

AMEC FOSTER WHEELER

Frank Babic [□], Buddy Ledger [†] and Alfredo Rodrigues [‡]

Amec Foster Wheeler Environment & Infrastructure
160 Traders Blvd E., Suite 110 Mississauga, Ontario CANADA L4Z 3K7

Abstract

Amec Foster Wheeler is a global consulting engineering company that employs over 40,000 people in more than 55 countries. The Acoustic Centre of Expertise is a group within Amec Foster Wheeler that supports acoustics, noise and vibration engineering services. We are based out of the Mississauga, Ontario, Canada and support projects throughout North and South America. Our expertise includes environmental noise, transportation noise, building acoustics, vibration and monitoring in support of our oil and gas, clean energy, environmental and infrastructure and mining markets.

Keywords: environmental noise, transportation noise, building acoustics, vibration, noise measurements, noise monitoring, vibration measurements, vibration monitoring, oil and gas, clean energy, environmental, infrastructure, mining

Résumé

Amec Foster Wheeler est une entreprise de consultation et d'ingénierie qui emploie 40 000 employés œuvrant dans plus de 55 pays. Au sein d'Amec Foster Wheeler est le Centre d'Expertise en acoustique qui soutient services d'ingénierie dans les domaines de l'acoustique, du bruit et des vibrations. Nous sommes établis à Mississauga, en Ontario Canada et on soutient de projets à travers l'Amérique du Nord et du Sud. Notre expertise comprend les domaines du bruit ambiant, le bruit des infrastructures de transport, l'acoustique du bâtiment, la surveillance et les vibrations en appui de nos secteurs du pétrole et du gaz, de l'énergie propre, de l'environnement et des infrastructures et des mines.

Mots clés : bruit dans l'environnement, bruit des infrastructures de transport, acoustique du bâtiment, vibrations, mesures de bruit, contrôle du bruit, mesures de vibrations, contrôle des vibrations, pétrole et du gaz, énergie propre, l'environnement, infrastructures, exploitation minière

1 Introduction

Amec Foster Wheeler designs, delivers and maintains strategic and complex assets for its customers across the global energy and related sectors. We design, deliver and maintain strategic and complex assets and employ around 40,000 people in over 55 countries worldwide.

Our operation spans across four key markets: Oil & Gas, Mining, Clean Energy, and Environment & Infrastructure. In each market, the range of services provided to our customers is very similar and runs right across the lifecycle of assets. Our engineering and project management activities are managed by four business units: Americas, Northern Europe & CIS (NECIS) and Asia, Middle East, Africa & Southern Europe (AMEASE) and Global Power Group (GPG). We are proud of our core values: delivering on promises, developing full potential and doing the right thing. Amec Foster Wheeler is driven by delivering value to our clients, providing safe and sustainable project solutions, developing the full potential of our people and contributing to the communities we work in.

Amec Foster Wheeler's Acoustics Centre of Expertise is located in Mississauga, Ontario, Canada, and supports the North and South American geographies in our various key markets. The concept of a Centre of Expertise is an exciting new and growing area for Amec Foster Wheeler. We rely on

collaboration between multiple offices across the Americas and the globe to deliver quality driven work to our clients. The Acoustic Centre of Expertise was founded in 2013, and its key members, a core group of senior engineering practitioners, have a combined collective experience of over 50 years in acoustics, noise and vibration. We offer consultancy, engineering, and project management services in the core areas of environmental noise, transportation noise, building acoustics, monitoring of noise and vibration, including both assessment and mitigation of noise and vibration. We also collaborate with our other Amec Foster Wheeler acoustics practitioners in the UK.

2 Areas of Focus

We are experienced with environmental noise and vibration as they relate to industrial and manufacturing facilities, construction and blasting activities, renewable energy, and occupational health. We have also completed many transportation noise projects involving the impact on the acoustic environment from transportation sources including roads, aircraft, and rail. We bring our extensive expertise with transportation (e.g. All Aboard Florida High Speed Rail Project and various TTC Projects) and environmental (e.g. Pampa de Pongo Mining Project, Ontario Power Generation) concerns, an understanding of regulatory and policy requirements, and experience with handling community

[□] frank.babic@amecfw.com

[†] buddy.ledger@amecfw.com

[‡] alfredo.rodrigues@amecfw.com

consultation for our environmental and transportation clients – both locally and across the Americas.

The successful design and operation of any building involves incorporating various engineering disciplines - including architectural, mechanical, electrical and structural. These disciplines continue to evolve in their need to address noise and vibration. We have extensive successful experience delivering building acoustic projects (e.g. UofT Innis Town Hall and Cinema Retrofit) by ensuring the integration of acoustics throughout the entire design, delivery and commissioning process.

We have the knowledge and experience to address vibration generating activities and associated impacts to buildings and structures (e.g. Deloro Mine Site Cleanup Project Blasting). Typical sources of vibration we address include construction equipment, rail transportation and explosive blasting.

The measurement and monitoring of noise and vibration is a requirement for a variety of projects and diverse jurisdictions. We are continually involved in the measurement of individual sources of noise and vibration, as well as monitoring construction for on-going noise and vibration impacts to communities (e.g. Edmonton Downtown Tunnel Construction Vibration) as well as long-term operational noise monitoring from facilities and transportation corridors.

3 Sample Projects

3.1 Rumble Strip Noise

Amec Foster Wheeler conducted a detailed assessment of rumble strip noise for the Ontario Ministry of Transportation. Noise levels (both interior and exterior to the car) were investigated and a classification of noise characteristics for the different designs was developed. From this investigation, we were able to identify various design characteristics (width, distance between strips, angled) that contributed to overall noise levels, and tonal components, of rumble strip designs.



Figure 1: Rumble strip noise testing

3.2 UofT Innis Town Hall and Cinema Retrofit

Amec Foster Wheeler was chosen to provide acoustic design for the retrofit of the University of Toronto Innis College Town Hall and Cinema. The Acoustic Centre of

Expertise integrated with the project team from the early stages of conceptual and detailed design, tendering and construction. We were successful in meeting the interior reverberation time criteria for the cinema, while significantly upgrading the sound isolation to adjacent spaces in Innis College through wall and door construction upgrades.



Figure 2: University of Toronto Innis College Town Hall and Cinema

3.3 Edmonton Downtown Tunnel Construction Vibration

The Amec Foster Wheeler Acoustic Centre of Expertise, in collaboration with the local Edmonton office, has and is continuing to conduct vibration monitoring for the City of Edmonton's Downtown Intensification project. This involves standard vibration monitoring for drop shaft construction and tunnel boring activities, as well as specific vibration monitoring of Nuclear Magnetic Resonance (NMR) spectroscopy and experimental labs at the MacEwan University.

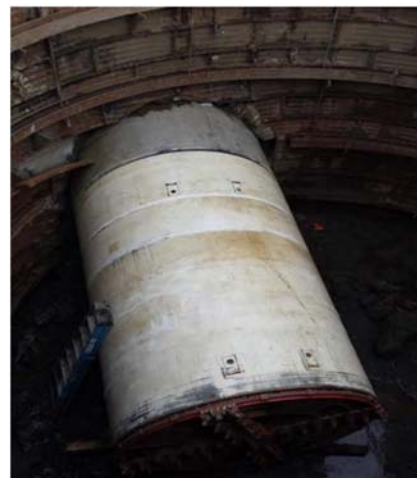


Figure 3: Tunnel boring machine breaking through receiving shaft