



The former AEA Technology Rail Wind Tunnel

Photograph courtesy of Terry Johnson

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❖ Ramblings

In this newsletter are reports on the closure of SRI and the AEA wind tunnel. The demise of such facilities leaves the already fragile UK Wind Engineering committee severely depleted. If we are to remain internationally competitive then some drastic changes must occur. Although anecdotal and sometimes amusing, the *Snippets* section of the newsletter reminds us of the dangers of strong winds and the number of basic research issues yet to be addressed. I believe that research can continue successfully in the long run only if academia and industry work more closely together. As an academic I often look enviously at colleagues in associated with other areas of engineering and note the apparent ease at which they can attract government and industrial funding. While a number of these areas are currently fashionable, and in a number of years may well be *old-hat* there are very few areas that appear to be doing worse than we are. You may dismiss the above as just the ramblings of an jaded academic who has had another series of research grants rejected, however for once this is not the case. I believe that unless we make a concerted effort to raise the profile of our community then research in the UK will slowly grind to a halt. If you have any ideas how we can stop this decline then please write to me at the address given at the back of the newsletter.

Mark Sterling

❖ Snippets

- **Heavy storms affect Swedish railways.** In early January, Sweden was hit by heavy storms with hurricane force gusts. Thousands of trees and other debris were blown down blocking railway tracks and ripping down overhead contact lines. (http://www.banverket.se/templates/Presmeddelande_11388.asp)
- **Tornadoes in Bangladesh.** Two tornadoes struck northern Bangladesh on 20th March leaving thousands homeless. In Gaibandha district at least 28 people were killed and about 800 injured. The tornado that hit Rangpur district killed at least 3 people and injured about 100. Cattle were also killed, crops destroyed and power cut.
- **More information to go on hurricane chart.** The National Hurricane Center in the US is changing its map which showed the chance of the centre of a hurricane passing within 75 miles of a given location in the next 3 days. The new map shows the chance of a given location experiencing hurricane wind speeds of 74mph in the next 5 days. Other maps will deal with wind speeds of 58mph and 39mph. (http://www.palmbeachpost.com/news/content/news/epaper/2005/03/19/m1c_Chart_0319.html)
- **Tropical storm Roke.** A storm, which had maximum wind speeds of 105kph, struck the central Philippines on 17th March killing at least 5 people. The storm struck in the middle of the Philippine dry season. (<http://www.brunet.bn/news/bb/fri/mar18w6.htm>)
- **Outdoor movie screen damaged.** Winds in Huntington, US, caused a large portion of the screen at a drive-in movie theatre to topple over. This season's movie showings may be cancelled or delayed. Also, the façade of a Huntington store needs to be replaced after being torn off by strong winds. (<http://www.hponline.com/articles/2005/04/01/news/01wind.txt>)
- **Sand loss due to hurricane Ivan.** The Geological Survey, NASA and NOAA (National Oceanic and Atmospheric Administration) are measuring the US coastal sand and land loss due to hurricanes. Findings show that Hurricane Ivan resulted in an average shoreline erosion of 42 inches where Ivan came ashore. (http://www.kentucky.com/mld/kentucky/news/breaking_news/11252633.htm)
- **Storm-damaged trees in Cumbria.** In January, winds of up to 102mph resulted in hundreds of thousands of trees being uprooted and snapped in Cumbria. After a two-month clean-up by the Forestry Commission and Cumbria Woodlands more than 70% of walkways and paths



have reopened for Easter. The cost of the clean-up was £500,000. (<http://news.bbc.co.uk/1/hi/england/cumbria/4375467.stm>)

- **Pram lifted by wind gust.** In late March, gusts of up to 102kph affected Newcastle in Australia. A pram containing a nine-month-old baby was lifted into the air and flipped onto its side. The wind in that particular street was so strong that the street had to be closed off to pedestrians. (http://www.thecouriermail.news.com.au/common/story_page/0,5936,12641179%255E953,00.html)
- **Lorry blown off bridge.** In January, an articulated lorry was blown off the Foyle Bridge in Londonderry by a gust of wind and fell more than a hundred feet onto mudflats. The driver was pronounced dead at the scene. (http://news.bbc.co.uk/1/hi/northern_ireland/4165489.stm)
- **Diesel pollution.** Also in January, a fuel container used to refuel boats was blown in Derwentwater by strong winds. An estimated two hundred gallons of diesel spilled into the Cumbrian lake from the container. (<http://news.bbc.co.uk/1/hi/england/cumbria/4167223.stm>)

(Ed – Thanks to Sarah Jordan for this section).

❖ AEA Technology Wind Tunnel Closes

Terry Johnson writes:

The AEA Technology Rail wind tunnel, situated at the Railway Technical Centre in Derby, has been forced to close due to declining use, in common with many other wind tunnels of a similar vintage in the UK.

The tunnel had an interesting history and some parts dated back to 1934, when the LMS Research Department were granted authorisation to build a wind tunnel. It was to be

used for problems associated with streamlining trains. That tunnel was of straight-through type and was based on NPL tunnel designs. In 1951, a new tunnel was developed from the first and included a significant speed upgrade. It was opened at the London Road site by Dr F C Johansen who installed the original tunnel and undertook an extensive series of train aerodynamic tests in it. The new wind tunnel contained the working section of the old, but the configuration was altered to a closed return design.

Since then, the tunnel was moved three further times. It spent a number of years at what was formerly the Derby College of Further Education (now Derby University), before being held in storage for a couple of years near Ilkeston in Derbyshire. It was finally reinstalled at London Road, oddly enough, not very far from its original location.

As a major research tool for the UK railway industry, the wind tunnel was involved in a variety of important projects over the years. These mainly concerned train aerodynamics, although the tunnel was also used for the calibrating instrumentation.

Wind tunnel tests have been used in the optimisation of BR train design for many years. Of particular interest was the reduction of aerodynamic drag. Another major project involved years of investigation into the effects of cross-winds on the APT (Advanced Passenger Train). Aerodynamic coefficients of lift, side force and overturning moment at various yaw angles and roll angles were measured and safe cross wind speed limits were recommended. Professor (then Dr) Chris Baker was much involved as well as Dr Richard Cooper of Queens, Belfast. Those studies even extended into topographical modelling in the early 1980's undertaken for BR by Dr Colin Wood at Oxford University.

Other applications of the wind tunnel have included investigations into the streamlining of coal hopper wagons to reduce coal loss during transit and the detailed design of high speed coaches in terms of drag reduction. In addition, the tunnel was also used for a variety of small projects looking at problems such as the leakage of train windows and optimal positioning of ventilation outlets within the boundary layer flow around the moving train.



In recent years, use of the wind tunnel declined significantly, although it was used for aerodynamic studies of the Virgin Cross Country Class 220 multiple units and the Class 390 Pendolino trains. As the UK train manufacturing industry gradually closed down or was moved abroad so demand for the wind tunnel fell. Finally, the basic running costs became too much for the corporate balance sheet and so the wind tunnel had to close.

A valiant attempt to sell it for £1 on ebay, resulting in an interested party willing to dismantle it, move it and reinstate it elsewhere, finally came to nothing and recently it was scrapped. A few parts of the wind tunnel, including a section of the working tunnel and some models will go on display in the Derby Industrial Museum. The propeller and motor which generated the wind tunnel flow have also been moved and may run again in a new wind tunnel for testing kit cars.

References:

1 Johansen, F. C. "The air resistance of passenger trains". Proc. IMechE, Vol 134, p91, November-December, 1936.

2 Peacock, D.W. "British Railways wind tunnel", Nature, Vol. 172, p1165, December 26, 1953.

❖ Aerodynamic reminiscences of planes and trains

On the 26th of January Prof Roger Gawthorpe delivered an inaugural style lecture entitled "*Aerodynamic reminiscences of planes and train*" at The University of Birmingham. In his usual style, Roger delivered a thought provoking and entertaining presentation. A pdf copy of the overheads will be available on the website soon.

❖ Full-Scale Measurements at SRI

Roger Hoxey writes:

The 31st May 2005 will be a day of reflection touched with sadness. The work on wind engineering will come to an end at Silsoe Research Institute. The Institute is in the process of closing down – it no longer delivers the mission of its master the BBSRC (Biotechnology

and Biological Science Research Council). Although the Institute receives only one third of its funding from BBSRC, they are our employer, and they do have the power of closure without regard to the service that SRI could continue to provide to its other customers.

Wind engineering started at Silsoe in 1969 when we were called the National Institute of Agricultural Engineering (NIAE). Problems had occurred with wind damage to glasshouses and the proposed action of imposing British Standard CP3: Chapter V; Part 2 was not acceptable to the industry. Work was commissioned at NIAE by the Ministry of Agriculture to determine the wind loads that act on these light-weight structures where light transmission is the highest priority. The project leader at the time was Derrick Wells, and in consultation with Keith Eaton and John Mayne at BRE (and later Nick Cook) full-scale measurements were proposed as there was a considerable stock of glasshouses available (this was also the time that BRE were making full-scale measurements at Aylesbury.)

The first glasshouse was instrumented by Derrick and Jim Dawson in 1971 at the Lancashire College of Agriculture, Myerscough, on the basis that stronger winds can be expected in the NW of the country. A further two houses were instrumented at Hesketh Bank near Southport and measurements were made over two winters. Although the records show that more wind can be expected in the NW, the reality is that it cannot be forecast sufficiently accurately to give 6 hours warning to us at Silsoe. It also rains more in Lancashire and erecting an anemometer in a field of Brussels sprouts, which were grown on ridges, like potatoes, when the ground was water-logged and the troughs were ankle deep with water, made this work a 'popular' assignment. Remember also that the M6 had the part through Birmingham missing. I joined Derrick at the beginning of 1972, 3 days before the first data-recording trip to Myerscough.

Further glasshouses were instrumented and the work extended to include film plastics covered structures. The successful development of reliable instrumentation for full-scale work extended the project to cover all types of farm buildings. More staff were needed including Peter Moran, Geoff Richardson and in 1982 Adam Robertson. Adam gave a structural engineering emphasis with developments such as the Silsoe Structures Building and frame design. The expertise developed on agricultural buildings was

then applied to other areas of civil engineering including buildings, free-standing walls, prison walls, fences, embankments, lighting columns, etc.

We were grateful to SRI for providing science funding to carry out more fundamental studies on wind structure, instrumentation, analysis techniques, Reynolds number effects, code development, etc. This funding also encouraged visiting workers to come to Silsoe: I particularly wish to thank Peter Richards from the University of Auckland, New Zealand, who spent two sabbatical years here, in 1988 and 2000, who developed our more fundamental interest in aspects of fluid dynamics applied to wind engineering. In part, the development of CFD at Silsoe started with Peter in 1988 and this encouraged further work that Andrew Quinn continued although Andrew quickly became a full part of the project team and took responsibility for some of the science programmes and contracts.

But all good things come to an end and we must now move on. We are hopeful that the work will continue in some form under the leadership of Chris Baker and Birmingham University. Andrew has been appointed as a Roberts Research Fellow at Birmingham and Adam and myself will be maintaining contact through contract and other work. It is possible that the wind site at Silsoe will continue to operate through leasing arrangements which have yet to be finalised.

A final thanks to all the staff at Silsoe who have worked on wind engineering over the past 36 years, especially the staff named above, Lynn Short and Andy Bradley for computer programming development/data analysis, and our technicians over the years who include Len Burgess, Alan Glass, Chris Hampson, Paul Pollard, Nick Teer, Graham Westgate, Gordon White and David Wright.

Roger Hoxey

PS In clearing the office I came across a copy of a paper I presented at the 2nd UK WES conference held in Warwick in 1994 ('The folly of using extreme value methods in full-scale experiments' JWEIA 60,(1996) 109-122.) which should have been a lesson to me, not to question established procedures. Thankfully it wasn't and further work here and elsewhere has now clearly established the quasi-steady method for pressure coefficient derivation. I hope we are

now able to separate what amounts to sampling error from legitimate trends.



Examples of early full scale tests at SRI.



❖ Forthcoming WES Meetings

The following meetings are have been proposed. Unless stated otherwise all meetings will be held at the ICE from 6 pm.

3 May 2005 The Effects of Hurricane Ivan in Grenda & Grand Cayman by Tony Gibbs. (Preceded by the AGM at 5:45pm.).

7 September 2005 University Day

2 November 2005 9th Scruton Lecture

❖ Other Forthcoming Conferences

2005

- **10th Americas Conference on Wind Engineering (10ACWE)**
Baton Rouge, Louisiana, U.S.A., May 31 - June 4, 2005
<http://www.10ACWE.lsu.edu>
- **EACWE 4. The fourth European & African Conference on Wind Engineering.**
Prague, 11-15 July, 2005
<http://www.itam.cas.cz/eacwe2005>
- **RMets Conference 2005**, University of Exeter, 11-16 September,
<http://www.rmets.org>
- **The sixth Asia-Pacific Conference on Wind Engineering (APCWE VI)**
Seoul, Korea, September 12-14 2005
<http://apcwe-vi.kaist.ac.kr>

2007

- **12th International Conference on Wind Engineering (ICWE12)**
Cairns, Queensland, Australia, 1 – 6 July
www.awes.org/icwe12

❖ Contact Point

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