

Robin Mackenzie Partnership

Excellence in Acoustics

Education - Schools

50



acoustics energy vibration



Hazelwood School, Glasgow
Architect: gm + ad architects

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 Energy 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.

RMP for education

Acoustics play an important role in the learning and teaching environment. Poor acoustic conditions put strain on teachers' voices, increase stress levels and can negatively impact on the learning process. Good acoustic design can make a positive difference in reducing unwanted noise and enhancing the acoustic ambience.

The guidance document Building Bulletin 93:2003 (BB93) 'Acoustic Design of Schools' outlines the acoustic criteria for schools. This document is now widely used as the acoustic design brief for most new schools and colleges.

Acoustic consultancy for schools relates to three main areas:

- Control of external noise
- Control of internally generated noise
- Compliance testing

RMP have successfully completed the acoustic design of over 300 new school and college design projects throughout the UK in recent years.

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 rooms.
- 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.

This section highlights our involvement in educational projects throughout the UK. For a comprehensive list of our education projects please visit the RMP website .



Image Courtesy of Corstorphine + Wright Architects

PROJECT: Leicester Schools BSF Programme

CLIENT: Galliford Try

ARCHITECT: Aedas, Corstorphine and Wright

OUR ROLE: The Leicester School Project comprised a series of schools with a combined value of £300 million for Leicester Miller Education Company under its Building School for the Future (BSF) programme. RMP provided full acoustic design services for the sixteen new and refurbished schools during Phase 1 and Phase 2.

The schools were all designed to meet the requirements of BB93 with a number of the schools incorporating specialist acoustic requirements such as audiosensory rooms to meet the special needs of some pupils, theatres and music accommodation.

Education projects



PROJECT: James Gillespie's Campus
CLIENT: Morrison Construction
ARCHITECT: JM Architects
OUR ROLE: Together with the Development Partner, hub South East Scotland Ltd, James Gillespie's is an educational campus for more than 1000 pupils aged 3-18, with a complex mixture of new build and refurbishment.
Set within the listed boundary walls of Bruntsfield House the Campus incorporates 5 new buildings arranged to relate to the centrally positioned listed building and provides educational, sports, leisure and community facilities.
RMP provided full design and acoustic services and worked closely with the project team to ensure that James Gillespie Campus successfully met the requirements of BB93.

PROJECT: Headfield Junior School, Dewsbury
CLIENT: Bramall Construction
ARCHITECT: EllisWilliams Architects
OUR ROLE: RMP provided detailed acoustic design advice to meet design specifications to include sound insulation, reverberation and building services noise control.



PROJECT: Dalbeattie Learning Campus
CLIENT: Graham Construction
ARCHITECT: Holmes Miller
OUR ROLE: Together with the Development Partner, hub South West Scotland Ltd, Dalbeattie Learning Campus brings together Dalbeattie High School, Primary and Nursery Schools into one shared site. The campus is set as 4 teaching blocks clustered around a central social space with areas beside the Learning Campus developed for outdoor sports and teaching facilities. Dalbeattie Learning Campus was designed to also enable much greater use by the Dalbeattie community.
RMP provided full design and acoustic services and worked closely with the project team to ensure that Dalbeattie Learning Campus successfully met the requirements of BB93.

PROJECT: Largs Campus
CLIENT: North Ayrshire Council
ARCHITECT: JM Architects

OUR ROLE: Together with the Development Partner, hub South West Scotland Ltd, Largs Campus amalgamates St Mary's Primary, Brisbane Primary, Kelburn Primary and Largs Academy, accommodating more than 2000 pupils. The new state of the art campus consists of two theatres for both primary and secondary and one of the largest gym halls in the UK. The 3rd floor art classrooms have balconies with stunning views of Cumbrae, Bute and Arran enabling the provision for outdoor working.

RMP were commissioned to provide design advice and compliance testing for the new campus and worked closely with the project team to ensure that Largs Campus successfully met the requirements of BB93.



PROJECT: Lundavra School, Fort William
CLIENT: Graham Construction Ltd
ARCHITECT: Halliday Fraser Munro

OUR ROLE: Located on Lundavra Road, Fort William, with panoramic views over Loch Linnhe, the school replaces Upper Achintore and Fort William Primary Schools.

RMP were commissioned to provide full design and acoustic services to ensure that the school met the requirements of BB93.

PROJECT: Wick Community Campus
CLIENT: Highland Council
ARCHITECT: Ryder Architecture

OUR ROLE: Together with the Development Partner, hub NorthScotland Ltd, Wick Community Campus brings together Wick High School, South and Pultneytown Academy Primary Schools, Nursery, and Community facilities into one shared site. The campus consists of two senior school teaching wings as well as a separate primary school with its own access. Spaces between wings are external courtyards offering semi sheltered play space. There is also a special needs wing, sports block, library, swimming pool and fitness suite alongside three sports pitches.

RMP provided full design and acoustic services and worked closely with the project team to ensure that Wick Community Campus successfully met the requirements of BB93.





PROJECT: Arcadia Nursery, Edinburgh

CLIENT: University of Edinburgh

ARCHITECT: Malcolm Fraser Architects

OUR ROLE: Arcadia Nursery has three playrooms linked together by a single-storey building, with a large roof light offering views up to the tree canopy. A first floor area contains offices, staff and family rooms. Each of the playrooms opens out to a covered terrace.

RMP provided full acoustic services for the new nursery building that has been constructed using a combination of Cross Laminate timber and Lignatur flooring units to meet the requirements of BB93 and Hea 05 of BREEAM The nursery which was designed to help develop children's confidence, independence and creativity was winner of the RIBA award for Scotland 2015, and RIAS award 2015

PROJECT: Western Isles Schools Project

CLIENT: 3D Reid

ARCHITECT: 3D Reid

OUR ROLE: The Western Isles School Project comprised the renewal of a secondary school and four primary schools in the Outer Hebrides. In addition an all-through school has been substantially refurbished and extended. The schools are located on the Islands of Lewis, Harris, Benbecula and South Uist.

RMP provided full acoustic design services for the six new and refurbished schools. The schools have each secured BREEAM Excellent accreditation, one of the most comprehensive and widely recognised measures of a building's environmental performance.



PROJECT: Fife Schools

CLIENT: Miller Group

ARCHITECT: 3D Reid

OUR ROLE: We provided full acoustic design and services for eight new and refurbished schools across Fife. Some schools were designed to incorporate audio-sensory rooms to meet the special needs of some pupils. Acoustic assessments were carried out beyond standard BB93 requirements for all eight of the project's primary and secondary schools.



PROJECT: Hazelwood School, Glasgow

CLIENT: Glasgow City Council

ARCHITECT: gm + ad architects

OUR ROLE: We provided full design and acoustic services to ensure that the school's noise environment met specifications that went beyond the requirements of BB93.

The design had to take into account the variation of pupil needs, some of whom have profound hearing, vision and physical disabilities and are very sensitive to noise. The school incorporated features to introduce pupils to autonomous living. Additional acoustic requirements for these purposes included: optimising acoustic performance of areas where people moved from the interior to the external green space; and finding a balance between reducing high noise levels from a nearby busy road and providing adequate ventilation in the classrooms.



PROJECT: Borders Schools PPP

CLIENT: Graham Construction

ARCHITECT: 3D Reid Architects

OUR ROLE: RMP provided fully inclusive acoustic services for three new secondary schools in the Scottish Borders. We offered detailed acoustic design advice for each school to meet design specifications to include sound insulation, reverberation and building services noise control. We also undertook site inspections of key acoustic details of the buildings during the construction stage. Upon completion, we carried out partition sound insulation measurements to demonstrate compliance with BB93 criteria.

PROJECT: Forfar and Carnoustie Schools

CLIENT: Robertson Construction

ARCHITECT: JM Architects & Mackie Ramsay Taylor

OUR ROLE: This project involved seven new schools in Angus. RMP worked with the contractor Robertson Construction to provide full acoustic consultancy on the project. This included controlling external noise to ensure a suitable work environment within the schools and the acoustic design of separating walls, floors and partitions. We also reduced noise and vibrations in the schools and undertook compliance testing of ambient noise levels, sound insulation and reverberation time in teaching and common spaces.



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.

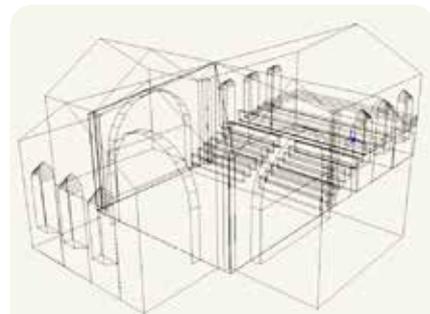
With the introduction of new technical guidance documents relating to schools, hospitals, offices and commercial premises (BB93, HTMo8-01, BCO, BREEAM etc) the need for good internal acoustics is now an issue for most architectural developments.

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.

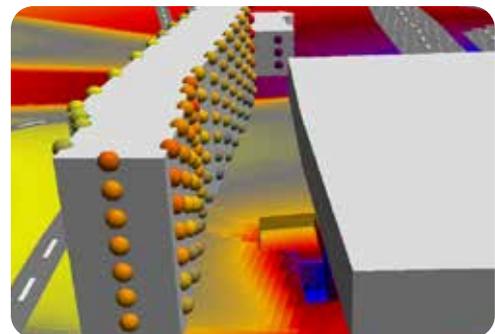
RMP assesses environmental noise sources against the specific criteria provided by local authorities, including the stringent inaudibility criteria. We carry out environmental impact noise assessments in support of planning applications and in response to noise abatement notices. We combine our extensive 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 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 (ATTMATS1).

Areas of expertise:

- EAS 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



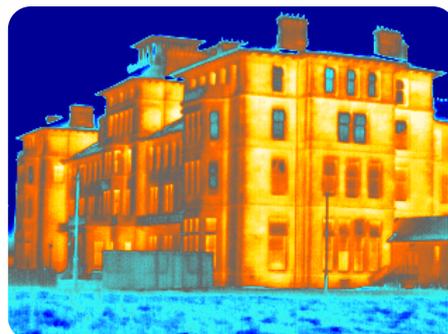
Infra-red thermography

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 airtightness 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

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

www.rmp.biz



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

Disclaimer

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

