



**SEVENTH INTERNATIONAL CONFERENCE  
ON  
WIND TURBINE NOISE**

**ROTTERDAM 2<sup>ND</sup> TO 5<sup>TH</sup> MAY 2017**

**POST CONFERENCE REPORT**

Another intensive four days of conference but still time to meet old friends and make new ones. The venue at de Doelen worked well and the food and refreshments were good and varied. Thanks to Daniele Ragni and his team at TU Delft for all their help; also to Gijssjan van Blokland and NAG (the Acoustical Society of the Netherlands) and Eric Roelofsen and NSG (the Dutch Noise Abatement Society) for their support.

A few statistics. 195 delegates. Can't quite break that 200 ceiling. We have had one hundred and ninety something at the last four events. 80% from Europe with 38 delegates from Germany topping the country league for the first time. But not to dismiss the huge support we have from outside Europe with 40 delegates. We do have a record this year with delegates from 27 different countries, so we are truly international.

The make up of delegates is changing. More manufacturers and industry people this time. Are delegates getting younger? I think so, or is it just me getting older? A few more women this year, but still only around 20%. It would be nice to see more next time.

We had 76 papers – just under 40% of delegates presented. That's a bit lower than 2015 and eased the pressure on the programme a bit – allowing us to have a guest speaker – professional miller Willem Roose to tell us the story of windmills. And an extra workshop on cyclical pitch control (CPC) – of which more later.

The two evening workshops were well attended - the first on propagation and other poster subjects and the second run by TU Delft and GRAS on the Aeroacoustic Investigation of Noise Sources. Thanks to everyone who organised and contributed to those.

We invited papers on Shadow Flicker this year as there does not seem to be any other forum where this can be discussed. We had four good papers and hope to repeat it next time.

I said in my last post conference report in 2015 that 4 days is really too long. I know that many people can't get that much time off. We will see how things develop next time but, if we can bring it down to three full days without compromising the programme we will certainly consider that.

Finally, the conference dinner was held on the 90 year old paddle steamer Majesteit as it toured the Rotterdam river and docks. Excellent food and craic.

### **WHERE ARE WE NOW – AND WHERE NEXT?**

In my last post conference report I tried to summarise where we were and where we were going. I suggested possible themes for 2017. I have to say that generally my predictions were not very accurate! But that won't stop me from trying again.

#### **Propagation**

I think perhaps I was too complacent last time that we had a good understanding of the propagation mechanism of sound from wind turbines. Papers, particularly from Sjoblom and Conrady showed that perhaps we need to get together more with our meteorologist colleagues to look more closely at how the atmosphere works. On the whole we can be pretty accurate, but perhaps more work in propagation over such surfaces as water, snow or sand would be useful.

#### **Regulations, Perception and Health Effects.**

Surprisingly few papers on regulations this time but plenty on perception and health effects. There is an enormous range of noise limits throughout the world which reflects the fact that none appear to be based on any real research on what levels affect people and what the balance should be between protecting the amenity of wind farm neighbours and the need for renewable energy. It would be good to see some of the resources currently being devoted to infrasound research diverted to work on the impact of audible sound levels. And more work involving stakeholders of the type described by van den Berg in his paper.

#### **Designing the Windfarm for Compliance**

After 2015, I thought there would be more papers on the optimisation of windfarms – that is ways of running windfarms close to the noise limit for more of the time. As it happened there was none. But it is a subject that may become increasingly important in the future.

#### **Background Noise, Assessment and Compliance Testing.**

We only categorised three papers this year as background noise. However, they gave us a very helpful insight into how background noise varies with the conditions of measurement.

A good selection of papers on assessment and compliance testing. There was a wide variation in the approach taken so perhaps this is a subject that will run for some time yet. For those who would like a standardised approach there is more work to be done.

### **Tones**

In 2015 I noted that there were less papers on tonal noise and that trend continued this time to the extent that we put tones together with low frequency noise in a single session. Manufacturers generally seem to have ways of mitigating tones, but they do still occur.

### **Small Turbines**

I was disappointed that we did not have enough papers on small turbines even to have a session. One of the difficulties is that noise from small turbines varies greatly from turbine to turbine so it is difficult to generalise findings on a single turbine. Some case studies on small turbines would be a useful addition to the conference though.

### **Trailing Edge Noise**

As in 2015 we had a whole day's session centred round trailing edge noise – including theoretical and wind tunnel modelling, combined source and propagation modelling and source location using arrays. University of Siegen and TU Delft had almost half the papers between them but interesting contributions from all presenters.

### **Infrasound**

We had a small session on infrasound. We separated it from low frequency noise this year because the two are often erroneously lumped together when describing turbine noise.

### **Amplitude Modulation**

Plenty of papers on amplitude modulation again this time. Some of the activity was related to the work that has been done recently in the UK. The metric developed by the Institute of Acoustics Noise Working Group seems to have been widely accepted. I suggested in my 2015 post conference report that I was not convinced that stall was the whole story as far as AM was concerned. There were suggestions this year that we should be talking about flow separation rather than stall and that would seem to be appropriate. There is still more work to be done on both the mechanism causing it and on its impact on people. But it remains a feature that appears to hit the headlines in a small number of countries.



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**Cyclical Pitch Control**

And whilst we are on the subject of AM, I was keen to try to get people talking about CPC and so we had a mid-day workshop run by Matthew Cand. It was cautiously titled "CPC and other avenues . . ." in case the CPC part of it came to a halt. As it happened there was a good debate and we had to extend ten minutes into the lunch break. Understandably, those who know most about the subject (turbine manufacturers) are not willing to say anything. But those of us involved in noise assessment and mitigation are keen to know whether we can use this to remedy AM. More in 2019?

**WTN 2019 - Themes**

Here are a few thoughts of what we need to address between now and 2019:

Build on how background noise varies with various factors. Does it vary with seasons, wind directions types of foliage and other factors?

How well does background noise mask turbine noise? We have had a few papers over the years on this – but we still need more.

Assessment and compliance testing. Should we be aiming at an agreed standard method? Or not?

Small turbines – some case studies describing the particular problems that have arisen with small turbines.

Cyclical Pitch Control. Can it help reduce AM? Does it reduce overall sound power?

More dose response tests on turbine audible noise to allow us to produce more robust regulations.

Why do some people become ill near wind turbines? Perhaps this is no longer a study that acousticians are qualified to do?

And one from 2015 - are LF tones being missed or wrongly interpreted as merely low frequency noise or even infrasound as suggested by Evans in Glasgow?

And, of course any other subjects that are useful to further the knowledge of Wind Turbine Noise.

Any feedback will be welcome – good or bad. Please contact me by email.

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