

Elliot Shaw Dyno assignment

by Elliot Shaw

FILE	3242_ELLIOT_SHAW_ELLIOT_SHAW_DYNO_ASSIGNMENT_213511_1243 822612.DOCX (397.48K)		
TIME SUBMITTED	07-JAN-2020 11:43PM (UTC+0000)	WORD COUNT	1519
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Vehicle Technology (M4X00394)

Engine performance characteristics

Introduction

Chapter numbering

1st person

In groups we were shown how to conduct an engine dynamometer test to find out the fuel consumption rate of the engine when operating at various rpm and at 100% throttle opening. To do so we used the a very complex computing programme to accurately add and reduce the load put on the engine.

1

The engine in question is a 1.6L Vtec Honda CRX 16v, which has a naturally aspirated four cylinder in line transverse front engine with a 5 speed manual gearbox.

Citation

[unsourced]

Equipment and Method used

Justify text both sides of the

Using an APICOM DSG hydraulic dyno, were able to conduct an experiment on an old 1.6L Vtec Honda CRX engine. With the dyno turned on the computer consists of complex software ready to simulate any test done on the engine. In this case we were looking to add increasing amounts of load to stress the engine therefore increasing the fuel consumption giving us an accurate torque curve.

2

Citation

[unsourced]

The dyno has attached to it a large water pressure brake, first the cold water flows through a load or rpm control valve through a flexible inlet hose to the stationary housing. Connected to the stationary housing is a torque arm and integral load cell which has a varying amount of 44.8lb weights attached to it. The Honda's crankshaft is then connected to the rotor shaft inside. There is a load cell at a measured distance from the centre of the housing.

The load cell is also orientated perpendicular to the arm extending from the housing. The Torque output of the engine is just the force measured at the load cell multiplied by the distance to where the extended arm and load cell both connect.

Basically, being very inefficient pumps, it uses the engine power to accelerate a mass of water within the absorber's rotor pockets inside the stationary housing it Transfers the kinetic energy by colliding the radially spinning water into the brakes stationery walls. During all this churning friction heats up the water so to prevent boiling it must frequently drain hot water via the drainage pipe. The computer programme basically allows the user to add increasing amounts of water this increasing the load put against the engines crankshaft trying to turn the rotor.

3

Citation

[unsourced]

The computer system also consisted of 2 large rotating dials, one increasing the RPM of the engine and the other increasing the load being applied. With the slight increase of just one the other would be affected drastically. For example, when the load would be increased the RPM would begin to drop rapidly and when falling between a certain amount could cause the engine to stall. Working in pairs to keep the engine at a steady number of revs it requires the pair operating the dials to communicate effectively and to stay in sync with each other's increments. Whilst this is happening the computer programme is recording all the data and changes that's happening to the engine such as the increase fuel consumption to pull such a heavy load.

4

5

Results

6

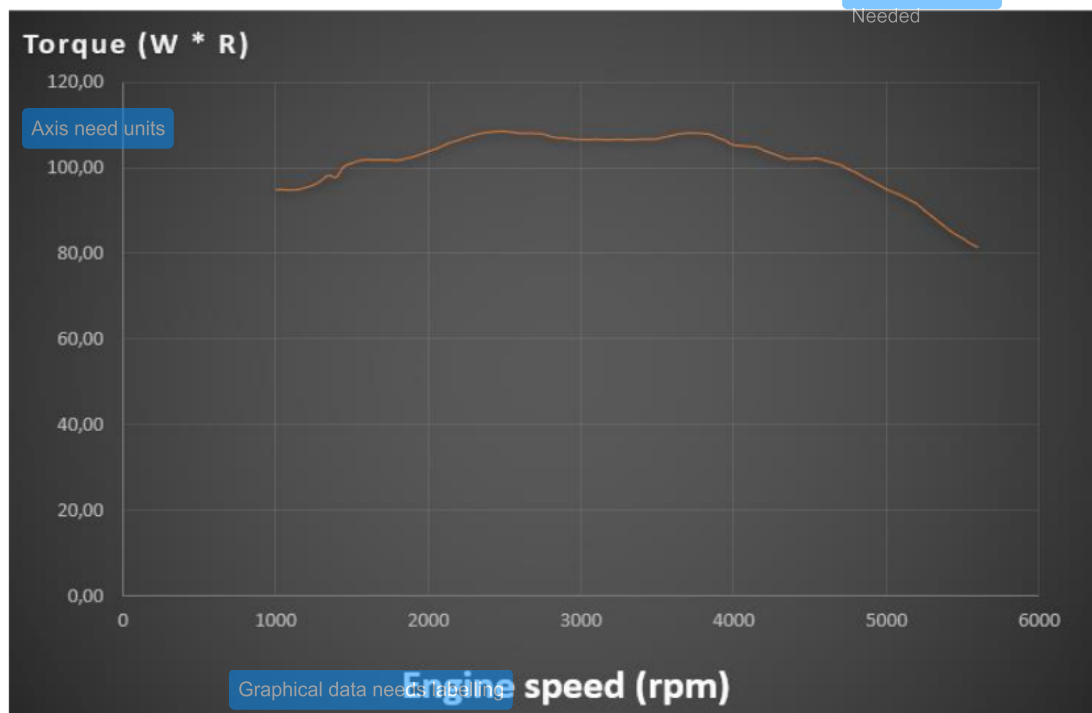
Analysis and Results

Torque / RPM:

The torque curve starts out slowly increasing till it reaches its peak and begins to flatline till it falls off heavily towards its maximum rpm. This is because as RPMs increase, the effect of valves, valve stem is magnified due to the restriction of air flow. Therefore, regardless of the amount of air being pumped in even under 100% throttle use, the restriction in the air flow is so great that because of the lack of space it does not have enough room to get through. Another reason it falls off so hard is because of the increase in friction as RPMs increase.

Power however continues to increase even though the Torque decreases because the rate of increase in Engine speed is always greater than the rate in which the Torque decreases.

Citation
Needed



For an engine of considerable age its torque curve is consistent, however due to the human element running the test it would have been possible to eliminate a few of the inconsistencies to get a smoother curve.

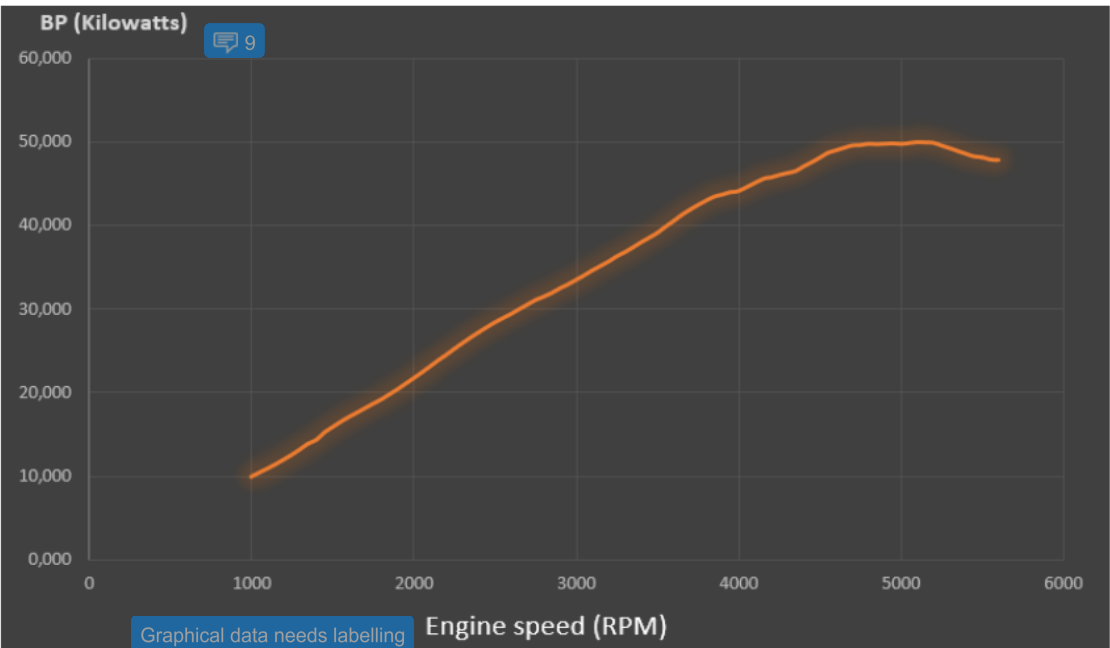
7

Brake power / RPM:

Similar to the previous graph involving the Torque the Brake power of the 1.6 Honda engine steadily increases till its peak at approximately 4500 RPM where it stalls and then eventually begins to fall off. This is because of the increasing load and fuel consumption the engine is going through, which in turn allows it to perform harder till it reaches the point where the crankshaft go no longer go any harder and the amount of friction is decreasing.

Citation

This graph in comparison with the previous one is also smoother in its steady incline suggesting the pair working the dials were more in sync with their inputs into the computer.



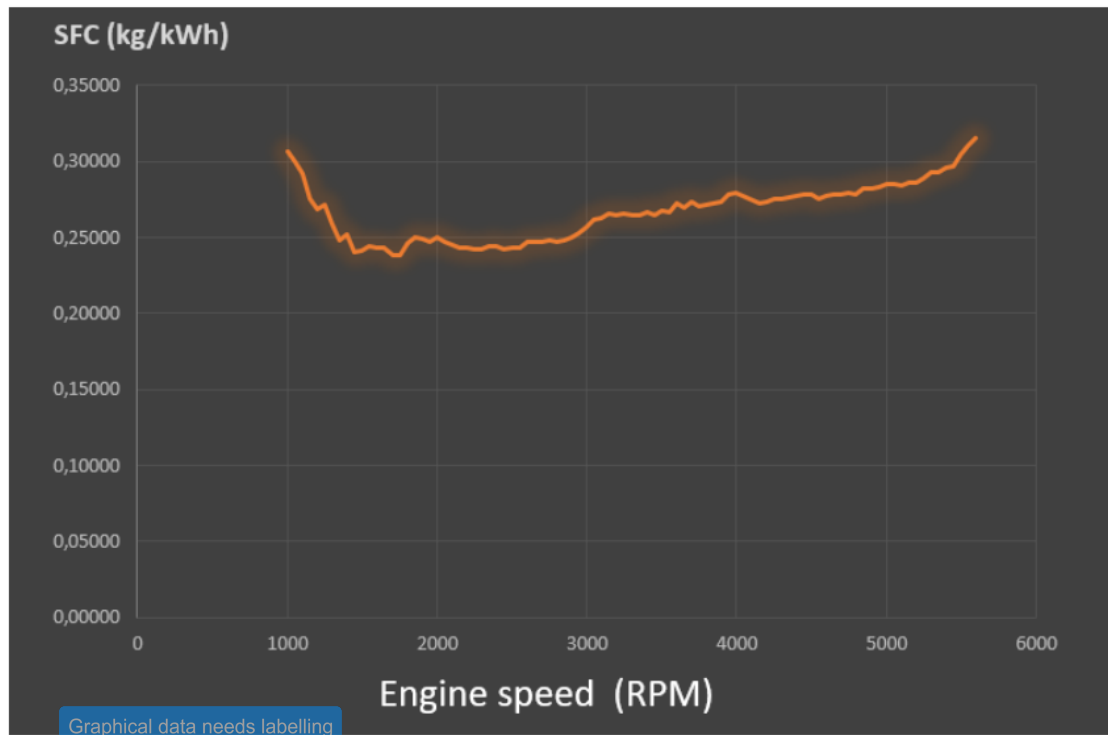
Graphical data needs labelling

Engine speed (RPM)

10

SFC over Engine speed:

For combustion to even take place inside the proper air to fuel ratio must be present in the cylinder
In engine testing the fuel consumption is measured in terms of the fuel mass flow rate and is a measure of how efficiently the fuel supplied to the engine is used to produce power.



The lower the SFC value the better since at a given power level less fuel will be consumed and our Honda engine has in fact got low SFC values, at times even below 0.25kg/kWh. The CRX boasted an impressive 35.1mpg when it was launched however over the years of being run in a dyno environment its number is considerably lower now.

Conclusion

After going over my table data its impressive how little fuel the 1.6 Engine used to perform its run on the dyno. The fuel flow rate was considerable less than expected however when converting the brake power and corected power back into BHP the engine resulted in quite a considerable loss of power.

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When the car was new at the factory it was producing 123BHP or 92kW of power, where as now its peak was approximetly 50.2kW and 67.34BHP which is almost half what it had when it rolled off the shop floor andeven more shocking its less than that produced by my bike.

Even so the weight of the CRX is considerably low at 890kg so at launh the car would have been quite a joy to drive and was popular in motorsport in the 90s having its own touring car championship.

Citation Needed

Evaluation

The experiment I feel like as a whole was very informative and provided a clear view as to how a dyno works in a professional enviroment. I feel like it could have been improved in a few areas as it felt a little rushed however being able to sit down and gets a hands on feel for the system really shows how effective it was as a method of teaching. I feel like I learned more in the hour of testing than in multiple lectures.

The computer system as well was easy to pick up and get the hang of very quickly. For the experiment I was put on my own instead of being put in a pair so I had to opperate both dials. Its impressive how easy doing it alone can be as its simpler to react to imputs yourself insteadf of having to communicate with somebody else meaning the results should show a smoother Torque graph on the system.

The only way I could of improved was to be given another attemnpt as everybody only got one and to do it alone was complicated at first. So if it were possible to have another attempted im sure the results would have been smoother and more professional.

As far as the investigation goes I feel like it was quite confusing to locate the data needed to complete the task. The excel sheet was very confusing and required a lot of research and asking questions and I feel like it will show in the overall grades for the class as im aware many struggled.

Also the way in which we were broken down into groups could have been done different in my opinions, I felt like the groups were a little crowded and it affected how hands and obstructed a little visibility with everyone crowded around the dyno. It did make it a little harder and forced some students to go around after taking photos to be able to study the dyno properly. Also due to the larger group questions were limited and not as many students even resorted to asking questions whereas in other classes I feel like ive leanrt more and not only that but its knowledge ive remember and not forgotten over a short period of time. Understandably though I can see how strict the sessions are and its not always possible to get everyone in and to make smaller groups as both technicians and lectures have tight time schedules.

And lastly as another suggestion to improve the task would be to include a second upload for the excel graph as its so large the quality is restricted and its not visible to see the effort put in by each student.

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The Excel graph provided in full:

RPM	Load	Torque (W * R)	BP (Kilowatts)	Fuel Flow Rate (L/min)	Lambda	Corrected Power	BMEP	SFC (kg/kWh)	Overall thermal Efficiency
1000	116.49	95.03	9.951	0.070	1.30182	9.989	138.62	0.30637	0.759
1050	116.53	95.06	10.453	0.072	1.30196	10.499	145.55	0.29995	0.761
1100	116.54	94.90	10.932	0.074	1.29795	10.974	152.48	0.29195	0.818
1150	116.49	95.03	11.444	0.073	1.29599	11.488	159.41	0.27548	0.907
1200	117.11	95.53	12.005	0.074	1.29068	12.051	166.34	0.26838	0.977
1250	117.79	96.09	12.578	0.079	1.2823	12.626	173.27	0.27183	1.010
1300	119.06	97.13	13.222	0.079	1.27008	13.273	180.20	0.25874	1.116
1350	120.61	98.39	13.910	0.080	1.26012	13.963	187.13	0.24782	1.226
1400	120.05	97.94	14.358	0.084	1.25367	14.414	194.07	0.25184	1.245
1450	123.09	100.41	15.247	0.085	1.25045	15.306	201.00	0.24057	1.384
1500	124.01	101.17	15.891	0.089	1.24615	15.952	207.93	0.24158	1.436
1550	124.79	101.80	16.524	0.093	1.24231	16.587	214.86	0.24426	1.477
1600	125.14	102.08	17.104	0.096	1.23973	17.170	221.79	0.24281	1.538
1650	124.98	101.96	17.617	0.099	1.24084	17.685	228.72	0.24274	1.585
1700	125.05	102.02	18.161	0.100	1.24179	18.231	235.65	0.23845	1.663
1750	125.03	102.00	18.692	0.103	1.24204	18.764	242.58	0.23874	1.709
1800	124.89	101.88	19.204	0.109	1.24113	19.278	249.51	0.24647	1.701
1850	125.32	102.24	19.806	0.114	1.24198	19.883	256.44	0.24958	1.733
1900	125.82	102.64	20.422	0.117	1.24083	20.501	263.37	0.24906	1.790
1950	126.63	103.30	21.094	0.121	1.24092	21.175	270.31	0.24749	1.861
2000	127.35	103.89	21.758	0.126	1.24036	21.842	277.24	0.24989	1.901
2050	128.13	104.53	22.440	0.128	1.23722	22.526	284.17	0.24674	1.986
2100	129.07	105.29	23.154	0.131	1.23433	23.243	291.10	0.24483	2.065
2150	130.02	106.07	23.881	0.134	1.23372	23.973	298.03	0.24362	2.140
2200	130.60	106.54	24.545	0.138	1.23338	24.639	304.96	0.24295	2.206
2250	131.46	107.24	25.267	0.141	1.23527	25.365	311.89	0.24174	2.282
2300	132.09	107.76	25.954	0.145	1.23647	26.053	318.82	0.24186	2.343
2350	132.61	108.18	26.622	0.150	1.23645	26.724	325.75	0.24376	2.385
2400	132.93	108.44	27.255	0.154	1.23275	27.360	332.68	0.24421	2.437
2450	133.13	108.61	27.865	0.156	1.23068	27.972	339.61	0.24190	2.515
2500	133.19	108.66	28.446	0.160	1.22965	28.556	346.55	0.24297	2.556
2550	132.95	108.46	28.961	0.163	1.2268	29.073	353.48	0.24313	2.601
2600	132.62	108.18	29.456	0.168	1.22195	29.569	360.41	0.24707	2.603
2650	132.66	108.22	30.032	0.171	1.21579	30.147	367.34	0.24723	2.652
2700	132.55	108.13	30.574	0.175	1.21006	30.691	374.27	0.24738	2.698
2750	132.46	108.06	31.119	0.178	1.2061	31.239	381.20	0.24826	2.737
2800	131.77	107.49	31.519	0.180	1.20393	31.640	388.13	0.24738	2.782
2850	131.30	107.11	31.967	0.183	1.20182	32.090	395.06	0.24804	2.814
2900	131.27	107.09	32.521	0.188	1.19914	32.646	401.99	0.25021	2.838
2950	130.91	106.79	32.991	0.193	1.19377	33.118	408.92	0.25275	2.850
3000	130.86	106.75	33.537	0.199	1.18514	33.666	415.85	0.25696	2.850
3050	130.79	106.70	34.079	0.206	1.17777	34.210	422.79	0.26184	2.842
3100	130.94	106.82	34.677	0.210	1.16873	34.810	429.72	0.26232	2.886
3150	130.81	106.71	35.201	0.216	1.16139	35.337	436.65	0.26579	2.892
3200	130.71	106.63	35.731	0.218	1.15541	35.868	443.58	0.26415	2.953
3250	130.96	106.83	36.360	0.223	1.15005	36.500	450.51	0.26566	2.988
3300	130.73	106.65	36.855	0.226	1.14299	36.996	457.44	0.26497	3.037
3350	130.82	106.72	37.437	0.229	1.13454	37.581	464.37	0.26432	3.093
3400	130.97	106.84	38.040	0.234	1.12726	38.186	471.30	0.26662	3.115
3450	130.94	106.81	38.590	0.236	1.11874	38.739	478.23	0.26489	3.181
3500	131.00	106.87	39.169	0.242	1.11016	39.320	485.16	0.26750	3.197
3550	131.57	107.33	39.902	0.245	1.10349	40.055	492.09	0.26639	3.270
3600	131.96	107.65	40.584	0.255	1.09859	40.740	499.03	0.27215	3.256
3650	132.31	108.09	41.317	0.258	1.09393	41.475	505.96	0.26999	3.342
3700	132.67	108.23	41.836	0.264	1.0882	42.097	512.89	0.27309	3.353
3750	132.70	108.25	42.509	0.265	1.08444	42.673	519.82	0.27007	3.437
3800	132.85	108.13	43.029	0.269	1.081	43.195	526.75	0.27103	3.466
3850	132.28	107.91	43.507	0.274	1.07942	43.674	533.68	0.27248	3.486
3900	131.32	107.13	43.751	0.276	1.0766	43.919	540.61	0.27309	3.498
3950	130.55	106.50	44.054	0.283	1.07426	44.223	547.54	0.27804	3.459
4000	129.30	105.48	44.184	0.285	1.07144	44.354	554.47	0.27889	3.459
4150	128.68	104.97	45.619	0.287	1.07043	45.794	575.27	0.27254	3.655
4200	127.70	104.17	45.818	0.289	1.06765	45.994	582.20	0.27311	3.663
4250	126.96	103.57	46.096	0.293	1.06665	46.273	589.13	0.27531	3.656
4300	126.15	102.91	46.340	0.295	1.06324	46.518	596.06	0.27559	3.671
4350	125.31	102.22	46.565	0.297	1.06113	46.744	602.99	0.27635	3.679
4400	125.38	102.28	47.127	0.302	1.05968	47.309	609.92	0.27769	3.705
4450	125.28	102.20	47.626	0.306	1.05762	47.809	616.85	0.27829	3.737
4500	125.31	102.23	48.173	0.309	1.05489	48.358	623.78	0.27796	3.784
4550	125.44	102.33	48.758	0.310	1.0536	48.946	630.71	0.27524	3.868
4600	124.84	101.84	49.057	0.315	1.05379	49.246	637.64	0.27763	3.858
4650	124.26	101.37	49.361	0.317	1.05472	49.551	644.57	0.27820	3.874
4700	123.64	100.86	49.643	0.319	1.05454	49.834	651.51	0.27862	3.890
4750	122.44	99.88	49.684	0.321	1.05289	49.875	658.44	0.27940	3.883
4800	121.54	99.15	49.836	0.321	1.05238	50.028	665.37	0.27867	3.905
4850	120.18	98.04	49.794	0.325	1.05143	49.985	672.30	0.28252	3.848
4900	119.07	97.13	49.841	0.325	1.05146	50.033	679.23	0.28199	3.859
4950	117.98	96.25	49.890	0.326	1.05117	50.082	686.16	0.28271	3.853
5000	116.65	95.16	49.824	0.328	1.05003	50.015	693.09	0.28483	3.819
5050	115.73	94.41	49.927	0.328	1.04989	50.119	700.02	0.28489	3.826
5100	114.84	93.68	50.034	0.329	1.05055	50.226	706.95	0.28450	3.840
5150	113.66	92.72	50.004	0.330	1.05114	50.196	713.88	0.28567	3.822
5200	112.47	91.75	49.961	0.330	1.05098	50.153	720.81	0.28578	3.817
5250	110.64	90.26	49.622	0.331	1.04962	49.812	727.75	0.28883	3.751
5300	108.91	88.85	49.313	0.334	1.04854	49.502	734.68	0.29314	3.673
5350	107.14	87.41	48.969	0.331	1.04644	49.157	741.61	0.29298	3.649
5400	105.43	86.01	48.636	0.332	1.04426	48.823	748.54	0.29597	3.588
5450	103.80	84.68	48.328	0.331	1.0419	48.514	755.47	0.29642	3.560
5500	102.63	83.72	48.221	0.339	1.04052	48.406	762.40	0.30426	3.460
5550	101.15	82.51	47.956	0.344	1.03778	48.141	769.33	0.31046	3.373
5600	100.09	81.65	47.884	0.349	1.03382	48.068	776.26	0.31545	3.314

Elliot Shaw Dyno assignment

GRADEMARK REPORT

FINAL GRADE

GENERAL COMMENTS

Instructor

40/100

PAGE 1

QM

Title Page | Skills Prof P

All assignments you submit to this university need a title page, this must include, the title of the assignment, your name, your module, your programme and the lecturers name.

QM

Contents page | Skills Prof P

All professional reports you submit need a contents page.

QM

Chapter numbering | Skills Prof P

Technical reports need to have numbered chapters e.g 1.0 Introduction, 2.0 Research, 2.1 Background etc

QM

1st person | Skills Prof P

Professional Technical reports are always written in the perfect passive tense not the first person. No 'I', 'we', 'us', 'my', 'our' etc.



Comment 1 | K & U

A bit more than just the fuel consumption!

QM

Citation Needed | Literature

Cite Source:

Please use the link below to find links to information regarding specific citation styles:

http://www.plagiarism.org/plag_article_citation_styles.html

QM

Justify text both sides of the page | Skills Prof P

QM

Citation Needed | Literature

Cite Source:

Please use the link below to find links to information regarding specific citation styles:

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Comment 2 | K & U

Nope, ours is electromagnetic.



Citation Needed | Literature

Cite Source:

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http://www.plagiarism.org/plag_article_citation_styles.html



Comment 3 | K & U

What a shame!



Comment 4 | Skills Prof P

Technical language please.



Comment 5 | Practical

However we did a sweep test at the end to collect the results.

PAGE 2



Results | Skills Prof P

Results chapter should only include the raw data from your experimental procedure and the spread sheet should go into your Analysis chapter.



Comment 6 | Cognitive

No table of results?



Citation Needed | Literature

Cite Source:

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http://www.plagiarism.org/plag_article_citation_styles.html



Axis need units | Cognitive



Graphical data needs labelling | Skills Prof P

Graphs should be labelled 'Figure 1:Title (citation)' underneath the object and then referred to accordingly in the text.



Comment 7 | Cognitive

Is this what you were expecting? Should it look like this? Peak values marry up with the manufacturers spec?

QM

Citation Needed | Literature

Cite Source:

Please use the link below to find links to information regarding specific citation styles:
http://www.plagiarism.org/plag_article_citation_styles.html

**Comment 8** | K & U

It was automated so I'm not sure why you are referring to the manual demo.

**Comment 9** | Cognitive

Incorrect units.

QM

Graphical data needs labelling | Skills Prof P

Graphs should be labelled 'Figure 1:Title (citation)' underneath the object and then referred to accordingly in the text.

**Comment 10** | Cognitive

A comparison with a graph from a text book would have been good, or even one from a test on the same/ similar engine.

QM

Graphical data needs labelling | Skills Prof P

Graphs should be labelled 'Figure 1:Title (citation)' underneath the object and then referred to accordingly in the text.

**Comment 11** | Cognitive

What would you expect the fuel consumption to do as the revs increase?

**Comment 12** | Cognitive

You need some figures here to give this validity

QM

Citation Needed | Literature

Cite Source:

Please use the link below to find links to information regarding specific citation styles:
http://www.plagiarism.org/plag_article_citation_styles.html

Additional Comment

You need to refer to text books or similar tests to give your work any credibility.



Comment 13

No bibliography? Are you saying you didn't refer to any external information? This should not be the case for any work you submit.

PAGE 6



Comment 14 | Cognitive

Units?



Comment 15 | Cognitive

Should be a % and I think these are incorrect, as they are not the same as what I worked out, shame.



Comment 16 | Cognitive

Units?

LITERATURE

0 / 0

Engagement with literature (including reading, referencing, academic conventions and academic honesty)

FAIL 0-29% (0)	Little or no evidence of reading. Views and findings unsupported and non-authoritative. Referencing conventions largely ignored.
UNSATISFACTORY 30-39% (0)	Poor engagement with essential reading. No evidence of wider reading. Reliance on inappropriate sources, and/or indiscriminate use of sources. Heavily reliant on information gained through class contact. Inconsistent and weak use of referencing.
SATISFACTORY 40-49% (0)	Engagement with a limited range of mostly relevant and credible sources but with some reliance on information gained through class contact. Some omissions and minor errors. Referencing conventions evident though not always applied accurately or consistently.
GOOD 50-59% (0)	Engagement with an appropriate range of literature, including sources retrieved independently. Some over-reliance on texts rather than other sources. Referencing may show minor inaccuracies or inconsistencies.
VERY GOOD 60-69% (0)	Engagement with a wide range of literature, including sources retrieved independently. Selection of relevant and credible sources. Generally sound referencing, with no/very few inaccuracies or inconsistencies.
EXCELLENT 70-79% (0)	Engagement with an extensive range of relevant and credible literature. Consistently accurate application of referencing.
EXCEPTIONAL 80-100% (0)	Exceptional engagement with an extensive range of relevant and credible literature. High-level referencing skills consistently applied.

K & U

0 / 0

Knowledge and understanding (Knowledge of the basic underlying concepts and principles of a subject.)

FAIL 0-29% (0)	Major gaps in knowledge and understanding of the basic underlying concepts and principles of the subject matter. Inclusion of irrelevant material. Substantial inaccuracies.
UNSATISFACTORY 30-39% (0)	Gaps in knowledge of the basic underlying concepts and principles, with flawed or superficial understanding. Some significant inaccuracies and/or irrelevant material.
SATISFACTORY 40-49% (0)	Limited knowledge and understanding of the basic underlying concepts and principles within the subject area. Some elements may be missing.
GOOD 50-59% (0)	Knowledge of the basic underlying concepts and principles is accurate with a good understanding of the field of study but lacks depth and/or breadth.
VERY GOOD 60-69% (0)	Competent knowledge of the basic underlying concepts and principles. Exhibits very good understanding.
EXCELLENT 70-79% (0)	Excellent knowledge and understanding of the basic underlying concepts and principles of

(0) the subject.

EXCEPTIONAL 80-100%
(0) Exceptional, detailed knowledge and understanding of the basic underlying concepts and principles.

COGNITIVE

0 / 0

Cognitive and intellectual skills (Evaluate underlying concepts and principles of a subject and interpret qualitative and quantitative data in order to develop lines of argument and make sound judgements.)

FAIL 0-29%
(0) Wholly or almost wholly descriptive work. Little or no evaluation of the underlying concepts and principles. Failure to develop arguments, leading to illogical or invalid judgements. Minimal or no use of evidence to back up views.

UNSATISFACTORY 30-39%
(0) Largely descriptive work, with superficial evaluation of the underlying concepts and principles. Weak interpretation of data, flawed development of arguments and judgements. Information accepted uncritically, uses generalised statements made with scant evidence and unsubstantiated opinions. Ideas sometimes illogical and contradictory.

SATISFACTORY 40-49%
(0) Limited attempt at evaluation of the underlying concepts and principles, tending towards description. Can interpret qualitative and quantitative data but with some errors. Some evidence to support emerging arguments and judgements but these may be underdeveloped or with a little inconsistency / mis-interpretation.

GOOD 50-59%
(0) Good evaluation of the underlying concepts and principles. Can interpret qualitative and quantitative data, with minor errors. An emerging ability to use evidence to support the argument. Mostly valid arguments and logical judgements.

VERY GOOD 60-69%
(0) Sound evaluation of the underlying concepts and principles. Can interpret qualitative and quantitative data accurately. Ability to devise arguments using evidence to make mostly appropriate and valid judgements.

EXCELLENT 70-79%
(0) Excellent evaluation of the underlying concepts and principles. Can interpret qualitative and quantitative data accurately and with some insight. Excellent ability to devise arguments using evidence and make appropriate and valid judgements.

EXCEPTIONAL 80-100%
(0) Exceptional evaluation of the underlying concepts and principles based evidence. Outstanding interpretation of qualitative and quantitative data. Exceptional ability to devise arguments using evidence and make wholly appropriate and valid judgements.

PRACTICAL

0 / 0

Practical skills (Different approaches to solving problems in particular contexts.)

FAIL 0-29%
(0) Limited or no use of taught, basic methods, materials, tools and/or techniques. Little or no appreciation of the context of the application. Very weak evidence of different approaches to problem-solving in particular contexts.

UNSATISFACTORY 30-39%
(0) Rudimentary application of taught, basic methods, materials, tools and/or techniques but without consideration and competence. Flawed appreciation of the context of the application. Weak evidence of different approaches to problem-solving in particular

contexts.

SATISFACTORY 40-49% (0)	An adequate awareness and mostly appropriate application of basic methods, materials, tools and/or techniques. Basic appreciation of the context of the application. Can identify problems in particular contexts and propose basic alternative approaches or solutions though there may be errors.
GOOD 50-59% (0)	A good and appropriate application of basic methods, materials, tools and/or techniques. Clear appreciation of the context of the application. Good evidence of different approaches to problem-solving in particular contexts and proposes mostly appropriate solutions.
VERY GOOD 60-69% (0)	A very good application of a range of basic methods, materials, tools and/or techniques. Very good consideration of the context of the application. Very good evidence of different approaches to problem-solving in particular contexts and proposes appropriate solutions.
EXCELLENT 70-79% (0)	An advanced application of a range of taught, basic methods, materials, tools and/or techniques. The context of the application is well considered, and insightful. Excellent evidence of different approaches to problem-solving in particular contexts and proposes appropriate solutions.
EXCEPTIONAL 80-100% (0)	Exceptional levels of application and deployment skills in particular practical contexts. Outstanding identification of problems in particular contexts and formulation of wholly appropriate, thoughtful solutions / different approaches.

SKILLS PROF P

0 / 0

Transferable skills for life and professional practice (Communicate the results of their study/work accurately and reliably, and with structured and coherent arguments; the qualities needed for employment requiring the exercise of some personal responsibility within a structured and managed environment.)

FAIL 0-29% (0)	Work is poorly structured, disorganised, inaccurate and/or confusingly expressed. Very weak use of language and/or very inappropriate style. Failure to work effectively individual or as part of a group. Little or no evidence of the skills for employment requiring the exercise of some personal responsibility.
UNSATISFACTORY 30-39% (0)	Work is poorly presented in a disjointed manner. It is loosely, and at times incoherently, structured, with information and ideas often poorly expressed. Weak use of language and/or inappropriate style. Flawed approach to individual or group work, meeting only partial obligations to others. Limited evidence of the skills for employment requiring the exercise of some personal responsibility.
SATISFACTORY 40-49% (0)	Mostly ordered presentation and structure in which relevant ideas / concepts are reasonably expressed. Work may lack coherence and/or accuracy in places. Can work as part of a group, meeting most obligations to others but perhaps with limited involvement in group activities. Demonstrates the basic skills for employment requiring the exercise of some personal responsibility, with some areas of minor weakness.
GOOD 50-59% (0)	Mostly coherent, organised and accurate work, in a suitable structure and is for the most part clearly expressed. Can work effectively independently and/or as part of a team, with clear contribution to group activities. Demonstrates the skills for employment requiring the exercise of some personal responsibility, with some areas of strength and some of minor

weakness.

VERY GOOD 60-69% (0)	Work is accurate, coherent, fluent, well-structured and organised. Can work effectively independently and/or as part of a team, with very good contribution to group activities. Demonstrates very good skills for employment requiring the exercise of some personal responsibility, with just occasional minor weakness.
EXCELLENT 70-79% (0)	Work is coherent, very fluent and is presented professionally. Can work effectively independently and/or as part of a team, with an excellent contribution to group activities. Demonstrates excellent skills for employment requiring the exercise of some personal responsibility with an appetite for further development.
EXCEPTIONAL 80-100% (0)	Work is accurate, exceptionally coherent, very fluent and presented well. Can work effectively independently and/or as part of a team, with an exceptional contribution to group activities. Demonstrates exceptional skills for employment requiring the exercise of some personal responsibility with an appetite for further development.