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Building Surveying Journal

Incorporating the Building Conservation Journal



**Sustainable architecture:
exciting, enriching and good for the planet**

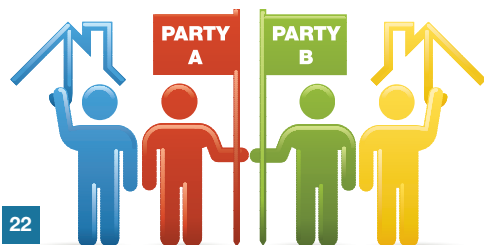
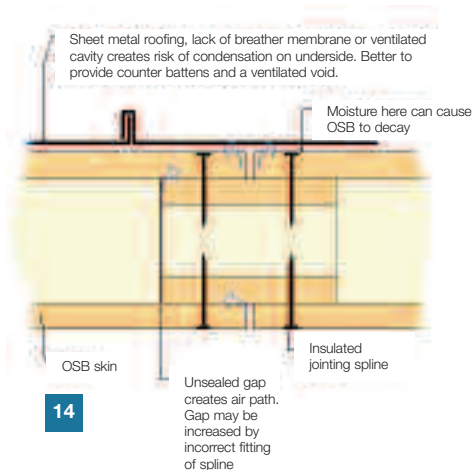
Also in this edition of the *Conservation Journal*

- a maintenance case study
- maintenance guidance
- heritage agenda
- historic glass

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From the Chair

Dilapidations best practice



Helen Gough welcomes the conclusion to the legal review of the *Dilapidations* guidance note and discusses its importance to the growth of this service

If I reflect on those issues which have been brought to my attention by members of the profession, there is one area which has created the greatest volume of correspondence: dilapidations. The RICS *Dilapidations* guidance note was published in June 2008 following considerable consultation, but there has recently been a discussion played out in the pages of *Estates Gazette* and on the Dilapidations Forum website. In response to these comments and observations, the RICS Knowledge Board sought an independent legal review of the guidance note as a current best practice guide for professionals. The review by Mr Guy Fetherstonhaugh QC was finalised in January and coincided with the publication of Lord Justice Jackson's 'costs of litigation' review.

A pragmatic approach and considered dialogue [on dilapidations] can provide the basis for equitable and timely resolution in the interests of landlords and tenants alike

Where appropriate, reference to Jackson LJ's recommendations has been incorporated into the overall legal review. I am pleased the legal review has confirmed that, with very minor amendments for future reference, the current guidance note still represents the best practice guide for professionals involved in the dilapidations arena. If members are interested in the published findings, these are available on www.rics.org/dilapidations

I am encouraged by the publication of this legal opinion and I hope that it clarifies and removes any possible misunderstandings of professionals and their clients in this key area of business. In my own office, I have seen the volume of dilapidations work increase greatly. It's an area that is little explored in undergraduate studies and its application throughout our careers depends very much on the areas of work in which we choose to practice. It seems to be the arena in which there can be the greatest debate and passionate argument between surveyors; but a pragmatic approach and considered dialogue can provide the basis for equitable and timely resolution in the interests of landlords and tenants alike. The guidance note is a solid foundation for managing dilapidations claims in the most professional way.

Board restructure

A key issue that has been facing the Building Surveying Board over recent months is the restructuring of the Professional Group Board. The Building Surveying Professional Group will move forward with a combined UK/European Board of 16 members including a Chair and Executive Core Group. Separate boards will be set up for the Americas, India, Oceania, Asia and Middle East/Near East/Africa. By the time of publication, the new UK/European board will have been installed and will have met with a remit to promote members' professional interests through the provision of technical guidance and information and professional standards – both locally and internationally. At the time of writing, the precise composition of the board has yet to be confirmed but we do hope to focus on this in the next edition of the journal.

I very much look forward to working with and supporting the new board going forward on the key initiatives and projects which we consider to be important to our members and to the development of the profession.

This edition of the *BSJ* focuses on the content of the recent National Building Surveying Conference, which has changed format this year to a one-day, London-based event. At the time of writing, we are a number of weeks away from the Conference but, on the basis of the delegates confirmed to date, we know that this continues to be a popular event with bookings greatly exceeding our expectations. The focus on delivering cutting-edge content from respected speakers in the profession has not changed, and is testament to the work of Matt Clare and the Conference Committee that the transition from a two-day residential event has been relatively smooth. I do hope that those of you who attended the conference enjoyed it, and that others who have an opportunity to read the relevant articles within this edition get a flavour of the event and current topics pertinent to building surveying.

Helen Gough is Chair of the Building Surveying Professional Group
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Dilapidations Roadshows, various dates and locations, UK, www.rics.org/events

Leader

On the road to recovery



Dennis Turner summarises the state of the economy and looks at the first signs of recovery

The recession is over – just. GDP growth in Q4 2009 of 0.4% followed six quarters of negative growth and a peak-trough fall in activity of 6%. Welcome as this news is, it is only the start of the recovery. Although growth is back in positive territory, the current rate implies unemployment will still rise, businesses will fail and the squeeze on profits will continue. The economy needs to move from the end of recession to ‘business as usual’ (trend growth of around 0.7% a quarter), and it will take most of 2010 to get there.

Business surveys have been signposting the recovery for several months and the unprecedented response from policymakers is at last taking effect. At 0.5%, interest rates are the lowest since the Bank of England was formed in 1694, the fiscal easing (a government deficit of £167bn) is the biggest in history and a weak currency is a boost to exporters. On top of this, the Bank of England has injected £200bn into the economy via the banking system through quantitative easing to ensure the upturn is not stifled by a shortage of credit.

Business surveys have been signposting the recovery for several months and the unprecedented response from policymakers is at last taking effect

Upward signals

At turning points like this in the cycle, the evidence often pulls in two directions and can appear contradictory, but the signals pointing the economy upwards seem stronger than those pointing down. The key monthly PMI surveys for manufacturing and services, for example, have been above the critical 50 mark for several months, indicating expansion. Construction is lagging, but it did fall further in 2008/9, and is moving in an upward direction.

Secondly, the huge destocking in the pipeline has probably run its course and restocking will give the economy an extra boost. And, thirdly, life is returning to the housing market, as shown by annual increases in prices and rises in the number of mortgage approvals.

Recovery will, however, be slow and fragile, with the risks on the downside. This is because of the huge debt overhang, not just in the public sector but in the personal sector as well. At its peak, the household debt:income ratio was 160%, implying a debt equivalent to 19 months’ pay.

Public sector debt has been well documented. A fiscal deficit is understandable at this point in the cycle as the public sector tries to fill the gap left by a retreating private sector, but now the focus is on the exit strategy. Much as many people want to see the size of government reduced, when to reverse the fiscal stimulus and whether to raise taxes or cut spending are very sensitive issues that will test the judgement of the policymakers to the limit. Major changes to the fiscal stance are, however, unlikely to have an impact in 2010.

Take no risks

With everything pointing to a weak upturn, little change is likely in monetary policy this year. The bank rate will stay on hold in the first half of the year despite the recent spike in inflation. The Bank’s Monetary Policy Committee will not respond to the current Consumer Prices Index because inflation is expected to ease back down in the second half of the year. And the authorities will not want to take any risks until they are convinced the recovery is well under way.

For 2010, a growth rate of around 1.5% looks likely, better than last year’s -4.8% but still short of the trend of 2.5%. With a bit more inflation (2%) by year end, the bank rate will edge up to around 1.5%. And, as the economy moves closer to ‘business as usual’ sometime in 2011, the UK needs a marked rebalancing of activity if growth is to be sustainable.

Looking to consumers to spend and borrow, to the housing market and to the public sector for growth, jobs and profits may work in the short-term but it will merely be a shortcut to the next downturn. As a country, we have to export more and invest more and rely less on consumption, and manufacturing, too long neglected, has a critical role to play. In this respect, a weaker pound and an upturn in the global economy are essential for UK recovery. There is a long way to, but at least a start has been made.

Dennis Turner is the Chief Economist with HSBC

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This means you will receive the same technical information, but in the format that suits you best. It should also help reduce RICS' carbon footprint. Once you have changed your preferences via 'My Details' on www.rics.org, you will receive regular email alerts informing you when the latest pdfs are available.



RICS regulations updated

Some of the Rules of Conduct for firms and members, as well as other rules and supporting information, have been updated.

The amended documents are:

- Rules of Conduct for Members
- Sanctions Policy
- Rules for the Registration of Firms
- Disciplinary Registration and Appeal Panel Rules
- Rules of Conduct for Firms

- Sanctions Policy Supplement 2
- Monitoring and Investigation Rules
- Constitution of Conduct and Appeal Committee Rules.



For more information, visit www.rics.org/rulesofconduct

Free legal helpline service relaunched

Pinsent Masons and RICS have relaunched a free legal helpline service that covers all standard UK and international forms of construction contract. Experts are available for a 30-minute telephone consultation should you have a legal query on any construction-related issue. Whatever the circumstances, Pinsent Masons will be able to field an expert to supply advice to assist you in reaching an early, cost-effective resolution or support you in deciding on the appropriate strategy.



To use this service, please email your query to beg@rics.org

It's Your APC conference 2010

The RICS It's Your APC conference is an essential event for all APC building surveying candidates. This annual event provides delegates with guidance on the final assessment submission, interview and core competencies. The expert speakers and advisors will also guide candidates through a mock interview in the format you will experience on the assessment day. The conference will take place at RICS Headquarters on 16 June and is dedicated to APC candidates at all stages of their career.



For more information, visit www.rics.org/apc2010

In brief...

Date for your diary...

Insurance Conference,
18 May 2010, Victoria Plaza,
London



For more information, visit www.rics.org/events

Date for your diary... Building
Control Annual Event, 26
May 2010, RICS HQ, London



For more information, visit www.rics.org/buildingcontrol2010

RICS has published a report
on the transparency of
professional fees.



For more information, visit www.rics.org/transparency

The April edition of the
Construction Journal had a
theme of Building Services.



For more information, visit www.rics.org/journals

RICS has published its 2010
Graduate Intake Survey,
which has rendered a
qualitative picture of cautious
optimism in terms of UK
graduate recruitment.



For more information, visit www.rics.org/employers

RICS Training has launched
a series of professional
education courses for
trainees, members and
other professionals working
in land, property and the built
environment. The first series
covers technical, personal,
business, management and
leadership skills as well as
APC training.



For more information, visit www.rics.org/training

Building Conservation Summer School

12-16 September, Cirencester, UK

If you want to specialise in inspecting and repairing old and traditional buildings then this course will give you the key skills to unlock your career in the historic building surveying profession. Sessions include:

- building conservation philosophy
- structural diagnosis and repair
- energy efficiency and older buildings
- timber decay and stone conservation
- plain glass and glazing

- restoration and conservation of period interior woodwork
- building in brick
- conservation of cast and wrought iron
- timber-framed buildings.



For more information, visit www.rics.org/summerschool

A (carbon) step closer

Roger Waterhouse continues his search for 'invisible' carbon footprints and invites commercial property managers to get involved

Although calculations for these emissions have been undertaken for a limited number of products, an international metric for embodied carbon still has to be agreed

In my previous article (*Green is the new (carbon) black*, page 29, *BSJ*, May/June 09), I discussed the importance of establishing the carbon footprint of a construction project. This was based on the need to minimise carbon emissions wherever possible and that some leading project managers believed government controls are needed to measure these emissions over the project period (see Figure 1 – shown here as the 'Before use' stage of the full building life cycle).

I also talked of a carbon register format, which showed the activities, emissions sources, carbon ownership and reduction potential, etc, in order to tabulate and then measure the amounts of carbon being produced during the project stage. This identified carbon sources as 'direct', 'indirect' and 'external indirect', which included embodied and associated carbon emissions (e.g. transport).

However, before the measurement of these emissions could take place, there was a need to establish an approved metric if the resulting quantities were to be accepted as an internationally agreed standard of measurement.

Such an agreement was finally reached in December 2009. It began in March 2009, when an alliance of environmental ratings agencies – the BRE Trust and the US, UK and Australian Green Building Councils – signed a memorandum of understanding. This joined with the work of the Sustainable Buildings Alliance (SBA) whose members of the core group for common metrics include the BRE, CSTB in France, DGNB in Germany, FCAV in Brazil, ITC in Italy, NIST in the US and VTT in Finland. Schemes operated by these groups have previously taken varying approaches that made international comparisons difficult.

However, this work has now received important support from the United Nations' Sustainable Buildings and Climate Initiative (UNEP-SBCI), which also proposes 'a common carbon metric to support greenhouse gas emissions reductions through accurate measurement of energy efficiency in building operations'.

Together, the environmental ratings agencies, the SBA and the UNEP-SBCI have developed a common method for measuring carbon emissions. This covers:

Assessing performance at the building level (bottom up)

This measures the building's energy/water/waste consumptions from

- building-incorporated services, e.g. space/water heating/cooling, water and sewerage, lifts, etc
- non-incorporated services, e.g. IT, refrigerators, maintenance and repair, transport to and from the building, etc.

Assessing performance at the regional level (top down)

This considers key issues to assess the overall performance of particular types of buildings, including those at regional and national levels, which provide information needed by policymakers.

The actual measurement that has been agreed is the mass of CO₂ equivalent (kg CO₂-eq, i.e. the unit of greenhouse gas emissions based on impacts over a 100-year period) emitted per m² per year, therefore:

$$\text{Common Carbon Metric (CCM)} = \text{kgCO}_2\text{-eq/m}^2\text{/annum per building type}$$

The next stage

We are now ready to use these agreed common metrics for the first time and work towards measuring the total emissions of a building's life cycle. This will include the important carbon footprint of the project or the Before use stage.

However, to begin the process, for reasons of accessibility (see under Embodied carbon, later) it has been decided to begin measuring the operation of building-incorporated services (within the green 'Use' stage in Figure 1), as quantities for activities within this period should be more readily obtainable.

Before use stage					Use stage				End of life stage			
Product stage			Construction stage							Disposal stage		
Raw material process	Transport	Manufacturing	Transport	Construction installation process	Operation of building-incorporated services	Operation of non building-incorporated appliances	Maintenance, repair and refurbishment	Transport (of people)	Deconstruction	Transport	Recycling, reuse and energy recovery	Waste disposal

Figure 1 – Building life cycle stages and elements (source: *A Framework for Common Metrics for Buildings*, SBA 2009)

These will include:

- energy (with sources) consumed for
 - heating/cooling/ventilation
 - lifts, escalators, etc
- water consumption
- waste.

More details are contained in the SBA's *A Framework for Common Metrics for Buildings* report, but some useful units of measurement are indicated in Figure 2.

Industry invite

At the January 2010 meeting of the RICS Sustainability Working Group, Martin Townsend of the BRE was invited to present a paper based on the above mentioned SBA report. This was well received and laid the foundation for an agreement between RICS and BRE to invite members to participate in a nationwide emissions survey (see panel, right).

The aim is to progress the measurement of carbon emissions, by establishing actual consumptions of activities associated with the building-incorporated services using existing data. This will be an important step towards establishing carbon footprint guidelines for buildings. In return, participants will receive information concerning the general analysis, although individual data will be treated confidentially where requested.

Embodied carbon

It is hoped the results from the operational/'Use' period will provide empirical evidence of realistic performance and hence of potential carbon emissions (as far as can realistically be measured at present).

However, to establish the full life cycle footprint or trace the footprints for each of the three stages (especially the project/Before use stage) it will be necessary to establish a metric for embodied carbon. This includes the full manufacturing process (commencing with the mining of any raw materials) and all transportation associated with the supply and distribution process throughout manufacture to end product.

Although calculations for these emissions have been undertaken for a limited number of products, an international metric for embodied carbon still has to be agreed. Nevertheless, some organisations claim to have already established their own (e.g. Davis Langdon, *The Road to Green Property*). However, it is important for a systematic analysis to be established internationally to ensure consistency across calculations and talks are ongoing by the above referred parties to achieve this.

Once agreement for this metric has been achieved, it should open the way for assessments or values to be agreed for key elements (e.g. reinforced concrete, steel, cement, timber, plastics, clayware, etc) up to more complex components and systems (e.g. cladding, glazing, heating and ventilation).

This should then allow emissions comparisons of structural and M&E systems, components and cladding, and roofing systems to be made so that

Functional equivalent													
Type of building		<office, house, school etc>											
Occupancy (pattern of use)		<number of occupants, hours of use>											
Required service life		<for the building in years>											
Regulations and standards		<country/region for the building regulations or standards for the construction or use of the building>											
Climate type		<e.g. Mediterranean>											
Indicator	Annualised unit	Before use stage			Use stage					End of life stage			
		Product stage		Constr. stage	Operation of building-incorporated services	Operation of non building-incorporated appliances	Maintenance, repair and refurbishment	Transport (of people)	Deconstruction	Disposal stage			
		Raw material process	Transport							Manufacturing	Transport	Construction installation process	Recycling, reuse and energy recovery
GWP	CO ₂ -eq												
Energy	kWh												
Water	m³												
Waste	tonnes hazardous												
	tonnes non-hazardous												
	tonnes inert												
	kg – Nuclear												

Figure 2 – A typical 'Presentation of results' table from the SBA's *A Framework for Common Metrics for Buildings*

clients' project managers and designers can evaluate the total carbon footprint created by each option.

It is probable that guidelines will be established by governments, possibly by building volumes or areas that (together with costings) will shape the future of not only the appearance of our buildings but of life cycles, materials/raw material sources and their travel distances from projects, etc.

Similarly, energy is likely to be evaluated not just by kWh (see Figure 2) but by proportion of 'renewability' contained within that metric. Equally, there could be guidelines or controls over water and waste consumptions during all three phases of the project life cycle contained in Figure 1.

However, it would be a mistake to assume that the road ahead was straightforward when it comes to comparing the CO₂ emitted during the manufacture and delivery of two similar products from two countries. Many of the material and product supply chains are complex and contain huge uncertainties. Multiple variables will need to be established and agreed upon before a realistic system of comparisons can be made.

For example, in terms of transportation emissions, how do we compare a product shipped from Africa with a similar one transported by road or rail from Europe or central Asia? And how do we measure the waste consumed and the difference between machines driven by oil or coal?

Carbon footprints of buildings may be invisible, but unless they are considered when designing for sustainability, then preventing the collapse of our ecosystem could be seriously impeded. Achieving international agreement is therefore vital. The Common Carbon Metric now has to be tested and this can continue while progress is made towards an international agreement for the Embodied Carbon Metric. For the time being, however, we are at least, a (carbon) step closer.

Invitation

All commercial property/portfolio managers (for class A and B – retail/office/industrial) are invited to participate in this nationwide survey and contribute as soon as possible so that the use of the CCM can be further tested to measure emissions from the operation of buildings over a 12-month period.

For more information, contact Martin Townsend, Director of BREEAM, BRE Global via townsendm@bre.co.uk or T +44 (0)1923 664676

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C Related competencies include: M009, T003, T013, T021, T022

Tread carefully

Edward Shaw and Vivien King consider some of the issues that can arise with break clauses in commercial leases and what surveyors can do to lessen the problems so frequently encountered

Break clauses in leases give flexibility to the parties able to exercise them but can cause problems and loss to the other party. In consequence, they are often 'hedged around' with conditions which, at times, are so onerous that the party exercising the break finds it almost impossible to comply. Nevertheless, break clauses in commercial leases are common.

Driven no doubt by uncertainties in the market, the incidence of tenants' break clauses in commercial leases has increased significantly in recent years and as the letting market fell, particularly in the retail arena, tenants frequently sought to exercise them. However, the wording of the relevant lease may contain traps for the unwary.

The wording of break clauses, as with options, is strictly construed by the courts and landlords, anxious to retain their tenants, can prove to be far from flexible when the opportunity to argue a point presents itself.

Do not misunderstand case law either. The famous House of Lords judgement in *Mannai Investment Co Limited v Eagle Star Life Assurance Co Limited* [1997] 24 EG 122 held a notice containing a termination date which was expressed to be one day out was, in the circumstances of the case, valid. However, that would not assist a party who failed to serve the notice on time.

And who can exercise the break pursuant to the lease? While often expressed to be 'the tenant' or 'the landlord' (and the definition of these parties is expressed in the lease to include assignees), there are numerous leases around where the party given

the option to break is actually named in the lease. The infamous lease in the case of *Olympia*

and *York Canary Wharf Limited* and another *v Oil Property Investments Limited* [1994] 29 EG 121 stated the break could be exercised by 'the Tenant (meaning ICI Petroleum Limited)', i.e. the original tenant who had subsequently assigned to another party. The assignee wished to assign back to ICI in order that that company could exercise the break clause but the court held the landlord's refusal of a licence to be reasonable.

Our advice to surveyors regarding service of the break notice? Do not do it – advise your clients to consult their lawyers.

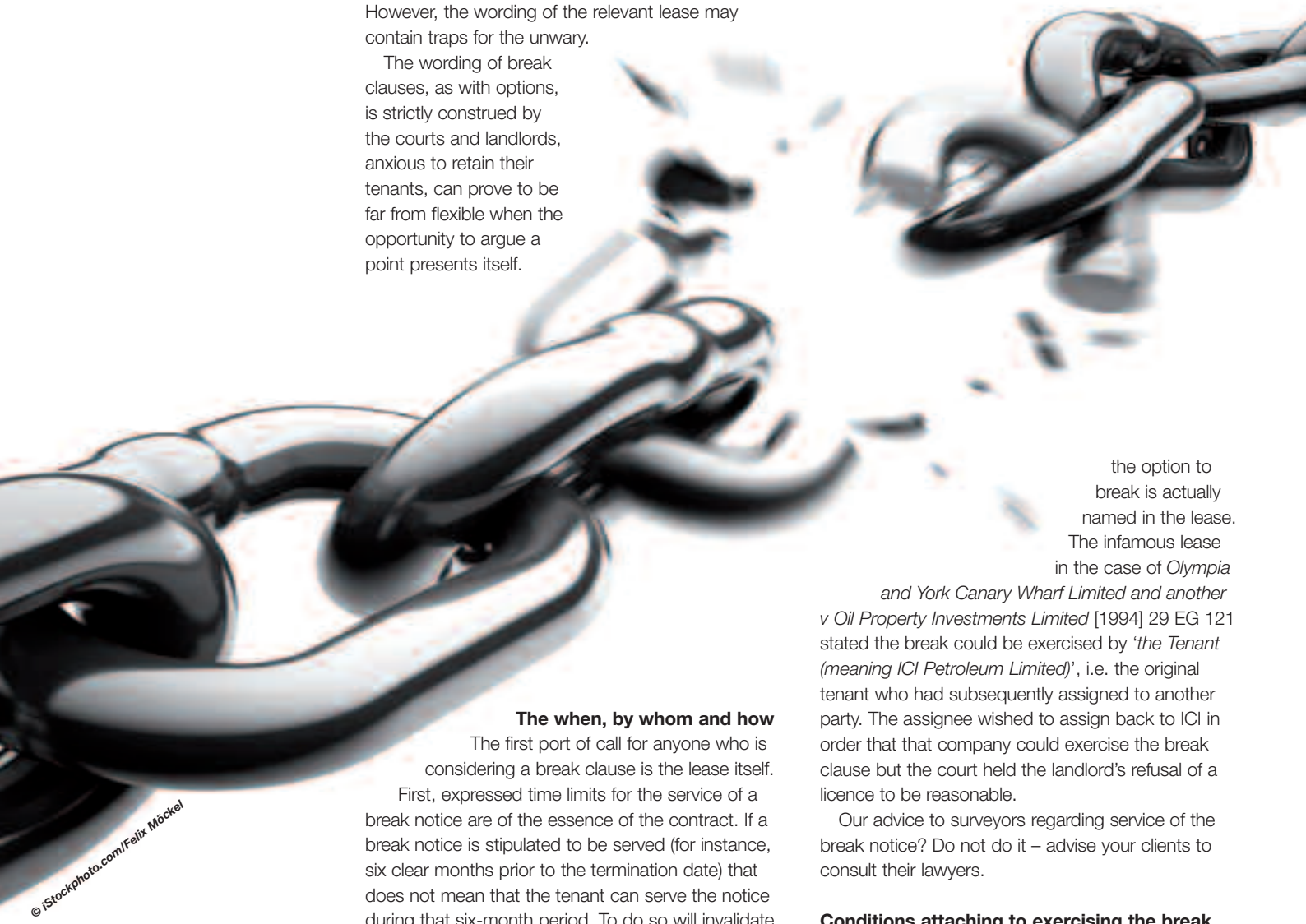
Conditions attaching to exercising the break

A break clause may not, of course, be conditional and so long as it is properly exercised, will operate on the termination date. Do not misunderstand the position regarding antecedent breaches, however. Although a lease might be terminated, the parties

The when, by whom and how

The first port of call for anyone who is considering a break clause is the lease itself.

First, expressed time limits for the service of a break notice are of the essence of the contract. If a break notice is stipulated to be served (for instance, six clear months prior to the termination date) that does not mean that the tenant can serve the notice during that six-month period. To do so will invalidate the notice and the break will not be effective. Take care as to how the notice is served, too. There will almost certainly be a clause somewhere in the lease (with no cross reference to the break clause) stipulating as to how and where notices are to be served.



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can still pursue the other, for instance, for failure to yield up the property in a physical condition which accords to the tenant's covenants to repair.

Often, however, the break clause can only be exercised if (in addition to serving a valid notice) the relevant party, usually the tenant, complies with certain conditions. Such conditions vary considerably so read the clause with care. Again such provisions are strictly construed.

Strict compliance

In *Bairstow Eves (Securities) Ltd v Ripley* [1992] 32 EG 52, in order to exercise an option, the tenant had

to perform and observe all the tenant's covenants, which included one to paint the premises at specified time periods. While the judge at first instance found as a fact that if the tenant had complied, the paintwork at the premises

would have been in no better condition than that exhibited, the tenant had not done the relevant works within the time periods specified.

Giving judgement, the Court of Appeal found:

"It would be quite impractical in cases such as the present to carry out an investigation into the comparative state of the premises, or into other matters, at the end of the lease in order to determine the validity of an option notice according to the degree to which a covenant had been complied with."

In other words, either the tenant had complied with the conditions or it had not.

Qualifying strict compliance

Additional words can temper the effect of strict compliance. An example may be seen in *Fitzroy House Epworth Street (No 1) Ltd and anor v The Financial Times Ltd* [2006] 14 EG 175. The FT could exercise a break if it *"has materially complied with all its obligations under this Lease"*.

On serving its break notice, the FT expended £915,689 in complying with its covenant to repair. It attempted to agree with the landlord what works were required but the landlord failed to be drawn. At the termination date, the landlord stated the FT had not complied with its repairing covenants and refused to agree that the lease had been determined. The Judge at first instance found as a fact that just over £19,000 of additional works could have been done in order that the tenant might strictly comply with its repairing covenants. However, he held that the word 'material' must have been inserted in the break clause in order to mitigate the requirement for absolute compliance to the extent that it is reasonably fair to both landlord and tenant. He held the lease had been successfully broken. The landlord appealed to the Court of Appeal.

Lord Justice Jacob gave judgement in the Court of Appeal. He said that the Judge at first instance had applied the wrong test (i.e. the 'reasonably fair' test) and said that *"Materiality must be assessed by reference to the ability of the landlord to relet or sell the property without delay or additional expenditure."* However, he continued that the question which the Court must answer is whether on the findings of fact, the tenant (the FT) had materially complied with its obligations. He found that it had. So, right answer by the Judge at first instance, but for the wrong reason.

Settlement

If strict compliance is qualified, the parties will often negotiate a settlement along the lines of settling a claim for dilapidations. Where settlement is negotiated, which it is in the majority of cases, it is strongly recommended that solicitors document the agreement due to the legal implications of the operation of the break and the consequences of the break being frustrated.

The memorandum of agreement effectively varies the lease and should contain confirmation of any payments or other consideration required to effect the break. It should also clearly state the condition in which the property is to be left. *Legal & General Assurance Society Ltd v Expeditors International (UK) Ltd* [2007] EWCA Civ 7 (a Court of Appeal Case) was a salutary lesson for a landlord where it was held that the agreement overrode the original condition to provide vacant possession, which the outgoing tenant did not do. The court held that the tenant would not have paid the money if the lease had not come to an end and so failure to give vacant possession would not invalidate the break. This case is specific on its own facts but is worth reading as it demonstrates the importance of getting the agreement properly documented.

So to conclude, whatever the conditions may be, they have to be complied with if the break is to be operated, and reliance cannot be placed on a financial settlement until the document recording the agreement is signed by both parties. Without that agreement to vary the conditions, the parties should proceed on the basis that all of the conditions must be complied with to the letter.

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Landlord & Tenant Act 1954 Update, 25 May 2010, Cardiff, www.rics.org/events

Recent Developments in Commercial Landlord & Tenant relations, 27 May 2010, Liverpool, www.rics.org/events

There will almost certainly be a clause somewhere in the lease (with no cross reference to the break clause) stipulating as to how and where notices are to be served



Related competencies include: T044, T051

An architectural evolution

Green buildings are exciting, enriching and award-winning, says Rab Bennetts, as well as being good for the planet

Among the countless conferences and working parties on sustainability, there is normally an earnest focus on technical challenges, regulation or data collection, but rarely is there much discussion about architectural quality.

What's so surprising about this is that 'green' buildings are much more interesting in architectural terms than most of their resource-hungry predecessors and they reflect a fascinating change in design philosophy that makes the techniques of the post-war period seem like ancient history. Looking back in a few decades' time, it will seem much clearer than it does now, in that the response to climate change has become a defining moment in architectural evolution at least as dramatic as the demise of timber and the emergence of brick and stone construction after the Great Fire of London.

As with the Great Fire, the catalyst is likely to turn out to be strict building regulations as voluntary measures are insufficient. Gone are the days when an architect had the freedom to conceive more-or-less any computer-generated shape or form they wished, with technology coming to the rescue if the building would otherwise be too hot or too cold. Now, the principles of sustainability have to be incorporated in the concept from the start, so architects are having to reinvigorate their creativity through a whole new range of challenges.

Designing for minimum energy

The first guiding principle of the new architecture is perhaps the most obvious of all: for buildings to use minimal energy, they need to be designed for their local climate.

Climate once had a dramatic effect on the design of buildings but, for the latter half of the 20th century, we were in a state of denial, assuming that technological solutions such as air-conditioning should even out the regional variations. It followed that modern architecture could be more-or-less the same the world over, which was proxy for an early kind of globalisation that rode rough-shod over local cultures and traditions.

Architects and engineers are now having to rethink their reliance on mechanical solutions and are instead using a far more sophisticated analysis of a building's performance based on minimising resources at all levels of the design process.

For a temperate climate like the UK, it is possible to achieve reasonable comfort by working with the natural properties of a building and its setting, with modest input from energy-consuming mechanical systems. 'Passive' design, as it is known, considers the building's orientation to the sun, its thermal mass, its potential for natural ventilation, its insulation values and the extent of its glazing before concluding the nature of its form and construction.

The raw material of design

For the new generation of commercial properties – with their solar shading devices, high levels of daylight from properly designed windows and relatively robust night-cooled structures – the raw material of design is far more appealing than the slick but rather superficial architectural language of the boom years. Even major internal spaces, such as an atrium, become an essential part of the building's air-buoyancy system, rather than just a powerful image.

Pursuit of natural systems is not dogmatic, however, and some fan power (normally with air supply from below the floor) is sometimes necessary in the depths of winter, when heat can be reclaimed instead

of disappearing out of open windows. During a hot British summer, too, a bit of forced ventilation might allow some cooling, but the net result is that mechanical systems are needed far less than in a fully air-conditioned building. It may be significant that the highly efficient 'Passivhaus' system is coming to a similar conclusion for domestic properties.

The striking fact that can't be ignored is that the energy these buildings consume is roughly one-third of their profligate predecessors, i.e. not just slightly better but a massive improvement that is broadly in line with the UK government's commitments to CO₂ reduction over the next decade. Although low carbon from low energy is the immediate goal, the evidence suggests that there are hugely valuable by-products, such as higher productivity and a sense of well-being within the workplace. Long after the owner-occupier market understood these lessons through projects such as the Wessex Water headquarters, it

For the new generation of commercial properties... the raw material of design is far more appealing than the slick but rather superficial architectural language of the boom years

does appear at last that the commercial market is beginning to catch on. Of course, the commercial building which anticipates the low-carbon markets of the future will have a greater long-term value than one which doesn't.

Designing-out embodied energy

If low operational energy is the catalyst for new attitudes to a building's form, the same is true for the energy that is 'embedded' in construction itself. If the structure has to be heavy in order to stabilise temperatures, how can it be done with the least amount of energy-intensive cement in the concrete? How much recycled material can be used? How little waste will find its way to the landfill site? Can materials be sourced nearby, so that transport emissions can be avoided?

The latter is particularly interesting, as it mirrors the same concern for local conditions that underpins the minimum use of operational energy, but it is also the most difficult. Modern construction has been fed by a worldwide supermarket of materials and assemblies that has greatly accelerated with the opening up of China and other markets. The UK has lagged behind Europe and America for years on the design and production of things like cladding systems, fuelling (if that is the right word) the army of trucks and ships bringing materials to the UK. By contrast, materials with a local origin are more likely to have lower carbon characteristics and the capacity to distinguish a building from its ubiquitous ancestors. In architectural terms, a 'sense of place' is the companion to a sense of well-being.

Redesigning existing buildings

The issue of recycling also raises more strategic questions, not least the recycling of buildings themselves. The pattern of throwing away our commercial buildings has quickened greatly in recent years and we now find ourselves demolishing buildings built in the 1980s. The reasons are complex but inflexible designs that are difficult to adapt are undoubtedly a major factor.

For architects, surveyors, engineers and contractors, there is a huge market in revitalising tired properties that should not be torn down, but the interesting thing for designers in particular is the range of design solutions and sheer inventiveness that is possible.

Perhaps it is the failure to recognise the potential quality of refurbishment projects that has impeded the recycling of existing buildings. Examples such as Hampshire County Council's 'new' headquarters show that interesting architecture and substantial reductions in CO₂ emissions are not restricted to new build. In the extensive remodelling of a 1960s office complex in Winchester, we re-engineered the building to accommodate natural and mechanical ventilation to reduce carbon emissions by 70%. Completed in 2009, it was awarded the Building/UKGBC 'Sustainable Project of the Year' and is shortlisted for the 2010 BCO Awards and the 2010 Building Awards.

Designing for adaptability

The challenge for new properties is, of course, to ensure that the inflexibility that has sealed the fate of too many post-war buildings does not recur. For offices, simple floorplates with regular shapes and planning grids, combined with generous floor-to-floor heights and a 'loose-fit' structure, is the essential starting point. I have a particular concern about steel-framed offices that have metal deck floors and ductwork passing through the beams; not only do they have poor thermal mass, they are also highly inflexible for the long term, as only one servicing system will fit.

Designing for architectural quality

Compare the banality of conventional offices with the emerging generation of 'green' buildings. Externally, the more sustainable examples are visually richer, more varied and capable of responding to their setting by virtue of their environmental needs. Depending on the circumstances they might be clad largely in local materials, as the proportion of glazing is so much less than before. Internally, 'green' buildings hold out the prospect of better daylight and ventilation, taller floors, exposed structures and greater awareness of the seasons. All of these characteristics resonate with the architectural virtues – form, colour, light, texture – and in the hands of a good designer are likely to produce award-winning architecture of the highest quality and value.

With sustainability in danger of becoming an overused word, the idea that 'green' buildings produce better architecture is also crucially important to motivation. This is not just about saving the planet, but is also worth doing because it is exciting and enriching. To use another well-worn cliché, it is a 'win-win' situation.

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Potterrow Development for the University of Edinburgh – completed in 2008, the building makes use of the existing campus-wide CHP system, which (in addition to active and passive measures) reduces the building's overall carbon emissions by about 80% less than the benchmark for this type of building. It won the RIAS Andrew Doolan prize for Best Building in Scotland in 2008 and the Scottish Design Award for Sustainability in 2009



© Peter Cook

Wessex Water Operations Centre, Bath – completed in 2000, its carbon emissions are about 60% less than the benchmark for this type of building. For a project built in 1998-2000 this was exceptional, but it has become the norm for ambitious green buildings. It was the Construction Industry's 'Project of the Year' in 2001 and an RIBA Award winner



Related competencies include: M009, T003, T013, T021, T022

The other side of the hill

To understand deleterious materials of the future, says Trevor Rushton, we must learn the lessons of the past

Deleterious materials perform in an undesirable way. We have considered high alumina cement, calcium chloride, asbestos and lead as deleterious or hazardous, but notwithstanding this, all materials have the capability of being in some way deleterious given the right circumstances.

With the drive to cut carbon emissions and provide a sustainable approach to construction, numerous new materials and construction methods are coming on to the market – many of which may indeed perform in ways that were not anticipated by the designer. How can we assess how well these innovations will perform?

The Duke of Wellington once proclaimed “All the business of war, and indeed all the business of life, is to endeavour to find out what you don’t know by what you do; that’s what I called ‘guessing what was at the other side of the hill’.”

The following examples serve to illustrate Wellington’s advice.

Don’t take information at face value

In January 2010, a short piece in the *Daily Telegraph* discussed a research paper published in the American Chemical Society’s Chemical Research in *Toxicology* journal.

The paper, *Risks of Copper and Iron Toxicity during Ageing in Humans*¹, drew attention to the possible risk of Alzheimer’s disease resulting from exposure to water in domestic copper plumbing systems. The author concluded that people with higher intakes of copper and a high-fat diet had ‘lost cognition’ more rapidly than expected, and that people over 50 should avoid drinking water from copper pipes.

CFL bulbs contain up to 5mg of mercury per bulb. The mercury from a single lamp is enough to pollute 30,000 litres of water beyond safe drinking levels

However, before we consider the ramifications of banning the use of copper, let us look at one small fact the *Telegraph* chose to ignore – the research paper was what is called in scientific circles a ‘narrative review’. This gives a comprehensive overview of a topic, but does not necessarily include all data. It is unclear how well the review covers the evidence, or whether it has omitted evidence that contradicts the author.

This review was also written by a single author, as opposed to being a collaborative effort, and may therefore be biased. Furthermore, a majority of the studies covered in the review were animal- or cell-based studies, which means that their direct relevance to humans is limited.

Thus far, information is limited and it would be dangerous to base decisions upon limited and selective examples of research – but watch this space.

Don’t overlook the obvious

Compact fluorescent lamps (CFL) are considered to be 80% more efficient than conventional incandescent lamps, and governments globally are pushing to introduce them as a substitute for tungsten bulbs.

CFL bulbs contain up to 5mg of mercury per bulb. The mercury is required to produce ultraviolet light, which is then changed into visible light by a phosphor coating. However, the mercury from a single lamp is enough to pollute 30,000 litres of water beyond safe drinking levels (source: Mercury Recycling plc).

Under normal operating conditions, a CFL bulb should not break but experience and common sense tells you that breakages in the home are inevitable. Start investigating how to clean up and you will find some alarming advice. In the UK, the Health Protection Agency recommends, among other things²:

- vacate the room and keep children and pets out of the affected area. Shut off central air-conditioning system, if you have one
- ventilate the room by opening windows for at least 15 minutes before clean-up
- do not use a vacuum cleaner, but clean up using rubber gloves and aim to avoid creating and inhaling airborne dust as much as possible
- dispose of the fragments in a double-wrapped plastic bag and treat as hazardous.

Somehow I do not see the layman adopting this advice. And there’s the problem – mercury will find its way into landfill. *BSJ* readers will recall a recent article on PCBs³ and the biopersistence of these materials – sound familiar?

Remedial work in progress to a TF building. The vertical load from the post in the centre of the picture was supposed to be transferred by a set of site-fixed studs below (now installed) but these were originally missing. The resultant distortion of the frame led to severe water penetration from a balcony



All images © Watts Group/Trevor Rushton



The same floor in the TF building seen from below. That the building merely distorted is testament to the flexibility of this form of construction. The vertical support studs have been installed as remedial work

Research by the Maine Department of Environmental Protection in the US has revealed that, depending upon the clean-up regime implemented, mercury concentrations can be extremely variable. Double re-sealable polyethylene bags did not appear to retard the migration of mercury adequately to maintain room air concentrations below action levels. Also, clean-up material may remain in the home for some period of time and/or be transported inside a closed vehicle, potentially exposing occupants to mercury vapour.

Given the difficulty of monitoring such precautions, one can see that uncontrolled disposal is a possibility, with at least some bulbs finding their way into landfill.

Expect the unexpected

In 2001, BBC2's *Newsnight* questioned the use of Incinerator Bottom Ash (IBA) as a secondary aggregate in road surfaces and building blocks on account of alleged high dioxin content. IBA is a by-product of industrial waste incinerators – it is essentially composed of those particles of ash that fall from a moving grate into a quenching pool. The Environment Agency's current classification of IBA has been challenged by some environmentalists and it is possible that the material may yet be reclassified and treated as hazardous waste.

Foamed concrete is often used for void filling and roadway applications; it is a cement-bonded material made by blending an extremely fluid cement paste (slurry), into which is injected a stable, pre-formed foam. Not all foamed concrete products are the same; some contain IBA while others do not.

IBA often contains aluminium so that when it is used with cement, the aluminium reacts with the alkaline cement paste to produce hydrogen gas. In 'normal' concrete made with IBA aggregate, this 'off gassing' can cause swelling of the concrete and subsequent large spalling effects. If the IBA aggregate concrete is a foamed type for use as low density fill, the much greater porosity of the foamed mix will allow the small particle size of hydrogen gas to leach more easily from the mix in wet and hardened state.

IBA has been challenged by some environmentalists and it is possible that it may yet be reclassified and treated as hazardous waste

In a recent incident, contractors had been filling an old well with IBA foamed concrete over three days. The well was contained within a building and capped with temporary metal plates. It is thought that sparks from cutting equipment led to the ignition of hydrogen gas produced by the concrete. Two workmen received serious foot injuries in the resulting explosion.

The results of the HSE investigation have yet to be published, but as a precaution, The Highways Agency has banned the use of foamed concrete containing IBA until such time as the material is deemed safe.

If something can go wrong...

In 2006, a fire at a site in Colindale consumed a six-storey timber-framed (TF) building in less than nine minutes. Last year, a fire on a site in Peckham was fanned by high winds and destroyed 39 new homes, spreading to flats in adjoining estates and a public house.

Typical features of these fires are early structural collapse and fire spread to neighbouring buildings. But not only are TF buildings at risk during construction, the poor installation of fire stopping, plasterboard finish quality and cavity barriers can pose serious risks of fire spread in a completed building.

According to the Association of British Insurers, the insurance industry is increasingly concerned about rising fire losses: the cost of fire damage in 2008 in the UK rose by 16% on 2007 to a record £1.3bn, i.e. £3.4m every day⁴. New building techniques, including TF are highlighted as being a factor.

All of the above factors point to growing concern about the use of TF construction and recent rumours suggest that insurance companies will withdraw cover for these types of buildings.

Read the instructions

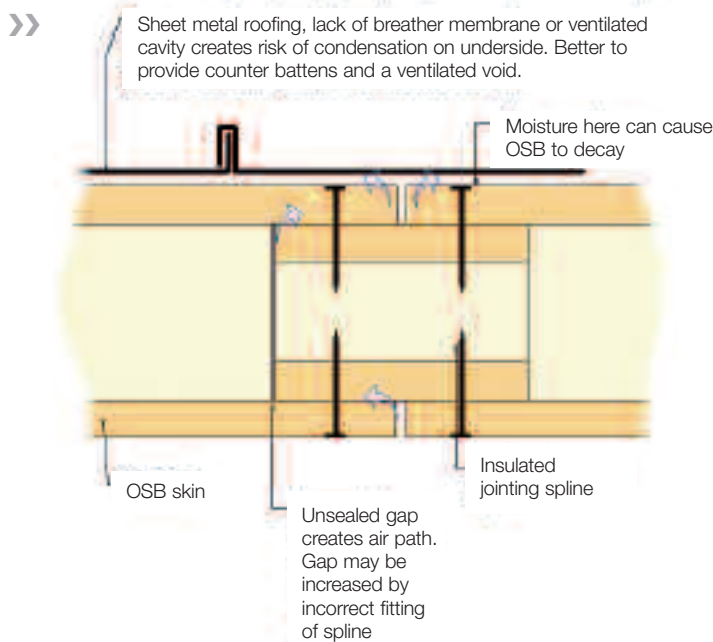
Building is now a process of assembly, with craft-based skills now diminishing. However, it is vital that new systems are fully explained and understood throughout the chain. Not only does TF construction demand attention in respect of fire, proper consideration of shrinkage and load paths are essential.

For example, we are currently involved with repairs to a recently constructed block of 15 flats arranged over four floors. The building is of platform construction whereby the external walls are constructed of prefabricated timber panels bolted together on site. The timber panels support prefabricated floor and ceiling 'cassettes'.

The design was fully detailed by designers and required 'loose studs' to be inserted within certain internal wall panels to increase the load-bearing capacity of the panels to support point loads from the roof structure. The building was clad in brickwork.

Fairly soon after construction, residents were alarmed by distortion that began to occur in the building, windows no longer fitted and floors became uneven – in the most severe cases, differences in level developed of up to 75mm across a single room. The downward motion of the floors caused the external balconies to distort, with the result that water flowed back into the building.

»



Although a common form of construction, and one that can perform well in service, insufficient care in the sealing of joints can lead to air leakage and, in the right conditions, severe condensation on the underside of roof coverings causing the oriented strand board (OSB) to rot. Good construction systems can be given a bad name by poor assembly and detailing

The propensity of a TF building frame to shrink is well documented; suitable provision has to be made. However in this case, investigations revealed that many of the additional loose studs had not been fitted. Furthermore, some of the floor cassettes had been laid reverse-handed so that double-joisted sections no longer occurred beneath partitions or load paths. That the building did not collapse is testament to the inherent flexibility and strength of TF construction, but remedial work, involving decanting the flats is costing in excess of £0.5m.

Understand the need for water management

In Canada, a problem known as 'Leaky Condo Syndrome' led to the collapse of the British Columbian equivalent of the NHBC – the New Home Warranty Program in 1998. The syndrome involved the decay of TF houses arising from water penetration behind external wall insulation (EWI) systems.

Mineral wool, cellulose fibre and phenolic foam all have the capacity to retain water and, if coupled with a form of construction that resists drainage and evaporation, can lead to serious decay. Phenolic foam in particular contains acidic compounds that when released in wet conditions can have a very corrosive effect upon lightweight galvanized steel sheeting or structural elements. Applying impervious insulation and render systems to old walls can have harmful effects – it can prevent existing water management (breathability) of the fabric and exacerbate problems such as dampness, condensation and mould. The ability of the wall to release water is reduced and as a result, the increase in moisture content reduces the U-value. Problems such as these are typically encountered in older buildings without an effective DPC.

NHBC Standards include detailed guidance to control the risk of rain penetration. For example, they require that external insulation systems over TF include a 15mm drained and ventilated cavity, and over light gauge steel frame a 15mm drained cavity. However, this is controversial and while the EWI industry acknowledges that in some cases a 'second

Phenolic foam contains acidic compounds that when released... can have a very corrosive effect upon lightweight galvanized steel

line of defence' is needed, there are no recognised methodologies to determine when such a system would be required.

Furthermore, we come across plenty of examples where the render system has been used as the primary means of defence without auxiliary back up. Damage arising from normal wear and tear, alterations such as the insertion of vents and flues, new windows and the like all create potential for moisture penetration and waterlogging.

In Japan, where structurally insulated panel systems (SIPS) are popular, water ingress and decay problems have been encountered. These result from faulty or insufficient jointing techniques and a failure to seal the joints to prevent vapour transfer from the inside of the building to the cold outside face where it condenses on the sheathing around the joint. SIPS panels are becoming popular in this country, but unless the principles of water management and moisture control are properly understood and implemented, this sound method could become problematic.

The cases that I have outlined here are interesting in that they do not reveal 'new' defects or characteristics. However, what is of concern is the way in which previous lessons have not necessarily been learned, with the result that avoidable problems have been ignored or treated with a Nelsonian eye. Surveyors are well equipped to offer advice and it is worrying, for example, that of the key stakeholders selected to form the working party on the London Assembly's investigation into fire safety in tall and TF buildings, RICS is not represented.

My six principles are essentially matters of common sense – using what we already know to find out what we do not. Sadly, the catalogue of failures illustrates one fact that is often missed – that common sense is not common enough.

Further information

¹ *Chemical Research in Toxicology journal*, 2010 Feb 15;23(2):319-26

² Fact sheet on mercury and compact fluorescent lamps, www.hpa.org.uk

⁴ *Tackling Fire – A call for action*, ABI, December 2009, www.abi.org.uk

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Investigating Defects in Commercial and Industrial Buildings is available from www.ricsbooks.com



Masonry stabilisation & structural reinforcement, various dates and locations, UK, www.rics.org/events



³ *A toxic legacy*, page 4, BSJ, Jan/Feb 2010



Related competencies include: M008, T006, T013, T021, T085

Building Conservation Journal

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Peter Napier outlines the statutory protection available to historic buildings in England and Wales and how these powers have not been used at the Brymbo ironworks in Wales – with devastating results

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Robin Miller discusses historic plain glazing and its importance to our cultural heritage

8 Heritage agenda



**The Coronation Library in Akaroa, NZ
– what story does its glazing tell?**

From the chairman

In this edition we begin a new series entitled Heritage Agenda (see page 8), which covers some important issues by reviewing recent developments impacting on building conservation, in particular legislation.

The advent of a new accreditation scheme for architects is an interesting development. It follows the parting of the ways between the AABC (Architects Accredited in Building Conservation – an independent group) and RIBA, which has decided to take a 'tier' approach to accreditation. We have always kept a distance from such an approach because we feel it can generate confusion to clients as it can be difficult for them to understand the difference between the categories. They will have to be careful to ensure clarity.

Our view has been that by only having one level, accreditation is clear in its assurance over the competence of the surveyor in conservation. It is also considered important that the process is run by our Institution to reinforce that competence expectation. Despite some issues over relaunching our updated scheme, we should be thankful we have been able to manage our scheme as one body throughout.

Other news Henry Russell covers on his Heritage Agenda page includes legislative changes. Of particular note is the Planning Policy Statement 5 and the review of non-planning consents. Both provide potential for a dilution of protection to our historic environment.

Robin Miller's view on historic glass identifies another way that legislation puts pressure on historic buildings. With Building Regulations updates becoming more regular and global in their application, no matter what a building's status there is more opportunity for elements such as glass to go undefended and overlooked. Robin gives us a timely reminder to consider these 'smaller' elements as well as the wider picture.

Lack of action

On reading Peter Napier's update concerning the Brymbo ironworks, you might actually wonder though how our system can be diluted much more when it appears to be so weak in the first place. However, it is clear it is not just weaknesses in the legislation that are to blame for the sad deterioration that has taken place but also a lack of action by authorities.

It is incredibly sad to read of the plight of the Pattern Makers' Workshop and the other buildings and structures at Brymbo. It was not that long ago we highlighted the site and related its importance in historic terms. They might not be fine architectural pieces but their significance should have been the catalyst for action.

Identifying significance and importance are two key elements of a surveyor's work in assessing historic buildings, which is highlighted in the RICS *Historic Building Conservation* guidance note; as is simple maintenance, which could have saved this building, and Nigel Dann covers so well in this edition, too.

In Brymbo's instance, despite significance being well established and highlighted, the continuing neglect has meant the fears reported in our previous edition are being realised. In my view, it is not just an historic building that is being lost here but more importantly, a potentially exciting educational opportunity.



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A duty to protect

Peter Napier outlines the statutory protection available to historic buildings in England and Wales and how these powers have not been used at the Brymbo ironworks in Wales – with devastating results

Low-cost repairs could have saved this section of the Workshop roof from collapsing

The building was vulnerable but we concluded that, with appropriate additional temporary support and immediate urgent maintenance, it could be fully repaired

“Everyone will agree that the first duty of those in charge of fine ancient buildings is to keep them in structural repair” (*Repair of Ancient Buildings*, AR Powys).

Unfortunately, this is not always the case and many owners of such buildings do not appear to agree with this statement – or have simply chosen to ignore it.

I recently wrote about the Brymbo ironworks in North Wales and its importance to the architectural and social history of iron and steel making¹. In 2006, I jointly inspected the site and prepared a conservation assessment including a report on the condition of the buildings.

At that time, the ironwork's buildings were all in various states of dilapidation. Of particular interest was the Pattern Makers' Workshop. Built of stone beneath a pitched roof covered with slates, the building dates from the early days of the 18th century ironworks. It was where the timber moulds were made for the castings produced in the foundry – canons, spoked wheels, bridge components, etc.

The Workshop roof was traditionally constructed using rafters supported on purlins bearing on intermediate trusses. One side the building is open and the other is attached to the foundry where the roof drains to a shared valley gutter.

Since the steelworks closed in 1990, the Workshop had been neglected and the valley gutter had leaked badly, causing rot in the feet of the rafters. On the open side of the roof, the wallplate had decayed and the roof structure was propped with bird cage scaffolding.

The building was vulnerable but we concluded that, with appropriate additional temporary support and immediate urgent maintenance, it could be fully repaired – and that without these actions the Workshop (and other buildings on the site) would collapse.

I have recently been sent a photograph of the Workshop which shows the accuracy of this assessment – some time since 2006, the roof has collapsed.

A building is most vulnerable at roof level. If water gets in and isn't arrested then it will cause problems all the way to its base. Roof, floor and wall supporting structures will suffer decay through damp and fungal attack, eventually resulting in collapse.

For the Workshop, the problems would have started with small leaks in the lead valley gutters and the cast iron eaves gutters, and continued with slates becoming dislodged in high winds due to corroding iron nails.

The demise of any building through neglect begins many years before any collapse and in this case possibly before the old steelworks closed down. The recent history of the Workshop is now littered with lost opportunities for relatively low-cost repairs, e.g. using materials such as bitumen-backed aluminium strips, such as Flashband, to prevent water getting in. However, major rebuilding is now the only course of action available. Not only is this infinitely more expensive than the preventative/corrective repairs, but there has now been a significant loss of irreplaceable historic fabric.

Who is responsible?

The owner of a listed building is responsible for maintaining it – and if they fail to do so then local authorities have the powers to intervene.

But what has the local authority been doing to protect the Workshop? Very little it seems. It maintains that because the Workshop is grade II* listed and a scheduled monument, the Welsh Assembly Government (WAG) and its agents, Cadw, are responsible.

» This may well be correct, but the site is in a prominent position close to a residential area and is adjoining a site which has been reclaimed using a large amount of public money. The reclaimed site continues to be subject to a number of planning applications for its redevelopment so the condition of the ironworks must have been visible.

Statutory issues

There are some very real problems with the statutory protection of listed buildings and ancient monuments. While related legislation makes it an offence to carry out works without authority, there is nothing that prevents an owner from neglecting a listed building or ancient monument, wilfully or otherwise. The legislation does, however, provide powers to deal with listed buildings and ancient monuments which are being neglected.

Listed buildings

A local authority has powers under section 54 of the Planning (Listed buildings and Conservation Areas) Act 1990 to issue an Urgent Works Notice requiring an owner to carry out basic works to preserve the building.

However, should the owner not comply then the local authority may enter the building to carry out the works with the owner becoming liable for the costs. This process is fraught with difficulties, not least of which is that local authorities have not been provided with the additional resources to finance the work pending repayment by the owner. Consequently, these powers are used sparingly.

The works to secure the preservation of buildings under an Urgent Works Notice have to be 'basic preservation works'. To successfully defend a claim by the owner that repayment is not required, the local authority must be able to demonstrate that the works were the minimum necessary to secure the building for about one year while options to permanently secure the building are explored.

Section 48 of the 1990 Act also allows local authorities to issue a notice to owners to carry out specified repairs which it considers reasonably necessary for the proper preservation of the building.

However, such a notice would only be served if the local authority is prepared to compulsorily purchase the building under section 47 of the 1990 Act if the owner does not comply. This is why the powers are seldom used unless a local authority can compulsorily purchase the building and fund its repairs. It is more usual for the local authority to do a 'back-to-back' deal with an interested party, e.g. a building preservation trust purchases the building from the local authority as soon as the compulsory purchase is confirmed.

Scheduled monuments

These powers are found in the Scheduled Monuments and Archaeological Areas Act 1979. However, there are no powers to serve an Urgent Works Notice requiring an owner to carry out works to preserve an ancient monument.

Instead, section 5 of the 1979 Act gives powers to the Secretary of State (SoS) in England and the WAG to enter a scheduled monument to carry out works which they consider to be urgent to preserve a scheduled monument.

Section 10 of the 1979 Act gives power to the SoS/WAG to acquire by compulsory purchase any ancient monument for the purpose of securing its preservation, but again these powers are seldom used because of funding issues.

Section 28 of the 1979 Act makes it an offence to damage or destroy any protected monument (a) knowing that it is a protected monument, and (b) intending to destroy or damage the monument or being reckless as to whether the monument would be destroyed or damaged. Section 28 explains that the section applies to 'anything done' by or under the authority of the owner.

The 1979 Act does not expressly deal with an owner who wilfully neglects to protect a monument and, unless it can be proved that an owner has 'done' something, it is probably unlikely that an owner who simply lets a protected monument fall down will be prosecuted.

The recent history of the Workshop is now is littered with lost opportunities for relatively low-cost repairs... however, major rebuilding is now the only course of action available

The future of the Workshop

The legislation relating to the protection of listed buildings and ancient monuments makes it an offence to carry out works without authority, but there is no offence for doing nothing to protect a structure.

The legislation anticipates that the relevant authority will step in when an owner neglects a listed building or ancient monument to the point where works become necessary to preserve it.

Sadly, there has been no such intervention in the case of the Pattern Makers' Workshop.

It is evident that the actions recommended to the owner should have been implemented and it is a great pity that the agencies with statutory powers to intervene did not do so at the stage when the Workshop could have been saved.

While the future for this building and the wider site are still uncertain, what are the lessons learned for surveyors? Mainly that, regardless of an owner's responsibilities and statutory agencies' powers, historic buildings can be at risk of being neglected – without any offence being committed. This places a greater emphasis on the need for surveyors to continue proposing practical, cost-effective and timely solutions to help persuade owners to safeguard our historic buildings.

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¹ *Iron in the soul*, page 4, BCJ, Sep 2009, www.rics.org/journals

A watching brief

Nigel Dann discusses the role of maintenance in conservation and identifies some of the constraints and opportunities affecting surveyors

One hundred and eighty years ago, author and artist John Ruskin was driven to write: *'The principle of modern times... is to neglect buildings first and to restore them afterwards. Take proper care of your monuments and you will not need to restore them. A few sheets of lead put in time upon the roof, a few dead leaves and sticks swept in time out of a water course, will save both roof and wall from ruin. Watch an old building with an anxious care; guard it as best you may, and at any cost, from every influence of dilapidation.'*

But have we paid sufficient heed to Ruskin's call? The importance of maintenance has often been repeated. However, even today, though enshrined in statutory policy and guidance, maintenance remains sidelined. Yet careful everyday vigilance and care clearly minimises the likelihood of damage and degradation to a place, its utility and its value – and thus its chances for long-term survival. Additionally, there is a clear philosophical link between maintenance and conservation.

Why is maintenance so important?

In other contexts, maintenance, repair and replacement are used interchangeably. What distinguishes maintenance for heritage places is that their fabric has cultural significance and is therefore effectively part-artefact. Maintenance, in these circumstances, should be intended to avoid or delay repair and replacement, and is defined in the guidance note as:

'The continuous protective care of elements of the building, i.e. its fabric, contents and setting, seeking to extend the life of such elements (rather than replacing them), and hence to extend the life of the building as a whole. It includes day-to-day activities such as cleaning, painting and very minor repair.'

In the context of conservation, maintenance is not just another intervention or potential activity, it is fundamentally connected to the key conservation principle of minimal intervention. There is an implicit hierarchy with such tactical principles – the ideal is to do 'as little as possible, as much as necessary', and if more intervention is justified, then other principles such as like-for-like repairs can be brought more fully into play. Until the recent past, it was these tactical principles which defined conservation and were used as the touchstones for guiding action.

In the last couple of decades however, a more explicitly strategic approach to conservation has emerged – that prior to any action, we should first identify and evaluate the cultural significance represented or embodied by a place. Any subsequent intervention should be informed by, and seek to retain/reveal/enhance, this significance in order to hand this on to the future. This idea of informed management of change, linked to futurity, has clear connections to the notion of sustainability.

The fundamental tactic of minimal intervention – with maintenance as the ideal intervention – is clearly associated with ensuring that it is predicated on the avoidance of damage and, on a more positive note, the enhancement of the cultural significance of the place.

This discussion of the benefits of maintenance is tempered by the reality that places are not maintained for purely conservation reasons: maintenance is also fundamental to the utility, functionality and value of places. Herein lies a significant issue with the maintenance of heritage places: they are part-building, part-artefact and part-investment and

there can be significant tension between these conceptions when organising and effecting their maintenance.

Advice in the guidance note

Identifying and prioritising areas of greatest risk, and mapping likely maintenance needs, are critical activities. Evaluating the potential evolution of defects and their potential impact requires an understanding of risk management. Experience to make fine judgements about the need to intervene, and an understanding of the relative significance of the place, are additional requirements.



What distinguishes maintenance for heritage places is that their fabric has cultural significance and is therefore effectively part-artefact

Planned preventative maintenance, strongly promoted in other contexts for its financial and managerial economies, needs to be re-contextualised for conservation. Rather than planned intervention, such as replacement or repair, a preventative approach in conservation terms should mean planned re-inspection of areas of risk. The frequency and prioritisation for re-inspection must be based on the risk of consequential failure and the relative cultural significance, as well as the element's functional utility. 'Just in time' maintenance is the ideal. Areas identified as 'maintenance-vulnerable' are often difficult to access – so providing suitably and sympathetically detailed access is frequently a common early maintenance intervention.

All maintenance activities require and produce lots of information. For heritage places, this is (or can become) part of the cultural significance of the place, i.e. it helps explain its development and it may contain messages for the future regarding contemporary priorities, values and concerns, etc. Careful consideration of the strategic, tactical and archival uses of condition and maintenance data also requires serious consideration on how to format, structure and store such data. Creating integrated databases for organisations and logbooks for individual owners are recommended.

What you can do?

Building maintenance *per se* has always been viewed as a low-status activity. Even in the context of conservation, where maintenance is of such importance, this remains the case: as a regional director of the



» National Trust once said “You’d never get a knighthood for a well-executed maintenance programme, but you might for a major restoration.”

Large repair budgets and daring, complex rescue projects provide glamorous work for large numbers of professional people. But a more sustainable and philosophically appropriate approach is to provide timely advice and careful, targeted and minimal intervention. However for many building professionals, from craftspeople to surveyors, justifying their fees and ‘doing something’ can all militate against maintenance over more dramatic and visible interventions.

Owners don’t see an obvious return on the money spent on maintenance, i.e. you get the avoidance of *potential* future disrepair spending and disruption. Additionally, the evidence is that owners tend to adopt an “If it ain’t broke, why fix it?” approach and often believe that replacement and reproduction are synonymous with good conservation.

There is a requirement for a more sustainable and rational approach at a national level too. There are excellent maintenance practices in this country and internationally. However, the combination of contradictory policies (which blithely acknowledge maintenance as ‘*fundamental to conservation*’ and then provide no support, advice or encouragement), no sectoral leadership and the punitive and irrational VAT regime hardly constitutes fertile ground. In particular, there is virtually no encouragement aimed at individual owners, a cornerstone of successful approaches to conservation maintenance in other European states.

Providing owners with support, information and professional services to enable the adoption of an appropriate approach to maintenance is not always a major priority for surveyors – but it should be. It builds long-term relationships with them, it can enable them to take a far more proactive approach to their property and its cultural significance, and it enables a sustainable and conservation-appropriate approach that saves both cultural heritage and money.

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The guidance note can be download for free from www.rics.org/standards or a hardcopy can be purchased from www.ricsbooks.com



Insurance Solutions for Heritage Renovation Projects, 24 May 2010, North Kilworth, Leicestershire, www.rics.org/events



© Robin Miller

Look and you will see

Historic plain glass is easy to miss, says Robin Miller, but is important to our cultural heritage

Look at the picture and describe the building and its use. The fact that it's in Akaroa, New Zealand and not the UK makes no difference to its story. The inscription above the door is a giveaway: 'The Coronation Library' (built in 1873 and renovated in 1911 to mark the coronation of King George V). But what if the inscription was not there? Could you still guess the building's original use and significance?

The windows and the glazing provide much of the evidence you need. The sun hoods suggest the orientation and the need to keep the interior cool. The lower third of each window contains patterned glass, which provides privacy, diffuses direct sunlight and prevents the eye from being distracted when seated inside. The middle third is clear glazed, allows in direct light and lets the occupiers look out when needed. The upper third, in the shadow of the hoods, has small panes of cheaper, patterned glass in leaded lights; a sensible economy for a utilitarian use, particularly when considering that glass in the 19th and early 20th century was a valuable commodity.

Under pressure

Whatever the location, historic plain glazing is under serious threat. There is pressure from environmental legislation, bland recommendations for double-glazed 'improvements' in standardised survey reports, and the well-intentioned, but ill-informed, public desire to replace traditional windows and doors with 'energy-efficient' plastic double-glazed units. There is also pressure to create maintenance-free buildings and from the misguided notion that replacement materials are more sustainable than extant ones. Finally, there are threats from simple neglect, ignorance and apathy – often from building professionals – and from the diminution in craftsmen with the skills to perform conservative repair and maintenance.

Perhaps, the problem is because glass is a see-through material – and that is exactly what we do without a second thought. But few would destroy carved stonework or lime plaster mouldings, so why is historic glass any different? Other than during the last half century, it has been crafted by hand or (of its time) cutting-edge technology and its inherent value is easy to ignore. Glass has been used for glazing windows from the 1st century AD and has a long history of innovation and

development. It has evolved as a building material in terms of its visual clarity, the purity of its chemical composition and the scale of its unit size, manufacture and uses. However, in the 21st century it has become one of the most rapidly diminishing resources of our cultural heritage.

The conservation of historic glazing is the subject of a forthcoming technical pamphlet from The Society for the Protection of Ancient Buildings. It will help building professionals identify the principal types of traditionally manufactured glass, such as crown glass (recognisable by the circular striations and by its ability to be hand-spun as thin as 1.5mm) and cylinder glass (blown by mouth into a long vessel, cut down its length and opened to produce a flat sheet with longitudinal ripples).

Add to these, mechanically produced, drawn-sheet, pressed-patterned and acid-etched glasses and you have a wide-ranging and fascinating material that always warrants special consideration. Most of all, it is fragile and even simple works nearby, such as scaffolding, maintenance, painting and re-pointing, can lead to its irrevocable loss.

We will all encounter traditionally made glass in our every day work. The first step in protecting it is recognition – look for distortions in how it reflects light, imperfections ('seeds' and 'reams') and for slight colour (usually yellow or green tints). Make sure it is properly protected during works and avoid harsh cleaning regimes. Consult with a conservation surveyor/architect and the conservation officer before undertaking any work or alterations to the glass and always use a specialist, conservation-minded glazier.

You may think you are dealing with a building of little significance, that is less than 100 years old, but think again. Technology has moved rapidly in the last 60 years since the introduction of indistinctive 'float glass' and any earlier glass should be viewed as having a long heritage of design and value. Break it and it is lost forever. So use your eyes and see what is see-through...

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Ecclesiastical Exemption under consultation

The Department of Culture Media and Sport is consulting on changes to the 'exemption' (as it is commonly known) for places of worship. Key to this is a revised interpretation of what is included in the exemption, and it is proposed that other listed structures in churchyards will also be covered by the exemption. This avoids the dual jurisdiction of listed building consent and faculty jurisdiction when applying to repair listed table tombs, for example. The new order will clarify the regulation of 'peculiar', such as school and college chapels. We will keep you up-to-date with the consultation results once published.

For more information, visit www.culture.gov.uk/reference_library/consultations/6605.aspx

Call for entries to IHBC prosecutions database

The Institute for Historic Building Conservation has published a prosecutions database containing 150 cases compiled by Bob Kindred, IHBC's government liaison secretary. Most prosecutions involve Grade II buildings, as might be expected as they form the largest number, but a significant proportion are curtilage cases (buildings not listed themselves, but gaining listed protection by being within the curtilage of a listed structure). The IHBC would like to hear about further cases (irrespective of the outcome) to help maintain the database.

For more information, visit www.ihbc.org.uk/prosecutions.htm

Planning Policy Statement 5

The draft Planning Policy Statement 15: Planning and the Historic Environment was criticised from all sides last year. We expected further consultation after re-drafting, however the new PPS5 has now been published with immediate effect. It merges the former Planning Policy Guidance 15: Planning and the Historic Environment and Planning Policy Guidance 16: Archaeology and Planning. The brief policy statement is accompanied by a practice guide which has been prepared by English Heritage.

Review of non-planning consents

The Department of Business Innovation and Skills is carrying out a review of the barriers to development imposed by non-planning consents, which includes listed building consents and conservation area consents. Known as the Penfold Review, after Adrian Penfold of British Land, it asks a number of questions which are clearly targeted

at developers, although it has taken evidence from the conservation sector as well. It would be worrying if this resulted in proposals to dilute protection for the historic environment. We will keep you up-to-date with the consultation results once published.

For more information, visit www.bis.gov.uk

Conservative Heritage Policy revealed

The Conservative party's document *The Future of the Arts with a Conservative Government* says: 'We will introduce a Museums and Heritage Bill which will establish a new administrative status for non-departmental public bodies within the cultural and heritage sectors. This will recognise their role as public organisations with responsibility to steward the nation's assets. But it will also allow them the independence to be truly effective and entrepreneurial fundraising bodies. They must have both the ability and responsibility to raise money both for capital projects and also for endowments to give them funding security over the long term.'

At the Heritage Alliance Annual General Meeting in December, Shadow Arts Minister Ed Vaizey suggested the bill might include the core provisions of the stalled Heritage Protection Bill. He also said that a Conservative government would consult on breaking up English Heritage, merging the grant-giving functions with the Heritage Lottery Fund and hiving the properties in care into a separate trust, leaving a separate regulatory body.

For more information, visit www.conservatives.com

RIBA accreditation scheme launched

The Royal Institute of British Architects plans to set up its own conservation accreditation register since the unfortunate parting of the ways with the Architects Accredited in Building Conservation (AABC) Register. It will have three levels: Conservation Registrant, designed to demonstrate general conservation competence to clients; Conservation Architect (Grade II listed and regionally-important buildings) and Specialist Conservation Architect (Grade I and II* and other buildings of outstanding importance). I understand that the Specialist Conservation Architect level will match AABC registration, and is intended to be acceptable to English Heritage for grant-aided projects. The March issue of *RIBA Journal* invited candidates for assessment panels, ready for the first round of applications.

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Are you sitting comfortably?

In his final article on air-conditioning systems, Keith Horsley looks at other common indoor climate control systems

My previous article* introduced three of the indoor climate control systems most commonly specified in new buildings: four-pipe fan coils, variable refrigerant flow (VRF or VRV) and displacement ventilation with static cooling and heating (DVSCH). This article will look at a number of other types of system, less prevalent but still commonly encountered, that are capable of providing a similar level of control of minimum and maximum temperatures and, in some cases, providing fresh air ventilation requirements and control of relative humidity.

CIBSE¹ classifies comfort cooling and air-conditioning systems into three categories:

Centralised all-air systems

These employ central plant and duct distribution to treat and move all of the air supplied to the conditioned space. The use of air as the main heat transfer medium, rather than a fluid of higher thermal capacity, such as water or refrigerant, results in the need for large air-handling plant and big ducts requiring more distribution space (ceiling voids and

risers) than many other systems. In essence, there are two types of all-air system. Constant volume systems supply a constant volume of air and vary its temperature to meet the heating or cooling loads of the space. Variable air volume (VAV) systems supply air at a constant temperature and vary the air flow rate to match the loads.

Variable air volume

VAV was a popular system in the UK until around 15 years ago, particularly in offices. It is now much less commonly used in new buildings, but still has its adherents, particularly among North American and other overseas clients.

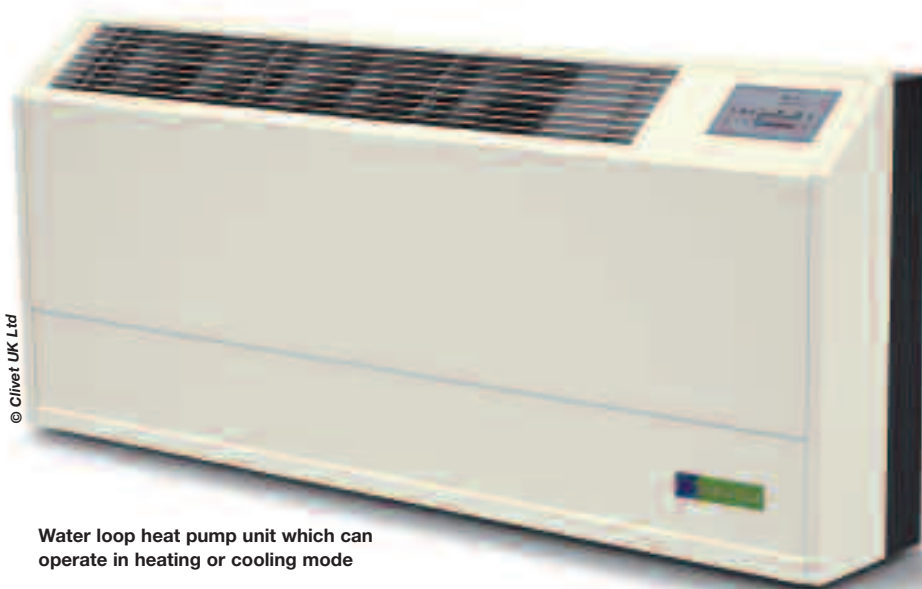
The network of supply air ductwork terminates, in each zone, in a VAV terminal unit or 'VAV box' containing a throttling damper to control the air flow rate. Pressure controls vary the primary air flow rate accordingly. Older systems tend to use inlet guide vanes on the fans for this purpose and efficiency savings can often be realised by replacing this arrangement with a variable speed, inverter-driven fan.

An obvious limitation of the constant temperature/variable volume principle is that such a system can only provide either cooling or heating at any point in time. Sometimes the primary air temperature is varied on a seasonal basis, but in cooling-dominated buildings heating is typically provided by either a completely separate perimeter heating system, or by re-heat coils on zone supply ducts.

One problem that needs to be overcome in the design of VAV systems is that of achieving effective air distribution over a range of flow rates. Variations on the basic system, including fan-assisted and induction VAV, have evolved in response to this issue. Humidity control and provision of sufficient fresh air can also be problematic.

CIBSE Guide M² lists the indicative life expectancy of a VAV terminal unit as 15 years; the same as a fan coil unit. One of the most common problems in operation is failure of the dampers in the terminal units. These can easily be repaired or replaced as required. However, VAV systems of this age or older may have other disadvantages which would make it necessary to consider replacing the entire system. Due to the large quantities of air they move around the building and the high pressures required to allow the terminal units to operate effectively, VAV systems typically have very high fan power consumption. Depending on how their controls are configured, they may also provide an inefficient means of cooling. For these reasons, building owners under pressure to reduce their carbon emissions may consider replacement with a fan coil, DVSCH or VRV system.

The use of air as the main heat transfer medium, rather than a fluid of higher thermal capacity, results in the need for large air-handling plant and big ducts requiring more distribution space



Water loop heat pump unit which can operate in heating or cooling mode

Dual-duct air conditioning

This is another, less common, variant of the all-air system in which both heated and cooled air is distributed separately around the building and brought together, just prior to supply, in the appropriate proportion to produce air at the required temperature to meet the load. Both constant and variable volume versions of the dual-duct principle have been employed.

Partially centralised air/water systems

These generally employ terminal units which recirculate air over low temperature hot water heating and chilled water cooling coils to provide control of room temperature; central air handling plant is used to provide fresh air requirements only. The four-pipe fan coil is such an example.

Active chilled beams (ACBs)

The key difference between active and static chilled beams (SCBs) is that supply air ductwork is connected to each ACB unit and air is supplied in such a way as to create an induction effect, which improves heat transfer. Consequently, ACBs offer a higher cooling capacity than SCBs for a given size of unit. Often the primary air flow rate required to achieve this is higher than the minimum fresh air requirement for ventilation purposes. This leads to upsized central plant and distribution ducts (and hence ceiling voids and risers) compared to a DVSC system.

However, there is no need for a deep floor void to provide low-level displacement ventilation. ACB units can also incorporate heating coils, so the need for a separate heating system can also be eliminated. ACBs use similar chilled water temperatures to static cooling units, and can therefore benefit from the same improvements in the efficiency of chilled water generation compared to other systems. This also means, however, that any dehumidification required has to be done via the primary air at the central plant.

On the face of it, ACBs seem an attractive solution but the system hasn't taken off as much in the UK as was anticipated when it first emerged in the late 1990s. This is probably due to a combination of the increased central plant and distribution requirements, and their appearance: as with static cooling, using ACBs imposes particular requirements on the ceiling in terms of high free area grilles. Typical system costs, as quoted in SPONS³, range from £205 to £230/m² for an office building up to 15,000m².

Despite their name, ACBs contain no moving parts and therefore the units themselves require little maintenance beyond occasional cleaning. Provided they are designed correctly to eliminate excessive noise (a potential problem due to the relatively high pressure air supply), and adequate water treatment is maintained to prevent corrosion, the units themselves have a life expectancy of 20 years². Problems with

the system in operation are more likely to be due to failure of control components, which will require preventative maintenance and replacement from time to time.

Underfloor air-conditioning systems

Many clients who use one of these systems express high levels of satisfaction with its performance, but it has failed to become one of the most common air-conditioning solutions for a number of reasons. The system is marketed by a relatively small number of manufacturers in the UK and constitutes something of a niche market.

The system utilises 'downflow' air-conditioning units located at floor level within the occupied space. These are essentially large four-pipe fan coil units. They mix return air from the space with ducted fresh air (from central air handling plant or directly from outside) and discharge conditioned air into an underfloor supply air plenum. Air from this plenum is introduced into the space via a network of 'fan-tile' units, set into the raised floor. These discharge the air in an upward direction at high velocity which induces rapid mixing with room air.

Each downflow unit can only provide either cooling or heating to the area it serves so the supply air temperature is determined by the zone with the largest cooling requirement. Fan-tile units are provided with electric reheaters to provide heating when and where required. The return air path can either be through a separate zone in the floor void or at high level.

The need to locate downflow units in the occupied space leads to a loss of lettable floor area and a potential loss of flexibility. The noise from these units also has to be considered. Conversely, the ease with which fan-tile units can be relocated enhances the flexibility of the system. The use of electric reheaters reduces the system's carbon efficiency but the use of variable speed DC motors on the fan-tiles and in the downflow units can lead to low fan power consumption.

The equipment involved has many similarities to fan coil units and so maintenance and repair/replacement issues are similar (see previous article). The manufacturers of underfloor systems recommend a whole life cost approach to the financial appraisal as they claim the system results in cost savings in areas other than the mechanical services. These claims need to be assessed on a project-by-project basis.

Induction air conditioning

Induction units are unlikely to be encountered in new buildings in the UK, but there are many existing installations from the 1980s or earlier. Induction units are still available from a few manufacturers so there is an option for replacement in buildings where an existing induction system meets the owners' and occupants' needs but has deteriorated due to its

Provided ACBs are designed correctly to eliminate excessive noise... and adequate water treatment is maintained to prevent corrosion, the units themselves have a life expectancy of 20 years



» age. The principles of the system are, in some ways an amalgam of fan coils and ACBs. The units, usually located at low level around the building perimeter, do not contain a fan. Instead they rely on induction, caused by introducing primary air at a high pressure, to generate the required circulation of air over the heating and cooling coils. The need to circulate relatively high volumes of air at sufficient pressure results in large, and not particularly energy efficient, central plant. The introduction of air at high velocity has a tendency to cause noise and control problems.



Recessed active chilled beam unit design to fit into a standard ceiling grid

Local air-conditioning systems

These include systems employing terminal units that use refrigerant as their heat transfer medium. VRV falls into this category.

Split and multi-split system air-conditioning systems

These utilise a similar principle to VRV but are generally smaller systems with only one, or at most a handful, of indoor units connected to each outdoor unit. They do not have the ability to provide simultaneous heating and cooling (and heat recovery) between indoor units on the same system. Refrigerant is the heat transfer medium and refrigerant pipework connects the indoor to the outdoor units in each system. Such systems are typically used in small scale projects, where only a few rooms require cooling (domestic buildings or small offices), or when a few rooms in a large building require their air-conditioning system to be separate from the main building system, perhaps due to different operating hours. Examples of this include IT server rooms and plant rooms. A further variation is the use of through-the-wall or window air-conditioning units, in which the indoor and outdoor units are effectively combined into a single piece of equipment containing the entire refrigerant circuit.

Water loop heat pumps

This system is based around room-mounted reversible heat pump units, which contain a fan drawing room air over an evaporator (in cooling mode) coil while the condenser rejects heat to a water loop circulating around the building. In heating mode, the air coil becomes the condenser and the evaporator extracts heat from the water loop. Central cooling (chiller, cooling tower or dry air cooler) and boiler plant removes or adds heat from or to the water loop as necessary to keep its temperature within set limits. There is the possibility of heat recovery between different parts of the building. A common application is in multi-tenanted developments such as shopping centres where

the landlord provides the water loop and central plant and tenants connect heat pump units to it.

As it is a refrigerant-based system, water loop heat pumps are subject to the same issues concerning refrigerant phase-out as described for VRV (see previous article*). Systems with individual refrigerant circuits for each room are also likely to be more maintenance-intensive than some alternatives and require careful design to eliminate excessive noise from the refrigerant compressors. For this reason the system is not as popular in new buildings as it once was, but there are still many examples around.

These two articles have introduced a number of types of indoor climate control system. They differ in their method of delivering conditioned air to the space, and of distributing heating, cooling and ventilation to the load. Recent legislation means that energy use will usually be a key consideration when deciding what type of system to install in a new building, or when replacing an existing installation. Although some types of system are inherently more energy-efficient than others, this is only the start of the story. Desiccant cooling, evaporative cooling, ground-coupled ventilation (earth tubes), ground source heat pumps, turbocor chillers, night cooling and free cooling are all strategies that can be employed at a central plant level. In conjunction with many different indoor climate control systems, these reduce energy consumption and carbon emissions.

Further information

¹ CIBSE Guide B2, Ventilation and Air Conditioning

² CIBSE Guide M, Maintenance Engineering and Management

³ SPONS Mechanical and Electrical Services Price Book 2009

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Although some types of system are inherently more energy-efficient than others, this is only the start of the story



* Keeping you cool, page 18, *BSJ*, March/April 2010, www.rics.org/journals

The April edition of the *Construction Journal* had a theme of Building Services, www.rics.org/journals



Related competencies include: T013, T021

All Professional Groups – recently published

Professional Group	Type	Title	Professional Group contact	Published
Valuation	Guidance note	Red Book – Update	David Rusholme	Apr-10
Land	Guidance note	Contamination, the environment and sustainability: implications for chartered surveyors and their clients	James Kavanagh	Apr-10
Land	Information paper	Geospatial information and the property profession	James Kavanagh	Mar-10
Land	Guidance note	The valuation of trees for amenity and related non-timber uses	James Kavanagh	Feb-10
Dispute Resolution	Guidance note	Surveyors and lawyers involved in lease renewals under PACT (Professional arbitration on court terms)	Carol Goodall	Jan-10
Residential	Guidance note	isurv Blue Book – Update	David Dalby	Nov-09
Residential	Guidance note	Blue Book – First interim update	David Dalby	Oct-09
Land	Information paper	Spatial planning	James Kavanagh	Oct-09
Built Environment	Guidance note	Black Book – Electronic document management	Alan Cripps	Oct-09
Built Environment	Guidance note	Construction insurance	John Parsons	Sep-09
Built Environment	Guidance note	Development management	John Parsons	Sep-09
Land	Guidance note	Energy strategies for rural businesses	James Kavanagh	Sep-09

Built Environment Group – planned guidance

Type	Title	Professional Group contact
Information paper	Black Book – Practical completion	Alan Cripps
Black Book guidance notes	E-tendering	Alan Cripps
	Introduction	Alan Cripps
	Value engineering and value management	Alan Cripps
	Management of risk	Alan Cripps
	Developing an appropriate building procurement strategy	Alan Cripps
	Tendering strategies	Alan Cripps
	Tendering documentation and management	Alan Cripps
	Extensions of time	Alan Cripps
	Forecasting and cash flows	Alan Cripps
	Valuing change	Alan Cripps
Guidance note	Contract administration	Laura Brazil
Guidance note	Reinstatement cost assessments of buildings and dealing with loss and subsequent claims	Laura Brazil
Guidance note	Technical due diligence of commercial and industrial property	Laura Brazil
Guidance note	Sustainability retrofit	Laura Brazil
Guidance note	Building pathology	Laura Brazil
Guidance note	Surveying safely	John Parsons
Information paper	Flooding consumer guide	Alan Cripps
Guidance note	Managing the design delivery	John Parsons
Guidance note	Contract comparison construction projects	John Parsons
Guidance note	Electrical surveys	John Parsons

Averting disaster

In his final article on recent developments in party walls, Andrew Smith discusses a case study that provides some useful guidance for building surveyors

If works are carried out under sections 2 and 3 of the Act, the cost is potentially divisible between the two owners, whereas if they are carried out under section 6, they are carried out at the cost of the building owner

The case of *Manu v Euroview Estates Limited* [2008], an unreported county court decision, is full of useful information but it is necessary to summarise the facts before considering the conclusions that can be drawn from it.

The facts

The building owner proposed excavation works on its own land and wished also to underpin the party wall. As is common practice, the building owner's surveyor's appointment preceded service of notice. The building owner served notice in a single document under sections 3 and 6 of the Party Wall etc. Act 1996 and the notice was accompanied by a plan and an indicative section and method statement. At trial, the plan was found to be insufficient in that it did not comply with the section 6(6) requirement to show the site and depth of the excavation.

The adjoining owner appointed Mr Lai as party wall surveyor. It appears that the judge (HH Hazel Marshall QC at the Central London County Court) did not approve of this choice as she commented in her judgement:

"Mr Lai is a barrister and a solicitor and he also told me that he has a Master's degree in nuclear physics. His practical experience of building was derived from five years' manual work with Higgs & Hill... he has no qualification as either a surveyor or an engineer.

"The 1996 Act does not say that an appointed 'surveyor' must be a person qualified in building surveying or engineering, but it is usual to appoint such a professional because of the nature of the functions the 'surveyor' is required to perform under the 1996 Act. Mr Lai, however, is a lawyer – he has also acted throughout as Mr Manu's solicitor as well as his party wall surveyor – and he brought a lawyer's approach to the matter."

After various difficulties relating to fees, and the selection of a third surveyor (ultimately appointed by the local authority in exercise of its default powers), the building owner eventually sent Mr Lai a draft award. This provided that Mr Manu, as adjoining owner, should pay 50% of the costs of underpinning, as this was required as a result of the condition of the wall. Mr Lai said that this was contrary to section 6(3) which provides that underpinning shall be carried out at the building owner's expense.

This was fundamental to the proceedings. The building owner said that the section 3 works included all the works necessary to underpin the party wall, including the excavations required to get to it and that the section 6 notice covered the other excavations. Mr Lai said that section 3 does not mention 'excavations' but only 'underpinning' and that only

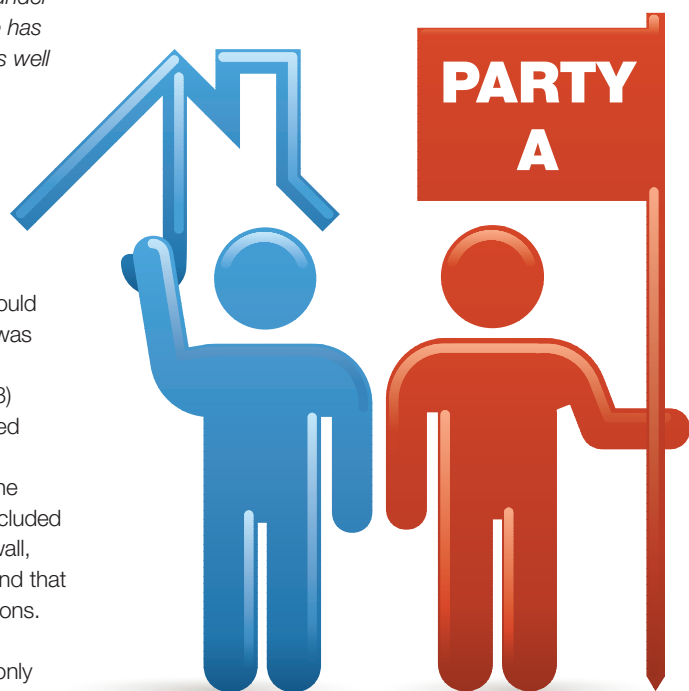
the underpinning but not the excavation was covered by section 3. The significance is that, if works are carried out under sections 2 and 3 of the Act, the cost is potentially divisible between the two owners, whereas if they are carried out under section 6, they are carried out at the cost of the building owner. The more works falling under section 6, therefore, the less the adjoining owner might have to pay.

All of this took time. The notices were served on 12 May 2004 and on 12 January 2006, Mr Lai first took issue with the adequacy of the drawings which accompanied the section 6 notice and required a new notice to be served. Mr Lai said: *"Once I receive the new notices, I shall discuss these with the engineers..."*

Mr Lai also claimed that the reason the party wall was in a poor state was that it had been damaged by the roots of trees removed from the site before the building owner even purchased it and Mr Lai was also continuing to demand undertakings in respect of his fees.

On 19 January 2006, the building owner's surveyor wrote to Mr Lai stating that, in all the circumstances, he regarded Mr Lai's conduct as entitling him to act *ex parte* and enclosing an award in respect of the section 6 works. The award stated specifically that it did not relate to the party wall. Mr Manu appealed that award. He appointed Mr Lai as his solicitor in the appeal.

The third surveyor later made an award in respect of the party wall, stating that it required underpinning and the cost of the underpinning should be borne by



the building owner and the adjoining owner equally because they were equally 'responsible' within the meaning of section 11(4). He stated specifically that nothing in his award would prevent Mr Manu from seeking to exercise his right to damages under common law in respect of any neglect by the building owner or its predecessor. This award was also appealed. The two appeals were heard together.

The judgement

The trial lasted four days and the principles which emerged from the seven key questions are summarised below.

1. Was the building owner's surveyor's appointment invalid on the ground that it preceded the notice?

The judge said:

"Given that... the building owner in particular is likely to engage the services of its party wall surveyor before serving a party wall notice, it would be nonsensical in my judgement, to hold that he could not make a valid appointment until after any difference had actually arisen."

It is accordingly entirely acceptable for a building owner to appoint a surveyor prior to service of notice.

2. Does the word 'underpin' in section 2(2)(a) include the excavation works necessary to access the underpinning?

This concerns the interpretation of section 2(2)(a) and the meaning of the word 'underpin'. Mr Manu's argument was that underpinning is the installation of the concrete pin itself and that the word is not apt to refer to the 'excavation' that is necessary to access the underpinning. The judge was unimpressed by that argument. She said:

"I have no hesitation in rejecting this argument. It seems to me to be perfectly clear that by 'underpinning' section 2(2)(a) contemplates also whatever works are required in order to effect underpinning, including the obvious need to excavate, in order to be able to get at the location for the underpinning."

The judge found that the section 3 part of the notice was the part that governed those excavations which were necessary to install the underpinning. It follows that 'underpinning' for the purpose of section 2(2)(a) includes not merely the underpinning itself but also the excavation works required to get to the underpinning.

It follows that 'underpinning' for the purpose of section 2(2)(a) includes not merely the underpinning itself but also the excavation works required to get to the underpinning

3. Was the notice invalid regarding section 6 works because it was not accompanied by plans and sections which complied with the requirements of section 6(6)?

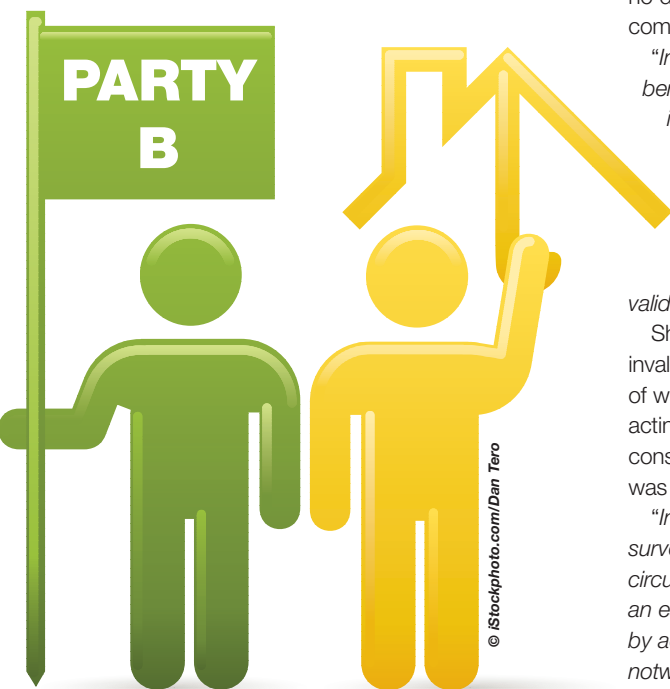
The judge found that the section 6 part of the notice (relating to adjacent excavations) was invalid because it was not accompanied by plans and sections which complied with section 6(6). This is despite the fact that all parties accepted that they could work out for themselves what was intended by the notice and that no difficulties had arisen as a result of non-compliance. She said:

"In my judgement, even construing this notice benevolently with regard to the fact that it is an instrument intended to take effect between practical men for a practical purpose, this document cannot fairly be regarded as including the information that section 6(6) requires it to include. The drawings are sloppy in this regard, and the notice was not valid insofar as it related to section 6 works."

She also took the view that, while the notice was invalid, it was nonetheless redeemed by the doctrines of waiver and estoppel. The surveyors had been acting in reliance on this notice for a very considerable period of time before its validity was challenged. The judge said:

"In my judgement, therefore, a party wall surveyor can by his acts or conduct in appropriate circumstances waive a defect in a notice or create an estoppel that would bind his appointing owner by accepting to act as though the notice was valid, notwithstanding."

»»



» It follows from this that if surveyors want to take points on the validity of notices or of appointments, it is incumbent on them to take those points quickly. The court will take a dim view if such points are saved for later ambush.

4. Did Mr Lai's letter of 12 January 2006 constitute a 'refusal to act effectively'?

The *ex parte* award in this case was based on Mr Lai's alleged refusal to act under section 10(6). His demand that a fresh notice be served in circumstances where (it was subsequently held) no fresh notice was needed were said to constitute that refusal. By itself, this may not appear to be enough to constitute a 'refusal' such as to justify an *ex parte* award. Context, however, is everything. The judge commented:

"Although the bare refusal contained in the letter might, in a different context, have amounted to no more than a statement of position, given the combined facts that it was raised so late in the day, more as part of a negotiating strategy than for genuinely good reasons and against the background of taking a succession of pedantic and difficult points, I find that, in this situation it did not do so... I therefore hold that Mr Lai's letter of 12 January 2006 was, in all the circumstances, a refusal to act effectively."

It follows that a party wall surveyor whose conduct is perceived by the court as being inappropriate may find that his actions inadvertently amount to a refusal to act, justifying the making of an award *ex parte*.

5. Was the building owner's surveyor entitled to act *ex parte* under section 10(6) or does that sub-section confer no power on the other surveyor to act alone?

There was what appears to have been a rather incoherent argument to the effect that section 10(6) does not permit an appointed surveyor to make an *ex parte* award without the third surveyor joining in. This argument was not pressed.

6. Was the third surveyor wrong in holding that the building owner was not 'responsible' for the defect requiring underpinning of the party wall?

The award provided that the owners should share the cost of underpinning equally because they were equally responsible for the want of repair. The adjoining owner argued that the condition of the wall arose as a result of matters for which he was not to blame (namely tree roots from next door) and that third parties (i.e. the building owner's predecessor) may be responsible. So far as third parties are concerned, the judge said:

"The 1996 Act is quite clearly contemplating that the question of 'responsibility' is decided as between the actual parties to the procedures, and not with regard to other persons, such as predecessors in title or third parties."

The judge clearly took the view that the Act is not intended to require the surveyors to embark on a legal analysis encompassing the possibility that third parties might be responsible for the condition of the wall. She went on to emphasise, again, that the surveyors' job is to apply a practical and commonsense approach.

7. Is the third surveyor's award challengeable on the grounds of internal inconsistency or of allocating costs illogically?

It was argued for the adjoining owner that the award should also be set aside because it contained some apparent minor internal inconsistencies and because the costs of the work had been allocated illogically. Those arguments were given short shrift by the judge.

Conclusion

Thousands of party wall awards are made each year and only a tiny minority lead to litigation. This is because surveyors discharge their duties in a sensible and pragmatic manner and rarely adopt a technical or legalistic approach. Their objective is to ensure that works are carried out efficiently and economically and with adequate safeguards. This approach has no doubt spared many property owners from the consequences of litigation which might otherwise have arisen. When they arise, neighbour disputes can be extraordinarily expensive and distressing. As the judge said in *Bradford & Bradford v. James & Others* [2008] EWCA Civ 837:

"There are too many calamitous neighbour disputes in the courts... litigation hardens attitudes. Costs become an additional aggravating issue. Almost by its own momentum, the case that cried out for compromise moves onwards and upwards to a conclusion that is disastrous for one of the parties, or possibly both. The extreme acrimony between these neighbours is nothing new."

By continuing to bring a sensible and co-operative approach to bear on party wall issues, surveyors can protect their appointing owners from a great deal of unnecessary difficulty and expense.

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Andrew Smith's previous *BSJ* party walls articles can be found on www.rics.org/journals



For information on the RICS Neighbour Disputes Service, visit www.rics.org/neighbourdisputes



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Related competencies include: T051

A party wall surveyor whose conduct is perceived by the court as being inappropriate may find that his actions inadvertently amount to a refusal to act, justifying the making of an award *ex parte*

Saving tomorrow's world

In their final article on smart materials, Chris Mahony and Kevin Tinkham look forward to new technologies and how they could benefit the built environment

Aerogels are particularly attractive as insulating materials due to their light weight – typically just 15 times heavier than air – and extremely low thermal conductivity

Design trends come and go and the popularity of specific building materials fluctuates but, for a variety of reasons, the construction sector is generally quite conservative in its choice of materials and technologies. However, as Bob Dylan once wrote (though, we suspect, not about the construction sector) “The times they are a-changin”.

The construction industry is worth £100bn per year to the UK economy but it also creates about 45% of UK CO₂ emissions, one third of all landfill and consumes 25% of all raw materials – hence why construction is a major focus for government sustainability targets. For example, the UK government has committed to reduce greenhouse gas emissions over the next 40 years by 80% (compared with 1990 levels) and all new houses built after 2016 should be zero carbon. These targets are ambitious and the technical challenges are demanding, so in this article we look at technologies that may help us to meet these goals.

Aerogel insulation

Aerogels are a diverse class of porous solid materials. They consist of open-celled, solid foams composed of a network of interconnected nanostructures and most have porosity levels of between 90 and 99.8%. Aerogels also exhibit a wide range of extreme properties and hold records including the lowest density solid (0.0011 g cm⁻³), the highest specific surface area for a monolithic material (3200 m² g⁻¹) and the lowest thermal conductivity (0.013 W/mK).

In construction, aerogels are attractive as insulating materials due to their light weight – typically just 15 times

heavier than air – and extremely low thermal conductivity. Developed in the US by

Aspen Aerogels, the

Spacetherm family of insulating

products is now supplied in the UK by

Proctor Group. By combining a silica aerogel

with a robust polyester carrier it is possible to manufacture highly insulating laminate chipboard and plasterboard.

Aerogel insulating products have only recently entered the UK construction sector but are suitable for both new build and refurbishment programmes. As always, care must be taken to follow installation instructions accurately but no specialist training is required. Once in place, Spacetherm products look like any other lining boards and can be decorated in the same way.

OLED lighting

Lighting in buildings accounts for around one sixth of electricity use in the UK. Given the targets for zero carbon buildings and greenhouse gas reductions, this is an area of significant activity and development. Most of us will be aware of the programme to replace traditional incandescent light bulbs with more energy-efficient bulbs and the energy saving potential of LED lighting. Less well known is organic LED (OLED) lighting, but it is this technology that LOMOX is developing for ultra-efficient lighting applications.

The LOMOX OLED lighting, which is currently in development, is said to be 2.5 times more efficient than current energy saving bulbs and has the potential to reduce CO₂ emissions globally by almost 7.5m tonnes by 2050. When coated onto a film, OLEDs could be used to cover walls creating, in effect, a light-emitting wallpaper that would replace conventional bulbs entirely.

In addition to being flexible, OLED film will only require a very low operating voltage (3 to 5 volts), meaning it will be capable of being powered by batteries or solar panels. Hence, OLED lighting will be suitable even for remote sites and can be powered by renewable energy technology.

Nanoparticle heat pumps

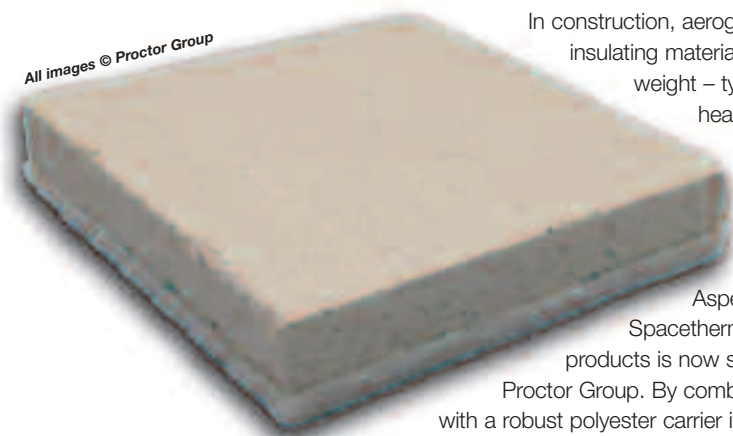
Though still at the research stage, scientists at the University of Technology in Sydney have recently described the idea of a heat pump based on nanoparticles to cool buildings without the need for energy-intensive air-conditioning. The idea is based on the ‘night sky cooling’ effect, in which the energy absorbed by a surface during the day is emitted back into the atmosphere at night.

Much of the heat emitted at night is reabsorbed by the atmosphere and subsequently re-emitted back to the earth's surface (and some gases, such as CO₂, are very good at absorbing radiation – but you would not want extra amounts of these in the atmosphere). However, some wavelengths – between 7.9 and 13µm – are less likely to be absorbed and the researchers have found that a mixture of silicon carbide and silicon dioxide nanoparticles emits heat radiation within this range. In the heat pump, air or water would flow in channels beneath a plate coated with the nanoparticle mix. The coating would emit radiation and cool the air or water beneath.

Colour change roofs

We have previously discussed the advantages of reflective roof panels to keep internal spaces cooler in hot weather and to reduce stresses on timber joists (see *Paint: the final frontier*, p24, BSJ, Jan/Feb 10). »

All images © Proctor Group



Spacetherm-F is a high-performance laminate comprising Spacetherm insulation blanket bonded to Fermacell. The strength and fire resistance properties of Fermacell and the thermal insulation properties of Spacetherm combine to give a versatile insulated lining board

Spacetherm-PP is a high-performance laminate specifically designed to be used when shot-fired fixing is preferred. It can achieve similar performance to traditional plasterboard laminates, but at a fraction of the thickness, allowing greater flexibility

» Of course, this technology only addresses the issue of cooling in hot weather. Now, researchers at the Massachusetts Institute of Technology in the US have developed roof tiles that change colour according to temperature, turning white during hot weather to reflect heat but turning black in cold weather to absorb heat. The MIT team believe that air-conditioning costs in hot weather could be cut by up to 20%.

The concept is quite simple. A common commercial polymer in a water solution is sandwiched between flexible plastic layers, with a dark layer at the back. When the temperature reaches a certain level (determined by the solution composition) the polymer condenses, forming tiny droplets that produce a white reflective surface. Below the predetermined temperature, the polymer stays in solution, revealing the black backing layer that absorbs the sun's heat. Research is currently underway to reduce the cost of the tiles and to establish the long-term durability of the system.

Interestingly, Solar Twin is developing a thermochromic solar collector for its solar water heating systems. Currently, the number of solar panels that can be attached to a hot water cylinder is restricted because of problems with the carrier liquid boiling. Solar Twin's prototype system involves the use of thermochromic paint. In temperatures of up to 70°C, the paint is black and absorbs heat but between 70 and 80°C the paint gradually changes to white, in the process becoming a solar reflector. As the temperature falls, or if someone uses any hot water, the paint becomes black again.

Self-repair coatings

Self-repair is hardly a new idea – organisms have been able to repair damaged bone and tissue for millions of years – and is an attractive concept for building materials. Product lifetimes would be extended, safety improved (as damaged features in hard to access locations would simply self-heal) and costs would be reduced through lower maintenance and refurbishment levels.

Some degree of self-repair can already be achieved in automotive paints but these rely on the resin flowing slowly back to fill light scratches. True self-repair is harder to achieve but construction is a large market and the commercial potential is clear. Perhaps the most likely technology to make a breakthrough will be based upon microcapsules.

When the coating is damaged the microcapsules will rupture and the corrosion inhibitors, polymers and pigments they contain will react together to effect a repair. Autonomic Materials in the US appear to be the world leaders in this technology, while a number of university research groups, including those at Bristol and Sheffield in the UK, are investigating alternative methods.

Which of the products discussed will be considered standard in the years to come? Perhaps others will join them. For example, Nanopool are about to launch an ultra-thin silica coating product that is claimed to be food safe, environmentally friendly, easy to clean and antimicrobial; researchers at Tel Aviv University recently described how arrays of self-assembling nanotubes could lead to the next generation of self-cleaning products; and Romag in County Durham already supplies PowerGlaz BIPV, a glass/glass laminate that encapsulates photovoltaic cells for electricity generation and is used as a substitute for ordinary glass.

The number of new materials technologies emerging from innovative companies and research groups continues to grow, offering enormous potential for exploitation in buildings. For most, we cannot yet be sure of in-service performance, nor is it possible to say exactly what their emergence will mean for surveyors. Nevertheless, the sustainability challenge is such that new technologies will definitely be required to help meet future sector targets.

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The previous BSJ 'smart materials' articles can be found at www.rics.org/journals



Related competencies include: M009, T006, T021

MIT researchers have developed roof tiles that change colour according to temperature, turning white during hot weather to reflect heat but turning black in cold weather to absorb heat

Floor with independent ceiling

Dwelling-house and flats formed by material change of use

For a full statement, the Approved Document E – Resistance to the passage of sound, must be consulted

Independent ceiling with absorbent material

- at least 2 layers of plasterboard with staggered joints, minimum total mass per unit area 20kg/m^2
- an absorbent layer of mineral wool laid on the ceiling, minimum thickness 100mm, minimum density 10kg/m^3 .

The ceiling should be supported by one of the following methods:

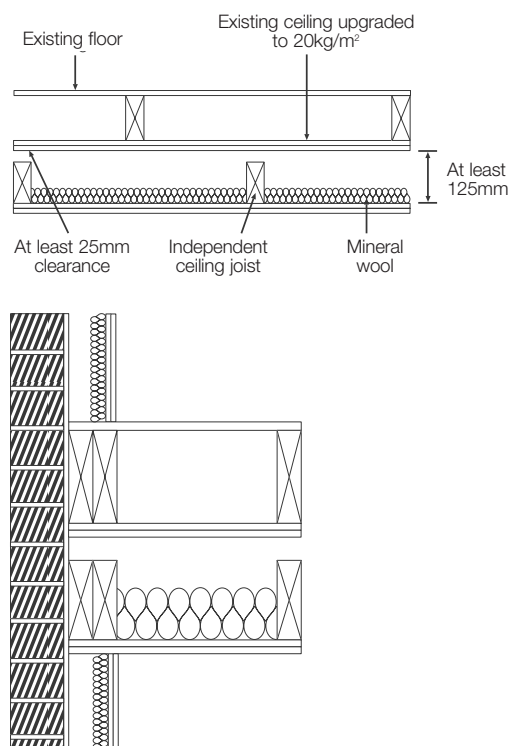
- independent joists fixed only to the surrounding walls. A clearance of at least 25mm should be left between the top of the independent ceiling joists and the underside of the existing floor construction, or
- independent joists fixed to the surrounding walls with additional support provided by resilient hangers attached directly to the existing floor base.

Do

- Remember to apply appropriate remedial work to the existing construction.
- Seal the perimeter of the independent ceiling with tape or sealant.

Do not

- Create a rigid or direct connection between the independent ceiling and the floor base.
- Tightly compress the absorbent material as this may bridge the cavity.



Platform floor

Dwelling-house and flats formed by material change of use

For a full statement, the Approved Document E – Resistance to the passage of sound, must be consulted

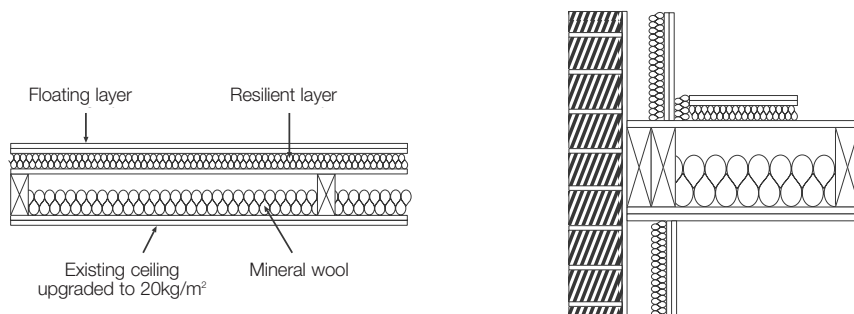
Where this treatment is used to improve an existing timber floor, a layer of mineral wool (minimum thickness 100mm, minimum density 10kg/m^3) should be laid between the joists in the floor cavity.

The floating layer should be:

- a minimum of two layers of board material
- minimum total mass per unit area 25kg/m^2
- each layer of minimum thickness 8mm
- fixed together (e.g. spot bonded or glued/screwed) with joints staggered.

The floating layer should be laid loose on a resilient layer. The resilient layer specification is:

- mineral wool, minimum thickness 25mm, density 60 to 100kg/m^3
- the mineral wool may be paper faced on the underside.



Do

- Remember to apply appropriate remedial work to the existing construction.
- Use the correct density of resilient layer and ensure it can carry the anticipated load.
- Allow for movement of materials, e.g. expansion of chipboard after laying (to maintain isolation).
- Carry the resilient layer up at all room edges to isolate the floating layer from the wall surface.
- Leave a small gap (approx. 5mm) between skirting and floating layer and fill with a flexible sealant.
- Lay resilient materials in sheets with joints tightly butted and taped.
- Seal the perimeter of any new ceiling with tape or sealant.

Do not

- Bridge between the floating layer and the base or surrounding walls (e.g. with services or fixings that penetrate the resilient layer).



A pdf of the Essential Cards is available on the Building Control Professional Group pages of www.rics.org