

Title Vibration monitoring of Rugeley chimney

Client Bierrum International

Location Rugeley, near Birmingham, UK

Background The 183m tall original chimney at Rugeley power station operated without incident since it was built in 1968 until construction, in late 2006, of a replacement chimney in the upstream direction of the prevailing wind. An investigation on behalf of the specialist contractor (Bierrum) of cross-wind interference effects, on the old chimney, prior to construction (Figure 1) and commissioning of the new chimney led to the installation of a tuned mass damper (TMD) by Multitech (France) (see Figure 2) and of a system for monitoring performance of both TMD and chimney during the remainder of its operational life.

Response The monitoring system employed novel procedures for identifying natural frequency and damping ratios, available to the operator by internet viewer and email. In addition the system provided alerts of high response levels. More recently the system has been used to check the safety of the structure during demolition.

Monitoring of the chimney continued (Figures 3, 4 & 5) until complete demolition of the chimney during 2009-2010. In early 2008, the old chimney was taken off-line, and significant changes in the dynamic performance were captured by the monitoring system, which confirmed the continued effectiveness of the TMD.

Outcomes Even during the progressive demolition from the top of the chimney, the monitoring system continued to provide performance information capturing the effect of removing the TMD and increasing the structure natural frequency to the point where response due to vortex shedding was no longer a safety concern.

References Brownjohn JMW, Carden EP, Goddard CR, Oudin G, Real time monitoring of tuned mass damper system for a 183m reinforced concrete chimney. Journal of Wind Engineering and Industrial Aerodynamics 8(3), 2010 pp169-179

We were very pleased with the innovative monitoring system that was implemented and FSDL's positive responses to the changing structural circumstances throughout the project.



Figure 1: without TMD

Figure 2: with TMD

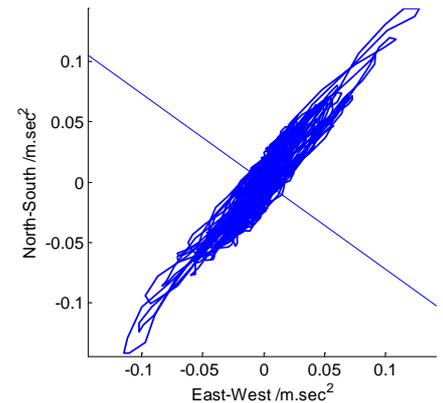


Figure 3: Typical cross-wind response due to vortex shedding

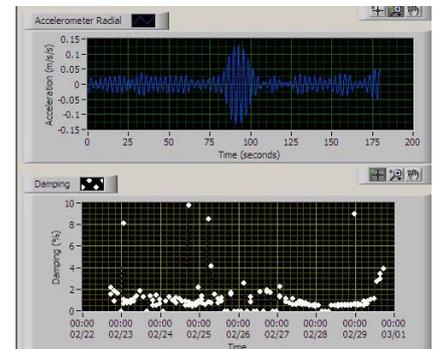


Figure 4: Response and damping reported by the system in February 2007

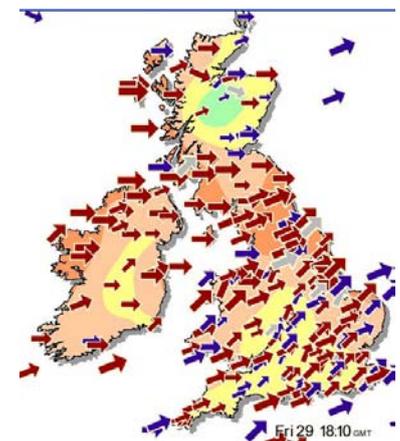


Figure 5: Corresponding wind conditions