BRITISH TRANSPORT ADVISORY COMMITTEE (BTAC)

ANNUAL FUEL EFFICIENCY AND TECHNICAL EVALUATION EVENT

JUNE 5TH & 6TH 2004

1. SUMMARY

The ten evaluations conducted this year have reinforced some expectations and challenged others. Clear results have emerged in some cases which will be useful for fleet managers. For example, the impact of fuel efficient tyres and their sensitivity to road speed has been confirmed as has the influence of road speed on fuel consumption. At an average cost of £1,447 per evaluation a great deal has been learnt for a relatively low cost.

The influence of ambient temperature upon some tests has been identified and requires further investigation to ensure that future test procedures can deal with it effectively.

The impact of increasing vehicle size and weight has been evaluated and whilst the amount fuel used increased when measured by miles per gallon (MPG) - the fuel intensity improved.

Not all tests went according to plan and such tests need to be investigated further to ensure that future tests build upon the lessons learnt as part of the continual evolution of the event. Overall the planning group were pleased and encouraged by the results and the feedback from entrants the majority of who were happy with their results. Finally, the use of mentors was well received and will be continued with next year.

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5. INTRODUCTION

BTAC stands for British Transport Advisory Committee – originally the Brewery Transport Advisory Committee.

In the late 1960's the brewers were very proud of their distribution fleets but realised that whilst they were very much in competition on the high street selling their companies products there was however a very strong case for working together to promote the safer and more efficient operation of both trunking and local delivery vehicles.

Peter Scott (Courage) and Herbert Strange (Guinness) were the founder members who were later joined by Peter Hendy from Taunton Cider, Gordon Goddard from Whitbread, Alan Bruce from Scottish and Newcastle, Fred Spreadborough from Watneys, John Woodford from John Smiths, Les Claxton from IDV, Gerry Smith from Bulmers, Tony Tomlinson of Marston's, Stan Thomas of Allied Brewers and Roger Denniss from Bass.

A significant boost was given in the 1980's when Bill Montague (ex Bass) was appointed as secretary and enthusiastically represented BTAC for a number of years and became known as "Billy BTAC" within the transport industry. As the brewers outsourced their distribution functions many of the brewery transport engineers' developed their careers outside the brewing industry.

For the last 24 years BTAC has organised an annual Vehicle Evaluation Event held at the Motor Industry Research Association (MIRA) Proving Ground near Nuneaton where vehicles and interventions that claim to be performance enhancing have been clinically evaluated under controlled conditions. A test procedure has been developed that simulates both motorway and stop-start conditions and is easily adaptable to represent other operational profiles.

In addition other performance measures have been developed such as:

- vehicle payload-earning factor;
- road holding and braking;
- noise (in cab and drive by) and
- exhaust gas emissions.

The results are, monitored by Dr Michael Coyle, Tim Blakemore, David Wilcox and John Dickson Simpson, who are recognised specialists in this area not only in the UK but also in North America, Italy, France, Spain, New Zealand, Hong Kong and Singapore.

BTAC members have walked off with no less than four Motor Transport, Fleet Engineer Awards namely John Eastman (Inchcape), Charlie Secker (Whitbread), Jim Smith (Bass) and Roger Denniss (Bass) for their contribution to the road transport industry.

Today the Department for Transport and vehicle manufacturers such as Volvo, Iveco Ford, and Daimler Chrysler in addition to many other industry suppliers such as Michelin, Continental, Bridgestone, BP and Lubrizol realise that BTAC provides a quite exceptional source for gaining fleet performance data at very low expense.

The 2004 event which is the only one of its kind in Europe was sponsored by the Department for Transport (DfT) and BTAC. Many members of BTAC who worked as marshals and mentors over the weekend did so freely.

This year saw a wide variety of different exercises undertaken, all aimed at improving the transport industry's knowledge of fuel efficiency with four different categories of evaluation being conducted. These being:

- benchmarking exercises;
- vehicle comparison;
- evaluation of fuel efficiency interventions and
- research and development exercises.

The weather was exceptionally warm over the weekend and the temperature rose considerably as each day progressed, especially on Sunday. An increased number of tests – both standard and non-standard – necessitated the running of some tests on Saturday. One of the changes made to this year's event was the allocation of a mentor to each team that was participating in the event. Mentors were chosen on the basis of their having personal experience of designing and participating in at least two previous BTAC events at the proving ground. It was felt by the planning group that the mentors knowledge and experience would help to ensure a better experience for those attending for the first time.

When conducting the evaluation exercises reported in this document it must be remembered that when a specific type of test is being done for the first time then factors can emerge which were not considered during the planning stage because no previous information existed. Therefore, information and factors come to light of which the planning group were previously unaware and these in turn improve our understanding of technical factors that influence fuel consumption and help us to run even better tests in the future.

Whilst there will always be a debate between the relative merits of using a test track and in-fleet trials the major advantage of a test track is that many of the variables that make an assessment of an intervention impossible or create a bias in the assessment when conducting in-fleet trials can be removed or reduced at the track. This increases accuracy and precision and enables the determining of smaller improvements in fuel efficiency to be made.

6. FORD & SLATER VARIABLE SPEED INVESTIGATION

This investigation is of particular interest to operators of lighter vehicles. The aim here was to determine what would be the impact upon fuel consumption of reducing the road speed from 70 mph to 60 mph and then 56 mph. The test was a non-standard test with ten laps at each of the three speeds being conducted. The vehicle used was a DAF LF 45 170 running empty.

This produced a total distance travelled of 50.63 kilometres (31.46 miles). Table 6-1 shows the results that were obtained and clearly shows the impact upon fuel consumption of the increasing aerodynamic resistance as road speed rises.

Table 6-1 Results of the Ford & Slater variable speed investigation.

MPH	Kilometres	Miles	Litres	Gallons	L/100km (MPG)
56	50.63	31.46	8.46	1.86	16.71 (16.90)
60	50.63	31.46	9.43	2.07	18.63 (15.16)
70	50.63	31.46	11.97	2.63	23.64 (11.95)

Reducing the road speed from 70 mph to 60 mph produces a saving of 3.22 mpg (27%) and reducing it from 70 mph to 56 mph reveals a saving of 4.95 mpg (41%).

Figure 6-1 7.5 tonne DAF LF 45 almost 17 MPG at 56 MPH.

7. LUBRIZOL ADDITIVES INVESTIGATION

The aim of this research and development investigation was to assess the fuel economy benefits of several engine, transmission and axle fluid formulations. All of the engine oil and driveline formulations are for the heavy duty diesel (HDD) market.

To obtain accurate and repeatable fuel consumption results identical tractor units, trailers and drivers with the same vehicle test weights, tyre pressures and oil flushing procedures were used. Data logging systems were also fitted to the three test vehicles for the duration of the event. The following channels were recorded from the vehicles Computer Area Network (CAN Bus) at a sample rate of once every ten seconds:-

- Engine Speed
- Engine Torque
- Engine Oil temperature
- Fuel flow rate and instantaneous fuel economy
- Throttle pedal position
- Vehicle odometer reading
- Inlet manifold pressure
- Inlet manifold temperature

It was also possible to compare the fuel consumption data produced by the on-board computer (OBC) with that produced using the gravimetric weighing procedure and compare the vehicle speeds and distances travelled with the observer. A total of 13 repeats of the test cycle were planned, with each cycle lasting approximately 2 hours. The test matrix is shown below in Table 7-1.

Table 7-1 Lubrizol test matrix

Run	Driver	Vehicle	EO	TO	Axle Oil
Sat 1	2	1	A	1	1
Sat 2	1	3	A	2	2
Sat 3	2	2	C	1	1
Sat 4	1	3	A	2	3
Sat 5	2	1	D	1	1
Sat 6	1	3	A	3	2
Sat 7	2	2	B	1	1
Sun 8	2	1	D	1	1
Sun 9	1	3	A	3	3
Sun 10	2	2	B	1	1
Sun 11	1	3	D	3	3
Sun 12	2	1	A	1	1
Sun 13	1	2	C	1	1

The viscosity of the different engine oils (EO) Gearbox oils (GO) and Axle oils (AO) are shown in Table 7-2.

Table 7-2 Oils on test

Engine Oil (EO)	Gearbox Oil (TO)	Axle Oil (AO)
A = Ref 15W40	1 = 75W80	1 = 75W90
B = 10W40	2 = Ref 80W	2 = Ref 90W
C = 10W40	3 = 75W/80	3 = 75W/90
D = 5W30		

Analysis of the results indicated that the optimum fuel economy saving due to engine oil was produced by changing to engine oil D (5W30) from the reference 15W40 was 2.87%. It was further noted that the engine oil savings were greater in the Stop-Start section (4.59%) compared with high speed (1.40%). The overall saving in gearbox and axle oils from their reference oils was 3.05% and the overall saving from all the reference oils compared to the overall best performance of the optimum mix of the three alternative oils was 3.51%.

Figure 7-1 Lubrizol vehicle on the Number 2 circuit.

8. DHL COMPARISON EXERCISE

Two different vehicle manufacturers were being assessed for the supply of several thousand 3.5 tonne gross vehicle weight vehicles to DHL for their European fleet. Part of the assessment was to determine the fuel consumption of the vehicles types that had made it through to the final round.

The assessment consisted of the standard BTAC Section 1 (high speed) and Section 2 (stop-start) with the drivers swapping between comparable vehicles to eliminate the impact of different drivers. Table 8-1 which contains the results produced by the first pair of vehicles clearly shows the Daily to have superior fuel consumption under both conditions.

Table 8-1 Comparison between Daily 35S12 – 8.3 and Sprinter 311CDI - 3550

Vehicle	Kilometres		Driver	Litres	
	High Speed	Stop- Start		High Speed	Stop - Start
Daily 35S12 - 8.3	73.13	38.80	1	5.44	2.54
Daily 35S12 - 8.3	73.13	38.80	2	5.68	2.78
Combined	**146.26**	**77.60**		**11.12**	**5.32**
Total Fuel Used				**16.44**	
Sprinter 311CDI - 3550	73.13	38.80	2	5.93	3.26
Sprinter 311CDI - 3550	73.13	38.80	1	6.17	3.26
Combined	**146.26**	**77.60**		**12.09**	**6.53**
Total Fuel Used				**18.62**	

The total fuel consumed figures when applied to the relevant distance (223.86 kilometres) produce overall fuel consumption figures of 7.35 L/100km (38.45 MPG) for the daily and 8.32 L/100km (33.96 MPG) for the Sprinter.

Figure 8-1 Iveco and Daimler Chrysler vehicles lined and up ready for their assessment.

The second pair of vehicles consisted of a Daily 35S12 – 15 and a Sprinter 311CDI – 4250 which were also to complete the standard BTAC test. Unfortunately, during the first part of the tests the driver of the Sprinter did an extra lap at 50 MPH. In order to ensure a valid test the same driver was instructed to complete an extra lap at 50 MPH when driving the Daily. These additional distances were taken into account when calculating the L/100km and MPG shown in Table 8-2.

Table 8-2 Comparison between Daily 35S12 – 15 and Sprinter 311CDI - 4250

Vehicle	Kilometres		Driver	Litres	
	High Speed	Stop - Start		High Speed	Stop - Start
Daily 35S12 - 15	73.13	38.80	3	6.29	3.26
Daily 35S12 - 15	77.63	38.80	4	5.93	3.26
Combined	**150.76**	**77.60**		**12.21**	**6.53**
Total Fuel Used				**18.74**	
Sprinter 311CDI - 4250	77.63	38.80	4	5.68	3.39
Sprinter 311CDI - 4250	73.13	38.80	3	6.65	2.78
Combined	**150.76**	**77.60**		**12.33**	**6.17**
Total Fuel Used				**18.50**	

The total fuel consumed figures when applied to the relevant distance (228.36 kilometres) produce overall fuel consumption figures of 8.21 L/100km (34.42 MPG) for the daily and 8.10 L/100km (34.87 MPG) for the sprinter.

The final evaluation was to produce a benchmark figure for a Daily 35S12 fitted with a box body. Table 8-3 shows the results for this specific benchmark test

Table 8-3 Benchmark for an Iveco Daily 35S12 with a box body.

Vehicle	Kilometres		Driver	Litres	
	High Speed	Stop - Start		High Speed	Stop - Start
Daily 35S12 - Box	73.13	38.80	5	9.55	4.23
Total Fuel Used				**13.78**	

Only one driver was allocated because this was a benchmark test. The fuel consumption has been calculated as 12.31 L/100km (22.94 MPG). This vehicle was carrying the same payload as the other four and the impact of being a larger and heavier vehicle can be seen on the fuel consumption. However, this does not take into account the greater potential payload and impact on fuel intensity (an example of which will be discussed later in this report).

9. INCHCAPE AUTOMOTIVE TYRE PRESSURE INVESTIGATION

This investigation which was being undertaken by Inchcape Automotive and Bridgestone tyres was designed to determine the effect upon fuel consumption of running on under inflated tyres on the trailer only. A base line was established on the first run with standard fitment tyres, inflated to the 'optimum' manufacturer pressures and then the tyres would be deflated by 20% and then by 30%.

The evaluation was carried out on the high-speed circuit only, at a constant speed of 56 mph.

Unfortunately, when the third run with the tyres which were under inflated by 30% was conducted the temperature had risen considerably and the result was called into question. A review of the result has been undertaken and the test is being developed further to take into account such temperature rises. Nonetheless the results from the baseline and 20% under inflation test are shown in Table 9-1

Table 9-1 Inchcape Automotive/Bridgestone tyre under inflation results

	Kilometres	Miles	Litres	Gallons	L/100km (MPG)
Standard	73.13	45.44	32.89	7.23	44.97 (6.28)
20% under inflated	73.13	45.44	33.62	7.39	45.97 (6.15)

A 20% under inflation resulted in a deterioration in MPG of 0.13 (2.1%) which was within the expected range.

Figure 9-1 Loaded Inchcape test vehicle.

10. TNT/RUGBY CEMENT FUEL EFFICIENT TYRE INVESTIGATION

Under certain conditions low energy or fuel efficient tyres can save fuel, there is however a trade-off to be considered because such tyres tend to wear quicker. Before going to the expense of running expensive and more difficult to manage in-fleet trials it had been decided to determine whether or not there was a saving in fuel consumption which would indicate whether an in-fleet evaluation would be worth considering.

A non-standard test was undertaken with the vehicle and trailer operating at 53 mph and 56 mph. This would also produce data on the difference in fuel consumption when travelling at these different speeds. The fuel efficient tyres being tested were the Continental HT type.

It can be seen in Table 10-1 that the fuel efficient tyres were 4.6% more efficient at 53 MPH and 6.4% more efficient at 56 MPH showing that road speed is a variable to which such a fuel saving intervention is sensitive.

Table 10-1 Fuel efficient tyres versus standard tyres.

Tyre type	Litres	Gallons	Kilometres	Miles	L/100km (MPG)
Standard					
53 MPH	19.35	4.26	50.63	31.46	38.22 (7.39)
56 MPH	20.07	4.42	50.63	31.46	39.64 (7.13)
Fuel Efficient					
53 MPH	18.50	4.07	50.63	31.46	36.54 (7.73)
56 MPH	18.86	4.15	50.63	31.46	37.25 (7.58)

The effect of a lower road speed can also be determined from the figures in Table 10-1 because both sets of tyres show that reducing road speed can save fuel. In the case of the standard tyres fuel consumption is improved by 1.42 L/100km (0.26 MPG) and in the case of the fuel efficient tyres 0.71 L/100km (0.15 MPG).

11. GREEN POWER DUAL FUEL BENCHMARKING EXERCISE

This exercise was designed to establish if results obtained during ‘real life’ or ‘in service trials’ could be validated on the track where many of the variables which cause data volatility can be controlled and in some cases eliminated. The vehicle used was a MAN TGA 410. The intervention is an electronically controlled diesel/LPG dual fuel technology. The results whilst impressive must be qualified in that the LPG refuel was disrupted at the track and the vehicle had to refill with LPG at a motorway service station. Whilst this was regrettable it happened on the second run when the dual fuel had been activated and therefore it is possible to establish without any doubt the difference in diesel fuel consumed.

Only the high speed section was utilised and therefore this was a non-standard test and the vehicle travelled 73.13 kilometres (45.44 miles) under both conditions.

It can be seen from Table 11-1 that when the dual fuel was activated the engine consumed 3.03 litres (0.67gallons) less. This does have to be accounted for by the use of LPG which comprised of 2 litres being issued at the track and 2.85 being drawn at the motorway services.

Table 11-1 Green Power dual fuel versus diesel only.

Condition	Distance		Diesel		L/100km (MPG)
	Kilometres	Miles	Litres	Gallons	
Diesel only	73.13	45.44	25.76	5.67	35.22 (8.02)
Dual fuel	73.13	45.44	22.73	5.00	31.08 (9.09)

Therefore, 4.85 litres of LPG replaced 3.03 litres of diesel.

It is unfortunate that the vehicle could not be fully refuelled at the track as this introduced an unknown factor into the test. In terms of financial analysis operators will have to break the figures down into pence per mile to evaluate the cost effectiveness of the dual fuel as they would with any fuel saving intervention.

12. DENBY 'DOUBLE B' (ECO LINK) ASSESSMENT

It has long been held by transport professionals that increasing payload (weight) and or increasing capacity (cube) will lead to greater energy intensity with savings in emissions and costs. Combinations such as a 'Double B' can increase both weight and capacity and the aim of the assessment was to determine what the reduction in emissions would be per tonne carried.

Figure 12-1 Final checking of the ECOLINK

The evaluation was a non-standard test which consisted of the high speed section only. The results are shown in Table 12-1.

Table 12-1 Denby Eco link evaluation.

Vehicle	Distance		Diesel		L/100km (MPG)
	Kilometres	Miles	Litres	Gallons	
B Double – Eco Link	73.13	45.44	32.16	7.08	43.98 (6.42)
Standard vehicle	73.13	45.44	24.79	5.45	33.90 (8.33)

The 'Double B' double had a combined laden weight of 59,120 Kilogrammes (payload of 34 tonnes) and used 32.16 litres to complete the high speed section. When set up as the typical unit and trailer and weighing 42,000 Kilogrammes (payload 25 tonnes) 24.79 litres of fuel was used completing the same section. Therefore, for an increase in total weight of 40.76% fuel and emissions were increased by 29.76% clearly there are environmental gains because every 1,000 litres of fuel that goes unused saves 2.6 tonnes of carbon dioxide and other harmful emissions are also reduced.

In normal configuration to move one tonne one kilometre of payload would require 0.01356 litres of fuel in ‘Double B’ configuration 0.01294 litres of fuel would be required to transport one tonne of payload one kilometre. Whilst these numbers are small when multiplied by the tonne kilometres represented in national statistics they become quite large. For example, transporting 100,300 tonnes 90 miles would require the standard configuration to make the equivalent of 4,012 trips and at a fuel consumption of 8.33 MPG would produce 512 tonnes of carbon dioxide. Alternatively, the ‘Double B’ would be required to make 2,950 trips and at a fuel consumption rate of 6.42 miles per gallon would produce only 377 tonnes of carbon dioxide – reduction of the order of 136 tonnes (26%).

13. SOMI TRAILERS INVESTIGATION

The aim of the investigation conducted at BTAC was to determine if the SOMI trailer was more aerodynamic and would reduce fuel consumption due to the well being occupied and providing flush surfaces at the sides of the trailer. The evaluation was conducted on both the high speed section of the proving ground and on the stop - start section.

Figure 13-1 The innovative SOMI trailer.

The SOMI (derived from Same Outside More Inside) trailer, use the well located between the front of the trailer's first axle and behind the trailer's landing legs. This is dead space in that it is not normally utilised by an operator. Although some operators have used the well to store empty pallets by enclosing the well area or placing some sort of load bearing frame there. The SOMI trailer utilises this space for load carrying and therefore increases the load carrying capacity of the trailer which can improve productivity and possibly fuel intensity. The results are shown in Table 13-1.

Table 13-1 Evaluation of the SOMI trailer.

Trailer	Kilometres		Litres	
	High Speed	Stop - Start	High Speed	Stop - Start
Standard	73.13	38.80	27.21	22.85
SOMI	73.13[(1)]	38.80	25.63	20.80

(1) Discrepancy recorded on record sheet indicates that a lap may have been missed. No tachograph available for validation.

The standard trailer consumed fuel at the rate of 37.21 L/100km (7.6 MPG) on the high speed section and 58.89 L/100km (4.8 MPG) on the stop start section. The SOMI trailer consumed fuel at the rate of 35.05 L/100km (8.06 MPG) on the high speed section and 53.61 L/100km (5.27 MPG) on the stop start section.

Attention is drawn to several caveats concerning this test. The first is that it appears that the SOMI trailer did one lap less when conducting the high speed evaluation. Secondly the standard trailer was a curtainsider whilst the SOMI has solid sides. Thirdly, the data in Table 13-1 indicates that the greatest saving 0.47 MPG (9.88%) was on the stop-start section which goes against the expectation that the greater saving would have been on the high speed section which also achieved an improvement of 0.47 MPG (6.13%) – without compensating for the missing lap.

Unfortunately the caveats expressed here do reduce the impact of the results. Clearly, there is more work to be done to investigate the advantages of the SOMI trailer which in terms of energy intensity should offer both efficiency and environmental gains.

14. VOLVO TRUCKS EVALUATION

The aim was to evaluate the impact on fuel consumption of using different driving styles and applying vehicle technology that is aimed at improving fuel consumption.

Driver 1 – Simulated a driver who just got in and drove the vehicle. All he did was position the selector in A, used the throttle pedal and drove, albeit in the green band. The cruise control, "eco roll" or brake mode function where not used.

Driver 2- This driver drove with cruise control used completely on the high speed section, and "eco roll" which on the high speed came in for around 17% of the total distance. In the stop-start section the VEB and brake mode on the "I" shift were used during the braking cycles.

Figure 14-1 Volvo FH12 420 with fuel economy technology

Before examining the results in Table 14-1 there is the caveat that two different drivers were used. Whilst the speed information shown in Table 14-1 is fairly consistent the impact of two different drivers cannot be ignored. It should also be pointed out that both drivers are highly skilled and work for the vehicle manufacturer.

Table 14-1 Volvo – Impact of a different driving style

	Kilometres		Driver	Litres	
	High Speed	Stop- Start		High Speed	Stop - Start
Standard drive	73.13	38.80	2	5.68	2.78
Advanced drive using vehicle technology	73.13	38.80	1	5.44	2.54

On the stop-start section driver 2 pre-empted the stops and used the B function brake mode. Rather than wait for the last minute and slam on the brakes. During this section it was found that the “eco-roll” still functioned at 30mph.

The results are impressive the reason for this is partially due to the fact it was on a track that allowed the “eco roll” to function for 17% of the total 73km distance. In effect the vehicle covered 12km on its own momentum hence a 12% improvement in fuel consumption. On the road there is a benefit but maybe not as large, the benefit will largely depend on terrain.

Using the vehicle technology correctly resulted in a fuel consumption of 29.27 L/100km (9.65 MPG) on the high speed section and 50.49 L/100km (5.6 MPG) on the stop – start section. Whereas the standard drive resulted in a fuel consumption of 32.9 L/100km (8.58 MPG) on the high speed section and 53.60 L/100km (5.27 MPG) on the stop – start section

The improvement in fuel consumption was an improvement of 12% during high speed operation and 6% during the stop start section.

15. DENBY LOW PROFILE TYRE INVESTIGATION

The aim of the test was to determine the effect of changing to low profile tyres on both the tractor unit and trailer. Low profile tyres tend to have a lower rolling resistance due to their stiffer walls which reduce energy absorbing deformation. However, if the gearing ratios in the transmission (gearbox and final drive) are set for a standard tyre then fuel consumption may deteriorate due to the smaller rolling circumference of the tyres on the drive axle.

The test was a non-standard test which used the high speed section only.

The results in Table 15-1 show that the low profile tyres were more fuel efficient which implies that their reduction in tyre deformation more than compensates for the reduction in rolling circumference. When fitted with the low profile tyres the vehicle consumed fuel at the rate of 24.97 L/100km (11.31 MPG) and when fitted with the standard tyres at the rate of 28.27 L/100km (9.99 MPG).

Table 15-1 Comparison of standard and low profile tyres.

Tyre Type	Distance		Fuel	
	Kilometres	Miles	Litres	Gallons
Standard	64.90(1)	40.33(2)	20.68	4.55
Low profile	73.13	45.44	18.26	4.02

(1) As recorded by the vehicle's distance recorder.
(2) Calculation based on (1)

It can also be seen in Table 15-1 that there was slight discrepancy between the recorded distances. The correct distance is 73.13 kilometres which was achieved by the low profile tyres but not by the standard tyres also this distance was used to calculate the fuel consumption in the previous paragraph.

This suggests that the transmission system in the unit was specified for low profile tyres and therefore further research is required. Additionally, the road speed at which the vehicle travelled will not have been the same. Assuming that the difference in the recorded distance 11.25% applies also to the road speed instead of travelling at 56 MPH the vehicle was actually travelling at 62.16 MPH and therefore the aerodynamic resistance would have been greater.

This type of test needs to be investigated to determine the most suitable way of minimising or removing the impact of changing the rolling circumference of a drive axle tyre.

16. CONCLUSION

The results reinforced some expectations, raised issues for further investigation and produced useful information for both operators and manufacturers. Without individuals and organisations willing to commit resources to events such as this the industry will be working with less and poorer information. BTAC is special because the organisers, marshals and mentors have no vested interest in the outcome other than it should be as accurate as possible. Due to volatility that is inherent when conducting ‘live’ tests it is only under more controlled conditions such as those found on a test track that more marginal changes in fuel consumption can be verified - the inevitable trade off between representativeness and accuracy.

The impact of road speed on fuel consumption was revealed in two tests and the sensitivity of savings generated by low energy tyres to road speed was also indicated. Reinforcing research undertaken at previous BTAC events. The environmental savings to be made from operating a single unit linked to two trailers have also been indicated.

It was reported to the general committee that the use of mentors had been appreciated by participants and had led to a better event in both the quality of the results and the ease with which new entrants found they could participate. Several people were acting as mentors and marshals and this at times put the individuals concerned under pressure and lends itself to the conclusion that more mentors and marshals should be recruited subject to them meeting the necessary criteria. These criteria should be drawn up and managed by the planning group.

17. VALUE FOR MONEY

The results from the different evaluations conducted at BTAC 2004 were reported in:

Transport Engineer – July
Commercial Motor – 10^{th} June
Motor Transport – 17^{th} June

The total cost for the 2004 event was £14,471. Sponsorship of specific items which helped to reduce this final cost was provided by BP (fuel and fuel storage) and Central Weighing (vehicle weighing). The remaining costs were met by entrant fees and the major sponsor – the Department for Transport (DfT).

A total of 10 different evaluations were conducted over the weekend which gives a cost per evaluation of £1,447

18. ACKNOWLEDGEMENTS

BTAC would like to thank the following for their sponsorship and support for the 2004 event:

SPONSORS
BP
Central Weighing
Department for Transport (DfT)

SUPPORTERS
DAF trucks

Last but not least, the many members who gave up their weekend to work as mentors and marshals to ensure a successful weekend.