

# Robin Mackenzie Partnership

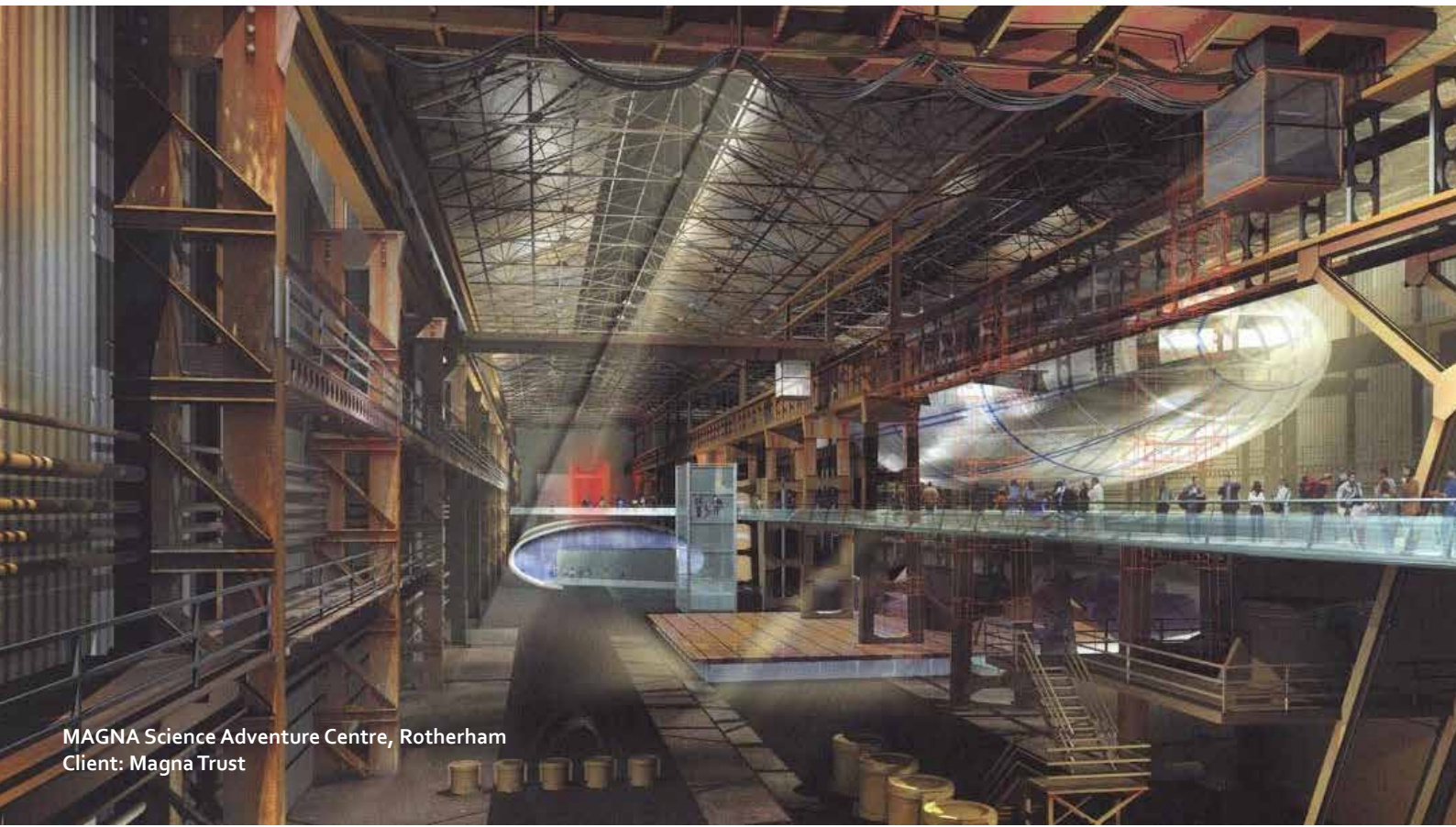
Excellence in Acoustics

Cultural

50



acoustics energy vibration



MAGNA Science Adventure Centre, Rotherham  
Client: Magna Trust

# 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
- iATS 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 Independent Airtightness Testing Scheme (iATS).

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.

# Acoustic design of cultural projects

Whilst in most projects acoustic design plays a supporting role to the structural and aesthetic design, within auditoria the acoustic design is often at the forefront. RMP Acoustic Consultants have extensive experience in working on all types of auditoria from small halls to opera houses.

Within museums and visitor centres the building acoustics play an important role in establishing the visitor soundscape experience. An excellent acoustic should be established to enhance the learning and teaching environment. Poor acoustic conditions can lead to negative visitor reactions, failure to communicate and reduce visitor return rates. Good acoustic design makes a positive difference in reducing unwanted noise and enhancing the acoustic ambience.

Acoustic consultancy for auditoria and visitor centres relates to three main areas:

- Control of external noise
- Design of internal acoustic finishes, soundscape and exhibit interaction
- Control of building services noise

Our areas of expertise include:

- Advising on appropriate noise levels and reverberation times for various activities and room types.
- Offering guidance on different criteria and design of specialist spaces such as music and drama facilities.
- Advising on façade design to provide adequate sound insulation and ventilation.
- Offering guidance on the control of plant noise and vibration
- Providing specifications of the acoustic performance of doors, walls and glazed panels.
- Zoning 'quiet' and 'noisy' spaces and separating them where possible by distance and 'buffer' spaces such as corridors.
- Undertaking compliance testing measurements of ambient noise levels, sound insulation and reverberation time.
- Internal acoustic design utilizing some of the latest computer modelling software such as Odeon 8.5 and Insul 4.2.

**PROJECT: Our Dynamic Earth, Edinburgh**

**CLIENT: Event Communications**

**ARCHITECT: Sir Michael Hopkins**

**OUR ROLE:** 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.

This project was Britain's first Landmark Millennium Project. It features a state-of-the-art exhibition based around the history of the Earth.



# Cultural Projects

**PROJECT: Museum of Liverpool, Mann Island, Liverpool**

**CLIENT: Countryside Properties & Neptune Developments Ltd**

**ARCHITECT: Broadway Malyan**

**OUR ROLE:** RMP provided Environmental Impact Assessment The museum of Liverpool, Mann Island due to be opened in July 2011 is being built by the River Mersey next to 'The Three Graces'. The building is conceived as inclined or elevated platforms. Situated at the pier head the museum will be visible from both the river and the city. The museum will be the largest newly built national museum in Britain and the first national museum to display popular culture and tackle social history. The museum timed it's opening to coincide with the 100th birthday of the city's Royal Liver Building



**PROJECT: Glasgow Science Centre Wing Tower Exhibition**

**CLIENT: Event Communications**

**ARCHITECT: Richard Horden Architects**

**AWARD: RIBA 2002**

**OUR ROLE:** We provided the full range of acoustic consultancy services throughout the project which spanned from 1999 through to its completion.

Designed by Event Communications, this was one of Scotland's Millennium Commission projects. The building on the south bank of the River Clyde features educational exhibitions focussing on Glasgow's past, present and future. The landmark Wing Tower is 127 metres high and is the tallest tower in Scotland.

**PROJECT: The Magna Centre, Rotherham**

**CLIENT: Magna Trust**

**ARCHITECT: Wilkinson Eyre Architects & Event Communications**

**AWARD: RIBA Stirling Prize 2001**

**OUR ROLE:** We provided the full range of acoustic consultancy services for both the exhibition and main building.

In 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.





**PROJECT:** Discovery Centre, Dundee

**CLIENT:** Event Communications

**OUR ROLE:** RMP provided the full range of acoustic consultancy services.

As a major whaling centre Dundee's shipyards had long experience of constructing ships robust enough to travel through the Arctic pack ice. It was this expertise that Markham harnessed to build RRS Discovery, the first vessel to be constructed specifically for scientific research. While the design was based on the great Dundee whalers, there were some modifications to be made. Magnetic surveys were to be an important part of the scientific work of the expedition. To be sure of complete accuracy an exclusion zone round the magnetic observatory was created, with no iron or steel allowed within 30 feet of the area.

**PROJECT:** Zayed National Museum, Abu Dhabi

**CLIENT:** Event Communications

**ARCHITECT:** Foster + Partners

**OUR ROLE:** RMP were commissioned to provide the acoustic design of the exhibition spaces. Achieving a museum ambience that gave visitors the grand sense of scale whilst still maintaining speech intelligibility and a sense of intimacy was a challenge that required RMP's years of experience in design of cultural projects. RMP constructed detailed 3D acoustic models of the complex spaces to assist the specification of surface finishes.

Designed by Pritzker prize winning architect Lord Norman Foster the Zayed National Museum's distinctive towers are reminiscent of the wing tips of the falcon. The National Museum of the UAE, will tell the story of the late Sheikh Zayed bin Sultan Al Nahyan, his unification of the United Arab Emirates, the history of the region and its cultural connections across the world.



**PROFILE:** The Edinburgh International Festival Centre, The Hub

**CLIENT:** Edinburgh International Festival

**ARCHITECT:** Benjamin Tindall Architects

**OUR ROLE:** RMP provided the full range of acoustic consultancy services throughout the project.

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 .

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.



**PROJECT:** The Queen's Gallery, Palace of Holyroodhouse, Edinburgh

**CLIENT:** Irons Foulner

**ARCHITECT:** Benjamin Tindall Architects

**OUR ROLE:** We provided full design and acoustic services for this project.

The project brief for The Queen's Gallery required a wide spectrum of acoustic design including room acoustics, sound insulation, environmental and building services noise control. 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.

**PROJECT:** The Scottish Storytelling Centre, Edinburgh

**CLIENT:** Church of Scotland

**ARCHITECT:** Malcolm Fraser Architects

**AWARD:** RIBA 2007

**OUR ROLE:** 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.

A landmark building situated on Edinburgh's Royal Mile, the Netherbow 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.



**PROJECT:** Royal Conservatoire of Scotland, Glasgow

**CLIENT:** Royal Conservatoire of Scotland

**ARCHITECT:** Helen Lucas Architects

**OUR ROLE:** RMP were the original acoustic consultants for the new build of the Royal Conservatoire of Scotland in 1988. In 2017 RMP were again commissioned to undertake the full acoustic design of 24 new practice rooms and a large rehearsal space. Altering of the existing building to provide high specification practice accommodation, required detailed acoustic design of the walls and floors, building services and design of appropriate room acoustics.

The facility will support performers of all ages and backgrounds, from undergraduate students and the young performers of the Junior Conservatoire to lifelong learners who study at the Royal Conservatoire at evenings and weekends.

# 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 environment 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.

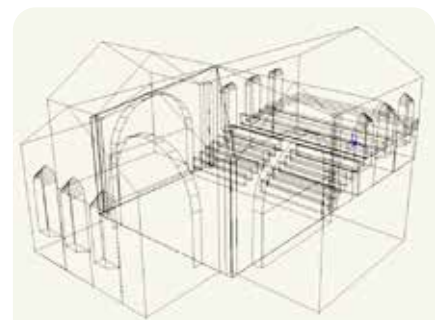
With the introduction of new technical guidance documents relating to schools, hospitals, offices and commercial premises (BB93, HTMo8-01, BCO, BREEAM etc) the need for good internal acoustics is now an issue for most architectural developments.

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 a coustical 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 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 Quatermile in Edinburgh and the Great Northern Tower in 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.

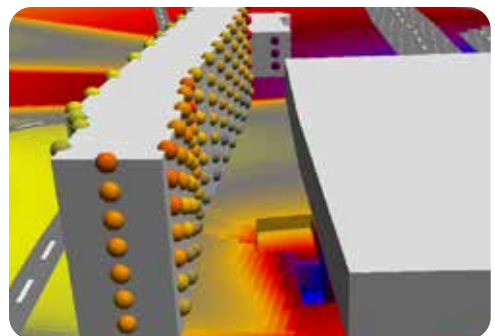
RMP assesses environmental noise sources against the specific criteria provided by local authorities, including the stringent inaudibility criteria. We carry out environmental impact noise assessments in support of planning applications and in response to noise abatement notices. We combine our extensive 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 Inquiries and Parliamentary Inquiries 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 Code of Practice on Noise from Organised Off-Road Motorcycle 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 Independent Airtightness Testing Scheme (iATS) 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 (ATTMA TS1).

### Areas of expertise:

- iATS accredited domestic air tightness testing to ATTMA TS1 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



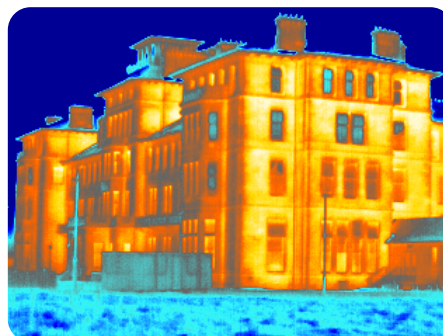
## Infra-red thermography

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



# 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](http://www.napier.ac.uk/isc)

## OFFICES

### Head Office Edinburgh

Unit 1, 7Hills Business Park  
37 Bankhead Crossway South  
Edinburgh  
EH11 4EP

**0345 062 0000**

### South West

17 Bishops Close  
Torquay  
Devon  
TQ1 2PL  
07908 144954

### South East

The Officer's Mess  
Royston Road  
Duxford  
Cambridge  
CB22 4QH  
07592 104564

[rmp@napier.ac.uk](mailto:rmp@napier.ac.uk)

[www.rmp.biz](http://www.rmp.biz)

 [@RMPsoundtesting](https://twitter.com/RMPsoundtesting)

### Disclaimer

In the preparation of this collection of work we have, where possible, credited photographic copyright.

