

## Innovation Secures Future at Rural Haulier



**Company:** Andrew Black Limited



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With thanks to Andrew Black Snr, Andrew Black and John Black.

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# Introduction

By identifying and investing in new technology for your vehicles you can gain a competitive edge for your business. If you maintain and service vehicles in house, inward investment in the right areas can further benefit your organisation. Key benefits include:

- Ways to reduce fuel consumption
- Vehicle weight reduction, ensuring maximum payload
- Minimising vehicle workshop and downtime

This case study is aimed at all hauliers looking for suggestions for realising a more cost effective business. The technologies investigated within this publication are not all new, but importantly have been put into best practice. Within the publication Andrew Black Ltd have kindly agreed to provide information on the investments they have made into new technology and innovative measures. From this information we shall demonstrate the benefits this investment has brought them.

## Investment into Vehicle Technology and Systems

Details on the following technologies are contained within the case study:

- Fleet tracking and telematics – the use of IT systems to monitor vehicle movements
- Onboard weight sensors – sensors to allow for accurate vehicle weighing at remote locations
- Weight saving equipment – lightweight components to reduce the unladen vehicle weight allowing for a bigger payload
- Lift axles and tyres saving – the ability to lift axles off the road when running empty or with a part load, reducing rolling resistance and improving fuel consumption

- Braking retarder – fitted to a tractor unit's gearbox acting as a secondary braking system which can slow a vehicle on long gradients, improving braking performance and saving service brake wear

## Investment in Facilities and Maintenance

Your company is only as good as the sum of its parts. Effective vehicle maintenance is essential for your company to operate in today's competitive market environment. The case study includes information on the following:

- Vehicle wash – clean vehicles not only look more professional but also save time and effort for maintenance staff in spotting defects
- Wheel alignment – specialised equipment used to ensure that suspension and steering equipment is set up correctly
- Diagnostic equipment – allows for efficient fault finding on electrical systems – this minimises the time a vehicle is off the road for repair
- Disc brake re-grinding – it is well known that tyres can be re-grooved for extra use. Brake discs can also be put through a similar process to extend their working life

# Background and Operations

## Background and Premises

Andrew Black Limited operates a 30 vehicle fleet from a ten acre site near North Berwick in East Lothian. Vehicles and trailers are purchased outright with all servicing and maintenance carried out in-house by two full time mechanics.

Tractor units are typically kept for up to six years with much of the fleet showing a longer usable lifespan before being retired.

With over 50 trailers from bulk tippers to bulk potato boxes and curtain-sided trailers, Andrew Black Limited has created a flexible fleet.

Facilities at these premises include:

- A VOSA certified test bay allows Andrew Black Limited to perform pre-MoT inspections on their own fleet as well as offering services to other local hauliers
- These facilities are also complemented by a 50-tonne weighbridge
- A full length drive through truck wash capable of washing an articulated truck and trailer combination up to maximum height

## Fleet Tracking and Telematics

With seasonal agricultural work taking precedence over regular general haulage business every effort is made to maximise utilisation and to track each vehicle's location. In early 2007 Andrew Black Limited invested in a telematics and fleet tracking software package.

Traffic office staff can monitor the position of all the vehicles in the fleet ensuring maximum utilisation and securing good quality information about the performance of their vehicles in delivering goods on time for valued customers.

Effective use of the right system can lead to:

- Significant improvements in fleet security
- Increased productivity and efficiency
- Reduced fleet mileage
- Reduced operational costs and fuel consumption
- Improved customer service

**Table 1 - Telematics**

Investment	£2,000, plus £1 per day per lorry
Estimated Savings / Payback Period	4-5 years
Other Benefits	Vehicle traceability Accurate operating records

“You can't put a price on this technology. I can see who is where, at what speed, at any time.”

**Andrew Black, Director, Andrew Black Limited**



# Vehicle Technology

## Onboard Weight Sensors

As Andrew Black Limited's articulated vehicles regularly load at remote farms and sites away from public weighbridges, it is essential they keep the 44-tonne vehicles within the law by using onboard weighing equipment. Equally, the presence of onboard weight sensors helps to ensure that vehicles operate at maximum payload to ensure vehicle utilisation as shown in Table 2.

**Table 2 - Weight Sensor**

Investment	£1,500 / trailer
Estimated Savings / Payback Period	No fines for overloaded vehicles
	Accurate on board measurement to maximise payload
Other Benefits	Ensures that both driver and operator stay within the legal GVW Fewer overall journeys as vehicles run at maximum capacity

### About this technology:

- Approximately £1,500 as an optional extra from trailer manufacturers
- Includes chassis mounted digital scale for monitoring payload weight
- Some manufacturers can include as standard fitment

## Weight Saving Equipment

Reducing weight increases the usable payload of the vehicle. A vehicle with a lighter unladen vehicle weight (UVW) can carry an increased quantity of product and ultimately make the vehicle more profitable.

Vehicles with lighter unladen vehicle weight (UVW) also use less fuel when running empty.

At Andrew Black Limited, a £1,500 investment per vehicle in alloy equipment has the added advantage of not rusting or requiring to be painted which, over the long life of many of their vehicles is an additional cost saving. Andrew Black Limited has invested in optional alloy wheels, fuel tanks and air tanks generating a 0.3 tonne weight saving and therefore a 1% payload gain (see Table 3).

What this technology can save you:

- 40–50% weight saving over factory fitted steel wheels
- Up to 50% weight saving with alloy fuel and air tanks
- Additional 40–50% weight saving on trailer wheels
- Total vehicle weight saving of 300kg (0.3 tonne)
- Reducing UVW to approximately 14,000kg (14 tonnes)
- Increasing useable payload to 30,000kg (30 tonnes)
- A total payload gain of approximately 1%

**Table 3 - Lightweight Equipment**

Investment	£1,500+ per 6-axle articulated vehicle
Estimated Savings / Payback Period	0.3 tonne weight saving generating extra 0.3 tonne
Other Benefits	Increased payload and profitability
	Reduced total number of vehicle journeys
	Lighter unladen weight improving fuel consumption and reducing CO <sub>2</sub> emissions

## Lift Axles

Andrew Black Limited was the first haulier in Scotland to specify a second lift axle for their tipper trailers.

On bulk tippers both the front and rear axles lift off the ground which dramatically reduces tyre wear on the tri-axle vehicles. There are added advantages to running a trailer on one axle.

### Lift axle information:

- Three axle tractor units have either 'mid-lift' or 'tag axle' specified
- Tipper trailers have two lift axles front and rear leaving the middle axle on the ground
- Weight sensors automatically control the axles' position on both tractor unit and trailer
- Axles rise off the ground when empty or below a certain weight of load
- A manual override by driver can be used to avoid tyre scrub in tight turns

“It’s important to keep up good relations with our customers, particularly the farmers, they don’t want a great big lorry turning hard and tearing up their yard making a mess.”

**Andrew Black Snr, Chairman,  
Andrew Black Limited**

### Why you should choose lift axles:

- Each trailer covers 100,000km per year, and empty running accounts for about 30% of total mileage. Before lift axles were specified eight tyres per year were changed on each trailer, lift axles reduced tyre wear to approximately six tyre replacements per year, saving two £400 supersingle tyre replacements per year as detailed in Table 4
- Two lift axles (as opposed to one) on the same trailer contribute to a 1% fuel saving when running empty (see Table 5)



**Table 4 - Lift Axles**

Investment	£1,000 per trailer
Estimated Savings / Payback Period	<p>£800 tyre saving trailer per year</p> <p>£608 fuel saving per annum</p>
Other Benefits	Reduction in tyre wear
	Reduced damage to loose road surfaces
	Improved fuel consumption and reduction in CO <sub>2</sub> emissions

**Table 5 - Fuel Saving through Using Lift Axles**

Empty Mileage (10 trailers)	300,000km	1% FUEL SAVING
MPG	11.1	1% FUEL SAVING
Gallons	16,892	1% FUEL SAVING
Litres	76,014	760
Cost (Based upon £0.80 / litre)	£60,811	£608

## Additional Tyre Saving Measures

Curtainsided trailers run with super-single tyres. In a tri-axle configuration the trailers have been specified to include a lead lift axle which is weight sensitive plus a trailing axle which steers to follow the movement of the vehicle round corners. These optional extras cost £2000–£2500 per trailer as detailed in Table 6.

The system has proven popular with drivers and includes features such as locking in the straight ahead position when reversing.

**Table 6 - Steering Trailer Axles**

Investment	£2,000 per trailer
Estimated Savings / Payback Period	£800 tyre saving per trailer per year
Other Benefits	Improved vehicle handling
	Reducing tail end strikes, improving vehicle safety
	Reduced tyre scrub on all axles
	Improved fuel consumption and reduction in CO <sub>2</sub> emissions



## Braking Intarder

Repeated use of service brakes at maximum weight in all operating conditions reduces the lifespan of the brake pads and discs and costs more to maintain over the lifetime of the vehicle.

With a typical annual mileage of 130,000km per vehicle per year, each vehicle will use a full set of pads and discs every 12 months.

### Costs associated with brake replacement:

- Parts price for full pad and disc replacement approximately £1,000 (six axles)
- Additional costs through labour and workshop time
- Cost associated with vehicle downtime and loss of productivity

Prolonging the life of the service brakes is a crucial safety measure when operating heavy goods vehicles in an on-road / off-road environment. Long steep descents at low speeds on unpaved roads when accessing farms and rural locations can cause heat build-up reducing the service brake performance when the driver really needs to use them. A braking intarder can help solve some of these braking issues. (The benefits of this system are detailed in Table 7 on the next page.)

Used in conjunction with the service brakes a braking intarder:

- Ensures that maximum stopping power is available to the driver when required, resulting in a much safer vehicle
- Reduces brake pedal input, which helps to reduce driver fatigue
- Significantly prolongs the lifespan of brake system parts

Why you should choose this technology:

- Can handle up to 80% of the work of the primary braking system
- Prolongs the usable life of the service brake parts by up to three months (32,500km)
- Can cost up to £3,500 to specify from the manufacturer
- Saves workshop time which allows the vehicle to remain operational for longer periods

It should be noted that a braking intarder will increase the overall weight of the tractor unit.



**Table 7 - Braking Intarder**

Investment	£3,500 per tractor unit
Estimated Savings / Payback Period	<p>£250 saving on brake discs per vehicle per year</p> <p>Further savings on service brake maintenance time and other spare parts</p>
Other Benefits	Improved braking performance and vehicle safety
	Reduction in driver fatigue
	Reduced maintenance downtime and labour, (up to one workshop per day per year)
	Improved vehicle productivity

“We've always gone for this sort of technology. It's paid us back in spades, especially when you service your own trucks; it cuts down on workshop time and parts.”

**John Black, Director,  
Andrew Black Limited**



# Facilities and Maintenance

## Vehicle wash

In November 2006 Andrew Black Limited invested over £60,000 in a vehicle wash plus a £40,000 extension to an existing building was erected to cover the machinery and protect the wash from frost and weather damage.

The 18 metre long vehicle wash can be programmed to jet wash or brush wash a variety of vehicle sizes and shapes from private cars to full sized artics with trailers up to 16 ft high.

Reasons to consider investing in your own vehicle wash:

- Working in rural parts of Scotland vehicles get especially dirty running on and off road
- Due to the possibility of spreading diseases farmers are especially keen to see clean and presentable machinery
- A smart and professional image is also important to hauliers in order to attract new customers
- Helps keep corrosion at bay on valuable machinery
- Reduces vehicle downtime by speeding up vehicle inspections

- Removes the requirement for drivers to pressure wash vehicles by hand, cutting driver overtime and associated costs as shown in Table 8

**"We take great pride in our fleet's appearance to complete the professional image."**

**Andrew Black Snr, Chairman, Andrew Black Limited**

**Table 8 - Vehicle Wash**

Investment	£100,000
Estimated Savings / Payback Period	6–7 years
	Improved hygiene when operating in farms and agricultural environments
Other Benefits	Improved presentation and profile of fleet
	30 hours per week reduction in labour cost

# Wheel Alignment

Further workshop investment includes a laser wheel alignment tool for the workshop. A mechanic can align wheels by tweaking steering and suspension arms on the vehicle.

If a vehicle is coupled to a particular trailer for long periods of time, it is common practice to align all six axles to ensure the vehicle operates at peak efficiency.

Wheel alignment facts:

- A wheel misaligned by just one degree can add 5% to the fuel consumption
- A wheel with a 0.5 degree misalignment can reduce a tyre's usable life by up to 50%
- Steering and suspension components also suffer increased wear and tear as a result of misaligned wheels

Reasons that wheels can be out of alignment:

- A steering or suspension joint may be worn
- The vehicle may have nudged a kerb or hit debris on the road
- Running off-road can damage steering and suspension

To reduce tyre wear and avoid unnecessary fuel use, wheels should be checked and aligned regularly as part of a standard maintenance programme.

Signs of misaligned wheels:

- Driver input where the steering 'pulls' to one side
- The trailer is tracking off to one side of the unit (visible in the mirrors)
- Visible signs include wear on the tyre shoulder and uneven wear over dual tyres

This wear can lead to overheating in the tyres and potentially the dangerous situation of a 'blowout' where the tyre, under pressure of up to 120psi explodes sending debris over the carriageway.

“The worst wheels for being out of alignment are the second axle on the tractor unit, because they steer as well as lift. They carry a lot of load and are easily pushed out of alignment causing wear on the tyre shoulder.”

**John Black, Director,  
Andrew Black Limited**

Andrew Black Limited has invested in this technology primarily as a Preventative Maintenance measure, the approximated savings are shown below in Table 9.

**Table 9 - Wheel Alignment**

Investment	£7,000
Estimated Savings / Payback Period	Approximately 1 year
	Reduced fuel consumption and CO <sub>2</sub> emissions
	Improved tyre life
Other Benefits	Less stress on mechanical components
	Improved driver comfort and safety
	Reduced tyre overheating and replacement

Table 10 assumes out of the 30 vehicle fleet at least three (10%) have at least one wheel out of alignment at any one time due to the nature of on-road / off-road activities. This increases each vehicle's fuel consumption by 5% per year with MPG figures dropping from the fleet average of 7.5MPG to 7.13MPG.

**Table 10 - Fuel Saving through Wheel Alignment**

Estimated Mileage (3 vehicles at 130,000km / year)	390,000km	5% COST AVOIDED
Average Fleet MPG	7.3	5% COST AVOIDED
Gallons	34,186	5% COST AVOIDED
Litres	153,837	7,692
Cost (Based upon £0.80 / litre)	£123,070	£6,154

## Diagnostic Equipment

Investment in technology in the workshop includes a handheld diagnostic computer which allows the mechanic to interrogate the vehicle's engine management system for faults. Table 11 shows the benefits.

This is typically used to:

- Track electrical faults which appear on the dashboard warning system
- Trace bulb and lighting problems
- Monitor onboard systems, fuel management and engine operation

“We used to have mechanics chasing electrical faults with voltmeters crawling under trailers for hours, now we plug this in and can go straight to the fault.”

**John Black, Director, Andrew Black Limited**

**Table 11 - Diagnostic Equipment**

Investment	£6,000
Estimated Savings / Payback Period	2–3 years
Other Benefits	Reduction in fault finding and workshop time Increased vehicle utilisation and productivity



## Re-grinding brake discs

Modern heavy goods vehicles use disc brakes on tractor unit and trailer wheels. A competent driver with a well driven vehicle should ensure that pads and discs typically have a usable life of around one year (130,000km). The benefits are shown in Table 12.

Andrew Black Limited has recently invested in a specialist lathe to grind down or 'face' the discs providing a new wearing surface and prolonging the life of each disc.

**Table 12 - Re-grinding Brake Discs**

Investment	£7,500
Estimated Savings / Payback Period	4 years
Other Benefits	Improving the lifespan of a brake disc set for a 6-axle vehicle by up to 50%
	Saving on parts expenditure

# Summary and Recommendations

## Summary

Andrew Black Limited has a proven record of embracing innovation and investing in new technology by:

- Maximising payload and profitability
- Minimising vehicle downtime and maintenance
- Reducing tyre wear and improving fuel consumption
- Maintaining a clean fleet with the following advantages:
  - Improved hygiene for rural environments
  - Making the vehicles easier to inspect
  - Keeping a professional image

This case study shows that by identifying which elements of a business are of most value and pursuing the technology to improve them enables you to run a more profitable business as well as present a professional image to your customers. The elements that save fuel can also be marketed to your customers as being environmentally sound as reducing fuel consumption reduces CO<sub>2</sub> emissions.

## Recommendations

The choices for you the operator in taking onboard some of the innovations profiled in this case study include:

- Vehicle tracking and navigation software in order to maximise vehicle utilisation
- Retrofitting existing vehicles in your fleet with the most appropriate examples of technology to suit your business requirements

- Use your buying power with manufacturers to benefit from many of the optional extras available on tractor units and trailers, to potentially reduce running costs
- Managing your own vehicle maintenance and workshop time will allow you the operator to stay on top of vehicle down time, parts and maintenance expenditure

Not all of the topics covered in this case study may be suitable to implement in your own business, but the thought processes that have been used to understand what is practical, possible and profitable to do are valid to all operators.

Choose the elements of this case study which are most applicable to your business, and prioritise those that will pay you back the quickest. When dealing with capital expenditure it is vital to take your time over any decisions and ensure that the benefits over the payback period you require are realistic and achievable.

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