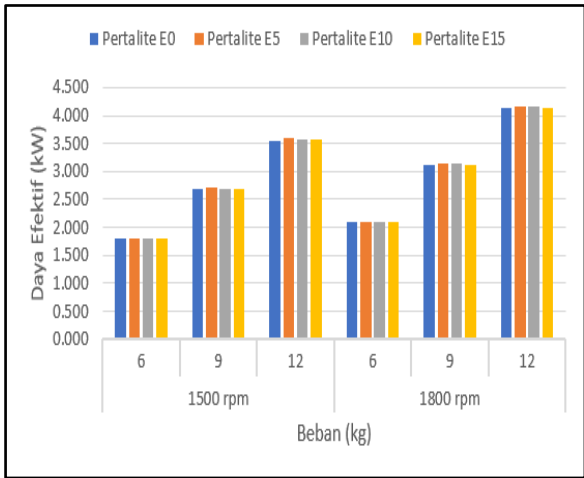
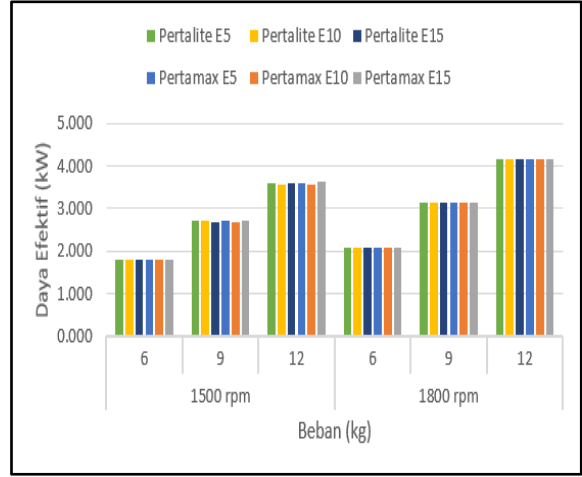
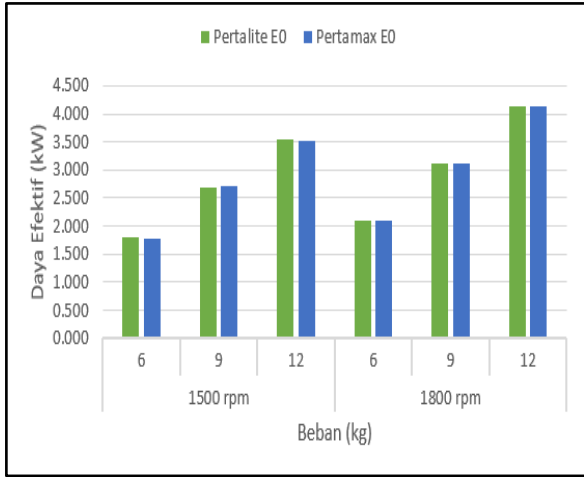
SFC									
Putaran	Beban (kg)	Pertalite E0	Pertalite E5	Pertalite E10	Pertalite E15	Pertamax E0	Pertamax E5	Pertamax E10	Pertamax E15
1500 rpm	6	0.347	0.357	0.360	0.385	0.399	0.405	0.406	0.459
	9	0.349	0.340	0.358	0.378	0.311	0.356	0.325	0.361
	12	0.288	0.282	0.258	0.259	0.277	0.306	0.286	0.318
1800 rpm	6	0.403	0.374	0.374	0.421	0.425	0.439	0.462	0.491
	9	0.313	0.338	0.308	0.386	0.327	0.322	0.322	0.386
	12	0.268	0.266	0.298	0.302	0.268	0.287	0.287	0.302

Efisiensi Volumetrik									
Putaran	Beban (kg)	Pertalite E0	Pertalite E5	Pertalite E10	Pertalite E15	Pertamax E0	Pertamax E5	Pertamax E10	Pertamax E15
1500 rpm	6	19.814	20.021	20.785	20.176	21.172	26.301	23.414	23.541
	9	27.254	24.929	26.842	26.182	23.198	28.201	26.727	29.240
	12	36.867	37.729	36.023	36.787	32.326	38.690	35.788	35.991
1800 rpm	6	23.353	22.089	21.852	23.353	25.886	31.666	33.959	31.811
	9	27.494	27.051	28.751	28.873	27.702	31.410	33.618	32.074
	12	35.579	36.107	36.021	36.114	35.468	36.056	37.428	36.580

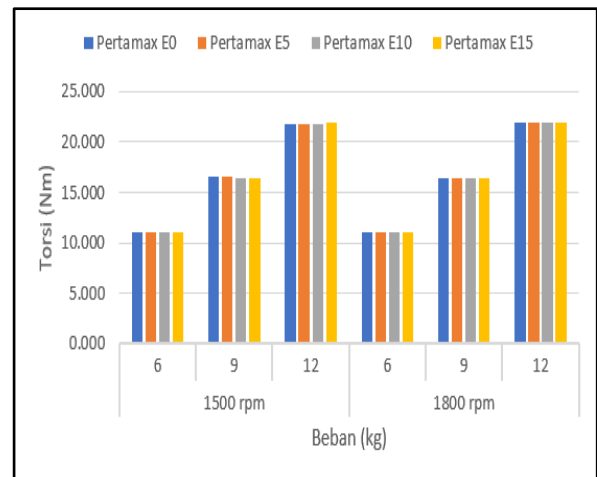
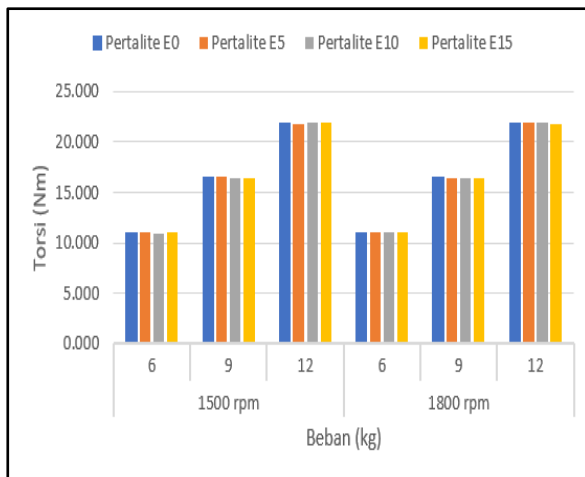
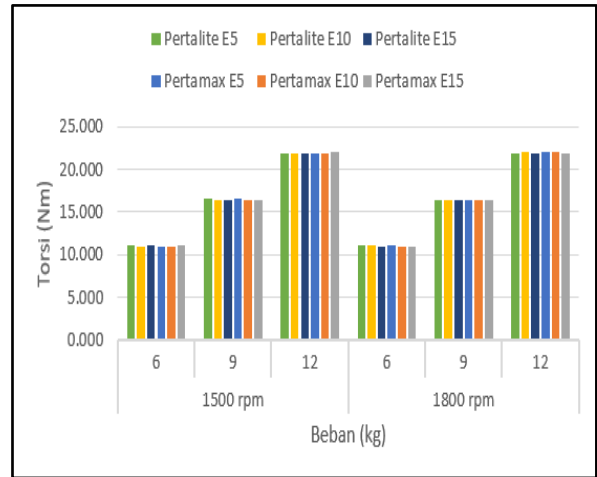
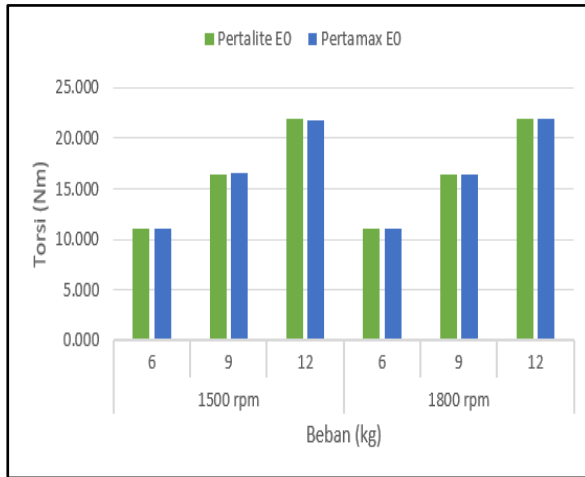
Efisiensi Termal									
Putaran	Beban (kg)	Pertalite E0	Pertalite E5	Pertalite E10	Pertalite E15	Pertamax E0	Pertamax E5	Pertamax E10	Pertamax E15
1500 rpm	6	23.497	23.289	23.596	22.485	20.369	20.477	20.857	18.815
	9	23.416	24.482	23.689	22.899	26.177	23.304	26.071	23.962
	12	28.292	29.543	32.931	33.486	29.346	27.135	29.594	27.131
1800 rpm	6	20.235	22.238	22.720	20.568	19.141	18.907	18.318	17.615
	9	26.113	24.615	27.544	22.446	24.857	25.740	26.271	22.407
	12	30.496	31.288	28.477	28.709	30.323	28.889	29.485	28.627



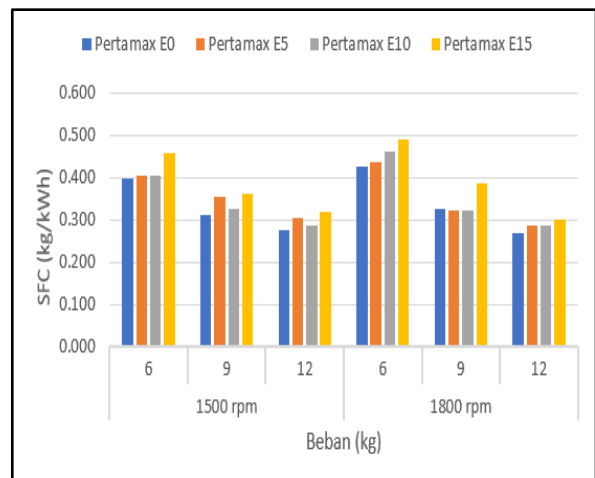
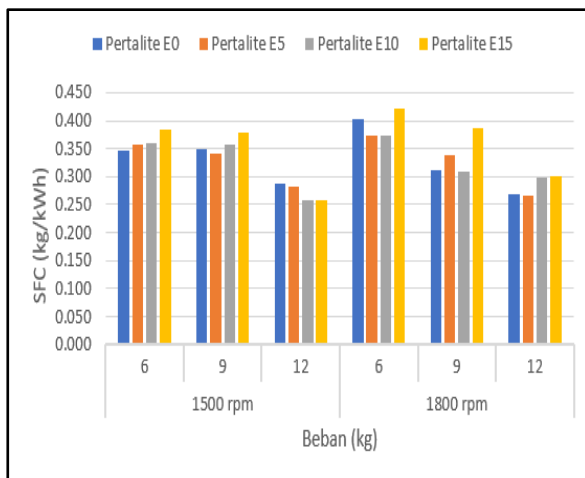
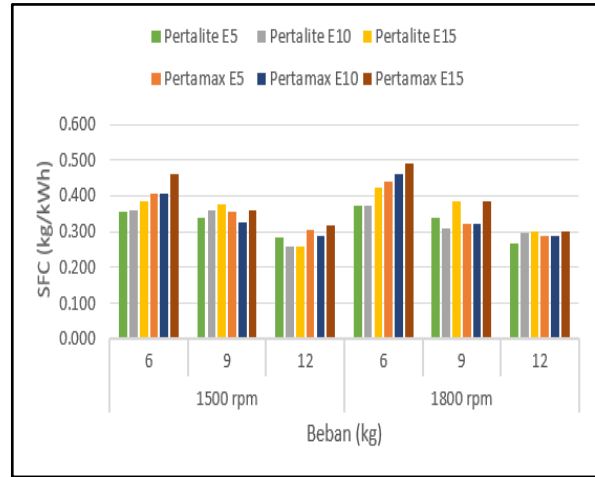
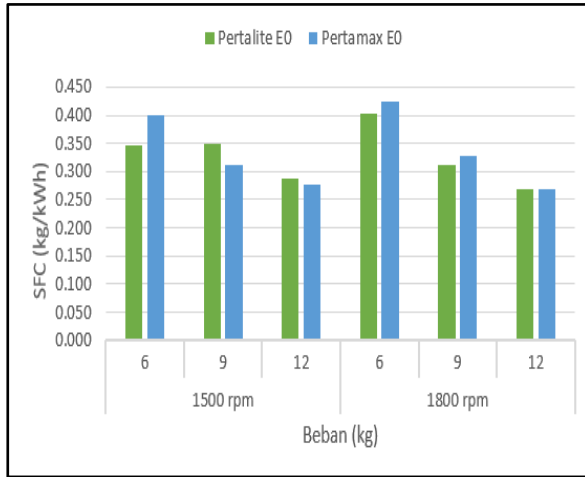
Lampiran 4. Perbandingan daya efektif pada campuran bahan bakar dengan etanol



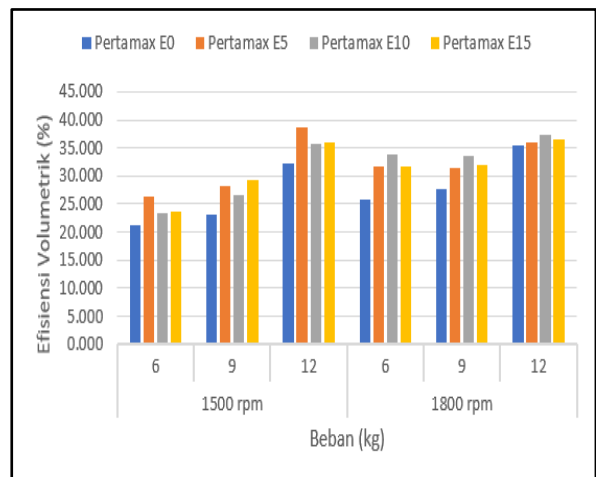
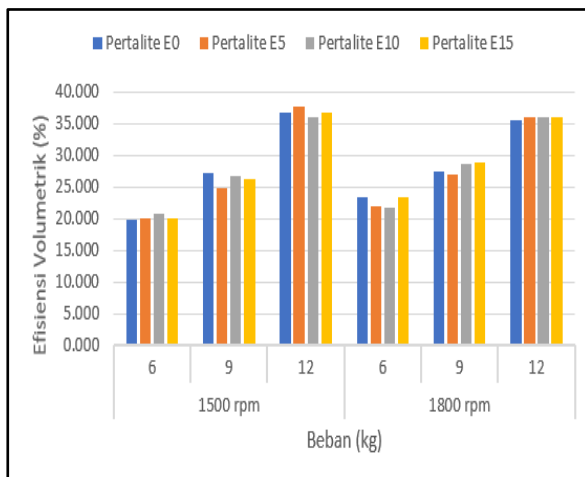
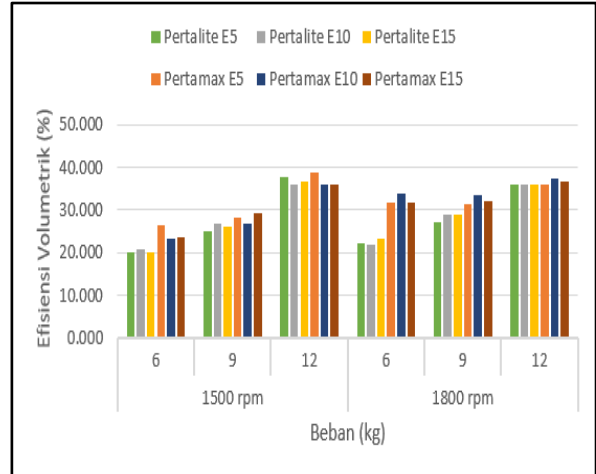
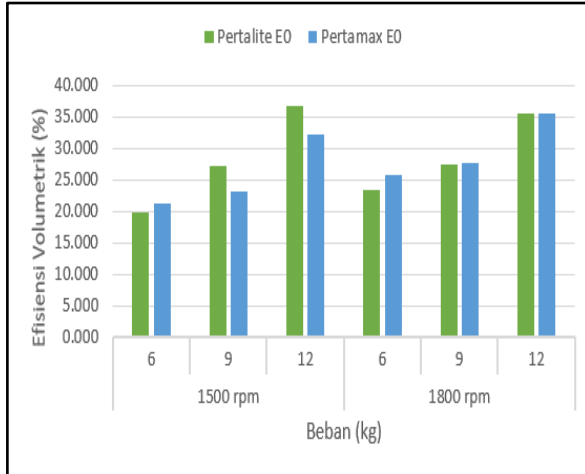
Lampiran 5. Perbandingan torsi pada campuran bahan bakar dengan etanol



Lampiran 6. Perbandingan konsumsi bahan bakar spesifik pada campuran bahan bakar dengan etanol



Lampiran 7. Perbandingan efisiensi volumetrik pada campuran bahan bakar dengan etanol



Lampiran 8. Perbandingan efisiensi termal pada campuran bahan bakar dengan etanol

