

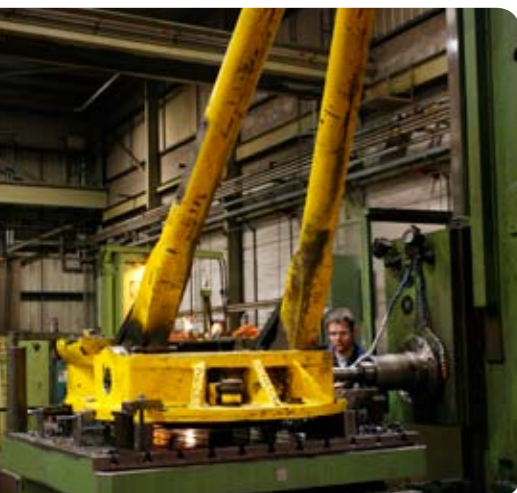
Case study

Energy savings in compressed air and lighting at John M Henderson, Arbroath



The business case

John M Henderson and Company Ltd. is an engineering company based in Arbroath. The company was highly commended for their actions to save energy at Carbon Trust Scotland's Energy Efficiency in Manufacturing Industry Awards in 2009.



Business benefits

- Annual electricity savings of over 270 MWh.
- Total energy costs savings of almost £25,000/annum. The overall payback period for the projects is less than three years.
- Carbon dioxide emission savings of approximately 147 tonnes/annum.

John M Henderson (JMh) has been established for over 140 years and specialises in the design, manufacture and installation of mechanical handling equipment for a range of industries in global markets. Other engineering commissions, such as the construction of a prototype wave power generator, are also undertaken. JMh employs about 90 people at its six acre site in Arbroath near Dundee. The site comprises large workshops for fabrication and painting as well as office facilities for design and management functions.

“The Carbon Trust has provided us with excellent advice and guidance and without the financial assistance we would never have been able to achieve such impressive savings. I have been fully recommending the service to others.”

André Nell, finance manager at J M Henderson

Introduction

As part of an initiative to reduce costs and improve its competitive position, the company decided to take steps to reduce energy consumption and identified lighting and the generation of compressed air as areas that would provide significant savings. Working with equipment suppliers, managers developed investment proposals for two energy saving projects which were approved by the board and then implemented.

The company was highly commended by Carbon Trust Scotland at the 2009 Energy Efficiency in Manufacturing Industry Awards for the reduction of energy use and carbon emissions through the replacement of their air compressor and upgrades to lighting.

Achievements

As a result of the energy saving projects, JMh has reduced its operating costs and by reducing the company's overall energy use, it is less exposed to high energy costs should prices rise in the future. The company obtained a Carbon Trust interest free loan to fund the projects and the cost savings realised through improved efficiency are sufficient to cover the cost of repaying the loan.

By installing new equipment maintenance costs have been reduced. The new arrangements for compressed air supply provide backup capacity and so the risk of unforeseen business interruptions due to breakdowns is significantly reduced. Through its work on implementing the energy saving projects, JMh has developed its awareness of wider energy efficiency issues and these are now integrated into the management culture. It is continuing to pursue initiatives to reduce energy costs and carbon emissions still further.

The technical case

New Air Compressors

A single fixed speed compressor rated at 75 kW provided all the compressed air used in the factory. Managers at John M Henderson suspected that the compressor consumed large amounts of energy and, as it was over 40 years old, were concerned over its reliability.

They thus sought the help of an equipment supplier to suggest more efficient and reliable means of supplying compressed air.

The supplier monitored compressed air consumption and associated electricity use over a week. This showed that compressed air demand was generally low, but increased significantly from time to time when the factory's shot blasting unit was in use. The old compressor, which was sized to meet the factory's

maximum level of air demand, was thus oversized for the normal low level of air consumption and this resulted in it running offload for long periods - consuming energy without generating any compressed air.

Using the information collected through the monitoring period, the supplier was able to propose the replacement of the existing large compressor with two smaller units rated at 37 kW each (one compressor could run at varying speeds and the other was a fixed speed unit). Together these compressors are able to closely match the factory's air demands at all times without wasting energy.

The variable speed compressor acts as the main duty unit and is able to meet fluctuations in the factory's normal air consumption.

When the shot blast unit is in use the air demand increases and the fixed speed compressor automatically starts to meet the higher demand, whilst the variable speed unit continues to modulate in response to variations in factory air demand. This configuration avoids the need for compressors wastefully running offload at any time.

By replacing a single large compressor with two smaller units to closely match the factory's demand for compressed air, JMh will save almost 220 MWh per year and will reduce emissions of carbon dioxide by 118 tonnes per year. Also, the company now has standby capacity for the provision of compressed air and so can continue most factory operations even if a compressor breaks down.

Lighting

Lighting in the JMh office block was provided by ceiling mounted fluorescent lamps which used older switch start control gear*. On the advice of equipment suppliers, the company retrofitted new high frequency control gear and modern efficient fluorescent tubes into the existing light fittings.

The new control gear provides considerable energy savings compared to switch start units and also reduces replacement costs as lamp life is extended.

High frequency control gear offers the following benefits over switch start units

- lower energy costs
- longer lamp life leading to reduced replacement cost and disruption
- improved light quality by eliminating flicker

Check whether you can make energy savings by retrofitting your fluorescent lighting with high frequency control gear.

In the factory, the company replaced the old sodium lighting with new lights containing fluorescent lamps. The old lights, which produced a yellow-orange light, were mounted at the top of the workshop bays and so the level of

lighting and quality achieved on the workshop floor was quite poor. The new lighting produces crisp white light and is suspended at a lower height meaning that illumination levels achieved at the workshop floor are significantly improved. In addition to reducing energy use, the new lights help to create a more productive and safer working environment.

The changes to lighting implemented by JMh will save approximately 53 MWh per year and the associated saving in carbon dioxide emissions is almost 29 tonnes per year.

*A 'package' of electrical or electronic components including ballast, power factor correction capacitor and starter that are required to operate a fluorescent light.

The financial case

Investments, savings and payback

The cost for the installation of the two new compressors was £43,000 and the energy savings provide cost savings of almost £20,000 per year at 2009 prices. The payback period for this project is thus just over two years.

The project cost for the replacement lighting in the factory and the upgrades to office lighting was £26,000. Energy cost savings achieved by the lighting improvements are approximately £4,800 per year and so the overall payback period is 5.4 years.

The Carbon Trust provided JMH with an interest free loan to pay for these energy saving projects. JMH found the application process straightforward and the loan was granted quickly, enabling the company to progress their plans without delay. The combined payback period for the projects is less than the three years over which the company is repaying the loan.



Expert advice

The Carbon Trust provides free expert energy efficiency advice.

Energy surveys

Your company may qualify for a free energy efficiency survey from one of the Carbon Trust's accredited consultants.

Energy efficiency loans

The Carbon Trust can provide an interest free loan of up to £400,000, repayable over up to four years for investment in energy efficiency measures. The loans are available to Small and Medium Enterprises or to businesses that do not qualify for participation in the Carbon Reduction Commitment.

For details of any of these services or free publications, contact the Carbon Trust Customer Care Centre on **0800 085 2005**, or visit the Carbon Trust website at www.thecarbontrust.co.uk/energy/.

Free publications

CTV021 – Lighting technology overview
CTV017 – Compressed air technology overview
CTG006 – Variable speed drives technology guide

Tax incentives

The whole capital value of energy efficient technologies, which qualify under the Enhanced Capital Allowances scheme, may be written down in the year of purchase. For further information go to www.eca.gov.uk.

Further information

The Chartered Institution of Building Services
www.cibse.org
British Compressed Air Society
www.britishcompressedairsociety.co.uk
The Lighting Association
www.lightingassociation.com

The Carbon Trust is funded by the Department of Energy and Climate Change (DECC), the Department for Business, Enterprise and Regulatory Reform (BERR), the Scottish Government, the Welsh Assembly Government and Invest Northern Ireland.

Whilst reasonable steps have been taken to ensure that the information contained within this publication is correct, the authors, the Carbon Trust, its agents, contractors and sub-contractors give no warranty and make no representation as to its accuracy and accept no liability for any errors or omissions. Any trademarks, service marks or logos used in this publication, and copyright in it, are the property of the Carbon Trust. Nothing in this publication shall be construed as granting any licence or right to use or reproduce any of the trademarks, service marks, logos, copyright or any proprietary information in any way without the Carbon Trust's prior written permission. The Carbon Trust enforces infringements of its intellectual property rights to the full extent permitted by law.

The Carbon Trust is a company limited by guarantee and registered in England and Wales under Company number 4190230 with its Registered Office at: 6th Floor, 5 New Street Square, London EC4A 3BF.

Published in the UK: December 2009. Code number CTS166.

©The Carbon Trust 2009. All rights reserved



www.carbontrust.co.uk