DAFTAR PUSTAKA

Koc, M., Sekmen, Y., Topgul, T., Yucesu, H.S., 2009. *The Effect Of Ethanol Unleaded Gasoline Blends On Engine Performance And Exhaust Emmisions in a spark-ignition engine, Renewable Energy. Vol 34 pp.* 2101-2106, Elsevier

Venkateswarlu, K., Ramesh, K., Veladri, K., 2009, *Testing of Methanol-gasoline Blends as Alternative Fuel for SI Engine, IE (I) Journal-MC Vol 90, April* 2009

M.Eyidogan, A.Ozsezen, M.Canakci, A.Turkcan, *Impact of alcohol–gasoline fuel blendson the performance and combustion characteristics of an SI engine, Fuel* (2010)

P. Breeze, 2018. *Piston Engine-Based Power Plants*. Academic Press, 2017

Heywood, J.B., 1989. *Internal Combustion Engines Fundamentals*. Mc. Graw Hill Book Company, New York.

Fitri Wijayanti, Dadan Irwan, 2014. Analisis Pengaruh Bentuk Permukaan Piston terhadap Kinerja Motor Bensin. Bekasi. Jurnal Ilmiah Teknik Mesin Universitas Islam 45.

Wiranto Arismunandar, 1988. Penggerak Mula Motor Bakat Torak, Bandung, Institut Teknologi Bandung.

Anonim, 2014. *Manual Book : Reserch Engine Test Set UP1 Cylinder, 4 Stroke, Multi-Fuel, VCR with Open ECU*. Jurusan Teknik Mesin FakultasTeknik Universitas Hasanuddin, Makassar.

Prabowo Setyo Irwan, 2015. Perbedaan Unjuk Kerja Motor 4 Langkah dengan Variasi Perbandingan Kompresi yang Menggunakan Bahan Bakar Premium dan Pertamax. Skripsi. Semarang: Program Studi Pendidikan Teknik Mesin Fakultas Teknik, Universitas Negeri Semarang.

Heywood, J.B., 1989. *Internal Combustion Engines Fundamentals*. Mc. Graw Hill Book Company, New York.

Kristanto Philip, 2015. Motor Bakar Torak. Andi Yogyakarta 55281. Jk.Beo 38-40.

Prabowo Setyo Irwan, 2015. Perbedaan Unjuk Kerja Motor 4 Langkah dengan Variasi Perbandingan Kompresi yang Menggunakan Bahan Bakar Premium dan Pertamax. Skripsi. Semarang: Program Studi Pendidikan Teknik Mesin Fakultas Teknik, Universitas Negeri Semarang.

Pertamina, P. (n.d.). Pertamina. *Retrieved* 26 September 2020, *from Fuel Retail*: https://www.pertamina.com/id/fuel-retail

Prasetyo, Totok, 2003. Karakteristik Pembakaran Methanol. Makalah Pengantar Falsafah Sains (PPS702), Institut Pertanian Bogor.

Ambarish Datta, Achin Kumar Chowdhuri, Bijan Kumar Mandal, 2012. *Experimental Study on the Performances of Spark Ignition Engine with Alcohol-Gasoline Blends as Fuel.* Department of Mechanical Engineering, Bengal Engineering and Science University, India.

Mulyono Sugeng, Gunawan, Maryanti Budha, 2013. Pengaruh Penggunaan dan Perhitungan Efesiensi Bahan Bakar Premium dan Pertamax Terhadap Unjuk Kerja Motor Bakar Bensin. Jurnal Teknologi Terpadu No. 1 Vol. 2.

Anonim, 2008. Modul Praktikum Motor Bakar. Departemen Teknik Mesin Fakultas Teknik Universitas Hasanuddin, Makassar.

S. Babazadeh, S. M. Seyedpour, F. Ommi, S. H. Moosavy, M. Alizadeh, 2011. *Impact of Methanol-Gasoline Fuel Blends on the Performance and Exhaust Emissions of a SI Engine*. International Journal of Automotive Engineering.

Mohamad Rifal, Nazaruddin Sinaga, 2017. *Impact of Methanol-Gasoline Fuel Blend on the Fuel Consumption and Exhaust Emission of a SI Engine*. American Institude of Physics.

Wei Yanjv, Liu Shenghua, 2007. *Effects of Methanol/Gasoline Blends on a Spark Ignition Engine Performance and Emissions*. School of Energy and Power Engineering. Xi'an Jiotong University, China.

Liu Shenghua, Eddy R. Cuty Clemente, Hu Tiegang, 2006. *Study of Spark Ignition Engine Fueled with Methanol/Gasoline Fuel Blends.* Department of Automotive Engineering, Xi'an Jiotong University, China.

Avinash Kumar Agarwal, Himanshu Karare, Atul Dhar, 2014. *Combustion, Performance, Emissions and Particulate Characterization of a Methanol–Gasoline Blend (Gasohol) Fuelled Medium Duty Spark Ignition Transportation Engine*. Department of Mechanical Engineering, Indian Institute of Technology Kanpur, India.

Mohamad Rifal, Nazarudin Sinaga, 2018. Kaji Eksperimental Rasio Metanol-Bensin Terhadap Konsumsi Bahan Bakar, Emisi Gas Buang, Torsi Dan Daya. Gorontalo Journal of Infrastruktur and Science Engineering, Gorontalo.

Monang Butar Butar1, Mulfi Hazwi, 2014. Pengaruh Variasi Penambahan Alkohol 96% pada Bensin Terhadap Unjuk Kerja Motor Otto.Departemen Teknik Mesin, Fakultas Teknik, Universitas Sumatera Utara.

Shayan, S. Babazadeh, S.M. Seyedpour, dkk., 2011. *Impact of Methanol–Gasoline Fuel Blends on the Performance and Exhaust Emissions of a SI Engine*. International Journal of Automotive Engineering. Department of Mechanical Engineering, Iran University of Science and Technology.

Data Performa Mesin

FUEL	Ratio	Putaran	Torsi	BP	FC	SFC	Ma	AFR	ηth	Mth	ηvol	ηm	pf	mabb	IP
PERTAMAX	Rasio 6:1	1200	9.09	1.14	0.58	0.51	10.64	18.36	14.66	27.84	38.21	47.06	0.743	10.64	2.43
		1400	9.03	1.32	0.71	0.54	12.35	17.31	13.81	32.48	38.01	55.16	0.743	12.35	2.40
		1600	9.21	1.54	1.11	0.72	17.58	15.77	10.30	37.12	47.36	49.43	0.743	17.58	3.12
		1800	9.19	1.73	1.07	0.62	22.48	21.01	12.04	41.76	53.83	48.10	0.743	22.48	3.60
	Rasio 8:1	1200	9.02	1.13	0.31	0.28	8.23	26.38	27.02	27.84	29.57	51.31	0.743	8.23	2.21
		1400	9.04	1.32	0.40	0.30	11.13	27.75	24.57	32.48	34.28	52.36	0.743	11.13	2.53
		1600	9.01	1.51	0.58	0.38	11.77	20.30	19.38	37.12	31.69	49.33	0.743	11.77	3.06
		1800	9.22	1.74	0.85	0.49	23.71	28.00	15.26	41.76	56.78	51.22	0.743	23.71	3.39
	Rasio 10:1	1200	9.3	1.17	0.45	0.38	7.80	17.49	19.50	27.84	28.01	56.09	0.743	7.80	2.08
		1400	9.2	1.35	0.58	0.43	10.49	18.11	17.31	32.48	32.31	52.17	0.743	10.49	2.58
		1600	9.22	1.54	0.62	0.40	12.35	19.78	18.41	37.12	33.26	51.98	0.743	12.35	2.97
		1800	9	1.70	0.71	0.42	23.97	33.60	17.69	41.76	57.39	50.00	0.743	23.97	3.39
PMAX90	Rasio 6:1	1200	9.23	1.16	0.67	0.58	9.80	14.63	14.06	27.84	35.19	38.29	0.744	9.80	3.03
		1400	9.03	1.32	0.80	0.61	12.60	15.68	13.38	32.48	38.78	39.80	0.744	12.60	3.32
		1600	9.04	1.51	0.98	0.65	15.30	15.58	12.52	37.12	41.22	35.27	0.744	15.30	4.29
		1800	9.21	1.74	1.25	0.72	20.98	16.78	11.28	41.76	50.23	37.23	0.744	20.98	4.66
	Rasio 8:1	1200	9.19	1.15	0.58	0.50	9.68	16.68	16.16	27.84	34.76	37.07	0.744	9.68	3.11
		1400	9.2	1.35	0.58	0.43	9.89	17.05	18.87	32.48	30.46	37.27	0.744	9.89	3.62
		1600	9.21	1.54	0.71	0.46	10.32	14.45	17.54	37.12	27.80	38.80	0.744	10.32	3.98
		1800	9.42	1.77	0.89	0.50	14.96	16.76	16.15	41.76	35.82	36.90	0.744	14.96	4.81
	Rasio 10:1	1200	8.86	1.11	0.58	0.52	9.29	16.01	15.58	27.84	33.38	36.75	0.744	9.29	3.03
		1400	9.24	1.35	0.67	0.49	10.32	15.41	16.43	32.48	31.78	38.50	0.744	10.32	3.52
		1600	9.84	1.65	0.80	0.49	11.17	13.90	16.66	37.12	30.08	41.18	0.744	11.17	4.00
		1800	9.38	1.77	0.85	0.48	19.37	22.84	16.93	41.76	46.38	37.28	0.744	19.37	4.74

Data Performa Mesin

FUEL	Ratio	Putaran	Torsi	BP	FC	SFC	Ma	AFR	ηth	Mth	ηvol	ηm	pf	mabb	IP
PMAX85	Rasio 6:1	1200	9.21	1.16	0.72	0.62	9.51	13.23	13.66	27.84	34.17	39.14	0.749	9.51	2.96
		1400	9.39	1.38	0.81	0.59	11.93	14.75	14.45	32.48	36.74	34.64	0.749	11.93	3.97
		1600	9.18	1.54	0.99	0.64	13.35	13.51	13.21	37.12	35.97	40.56	0.749	13.35	3.79
		1800	9.22	1.74	1.08	0.62	14.81	13.73	13.68	41.76	35.46	35.60	0.749	14.81	4.88
	Rasio 8:1	1200	9.41	1.18	0.63	0.53	3.60	5.73	15.96	27.84	12.94	33.73	0.749	3.60	3.50
		1400	9.41	1.38	0.81	0.59	9.76	12.06	14.48	32.48	30.04	38.45	0.749	9.76	3.59
		1600	9.19	1.54	0.85	0.55	9.60	11.24	15.31	37.12	25.85	34.23	0.749	9.60	4.50
		1800	9.17	1.73	1.08	0.62	14.44	13.39	13.61	41.76	34.58	36.14	0.749	14.44	4.78
	Rasio 10:1	1200	9.2	1.16	0.63	0.54	5.35	8.50	15.60	27.84	19.21	35.89	0.749	5.35	3.22
		1400	9.24	1.35	0.81	0.60	8.37	10.35	14.22	32.48	25.78	35.61	0.749	8.37	3.80
		1600	9.22	1.54	0.76	0.49	12.35	16.16	17.17	37.12	33.26	35.32	0.749	12.35	4.37
		1800	9.2	1.73	0.90	0.52	11.45	12.74	16.38	41.76	27.42	34.00	0.749	11.45	5.10
PMAX80	Rasio 6:1	1200	9.18	1.15	0.81	0.71	9.93	12.20	12.51	27.84	35.65	37.59	0.753	9.93	3.07
		1400	9.19	1.35	0.86	0.64	10.70	12.47	13.84	32.48	32.95	36.15	0.753	10.70	3.73
		1600	9.24	1.55	1.08	0.70	12.96	11.95	12.59	37.12	34.90	35.68	0.753	12.96	4.34
		1800	9.22	1.74	1.22	0.70	13.59	11.14	12.56	41.76	32.55	34.69	0.753	13.59	5.01
	Rasio 8:1	1200	9.19	1.15	0.72	0.63	4.53	6.26	14.09	27.84	16.26	36.00	0.753	4.53	3.21
		1400	9	1.32	0.81	0.62	6.05	7.44	14.31	32.48	18.63	33.66	0.753	6.05	3.92
		1600	9.18	1.54	0.90	0.59	10.63	11.77	15.01	37.12	28.65	34.81	0.753	10.63	4.42
		1800	9.4	1.77	1.13	0.64	11.38	10.07	13.83	41.76	27.24	33.76	0.753	11.38	5.25
	Rasio 10:1	1200	9.19	1.15	0.68	0.59	7.80	11.51	15.03	27.84	28.01	32.70	0.753	7.80	3.53
		1400	9.13	1.34	0.81	0.61	9.29	11.43	14.51	32.48	28.61	38.21	0.753	9.29	3.50
		1600	9.22	1.54	0.86	0.56	9.97	11.61	15.87	37.12	26.85	34.01	0.753	9.97	4.54
		1800	9.2	1.73	0.95	0.55	11.43	12.05	16.12	41.76	27.38	30.94	0.753	11.43	5.60

Data Pengujian Emisi Gas Buang

KONSENTRASI KARBON MONOKSIDA (%)					
Rasio Kompresi	Bahan Bakar	Putaran			
		1200	1400	1600	1800
RASIO 6:1	Pertamax	0.12	0.13	0.13	0.11
	Pmax90	0.13	0.15	0.16	0.12
	Pmax85	0.09	0.13	0.15	0.13
	Pmax80	0.12	0.15	0.14	0.11
RASIO 8:1	Pertamax	0.18	0.2	0.24	0.34
	Pmax90	0.21	0.22	0.17	0.26
	Pmax85	0.14	0.18	0.24	0.23
	Pmax80	0.2	0.2	0.17	0.16
RASIO 10:1	Pertamax	0.32	0.29	0.33	0.28
	Pmax90	0.32	0.31	0.28	0.27
	Pmax85	0.29	0.25	0.25	0.25
	Pmax80	0.3	0.27	0.22	0.22

KONSENTRASI KARBON DIOKSIDA (%)					
Rasio Kompresi	Bahan Bakar	Putaran			
		1200	1400	1600	1800
RASIO 6:1	Pertamax	3	2.4	2.8	3.5
	Pmax90	3.3	2.6	2.7	3
	Pmax85	3.7	2.9	2.9	2.8
	Pmax80	3.4	2.7	2.9	2.7
RASIO 8:1	Pertamax	3	2.4	2.7	3.9
	Pmax90	3.8	2.6	2.9	3.1
	Pmax85	3.2	2.1	2.4	3
	Pmax80	3.3	2.2	3	2.9
RASIO 10:1	Pertamax	2.3	2.8	3.4	5.3
	Pmax90	2.1	2.5	3.2	4.8
	Pmax85	2.5	2.2	3.3	4.3
	Pmax80	2	1.7	2.6	4

JUMLAH HC (ppm)					
Rasio Kompresi	Bahan Bakar	Putaran			
		1200	1400	1600	1800
RASIO 6:1	Pertamax	310	221	173	90
	Pmax90	298	214	167	96
	Pmax85	257	163	131	73
	Pmax80	301	201	127	62
RASIO 8:1	Pertamax	204	165	134	86
	Pmax90	189	148	112	105
	Pmax85	252	138	105	88
	Pmax80	191	117	95	65
RASIO 10:1	Pertamax	154	139	87	80
	Pmax90	168	134	117	96
	Pmax85	132	120	94	65
	Pmax80	93	102	78	65