



Robin Mackenzie Partnership

Excellence in Acoustics

50



acoustics energy vibration



**QUATERMILE
ONE**

Robin Mackenzie Partnership

Company Brochure

Having celebrated our 50th anniversary in 2019, the Robin Mackenzie Partnership is one of the UK's largest acoustic consultancies and a leader in its field. Here at RMP we consistently deliver innovative acoustic solutions which our clients value as both robust and cost effective.

We are very proud to have received the Queen's Anniversary Prize 2009 for our work developing the Robust Details constructions used in over 75% of new attached housing in the UK, and of our close association to the Queen's Anniversary Prize 2015 awarded to Edinburgh Napier University for its internationally acclaimed work in timber engineering, sustainable construction and wood science.

Our company brochure gives an insight into the practice and presents examples of developments on which we are proud to have provided the acoustic design.

- Building acoustic design
- Environmental and industrial noise control
- ANC accredited sound insulation testing
- Elmhurst accredited air tightness testing
- Infra-red thermography
- Noise mapping
- Vibration control
- CPD training
- Product development
- Design animation
- Acoustic research



Our dedicated team delivers a high quality client-focused service at a reasonable cost. All RMP consultants are full members of the Institute of Acoustics while our directors hold fellowship status. RMP test engineers are accredited by the Association of Noise Consultants and the Elmhurst Airtightness Testing Scheme (EAS).

The practice has a very low turnover of staff which ensures consistency throughout major long-term projects.

RMP operates from offices throughout the United Kingdom undertaking projects of all sizes, many of national significance. Our research work is internationally recognised and has helped formulate national building regulations. Our client database includes the UK's leading construction companies, architects, product manufacturers, trade bodies and public sector bodies.

Consulting Services

The acoustics market has grown, particularly since the 1990s, due to increasing regulation, population density and expectations of improved building standards. Since the millennium, global warming and energy cost concerns have created a greater awareness of the environmental impact of buildings which has led to tighter regulation. We have embraced this environmental challenge through low carbon impact design solutions and by introducing thermography and air tightness testing services to our portfolio.

We now provide a wide range of acoustic and environmental consultancy services, using state of the art measuring equipment and computer software. Our highly qualified consultants guarantee a service of exceptional quality.

Building Acoustics

Acoustic design of auditoria and theatres has always been one of our main services. This is because the necessity of delivering good acoustics inside such buildings has long been recognised.

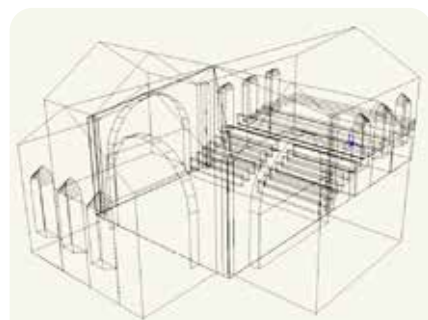
With the introduction of new technical guidance documents relating to schools, hospitals, offices and commercial premises (BB93, HTMo8-01, BCO, BREEAM etc) the need for good internal acoustics is now an issue for most architectural developments.

RMP has a wealth of experience in sound insulation, reverberant noise control and control of services noise. Our clients rely upon us to provide robust and cost effective design solutions which consistently achieve the design standards.

We have the experience to meet every architectural acoustic challenge – from the design of atria, school halls, court rooms and multipurpose spaces through to concert halls, exhibition centres and special needs schools. We achieve the very best results through a combination of experience, the latest computer modelling techniques (AutoCad, Odeon and CadnaA) and a full suite of on-site testing services.

Areas of expertise:

- Offices, hotels, commercial - BS8223, BCO guide
- Enhanced Housing Performance Code for Sustainable Homes, BRE Environmental Assessment Method (BREEAM), Robust Details
- Schools - BB93
- Hospitals - HTMo8-01
- Calculation of sound insulation - BS EN ISO 717, BS EN ISO 12354
- Design to Part E England and Wales
- Design to Section 5 and 7 Scotland
- Technical Booklet G/G1 Northern Ireland
- Public house and night club noise assessment
- Cinemas and leisure complexes
- Theatres and concert venues
- Museums and visitor attractions



Odeon wireframe acoustic model

Sound Insulation - Testing and Diagnostics

RMP were one of the first companies in the UK to undertake sound insulation testing back in the late 1960's. Over the years we have built up an unrivalled wealth of experience in sound insulation and building acoustic design. We draw upon this experience when providing acoustical services for the refurbishment of existing buildings or the design of new buildings. As a result, our expertise in this area is now internationally recognised. Our staff have provided research guidance and technical support a to government institutions and organisations from the UK to New Zealand.

RMP is registered on the Association of Noise Consultants Acoustic Tester scheme. This accredits RMP to undertake sound insulation testing for Part E, Section 5, Code for Sustainable Homes, BRE Environmental Assessment Method (BREEAM) rated developments for new build residential. We also regularly undertake sound insulation testing in schools, hospitals and office developments.

Our work ranges from small developer buildings and flat refurbishments through to multi-million pound residential flagship developments such as Quartermile in Edinburgh and the Great Northern Tower, Manchester.

The practice also specialises in the assessment of acoustic defects, providing invaluable advice to clients who require to remedy complex acoustic insulation problems which can occur in new build developments, refurbishment projects or in response to resident complaints.

We consider the provision of good, economical and practical design advice to be our business. This is why we provide technical guidance and recommendations, when needed, as part of our core service.

Areas of expertise:

- Offices, hotels, commercial - BS8223, BCO guide
- Enhanced Housing Performance Code for Sustainable Homes, BREEAM, Robust Details
- Schools - BB93
- Hospitals - HTMo8-01, HBN 12-01 Sup C
- Sound insulation testing on site (airborne and impact) - BS EN ISO 140, ANC registered, Robust Details inspectors, IOA Good Practice
- Reverberation time measurements - BS EN ISO 3382
- BS5363 – auditoria reverberation measurements
- Testing to Part E England and Wales
- Testing to Section 5 Scotland
- Public house and night club noise assessments
- Cinemas



Spot the scaffolding clamp!

Environmental Noise

Environmental noise covers a wide range of sources however, this is predominantly unwanted noise from transportation, construction and industrial activities. Increasingly governed by a variety of regulations, most new and existing noise sources now require assessment and mitigation. Requirements for assessment are diverse, but typically result in the assessment of the existing noise environment and the impact on the environment of constructing a new road, factory or wind farm etc.

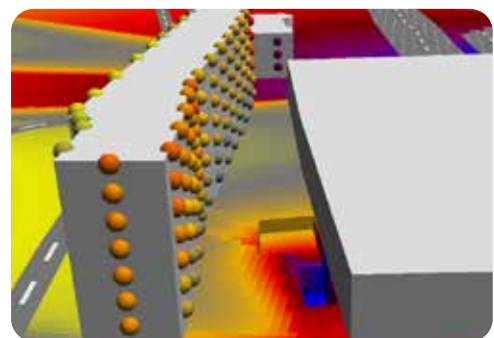
RMP assesses environmental noise sources against the specific criteria provided by local authorities, including the stringent inaudibility criteria. We carry out environmental impact noise assessments in support of planning applications and in response to noise abatement notices. We combine our extensive environmental impact experience with the latest calculation and mapping software to produce innovative and cost effective mitigation solutions for the most complex of projects.



Our directors and senior consultants frequently provide expert advice to Planning Inquires and Parliamentary Inquires such as The Edinburgh Tram inquiry. We are also frequently consulted on amendments to environmental noise planning guidelines.

Areas of Expertise:

- Environmental Measurements - BS 7445, WHO Guidance
- Planning and Noise - PAN 1/2011, NPPF
- Noise and Vibration from Mining - PAN 50
- Construction Noise and Vibration - BS 5228
- Motor Sports Noise Council's "Code of Practice on Noise from Organised Off-Road Motor Cycle Sport" 1994, Auto Cycle Union (ACU) Maximum Permitted Sound Levels
- Shooting Ranges/Galleries - BS EN ISO 172001
- Sports Grounds
- Road Traffic Noise, existing and new roads - CRTN, NISR, DMRB, PAN 56, PPG 24
- Rail Noise - CRN, BS 6427, BS 14837, BS 8041, PAN 56, PPG 24
- Aircraft Noise - BS8233, WHO, Noise Contours (civil and military)
- Industrial Noise - BS 4142
- IPPC Assessments
- Workplace Noise Assessments - HSE
- Low noise work environments - BS 11690
- Wind farm - ETSU R 97, IOA GPG
- Concert noise, noise council code of practice



CadnaA plant noise predictions on a residential façade

Vibration



RMP provides expert advice on vibration measurement and analysis. Our comprehensive engineering advice on problem resolution takes into account the long-term structural integrity and enhanced engineering performance. Our consultants are members of the Institute of Acoustics and The British Institute of Non Destructive Testing and are experienced in planning, collection, analysis, and interpretation of ground-borne vibration data.

We undertake vibration measurement and analysis on new residential developments – at railway track-sides, alongside highways (both urban and rural), in tunnels (both road and rail), on piled foundation construction sites, and across a broad spectrum of commercial and retail developments. We regularly act as expert witnesses in planning inquiries and insurance claim resolutions. The latter includes site vibration assessment, data synthesis and analysis to assist dispute and claim resolution.

We strongly recommend that vibration testing be carried out on development sites at an early stage, before it becomes an expensive post-completion problem. This allows our expert team to provide tailored advice which can significantly reduce the risk of failure following completion. It can also reduce the level of material and remedial measures necessary to meet vibration isolation guidelines.

Areas of expertise:

- Offices, hotels, commercial & retail developments
- Housing, mixed-use residential/retail/commercial, schools & colleges, vibration isolated laboratories & plant/machine rooms
- In situ vibration testing (air- and ground-borne): rail, road, bridge, and tunnel sites
- Piled foundation installation vibration assessment
- PPV, VDV, and RMS acceleration measurements: time and frequency domain analysis
- Assessment to BS 6472 Guide to the evaluation of human exposure to vibration in buildings (1 Hz to 80 Hz)
- Assessment to BS 7385 Evaluation and measurement for vibration in buildings
- Assessment to BS 5228 Noise and vibration control on construction and open sites
- Compliance checking to The Control of Vibration at Work Regulations 2005
- Blast induced and other sources BS 6427
- Ground Borne Vibration from Rail BS 14837
- Human Response BS 8041
- Hand arm vibration assessment
- Whole body vibration assessment

Air Tightness Testing

Air tightness testing is increasingly being requested by private developers, housing associations and social landlords, as a means of checking the energy performance and workmanship of dwellings. Unwanted air infiltration can account for up to 20% of a building's heat loss and reduces occupant comfort via draughts.

RMP provides a 'one-stop' consultancy service for both sound insulation and air tightness, simplifying the design and completion phases of a project.

We carry out air tightness testing for the domestic market using Elmhurst Airtightness Testing Scheme (EAS) accredited testers required for Part L1 England and Wales Building Regulations compliance testing. We also undertake commercial air tightness testing (volume dependant) and provide consultancy advice on design and detailing. The tests are conducted to the Air Tightness Testing Measurement Association's Technical Standard 1 (ATTMAT S1).

Areas of expertise:

- EAS accredited domestic air tightness testing to ATTMAT S1 requirements
- Part L complaint testing for the England and Wales Building Regulations
- Section 6, Energy, complaint testing for the Scottish Domestic Technical Standards
- Commercial air tightness testing
- Building fabric systems in relation to air tightness
- Design, detailing and construction consultancy services for air tightness
- Pressure loss diagnosis using building smoke testing and thermography



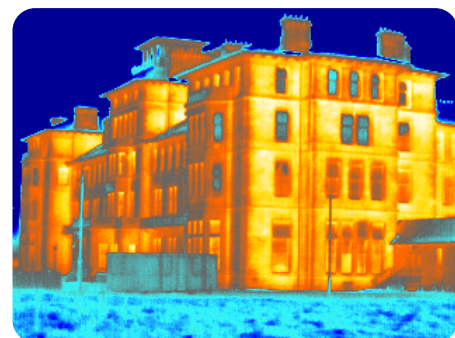
Infra-red Thermography

Thermal imaging (or infra-red imaging) captures thousands of surface temperature measurements and converts them into an image. The service can identify air leakages, badly insulated areas and other construction problems. Therefore, it is often complimentary to air tightness testing. Thermal imaging has a wide range of applications in the building industry.

RMP operates a range of thermal imaging infra red cameras to support our professional diagnostic services, software and detailed reporting. Our experience spans a wide range of activities.

Areas of expertise:

- Infra-red imaging of domestic dwelling
- Complex detailing of building envelope
- Evaluation of process energy system
- Diagnosis of building envelope defects
- Diagnosis of building pathology
- Assessments of energy heat loss



Industrial Noise



The control of industrial noise in the UK generally falls into two categories: the monitoring and control of existing industrial premises under the Integrated Pollution Prevention and Control regulations (IPPC) or the control of new industrial processes through BS4142 'Assessment of Industrial Noise in Mixed Residential and Industrial Areas'.

IPPC assessments typically need to be undertaken on bi-annual basis to monitor any change in processes and to control creeping background levels. BS4142 assessments are required where new plant or other noise sources are being installed within an existing or new facility.

RMP boasts a strong track record in providing full industrial noise assessments and major IPPC assessments such as BP's Grangemouth refinery.

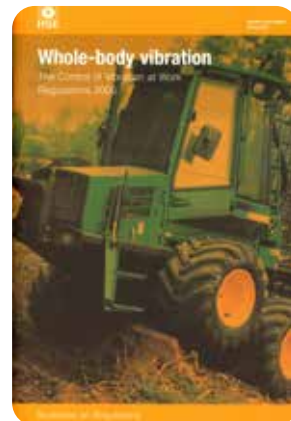
Failure to properly control industrial noise can have serious consequences for companies and result in noise abatement notices issued by local authorities under the Control of Pollution Act 1974. RMP are regularly commissioned to assist companies in meeting noise abatement notice requirements or supporting their case, where the company has undertaken 'best practical means' to control their noise emissions.

Noise and Vibration at Work

Ensuring the health and safety of your employees is critical to all employers. Failure to comply with the safety regulations can result in serious health implications for employees and substantial legal claims against the employers.

Noise and Vibration at Work are covered under the following HSE regulations:

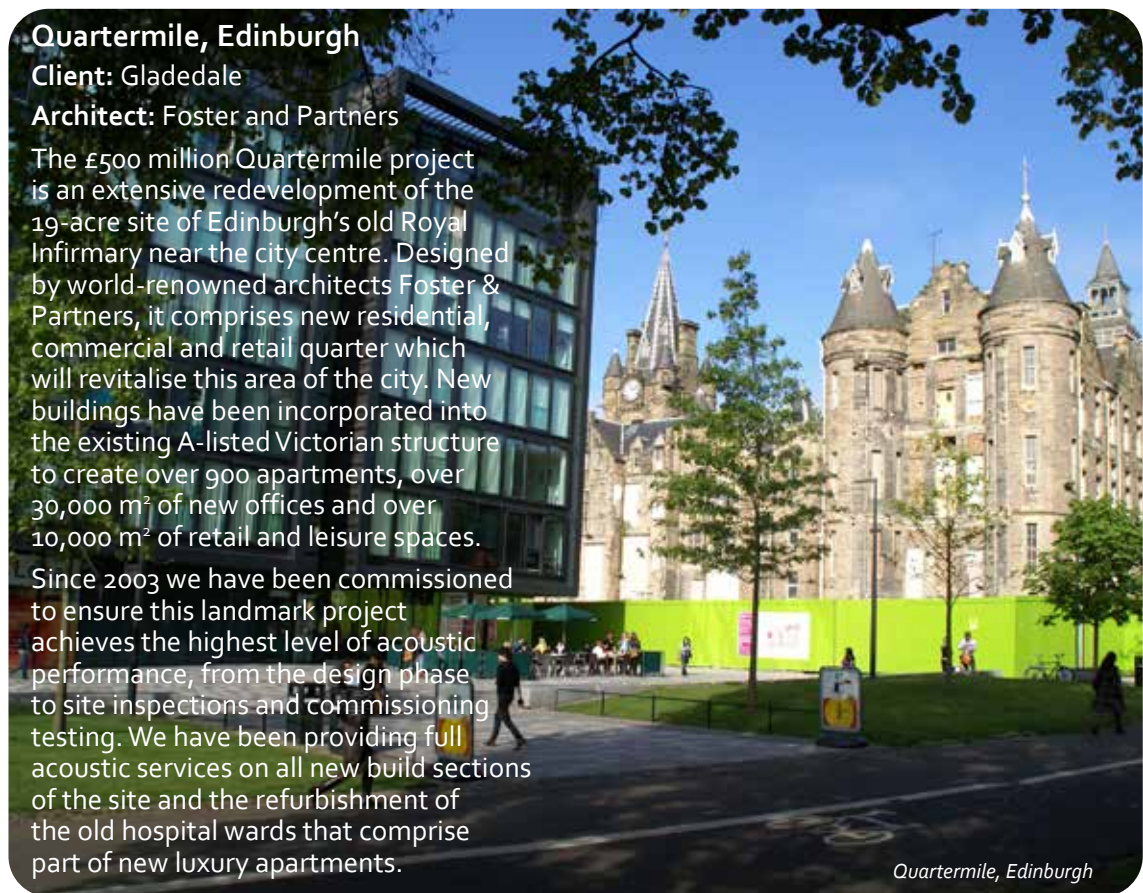
- Hand-arm Vibration, Control of Vibration at Work 2005
- Whole-body Vibration, Control of Vibration at Work 2005
- The Control of Noise at Work Regulations 2005



RMP regularly provides advice on industrial deafness, industrial noise and vibration reduction and monitoring to demonstrate compliance with the above regulations. We also offer expert witness services with regards to noise and vibration at work.

This service is typically required by the Health and Safety Executive and often also by insurance companies to minimise potential future industrial deafness claims.

Flagship projects



Quatermile, Edinburgh

Client: Gladedale

Architect: Foster and Partners

The £500 million Quatermile project is an extensive redevelopment of the 19-acre site of Edinburgh's old Royal Infirmary near the city centre. Designed by world-renowned architects Foster & Partners, it comprises new residential, commercial and retail quarter which will revitalise this area of the city. New buildings have been incorporated into the existing A-listed Victorian structure to create over 900 apartments, over 30,000 m² of new offices and over 10,000 m² of retail and leisure spaces.

Since 2003 we have been commissioned to ensure this landmark project achieves the highest level of acoustic performance, from the design phase to site inspections and commissioning testing. We have been providing full acoustic services on all new build sections of the site and the refurbishment of the old hospital wards that comprise part of new luxury apartments.

Quatermile, Edinburgh

Odeon Cinemas – Metro Centre, Newcastle

Client: Sir Robert McAlpine

Architect: Covell Matthews

This project involved the refurbishment of the existing structural shell of the Metro Centre while the external cladding and internal fit-out is entirely removed and replaced by a new 12 screen cinema, bowling alley, restaurants and leisure facilities. RMP were commissioned by McAlpines to oversee the acoustic design of the building and conduct regular key stage site inspections.

The re-use of the building structure provided significant challenges in achieving a high level of acoustic performance. A very high level of acoustic detailing was also required to isolate the vibration from the bowling machines to the cinemas. RMP were also commissioned to undertake completion sound insulation testing and ambient noise measurements which demonstrated that the project successfully met all the stringent Odeon design criteria.

The Great Glen House, Inverness

Client: Robertson Construction

Architect: Keppie Design

Award: Sustainable Building of the Year Award, 2006

The Great Glen House is the headquarters to Scottish Natural Heritage and the Deer Commission. The building has achieved the highest standards of environmental sustainability, including the BRE Environmental Assessment Method (BREEAM) rating of 84.01%, the highest score at completion.

Working with architects Keppie Design and developers Robertson Construction, we provided full acoustic consultancy on the project. We advised on appropriate acoustic standards to be achieved throughout the building including sound insulation, noise control and reverberation time. We also prepared the full computer modelling of the internal spaces and advised on achieving agreed acoustic standards, including the BREEAM assessment.



The Magna Centre, Rotherham

Client: Magna Trust

Architect: Wilkinson Eyre Architects & Event Communications

Award: RIBA Stirling Prize 2001

The former Templeborough steelworks was developed into a unique Millennium visitor attraction focusing on the four elements – Earth, Air, Fire and Water. The project involved the creation of four independent pavilions, each with their own particular requirements in terms of sound insulation and acoustic ambience. We provided the full range of acoustic consultancy services for both the exhibition and main building.

The Scottish Storytelling Centre, Edinburgh

Client: Church of Scotland

Architect: Malcolm Fraser Architects

Award: RIBA 2007

The Netherbow – a landmark building situated on Edinburgh’s Royal Mile – is a multi-purpose venue with facilities for speech, music, administration, retailing and educational activities. The Centre is also the headquarters of the Scottish Storytelling Forum. This network promotes a range of storytelling events and projects throughout Scotland and the world, and provides storytelling training and support. The centre, designed by Malcolm Fraser Architects, won the RIBA Award in 2007.

We carried out a full acoustic assessment of the existing Netherbow Theatre prior to its virtual demolition and provided the full acoustic design after it was rebuilt. Specific challenges of the project involved incorporating a picture window into the theatre and controlling a structure borne transmission from the storytelling court.



The Scottish Storytelling Centre, Edinburgh

Edinburgh Royal Infirmary

Client: AWG Construction

Architect: Keppie Design

The new Edinburgh Royal Infirmary (ERI), designed by Keppie Architects, is the £200m replacement of the old ERI and Edinburgh University School of Medicine. This was one of Scotland's largest private finance initiative (PFI) projects. We provided the full range of acoustic consultancy services. This included an environmental noise impact assessment to determine implications for nearby residential properties and internal acoustic design of the wards, theatres and plant areas. The building also incorporated the University of Edinburgh Medical School lecture theatre and teaching facilities.



Hilton Hotel, Hyde Park, London

Client: ChandlerKBS

Architect: ICA Architects

RMP were commissioned to undertake the acoustic design assessment for the London Hilton Hyde Park Hotel. Extensive environmental noise assessment were undertaken and facade design solutions provided to ensure a high quality sleeping environment within the hotel bedrooms.

Great Northern Tower, Manchester

Client: Taylor Wimpey City

Architect: Assael

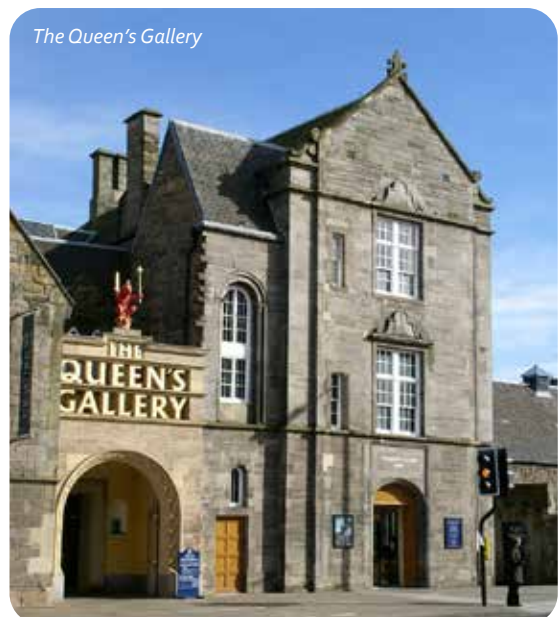
Designed by Assael architects for Taylor Wimpey City the 25-storey residential tower providing 260 apartments rises dramatically between the historic Great Northern Warehouse and Manchester G-Mex. We provided the full range of acoustic services. This included an environmental noise impact assessment; designing the external façade; controlling the noise from the surrounding city centre roads, bars and night club; sound insulation design to meet the new Part E regulations; and pre-completion testing.

The Queen's Gallery, Palace of Holyroodhouse, Edinburgh

Client: Irons Foulner

Architect: Benjamin Tindall Architects

The Queen's Gallery at Holyrood Palace provides purpose-built, state-of-the-art facilities to support changing exhibitions of works of art from the Royal Collection. The redevelopment of an A-listed guard house posed a number of acoustic challenges. We needed to control high levels of traffic noise and introduce a new plant room directly above the gallery space. The acoustic design also involved modelling the gallery space and providing absorbent panelling to provide an excellent gallery environment.





Hazelwood School For The Multiple Sensory Impaired, Glasgow

Client: Glasgow City Council

Architect: gm + ad architects?

Awards: 2008 Civic Trust Award, 2008 Design Share - International Honour Award, 2008 G.I.A. Award, 2008 Chicago Athenaeum Museum Architecture and Design - International Architecture Award

Designed by Murray Dunlop Architects, Hazelwood School caters for 60 students with multiple disabilities, aged from 2 to 19.

The unique learning requirements of the children and a desire to make the building itself part of the learning experience called for a high level of good acoustic design from the control of external noise sources through to the aural environment in both teaching and ancillary spaces.

Our Dynamic Earth, Edinburgh

Client: Event Communications

Architect: Sir Michael Hopkins

This project was Scotland’s principal Millennium Commission project. It features a state-of-the-art exhibition based around the history of the Earth. There are also ancillary conference, retail and catering facilities. We provided the full range of acoustic consultancy services for the project between 1996 and 1999. This included testing and offering recommendations on noise break out, services noise control, reverberation time and speech intelligibility. More recently we have designed the top-deck O-Zone conference and exhibition space. This is a unique free-standing acoustic enclosure, designed to provide a high level of acoustic insulation and control of reverberation while allowing the outer tent structure to move with the wind.



The Edinburgh International Festival Centre

Client: Edinburgh International Festival

Architect: Benjamin Tindall Architects

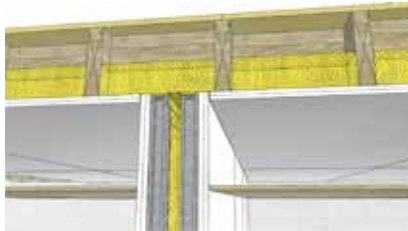
This historic A-listed building is one of Edinburgh’s iconic landmarks, proudly towering over the Royal Mile. Originally built in 1845, Edinburgh International Festival acquired the building in 1995. It then underwent a huge transformation under the design and supervision of Benjamin Tindall Architects. RMP provided the full range of acoustic consultancy services throughout the project.

The centre was re-opened to the public by the Queen in July 1999. It is now home to the Edinburgh International Festival Centre and features performers from other festivals. The building now has a 700-person auditorium and exhibition, retail, catering and office space.

Robust Standard Details (RSD) Project

RMP staff project managed the Robust Standard Details (RSD) project. The project was funded by the Home Builders Federation.

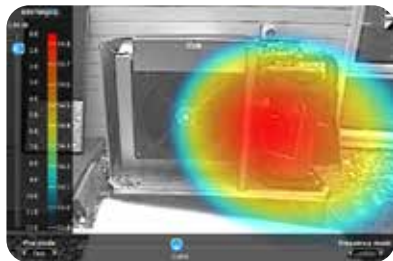
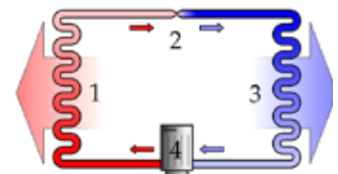
The RSD project was the largest research project ever carried out by the construction industry over such an intensive and short time period. Over 350 organisations were involved, 119 committee members representing almost every sector of the industry. Over 600 innovative new build wall and floor test structures involving 1,200+ dwellings were constructed and tested in nine months by the house building industry. The new innovative constructions dramatically reduce noise transmission within new homes and have also led to a range of other benefits for the environment and society.



In 2010, we were awarded the Queen's Anniversary Prize in recognition of the outstanding contribution to knowledge exchange in recognition of the impact the project has had in improving the sound insulation standards in homes.

DECC – Air Source Heat Pumps

The Department of Energy and Climate Change (DECC) commissioned us to undertake a series of acoustic measurements of in-situ Air Source Heat Pumps (ASHPs) and to provide recommendations for improving the acoustic performance of air source heat pumps. Heat pumps have an important role to play in achieving Government targets on reducing CO₂ emissions.



The project analysed the sound pressure level from 10 installations and undertook a tonal assessment of the units during normal operation and during defrost cycles. Sound power levels were also calculated for comparison against manufacturers' data. Noise outputs were assessed against the new permitted development criteria. Recommendations were provided on methods to improve the acoustic performance of air source heat pumps. Full technical report is available on the DECC website.

www.gov.uk/government/publications/acoustic-noise-measurements-of-air-source-heat-pumps

DEFRA Research Projects

RMP have completed three major acoustic research projects for DEFRA, investigating the sound insulation of windows, the impact of the use of hard wood flooring finishes and most recently an assessment of the impact of live music events on residents living near to open air venues. The concert noise project involved preparing the UK's first dose response relationship based on the reactions of over a thousand residents interviewed during 10 major outdoor summer festivals and concerts. The research is helping to inform the new code of practice on the control of noise for concerts.



Directors

Professor Robin Mackenzie

BSc (Hons), MSc, PhD,
CEng, FIOA, FRSA



Professor Robin Mackenzie was educated at Heriot-Watt University, the University of Edinburgh and the Massachusetts Institute of Technology. He is a fellow and past member of the Council of the Institute of Acoustics and the American National Science Foundation. Winner of The Institute of Acoustics Tyndall Medal in 1980, Robin was awarded the Royal Society Industrial Fellowship in 1992.

Robin has lectured extensively throughout the world on the subject of sound insulation and auditorium acoustics. He has been acoustic consultant for the Royal Scottish Academy of Music and Drama in Glasgow, the Edinburgh Conference Centre in Riccarton, The National Library of Scotland and The Queen's Hall in Edinburgh. He has also offered his expert advice on the lecture facilities at five of Scotland's universities.

His previous roles have included Dean of the Faculty of Engineering & Computing, and Vice Principal for Knowledge Transfer at Edinburgh Napier University.

Richard Mackenzie BSc, FIOA, MInstSCE



Educated in Building Engineering at Edinburgh Napier University and Applied Acoustics at Sheffield-Hallam University, Richard joined RMP in 1993. Richard has extensive experience in major building acoustics projects. These include the 2001 Stirling Prize winning Magna Project in Rotherham, the 2008 RIBA Prize winning Scottish Storytelling Centre in Edinburgh, Great Northern Tower in Manchester and Great Glen House in Inverness – Sustainable Building of the Year 2006.

Richard is adept at offering expert evidence during planning enquiries relating to environmental noise impact. He recently gave evidence at the Scottish Government Parliamentary enquiry for the Edinburgh Trams project.

RMP's principal consultant and business manager, Richard has significant experience of project management, particularly large scale contracts. He was Joint Project Manager on the House Builders Federation Robust Standards Details Project and is co-author of 'Housing and Sound Insulation'. One of RMP's three Robust Detail inspectors, Richard is an examiner on the Association of Noise Consultants (ANC) Members Registration Scheme and sits on the ANC board. In 2008 he was awarded Fellowship of the Institute of Acoustics and sits on the IOA council.

RMP works in partnership with Edinburgh Napier University's Institute for Sustainable Construction bringing together a wide range of specialist expertise in construction innovation.



**Institute
for
Sustainable
Construction**

**Construction technologies
for tomorrow's communities**

Our primary research and innovation support centres include:

Building Performance Centre

Centre for Geotechnics

Centre for Offsite Construction and Innovative Structures

Robin Mackenzie Partnership

Scottish Energy Centre

Centre for Sustainable Communities

www.napier.ac.uk/isc

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