

Achieving Supply Chain Efficiency through Backloading and Multi-modal Transport

Case Study



Company Involved:
Kronospan UK



Llywodraeth Cynulliad Cymru
Welsh Assembly Government

Acknowledgements

This case study was funded by the Welsh Assembly Government (WAG) and was compiled with assistance from:

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Introduction

There is a growing acceptance of the need to reduce emissions from transport, and hence make more use of environmentally friendly modes of transport, such as rail freight.

This case study reports on Kronospan UK, a Wales-based manufacturing company that is experiencing operational benefits by using both rail and road for the transportation of timber and related products. Kronospan has set itself some exacting targets to reduce emissions from its supply chain operations. This case study demonstrates the best use of road freight efficiency and multi-modal transport in the timber and manufacturing sector in Wales.

Company Overview

Based in Chirk, Wales since 1972, Kronospan UK is a leading manufacturer of high quality wood-based panels and associated products. Kronospan deals nationwide in the furniture, construction, distribution and DIY industries. The Chirk production facility handles hundreds of road freight deliveries each day, in addition to a daily train service.

Company Snapshot

- ➡ Kronospan UK is the third largest Medium Density Fibreboard (MDF) manufacturing site worldwide
- ➡ A dedicated rail service brings in timber from the company's privately managed forests in Eskdalemuir, Scotland
- ➡ Every year, over 60,000 timber deliveries are made by both road and rail and over 1.5 million tonnes of timber pass through Kronospan's log yard
- ➡ Kronospan has the advantage of total integration by producing all of its production components on-site, helping it to maintain a high standard of quality control, from raw material to finished board

The Challenge

Kronospan has set business, environmental and health and safety objectives that aim to deliver efficiencies in the supply chain and ensure continuous improvement. Rising energy, transport and material costs, alongside increased requirements of environmental practices are placing increasing pressure on manufacturers and their supply chains.

Current market conditions dictate that cost is key and the challenge for manufacturers is not only to maintain quality, but to continue to expand and update product ranges while keeping costs competitive. This is particularly challenging during a period that has witnessed dramatic increases in the cost of raw timber, energy and transport alongside a decrease in customers' disposable income.

! "At Kronospan, we integrate Environmental and Occupational Health and Safety criteria into all relevant business and supply chain decisions. This ensures a safe environment in which we can work and significantly helps Kronospan reduce the impact on the environment, benefiting the local community."

**Adam Bellis, Logistics Manager,
Kronospan UK**

Maximising Supply Chain Efficiency

Kronospan's operation relies on obtaining raw timber material from privately maintained forests, mostly in Scotland, converting these into a wide variety of wood-based products and managing the distribution of these products to customers, mainly in the home improvements and furniture sectors.

Freight by Road

Road freight remains the main mode of transport for Kronospan's goods, catering for 90% of all freight moved by weight. On average 200 vehicles, belonging to 35 hauliers of differing sizes, leave their manufacturing and warehouse site in North Wales each day with vehicles carrying an average of 25 tonnes per load to a wide-ranging customer base including distributors, retailers and furniture manufacturers.



The hauliers contracted by Kronospan need to be efficient in order to stay ahead of the game

Backloading of lorries (making use of spare capacity on the return leg of a delivery journey) is a major priority for Kronospan and the company is keen to ensure that as many journeys to and from the site are as fully-laden as possible. A recent company study confirmed that 92% of lorry journeys are successfully backloaded (excluding log carriers).

Lorries delivering raw materials to the site are backloaded either with finished products or waste materials to be recycled. Prior to the company's initiative to increase backloading, many vehicles leaving the site did so empty or only partially full. It was estimated that, as a result, the average load carried per journey was previously only approximately 20 tonnes. Therefore, more efficient backloading has led to an increase in the average load per journey of 25% (from 20 tonnes to 25 tonnes) without any increase in the size of the vehicles.

Backloading is not done merely to reduce the number of vehicle movements around the Chirk site. By backloading wherever practical, the hauliers contracted by Kronospan are paid for both inbound and outbound trips, cutting wasted mileage and Kronospan is able to obtain much more competitive haulage prices as a consequence.

To help with backloading, Kronospan is keen to ensure that vehicles are as versatile as possible and capable of being filled with different types of loads. To this end, Kronospan has worked with its hauliers to draw up new specifications for certain types of trailers, such as chipliners, to enable them to be used for a greater variety of load types. This enables them to be backloaded more efficiently, ultimately improving overall vehicle fill.

Chipliner Trailers

Kronospan's hauliers operate a fleet of specialised, roof-loaded, curtain-sided chipliner trailers, designed to handle bio-waste, wood chip, sawdust and bark. However, the company has recently invested heavily in an on-site wood chip incinerator, to dispose of much of the waste material from the plant. This has removed the need for 30 HGV trips a day and provides electricity direct to the site by utilising waste material to generate power. As a result, the Medium Density Fibre (MDF) and chipboard parts of the business are now carbon neutral.



Kronospan yard holding waste material produced as a result of manufacturing

“Through existing practices, we endeavour to maximise our sustainable ethos through our transport operation, minimising costs and usage, amplifying efficiency and reducing impact both to the environment and our community”.

**Adam Bellis, Logistics Manager,
Kronospan UK**

Road freight worked example of the benefits of increased loading / backloading:

- ➔ By increasing the amount of freight carried per journey from 20 tonnes to 25 tonnes (a 25% increase), Kronospan has been able to reduce the number of lorry trips required by 20%.
- ➔ Based on an average of 200 vehicles now leaving the site per day, 50 vehicle journeys from Chirk would have been saved daily (250 journeys – 20% = 200 journeys)
- ➔ Assuming an average round trip of approximately 200 miles, this equates to 10,000 vehicle miles per day being saved
- ➔ With an assumed average fuel efficiency of 1.76 miles per litre (8 miles per gallon), this results in approximately 5,680 litres of fuel being saved per day (if fuel consumption per journey was unaffected)
- ➔ Kronospan estimates that increasing the load by 5 tonnes increases the fuel usage by 3%, meaning 12% of the efficiency benefits are lost. This still results in 5,000 litres of fuel saved daily
- ➔ 5,000 litres of fuel saved per day equates to a daily saving of 13 tonnes of CO₂, assuming 2.64kg of CO₂ emitted per litre of fuel used (from 2010 Guidelines to DEFRA/DECC's GHG Conversion factors for Company Reporting)



Based on the above worked example and on a 5 day working week, Kronospan is able to save the following as a result of implementing the various road freight efficiency measures described (assuming 250 working days per year):

- ➔ 1,250,000 litres of fuel saved per annum
- ➔ £1,375,000 cost of fuel saved per annum (based on 1.10p per litre)
- ➔ 3,300 tonnes of CO₂ saved per annum

Freight by Rail

Kronospan has made a long term commitment to reducing the environmental and social impacts from its operations. All aspects of the business have been considered including the transportation of logs to the manufacturing plant.

A key source of timber for Kronospan is near Lockerbie, in the Scottish borders, and the challenge was to find a more effective way of transporting wood from Scotland to Wales. Prior to the implemented changes, much of the timber was transported by lorry. About 10% of logs are now transported by rail, the remaining by road freight.

Kronospan identified a suitable method for transporting the logs by rail and a relationship was established with Colas Rail to explore the options for rail based transport. A supply route was established from Lockerbie's nearest large rail freight yard in Carlisle, where Colas Rail has full loading and wagon maintenance facilities.



Loading of logs near Lockerbie, Scotland

The partnership formed with Colas Rail has been highly successful. Over 150,000 tonnes of timber are delivered to the Chirk site by rail each year. Each train can carry 700 tonnes per journey, which is the equivalent of 28 fully loaded lorries. In practice this means that approximately 6,000 fewer lorry journeys per year are made, helping to relieve congestion nationally, regionally and locally.



Rail wagon being loaded with logs in Scotland



Unloading of logs at factory in Chirk, North Wales

“Train journeys are made once per day (Monday to Friday), unless bad weather in Scotland makes it impossible to transport the raw product to the railhead. Whilst the train journey is usually very reliable with arrival usually within a half hour window, Kronospan has staff available to unload the train in the event of delays occurring on route”.

**Adam Bellis, Logistics Manager,
Kronospan UK**

Kronospan can only currently make use of the train for incoming journeys, so is investigating the possibility of a link-up with another company to utilise the return leg of the journey to Carlisle.

Kronospan Received Freight Facilities Grant Funding (FFG)

There are two types of Government grant to assist with encouraging modal switch from road to rail or water freight, thereby generating environmental and social benefits through removing lorry journeys. These are split into cash incentives towards the cost of providing fixed freight facilities (Freight Facility Grants, FFGs) and financial assistance towards operational cost, The Mode Shift Revenue Support (MSRS) scheme. In this Case Study we are featuring the provision of FFGs.

Due to the high initial costs of providing infrastructure to handle rail or water freight and Government's interests in encouraging the use of more sustainable forms of transport, Freight Facilities Grants may be provided towards part of the costs of certain new facilities. In November 2009 Kronospan received FFGs to assist with the cost of developing new rail sidings at Chirk in Wales and Carlisle in England. At the time of publication, the situation regarding Freight Facilities Grants is that they are available in Wales and Scotland but not in England. It is worth speaking to the relevant authorities at a very early stage of any project to check the suitability of any development scheme and the likely availability of a grant.

The capital cost of the new rail sidings at Chirk and a second siding at Carlisle is circa £4.5 - £5 Million. Construction work commenced in March 2010 and was due to take about a year. The FFG awarded to Kronospan UK. was for up to 50% of capital cost, to a maximum value of £2,056,000. As the development involved new infrastructure in both England and Wales, two separate organisations awarded the grants:

➡ Welsh Assembly Government: £555,000

➡ Department for Transport: £1,501,000

The balance of the project was paid for by Kronospan UK (50% or more of capital cost).

The existing volume of timber transported to Chirk by rail is 100,000 tonnes per year. This is planned to increase over the next 10 years to over 250,000 tonnes per year.



Freight Best Practice provides **FREE** information to logistics companies and freight forwarders, who are increasingly looking for opportunities to reduce costs, improve service and actively reduce their impact on the environment via multi-modal options. The programme gives free access to:

- Freight Grants Information
- Interactive Multi-modal Map
- Guides and Case Studies on incorporating multi-modal as part of the supply chains and how other companies have benefited from multi-modal supply chains

Worked example of the emissions reduction achieved through use of rail freight:

- The distance by road of the journey being covered by train is approximately 165 miles (presuming that all road freight journeys are backloaded for the return leg by the haulier)
- The total road miles being replaced by rail is approximately 990,000 miles per year, based on a reduction of 6,000 journeys per year
- The fuel usage of the freight train is estimated to be 0.22 miles per litre, meaning that for 250 journeys a year with a round trip (not backloaded) of 330 miles, approximately 375,000 litres of fuel are used by the train annually
- The equivalent fuel usage of 6,000 lorry journeys assuming an average 8mpg (1.76 miles per litre) is estimated to be approximately 563,000 litres

Based on the preceding worked example of Kronospan rail freight operations, the company is achieving the following savings:

- 990,000 road miles replaced by rail per annum
- 188,000 litres of fuel saved per annum overall (this could be greatly increased if a suitable customer could be identified to backload the train on some or all journeys)
- £206.800 net fuel cost saving (based on 1.10p per litre)
- 496 tonnes of CO₂ saved per annum (2.64kg of CO₂ per litre of diesel burned)



Logs transported by road to Chirk, North Wales



Conclusions & Summary

Whilst Kronospan does not run its own fleet of vehicles, the company has recognised that it has a social duty to minimise the amount of traffic generated by the business and that this can be achieved by maximising the efficiency of its freight operations.

Through the modal shift to rail freight for the delivery of much of its raw materials and the prioritisation of backloading road vehicles, the company has been able to significantly cut down on vehicle movements. This has significantly reduced the environmental impact of its freight operations whilst simultaneously cutting distribution costs. The annual savings Kronospan has been able to achieve are summarised below.

Table 1 Comparison of road freight (25 tonnes v 20 tonnes average load)

	25 tonnes average load	20 tonnes average load
Distance travelled (miles per annum)	10,000,000	12,500,000
Fuel used (litres per annum)*	5,852,300*	7,102,300*
Cost of fuel (per annum, assuming 95p per litre)	£6,437,500	£7,812,500
CO ₂ emissions (tonnes per annum)	15,450	18,750
TOTAL ANNUAL SAVING OF FUEL (LITRES)	1,250,000	
TOTAL ANNUAL FUEL COST SAVING	£1,375,000	
TOTAL ANNUAL SAVING OF CO₂ (TONNES)	3,300	

* includes 3% extra fuel as a result of transporting 5 tonnes extra payload

Table 2 Comparison between road and rail freight

	Train from Carlisle to Chirk**	Lorries from Carlisle to Chirk***
Distance travelled (miles per annum)	82,500	990,000
Fuel used (litres per annum)	375,000	563,000
Cost of fuel (per annum, assuming 95p per litre)	£412,500	£619,300
CO ₂ emissions (tonnes per annum)	990	1486
TOTAL ANNUAL SAVING OF FUEL (LITRES)	188,000	
TOTAL ANNUAL FUEL COST SAVING	£206,800	
TOTAL ANNUAL SAVING OF CO₂ (TONNES)	496	
TOTAL ANNUAL ROAD MILEAGE SAVED	990,000	

** Assumes train runs empty for return legs – return mileage included

*** Assumes all journeys are backloaded for return leg, hence return mileage not included here

Freight Best Practice publications, including those listed below, can be obtained FREE of charge by calling the **Hotline** on **0300 123 1250** or by downloading them from the website **www.freightbestpractice.org.uk/wales**

Saving **FUEL**

Fuel Management Guide

This is the definitive guide to improving the fuel performance of your fleet. It gives step-by-step explanations of the key elements of fuel management, how to measure performance and how to implement an effective improvement programme.

Performance **MANAGEMENT**

Performance Management for Efficient Road Freight Operations

This guide explains the process of measuring performance effectively. It includes advice on how information is best collected and interpreted to allow informed decision making in order to achieve operational efficiency improvements.

Developing- **SKILLS**

Saving Fuel Through People

This guide provides advice and real life examples to help operators motivate their staff effectively. It provides an understanding of the importance of people, the effects of change and shows how to implement and manage change more successfully.

Multi - **MODAL**

Choosing and Developing a Multi-modal Transport Solution

This guide provides a useful insight into the rail and water freight industries, explains the process for making an informed choice about modal shift, and also explains the availability of financial assistance such as grant funding.

Equipment & **SYSTEMS**

Truck Specification for Best Operational Efficiency

A step-by-step guide to the process of correctly specifying an efficient and 'fit for purpose' vehicle.

Case **STUDIES**

There are over 25 case studies showing how companies have implemented best practice and the savings achieved. Check out the following selection of case studies:

- Innovation in Scottish Timber Haulage
- The Benefits of a Central Supply Chain