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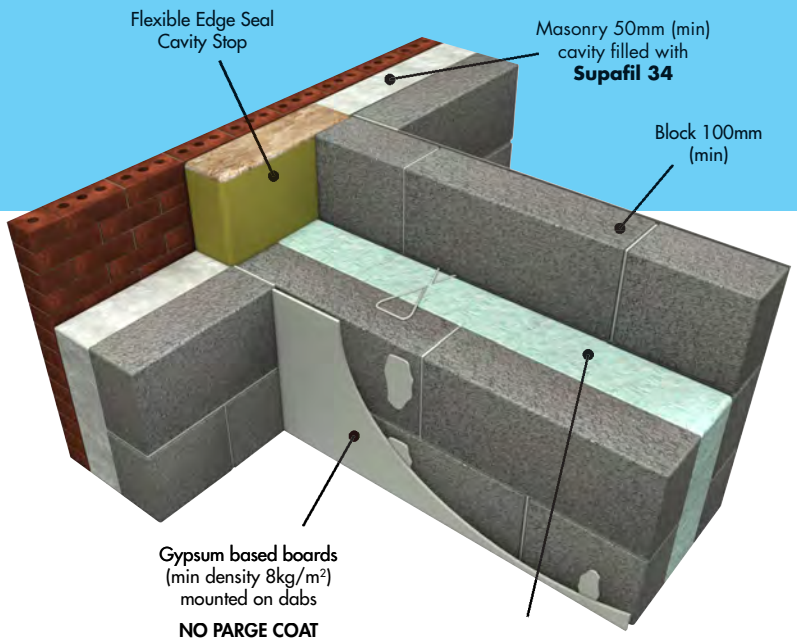

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Introduction

Welcome to the March edition of Planning and Building Control Today – Northern Ireland.

Northern Ireland's planning system is on the cusp of momentous changes with local government reforms seeing 11 new councils holding planning powers by 1st April 2015. It is an exciting time, but one not without challenges. Not least of those challenges is ensuring that the transfer of powers from the Department of the Environment, to the councils is done as seamlessly as possible. The ultimate result of the new planning system should see huge benefits, not only for communities, but for developers alike. NILGA, the Northern Ireland Local Government Association is confident that the new plan-led system will provide greater clarity for all, and will encourage the formation of healthy working relationships between the various participants in the planning process.

One area that must be addressed through the planning system is that of flooding which is a national infrastructure concern. This issue examines the latest government consultation on the SuDs programme with Sam Ibbott of the Environmental Industries Commission who looks at how this will be delivered through the planning system. With an ever-increasing call for more housing to be built, and all political parties likely to make a related commitment in their general election manifestos this year, it is important to get SuDS regulations in place as soon as possible as our towns, cities, and urban spaces become ever more densely populated.

In terms of BIM, this year has seen the Digital Plan of Work toolkit released along with PAS 1192-5. This issue contains an article from Stephen Hamil, Director of Design and Innovation and Head of BIM at RIBA Enterprises, discussing the Digital Plan of Work toolkit. Steve Thompson, Chair of BIM4M2 and Market Manager for Construction & Infrastructure at Tata Steel evaluates the product information required and how it can be delivered, and Sarah Birchall of BSRIA describes what is required by Government Soft Landings. We also have a very interesting article from Martyn Horne of the Landscape Institute's BIM Working Group highlighting how landscape architects can collaborate and share information with their project teams in the evolving process of BIM.

This edition also looks at energy efficiency with articles detailing fuel poverty and mitigating energy losses within buildings – another key topic for this time of year.

Whatever your profession, I hope you find something of interest in this issue and look forward to hearing your thoughts and comments. ■

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The Disintegration of the Housing Debate

In addressing the urgent need for more housing, Professor of Environment and Spatial Planning, Alister Scott believes that key participants in the housing question need to embrace the economic, social and environmental drivers of development in a more joined-up discussion...

As we move inexorably towards the general election in 2015, the issue of housing policy and delivery will become increasingly important in political debates. Current estimates of future housing need reveal an annual need for some 265,000 additional dwellings but, due to significant past undersupply, this figure may well need to rise to 300,000 (RTPI, 2014). Invariably, building houses on this scale will invoke negative political and public response. But how and where should these homes be built?

In my view, there are no 'magic bullet' solutions as the housing question is complex demanding much more cross-sector thinking; but this type of approach is something conspicuously absent in contemporary policy and decision-making processes. Unfortunately, this is also a view that does not sit well with the media, politicians or the public.

Arguably, we have reached this impasse because the 'wrong' question is being asked. Leaving aside the intractable issue of how 'need' is measured, the question should not be how many houses do we need to build; rather it should be: what kind of future places do we want to create? But this fundamental societal question is increasingly overlooked as the housing debate becomes increasingly disintegrated. New development is viewed in isolated pieces without reference to its place in the overall built and natural environment jigsaw. The fetish for housing

numbers alone pays little reference to the infrastructure, community, economic and environmental services needed to support them. This is symptomatic of a wider agency and sectoral myopia.

Potential solutions of new garden cities such as Ebbsfleet and Bicester have been heavily promoted by parts of the government. Yet the government is also providing renewed policy support for protecting green belt from new housing incursions; such political posturing and potential contradictions generates significant scope for land-use conflict and uncertainty.

This is exacerbated by the vacuum in strategic planning and where some 70% of local authorities are yet to make their local plans fully NPPF compliant (Source: PINS December 2014). Increasingly, questions are being asked about the competency of the Duty to Cooperate in resolving unmet housing demand, together with other fundamental components of the housing question such as speeding up the development pipeline, overcoming landbanking by developers, identifying viable delivery mechanisms, and delivering affordability and social and environmental justice through new schemes such as help to buy.

So I want to explore a different way to frame and manage the housing opportunity/problem. In doing this, however, the key participants in the housing question need to go beyond the current Duty to Cooperate models; moving out of established sector-based comfort zones and embracing the economic, social and environmental drivers of development in a more joined-up discussion.

First, there needs to be a more holistic approach to objective assessments of housing need. At present, too many assessments are made by the local authority in isolation resulting in challenges at examination. Unfortunately, the guidance and metrics for housing need assessments are beset by statistical anomalies and dubious econometrics, making any derived figure disputable. A collaborative approach such as that pursued by the joint housing study of the Birmingham and Black Country LEPS provides a useful model forward under the auspices of the Duty to Cooperate. However, there is a powerful

case for making such models more transparent and understandable and also linking them to transport, employment, waste and climate projections.

Secondly, there needs to be strategic consideration and assessment of different growth models, set within the opportunities and constraints of housing market areas, not just within single local authorities which do not represent functional geographies. Despite claims to the contrary, there is no way that solutions based on garden city ideas alone can address the housing requirement nor, equally, that brownfield sites alone can meet the projected housing need. So we need to bundle several options together within housing market areas that deliver multiple economic, social and environmental benefits. Here a potential option mix might include new towns, urban extensions, urban densification, public transport extensions and dispersed development for example.

Thirdly, we need to move away from any one-size-fits-all approaches that restrict such options. In particular, the green belt has moved past its 'use by' date. I have argued elsewhere that we need to sensitively rethink the value of the green belt in order to maximise its environmental and social benefits, but only as part of a wider discussion of placemaking. Such green components form a vital link in development considerations: not as bolt-ons, but rather as core infrastructure to help promote liveability and growth.

Fourthly, we urgently need to consider how housing and employment developments are to be financed and delivered. All too often, the debate revolves around the perceived problem of securing planning permission, but this is only one part of the overall development pipeline. Significantly, the development of 10,000 homes at Northstowe is being delivering by the Homes and Communities Agency as landowner on former RAF land – hence a brownfield, and previously-developed site. In many ways this might provide an instructive way of overcoming some of the stagnation observed in the development pipeline. Significantly, the TCPA has provided some much-needed leadership on this issue within its New Town Act manifesto with the idea of a revitalised development corporation delivery vehicle.

Finally, we need to think about the quality of life for residents and users of the new places we create. All too often the social and environmental components are seen as luxury bolt-ons to new developments. Yet, in reality, they need to be integral components of the mix from the start. Issues of climate change and health demand that we rethink how our cities, towns and countryside are designed and planned to avoid costs and disruption further down the line; flooding, drought and extreme weather conditions demand more proactive responses. These are all issues that will greatly add to the sustainability and liveability of our settlements.

At the heart of the housing debate lies the need for a culture change from agency and sectoral insularity to more cooperative and collaborative ventures across the built and natural environment professions and the wider public to understand, view and assess better the housing picture within the wider economic, social and environmental settings in which it sits. This is far from some academic navel gazing exercise, but rather a new set of discussions that have been missing from the current debate, which is becoming increasingly sterile and polarised as the election draws near. ■

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Planning for SuDs

Sam Ibbott, Deputy Public Affairs Director at Environmental Industries Commission examines the latest government consultation on SuDs and the new approach of delivering it through the planning system...

The photo-op, when staged, can be a politicians dream. If you follow politics, particularly at a local level, they can often be unintentionally hilarious – such as the classic pose of an MP crouched down and pointing at a pothole with a look of horror on his or her face as if the pothole had just said something rather untoward about their mother. So when the country saw widespread flooding last year it was unsurprising that MPs of all colours hastily donned waders and took the opportunity to get photos of themselves looking sympathetic next to people whose lives had at best been inconvenienced and, at worst, devastated by rising water levels.

Flooding is a national infrastructure concern, and with the issue so high in the public's consciousness it would have been an opportune moment to announce at least one practical step forward – the implementation of Sustainable Drainage Systems (SuDS). SuDS are the process of dealing with excess surface water by mimicking natural processes which slow the movement of water before it enters rivers or streams, or stores the water so it can either soak into the ground or evaporate. Not in themselves the answer to all flooding concerns by any means, but SuDS have an important role to play – particularly in an urban environment.

The independent Pitt Review on flooding, which first recommended the greater uptake of SuDS, was published in 2008 and they were formally legislated for two years later in the Flood & Water Management Act (2010). An initial consultation on their implementation (as required by Schedule 3 of the legislation) closed in early 2012, and two 'go live' dates were subsequently announced and later rescinded.

Then in September of last year the government went to consultation again with a new approach for implementation which intends to deliver SuDS through the planning system. The government published its formal response to this consultation in late December.

The consultation saw a diverse range of submissions from local authorities, water companies, property developers, consultants, community groups and trade associations (including the Environmental Industries Commission (EIC)). At EIC we raised a number of concerns, many of which were at least acknowledged in the government's response and/or subsequently dealt with to varying degrees. Chief among the issues we raised were that:

- The latest consultation document framed SuDS almost exclusively in terms of flooding, and did not take into account their potential impact on water quality;

- Whilst the consultation's focus on the ongoing maintenance of SuDS is welcome, hastily delivered but inappropriate or poorly installed SuDS have the potential for much higher maintenance costs in the long run;

- Local planning conditions have not always been effective in the past – with houses being built on flood plains for example;

- There is a potential loophole in the proposed exemption from SuDS requirements for 'micro' developments (fewer than nine properties) in that a major development could be reclassified as

numerous smaller ones. There will also be an onus on the local planning authority to monitor the cumulative impact of numerous micro developments in their area.

In a Written Ministerial Statement published alongside the consultation response, the government made clear their "expectation" that sustainable drainage should now be included as part of major new developments "unless demonstrated to be inappropriate" – which could, for example, be the result of ongoing SuDS maintenance not being "economically proportionate"; if SuDS were to impair the deliverability of the development; or if they were to place "an excessive burden on business."

Despite this, EIC welcomed the government's emphasis on a requirement for SuDS to be maintained over the lifetime of a development. Although the market in third party SuDS maintenance is relatively immature and there are potential difficulties in gauging the robustness of maintenance providers and their expertise, we feel it is an important principle to have set out from the start. There is in any case a suite of maintenance options for developers to choose from, allowing a level of flexibility in the methods by which this maintenance will be funded and delivered. Responsibility for putting an arrangement in place, whatever its make-up, however, remains the responsibility of the developer as part of the planning application process.

Responses to the consultation did however raise concerns over a lack of technical expertise at local government level, particularly in smaller local authorities, to determine the suitability of sustainable drainage proposals when assessing planning applications – which can lead to inconsistencies. Although not originally proposed in the consultation document as a channel for securing the required expert advice, the government has subsequently accepted that the Lead Local Flood Authority (LLFA) are well placed to provide advice on such issues due to recent provisions in the Flood and Water Management Act which gives these bodies overall strategic responsibility for local flood risk management, including surface water. The government now intends to consult on making LLFAs a statutory consultee for planning applications on surface water management.

These changes to planning will take effect from the 6th April 2015 and the government intends to publish revised planning guidance in advance of this date, in addition to engaging with local government on a capacity building programme.

By this time it will have been seven years from recommendation to implementation – far longer than had been hoped. The new approach of delivering SuDS through the planning system will likely see them delivered more quickly, if not automatically to a high standard given the disparity of resources and expertise within and across local authorities. It is the path of least resistance, but whilst not ideal it is workable and certainly preferable to even further delays by going back to the drawing board.

With an ever-increasing call for more housing to be built, and all political parties likely to make a related commitment in their general election manifestos this year, it is important to get SuDS regulations in place as soon as possible as our towns, cities, and urban spaces become ever more densely populated. If the result of a wider spread use of SuDS is fewer photo opportunities for MPs, that's a price worth paying. ■

EIC is the trade association for the UK's environmental technologies and services sector.

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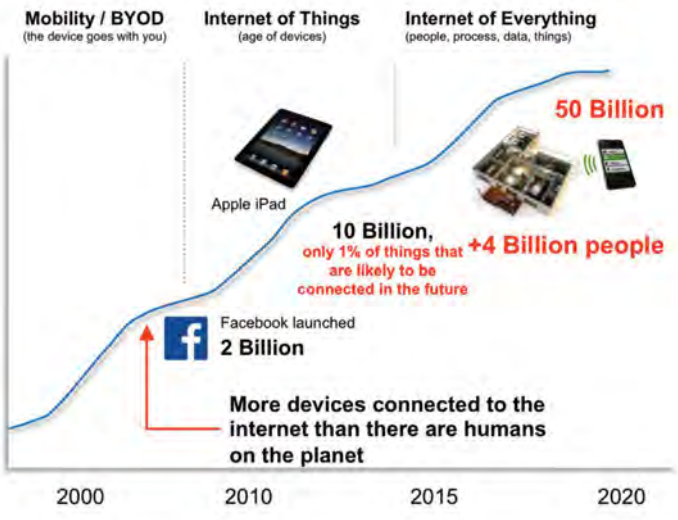
BIM and the data challenge

In developing data solutions for BIM Maturity Level 2, we also need to have in mind the future needs of Level 3 and beyond. Steve Thompson, Chair of BIM4M2 and Market Manager for Construction & Infrastructure at Tata Steel evaluates the product information required and how it can be delivered...

One of the most interesting aspects of digitisation of the construction industry for me is the potential to see a more complete picture of the reasons for a project and how an asset can be delivered, operated and maintained to maximum benefit. With my architect's hat on I see the BIM process as potentially providing a more complete and detailed brief to work with, with access to the information I need to make real-time decisions. With my product manufacturer's hat on I see it as a way of helping project teams ensure they have the right product to meet their specific needs, as defined by the whole project team throughout the asset's life-cycle. This may sound idealistic, but on both counts these scenarios have already been achieved many times over, they're just not yet the norm.

To illustrate the bigger picture and the direction of travel, it's worth looking at the number of things connected to the Internet, and how this is predicted to increase exponentially over the coming years. There are already significantly more things connected to the Internet than there are humans on the planet, and the impact of this is that things and humans can more easily communicate and interact.

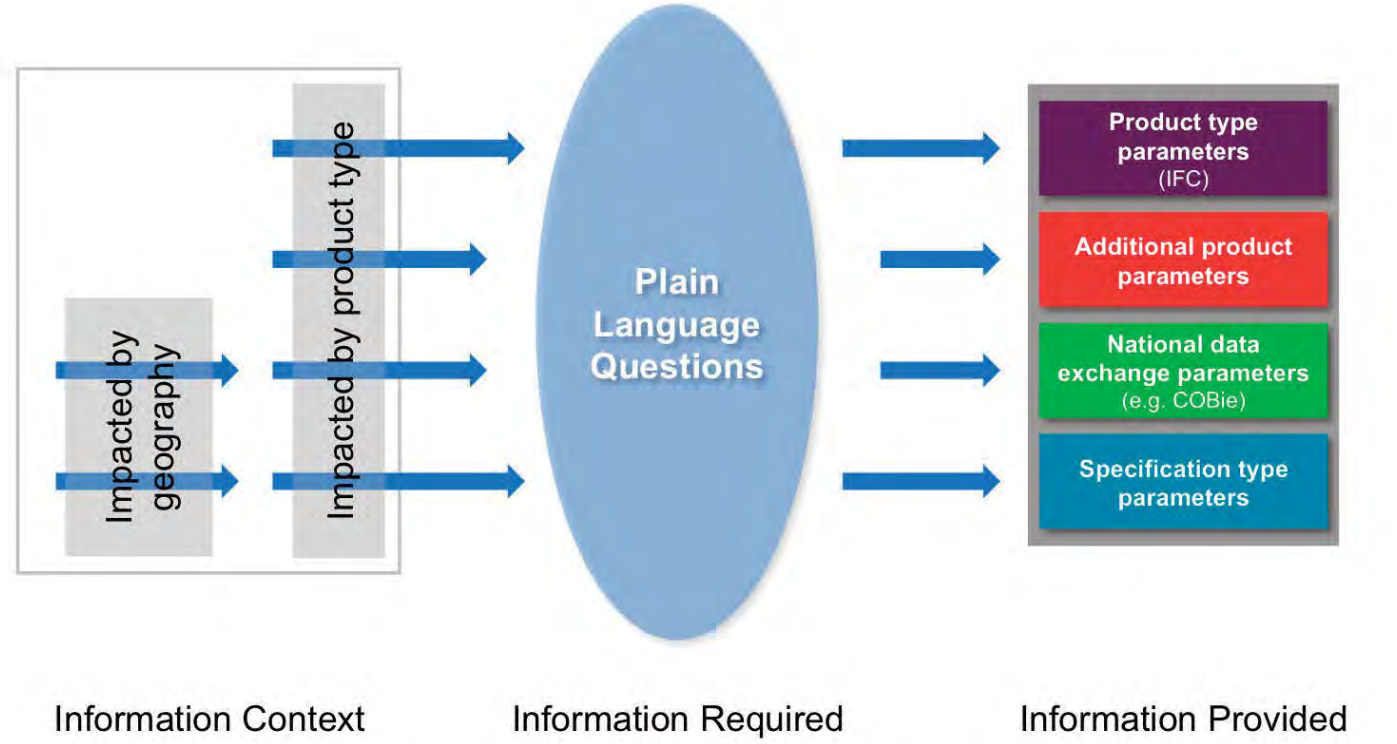
In addition to the predicted significant increase in connectivity, the United Nations are predicting a global urban population growth of over 2.5 billion between 2014 and 2050 (United Nations Population Division, 2014). In short, that means that if we house the increase in population at an average of 100 people per building, we will need to build just under 2,000 residential buildings every single day for the next 35 years.



Devices connected to the Internet over time. Source: CISCO IBSG, 2013

The reason for this slight detour is to highlight the point that when BIM maturity Level 2 becomes the norm, we are still only at basecamp in terms of the potential that can be achieved. It also means that in developing data solutions for Level 2, we need to have in mind the future climb to make sure we don't keep heading back to basecamp and starting again. From a delivery perspective, it means that with the scale of the physical construction challenge ahead, we need those tasked with delivery to be involved in defining the information that they will need to succeed, working with those who have the product data (manufacturers) to identify the data available and its potential benefits.

To get to the Level 2 basecamp we need structured, accurate, reliable and accessible product data that



not only clearly describes what a product is and how it performs, where it comes from and how it needs to be maintained, but also helps in the specification, supply and construction stages of its lifecycle. The challenge for the manufacturer amongst others, is to provide the right information in a suitable format to support a vast range of players, across different sectors and in different territories, using different approaches. If that is going to be achieved, there are a few key issues to address:

- Clearly defining what a product is, so that everyone and everything knows what they are looking at;
- Understanding the information requirements of different players (e.g. architects, engineers, supply chain partners, contractors, clients) and providing answers to those requirements;
- Understanding the most suitable format for exchange and use of information;
- Understanding how information requirements change in different countries or applications;
- Delivering the information required to address all of these issues, and understanding the potential resources and investment required.

It is certainly crucial that product information can be exchanged across software platforms and regions, so there needs to be clear mapping to open standards, including IFC (the Industry Foundation Classes). In addition, there needs to be clear mapping to any nationally mandated or required exchange formats such as COBie in the UK. The terminology used in these systems is still inaccessible to a large proportion of those who need to use them, including the majority of product manufacturers. Describing the thickness of a profiled composite cladding panel highlights the need for clear descriptions and definitions of parameters. Whilst generally described to the same ISO standard, a quoted panel thickness can mean

the core thickness (without the depth of the profile), or overall thickness (including the profile depth). This means that if a parameter is simply described as thickness, there may be two very different values used in comparisons, potentially leading to incorrect specifications.

This is where the concept of Plain Language Questions (PLQs) comes in. If a manufacturer understands the questions they are being asked and in a language that they are familiar with, they are much more likely to be able to provide the right information to answer the question.

This is the concept behind PDTs and PDSs (Product Data Templates, which become Product Data Sheets when completed with a manufacturer's product information). Originally developed by CIBSE, the PDT Steering Group now consists of representatives from other professional institutes, content providers, BIM4M2, BIM4 Fit Out, BIM4Water and BIM4DC (Data Centres). The focus is on having a cross-project team that has experience of a product or system type to develop templates based on what is required to effectively deliver that product, in commonly used language that is accessible to all. The BIM4M2 Data Working Group is working with others to significantly broaden out the reach of the templates to other product types.

In developing PDTs, the starting point is always COBie or SPie (Specifiers Product Information Exchange) templates where they already exist to ensure the minimum information requirements are met, and direct links to open standards. However, to maintain accessibility the complexity of mapping from the Plain Language Questions to these standards can, and is dealt with away, from the simplicity of the main data sheets.

The sheets are developed in a controlled environment between members of the design, manufacturing, contracting and FM communities, and then opened out to industry for wider consultation, meaning that the templates are created for industry, by industry.

There can be location-specific or sector-specific PLQs, all which are completed in Excel, and can then be used across all software platforms.

One of the key benefits of this approach is that the information only needs to be supplied by the manufacturer once for every product, and it can then be used in many applications, with project teams defining what information they require at each project stage.

The format can also be used as part of the selection process to filter products that meet the specified requirements. This may be achieved in the UK through the likes of the forthcoming Digital Plan of Works (DPoW), which whilst not mandated is likely to be used on public projects and will be a useful tool. However, as manufacturers who supply products into different territories, we need to provide data in a way that can be used in several formats and platforms, thus supporting both the Government's 2025 Strategy to increase exports of construction products and those private sector clients in the UK that are already using alternative approaches to developing MIDPs (Master Information Delivery Plans), and different formats of information. By providing information in a format that can be easily mapped to suit these differing requirements we are likely to arrive at a more efficient solution all round. ■

For more information on Product Data Templates, visit www.bimtalk.co.uk or the BIM4M2 website.

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COBIE – UK CASE STUDY
STRIDE TREGLOWN

In 2012, architects Stride Treglown were appointed to deliver a UK Government early adopter BIM project. As 'pathfinders' working with newly defined processes and delivering COBie outputs, Stride Treglown faced a number of challenges. To find out how Stride Treglown successfully implemented the project, Solibri UK Managing Director David Jellings, chatted with Anthony Walsh, Senior Associate and Sector Lead for Public & Community Projects and Dean Hunt, BIM Co-ordinator for Stride Treglown.

Stride Treglown is an international architectural practice with overseas offices in Dubai and Abu Dhabi and eight offices in the UK including London, Cardiff and Bristol, making them the 10th largest architectural practice in the UK.

Sustainability influences the way Stride Treglown runs its practice and since 2009 they have reduced their carbon footprint by 40%. Their expertise covers most sectors and they apply commercial awareness to balance the sometimes conflicting aspects of time, cost and quality to achieve the best outcome for our clients.

Stride Treglown have always invested in technology and are at the forefront of BIM implementation.

How did you first become aware of the Government BIM and COBie requirements?

'We had been working in a BIM environment for a number of years and as one of our key client groups is government, in particular justice and defence, we were aware of the new COBie requirement as a government directive from the outset. To help improve our knowledge, we've attended numerous conferences and seminars and disseminated the information internally to raise our overall company awareness. We knew this was going to be important and that it would involve developing new working practices, so we wanted to be properly informed.'

When/how were you first involved in a COBie project?

'In 2012 we were appointed to deliver one of HM Government's Early Adopter projects. Our appointment was as the technical delivery architect, initially to deliver the scheme to COBie data exchange stage 3 (representing the technical design solution). This changed however and we were eventually became tasked with fully coordinating the BIM process and COBie data requirement (with the lead contractor, other consultants and the supply chain) to stage 6 – i.e. practical completion.'

What were your individual roles in the project?

Anthony Walsh: 'I am a Senior Associate and Stride Treglown's Sector Lead for Public & Community, which incorporates this particular work stream.'

Dean Hunt: 'I am Stride Treglown's BIM Co-ordinator responsible for directing the project team in a collaborative BIM environment to ensure that the geometric coordination and data requirements were achieved and fully coordinated. I needed to develop new workflows and strategies to achieve the COBie data requirements for the project.'

How did this project change the way you worked?

'We were already familiar with current BIM processes, such as coordinating geometry and clash detection. However, the new process required us to output intelligent data in a format that could be easily accessible to all. This necessitated implementing new working practices and protocols to ensure that these outputs could be incorporated into the COBie schema. Technically, we had to invest in additional add-ins for authoring tools to enable a more efficient workflow. We also had to invest time working with other project partners to help them deliver the data requirements.'

"Early engagement of the whole project team is essential to ensure productive output. The management and collaborative culture of the team is just as important as the technical manipulation of the data."

Anthony Walsh, Senior Associate, Stride Treglown

What was the main initial challenge?

'This was a new way of working, not just for us, but everyone from the client down. The biggest challenge at the start of the process was the initial lack of understanding by the project team. The information requirements and formats were at first ambiguous, but after research into the requirements of COBie, the required levels of data became clearer and more understandable to us all.'

And the wider challenges?

'The whole team were fully committed to delivering the project, but not having previously worked with COBie, it was a steep learning curve for everyone involved, including the mechanical & electrical engineers, civil & structural engineers, catering suppliers and key supply chain partners. All were very enthusiastic about working in a collaborative environment. We believe our lead role was instrumental in ensuring that all parties were fully integrated into the process.'

How did Solibri become involved?

'We were aware of the options available to output COBie data, including directly from the authoring software itself. Initially this seemed like the obvious and easiest option but unfortunately it did not satisfy the requirements. It was important to us that we found a way of automating what was essentially a very manual process, in order to develop a repeatable workflow for our future COBie requirements. We originally became aware of Solibri Model Checker from our attendance at the ICE BIM Conference in 2012 and it seemed to provide the solution to many of our problems.'

How was Solibri Model Checker (SMC) applied in the project?

'One of the main problems we faced was how to ensure that the model contained the complete and correct COBie data. It is very inefficient to spend time validating, and checking COBie outputs only to have to correct them further down the line. Using SMC rule sets, we were able to validate the completeness of the COBie output before exporting to the data sheets. Using the classification tables to coordinate all consultant models is a particularly powerful feature of SMC, furthermore, SMCs infinitely configurable user interface makes coordinating data straight forward and particularly excels when using IFC models prepared by varying authoring software. Within SMC we were able to federate all discipline models using IFC, which is the industry standard exchange format and also a requirement of the COBie deliverable. At every stage, the Solibri UK team worked with us closely to optimise these solutions.'

How successful was the application of SMC?

'We believe we successfully implemented the workflow that we initially set out to achieve. We strongly believe that COBie should be an output provided by data in the authoring software which is then federated, coordinated, validated, and checked by SMC, which then automates the export to the completed COBie sheets. By eliminating any manual data entry in the final COBie sheets we not only save a huge amount of time, but more importantly eliminate user error from the process. Large projects that require data output from many maintainable assets becomes almost impossible to achieve without using automation software such as SMC.'

How do you see the future for COBie and Solbri's role in its implementation?

'Being championed by government, COBie will be business as usual from 2016 and we are already seeing elements of COBie being requested by some private clients. We feel ultimately that Excel as the output will gradually disappear; however, COBie data will remain and become the universal delivery method across all projects. Stride Treglown has now adopted SMC software to undertake internal coordination so that as a practice we can deliver fully co-ordinated buildings. We feel confident that SMCs communication method is far superior to its competitors and will be an essential component of future project deliveries.'

"It was important to us that we found a way of automating the process, creating a workflow that was repeatable. It was imperative to generate the data requirement via industry standard IFC format as COBie data is a subset of IFC. We strongly believe COBie data should reside in the authoring software which can then be federated, coordinated, validated, and checked by Solibri Model Checker".

Dean Hunt, BIM Co-ordinator, Stride Treglown

The toolkit for BIM – completing the jigsaw

Stephen Hamil, Director of Design and Innovation at NBS, discusses the digital toolkit that will complete the Level 2 BIM suite and how it will enable everyone in the industry to use BIM as an integral part of their everyday working lives...

The previous issue of BIM Today carried the news that the NBS-led team had been appointed to develop the digital toolkit that will complete Level 2 BIM; now we are almost half way through the process and on track for a Spring 2015 launch.

So what is the toolkit? What will it do and why is it important?

At the outset, it is important to remember that Building Information Modelling (BIM) is not an end in itself. The Government's Construction Strategy identifies predicted growth of 70% in the global construction market and is determined that UK businesses will be well placed to take advantage of this.

By delivering projects quicker, more cheaply and more sustainably, the industry can take the lead in a market where it already has a strong competitive edge and drive up exports. More broadly, BIM has a role within the burgeoning digital economy, as UK construction businesses need to be in a position to compete for the £200bn per annum market for integrated city systems that is forecast for 2030.

It is within this context that we are developing and delivering the digital toolkit on behalf of the UK BIM Task Group and Department for Business, Industry and Skills to sit alongside the five existing pieces of guidance that make up the Level 2 'suite'.

Collaboration is at the heart of BIM and at the heart of the toolkit. As David Philp, Head of UK BIM Task Group, said in BIM Today at the end of last year, BIM is a behavioural change programme which will enable and promote the closer integration of disciplines and it is this that will lead to the improvements in project delivery that lie at the heart of the construction strategy.

Up to now, BIM has been seen by many as the preserve of a few, rather 'techy' people, but this misses the point and the industry runs a risk of getting side-tracked by almost endless technical discussions held by small groups.

The digital toolkit is aimed at addressing this: it will simplify processes and be intuitive and easy to use, enabling everyone to use BIM as an integral part of their everyday working lives, whatever stage of BIM adoption they are currently at. The toolkit will be fit for purpose right across the industry, including all disciplines and all scales of projects from large infrastructure schemes to small, domestic scale works, so no-one should feel that it is "not for them".

While the mandated use of BIM on central-Government funded projects from April next year is clearly providing much momentum, discussions with architects, contractors, engineers, clients, manufacturers and facilities managers have reiterated that there's a real need for this initiative across the board.

At a recent roundtable held at NBS Live, the widespread view was that, although everyone's current processes allow projects to get built, there are many holes in these existing methods of working. It's these holes that the digital toolkit aims to fill, providing the missing pieces of the BIM jigsaw.

This kind of discussion makes the team hugely optimistic that it will be used in the private sector as well as public, because it's just a smarter way of working.

Stephen Hamil, Director of Design and Innovation at NBS

So what exactly is the digital tookit? Put simply, the project involves devising a standardised and digitally-enabled classification system and a digital plan of works tool. This will create a unified, single, classification system for use within construction and will provide an easy to use web portal which guides users through the construction process.

The first piece, the classification system, will be a new version of Uniclass which will be based on the international ISO/DIS 12006-2 framework. This will build on the work NBS has already carried out over recent years under commission from the Construction Information Committee (CPIC). By completing this, the industry will have a unified structure which will provide mapping and guidance so objects can be configured at a project level to have the correct multiple classifications where required.

Some 5,000 templates will be developed, setting out guidance for Levels of Detail (LOD) and Levels of Information (LOI) for construction objects. Initially these will be spaces, systems and products for architecture, building services, structural engineering, landscape design and civil engineering. These will be freely available online and will also be available in both IFC and MS Excel format. These will form the "construction language" that all project teams can use to define their information exchanges for a particular stage of a project.

The second piece, the digital plan of work, will enable the project leader to clearly define the team, responsibilities, and an information delivery plan for each stage of a project, who, what and when – in terms of documents, geometry and property-sets.

Over the next few months the project team will continue conversations with representatives of all disciplines and will be asking for feedback on progress. To assist this, events, webinars and seminars will be organised by NBS in partnership with the professional bodies that sit on our steering group.

The digital toolkit is for the whole industry and to have the greatest chance of success, we want it to be developed by the industry. To get involved and to keep up with latest developments, please visit the NBS website (www.thenbs.com/bimtoolkit) and the NBS BIM Toolkit and Digital Plan of Work Discussion Group on LinkedIn. ■

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BIM: The bigger picture

At the Viewpoint North American user conference in Portland Oregon earlier this year I presented the theory behind Viewpoint's BIM strategy. Because our goal of developing the best Common Data Environment in global construction is heavily influenced by the UK BIM mandate, the diagrams and processes of PAS1192:2/3 featured heavily, and information exchange and activities either side of the contract line were discussed in some depth. Nowadays, the audience rates the speakers on mobile devices and comments were captured in snappy tweet sized snippets, so the feedback wasn't long in coming. The most fascinating was 'Very informative, but the session wasn't about BIM'. If the process of building an information model as a team to inform and enrich the design – build – operate lifecycle isn't BIM, what then is?

It's clear that BIM means many things to many people.

This seemingly bizarre comment made me think. Words and concepts behind acronyms are overshadowed by the desire to adopt new technologies to improve the processes and parts of the project puzzle the beholder occupies. The designers see reusable design artefacts, the contractors see the greatly improved design review process, estimators can see the quantity take-off potential, and the clients are promised better handover information. It's rather similar to the Indian fable of The Blind Men and the Elephant – the true form of BIM is masked by perspective.

At 4Projects by Viewpoint in Newcastle we see the whole picture, or indeed, the elephant in the room, every day. Our users span the entire asset lifecycle from concept sketches, through construction and use to demolition. The B555 roadmap describes the need for a common data environment on both sides of the contract line so that information in the project information model (PIM) can be curated collaboratively by the tier 1 appointments and their supply chains, before being passed into an asset information model (AIM) for the clients operational use. Critically this AIM information should be structured in the same way as PIM. When the next project starts, the information can be churned back into the project as a key element of the briefing and tender process. But the self-populating employers information requirements (EIR) based on learnt wisdom from previous projects is currently a long way from fruition.

Car manufacturers have already created cleaner flows of products and data from inception to the hands of consumers. A new car comes with a handbook on operation and maintenance, the specification of the wiring or chassis is not relevant to the owner. In a similar way a building should be delivered with a well ordered handbook of relevant information. COBie is designed for this purpose; although each building is unique and requires tailoring of the required elements.

Why, also, do major construction companies and design practices adopt an internal facing strategy for BIM, when the government is encouraging a more external facing collaborative approach? Moving past this phase as we approach 2016 is the key challenge, and no one business can do it alone.

Perhaps delivering Level 2 ahead of the mandate is stalling for some because they believe their partners haven't completed the required work to reach this level, and focus therefore on matters that can be addressed today like developing a clash detection strategy, or deploying new BIM authoring software.

One of the most commonly cited shortcomings is the quality of EIRs. Lacking a fundamental digital project briefing document draws the focus away from creating a rigorous COBie delivery process. This is a symptom however, rather than the cause. How can a client prepare an adequate EIR when they don't know what data they need, or are able to, procure.

With prime responsibility are the facilities management software vendors. It is often said that until the FM tools can take COBie, the requirements cannot be set and, in turn delivered. FM software vendors refute this. They say that as soon as they know which parts of COBie their customers care about, they'll happily map COBie to their tool without risking access to legacy data. The FM world is aware of BIM and its consequences, but delivering BIM for FM tools which are fully 'COBie ready' is like designing HD ready televisions in the days when we only had 4 channels. The recent release of BS1192:4 was a key step towards BIM for FM in the UK, but software is not developed overnight and until this standard takes hold in live contracts the scope of works will remain incomplete.

Clients also take issue with the project team for not offering a menu of data for them to choose from; a kind of data takeaway menu allowing decisions to be made at the tender stage about which bidder offers not only the best price and value in terms of the physical project, but allowing the data product on offer to be judged as part of the process. But as with the FM conundrum the contractor counters with the need to understand the scope of works before pricing the job. As it is, BIM consultants are currently working hard to uncover the client's data needs by playing the role of a digital archaeologist, and the resultant bespoke EIRs lack consistency.

The government is also to blame for weak BIM Execution Plans leading to BIM projects resembling traditional projects but with more models and some new software tools. 'They haven't even finished Level 2, so how can we work to it?' This is true; it isn't all there yet despite 2016 approaching fast, and the situation described may appear to be a Mexican standoff, but the government has addressed the issues they are charged with resolving believing it will have a domino effect on the other issues that prevent progress. They believe that through standardisation and a mandated process, a world leading construction industry will prosper in the UK, selling its services to the world whilst delivering better projects at home.

Substantial investment in UK construction has delivered the right platform to deliver more efficient, more predictable and better informed projects than ever before. The 1192 suite of documents has been designed and delivered to address the situations discussed above. The classification system required to unify the way we order work across the supply chain to deliver information exchanges has been chosen and is on its way to delivery. The dPoW work is underway to allow clients to plan their projects and specify their requirements in a standardised way. All this with the COBie schema mandated some time ago to offer a framework for passing information from PIM to AIM, combined with the imminent EIR template make for a compelling description and facilitator for Level 2 BIM maturity. When all of this effort is outlined, or even distilled into the Bew-Richards wedge, which first appeared in 2008 it is no wonder the world is paying attention, this includes global software providers like Viewpoint.

Although UK defined, these are not just UK specific issues. Every modern construction industry needs to extract structured data from their projects, distilling it into information, which, combined and interrogated produces knowledge, impacting their business with wisdom won.

As for BIM, has the concept outgrown its acronym? Maybe it's just 'Big Data' with BIM processes as a mere source. We now have software as a service (SaaS) databases for construction, offering cross project knowledge capture and the collaborative data capture as and when it is created either on site, in the office or in the factory. This is why Viewpoint, as a software company that focusses solely on construction and which has a wealth of experience in SaaS and databases, is really focussing its energy in the BIM arena. We know construction and understand how challenging every day can be in your business and develop tools to help. We are already the home of thousands of live projects with all of the complex needs this brings. However, as construction industry processes evolve, the more structured data the supply chain will be able to produce to clients demand, creates a need for construction to have software tools that facilitate the delivery and acceptance of a digital product alongside the built fabric. So if you want to talk about how to construct, procure and take advantage of the 'I' in BIM call the 4Projects by Viewpoint team.

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BIM and the landscape architect

Martyn Horne of the Landscape Institute's BIM Working Group highlights how landscape architects can collaborate and share information with their project teams in the evolving process of BIM...

Any person or company setting out on the BIM journey may understandably think that BIM and its associated term, the Building Information Model, refers directly to buildings or more specifically, architecture. They may also be forgiven for thinking that it also refers to a particular file format or specific piece of software. However, BIM is not a file format, it is not a piece of software and it is not even an information technology. Rather it is a business process that is defined by a series of workflows (that may vary from project to project) and these workflows are enabled by information technology. Furthermore, the building referred to in its name is not a noun as in 'the building', but a verb, as in 'to build'. This is the first step to understanding how landscape architecture fits into the BIM.

Collaboration and communication

A key aim of the BIM process is to facilitate collaboration, communication and the effective exchange of data between different members of the construction team.

A typical visual definition of BIM is heavily focused on the architecture and it's often shown without even a basic terrain. But a building cannot, and does not exist as a separate entity to its site. As seen in Fig. 1, even at a basic planning level stage, the 3D model and its linked 2D plans, elevations, sections and information schedules communicate so much more information because they involve the site.

At the Landscape Institute we recognise the need to collaborate in order to get schemes built. The Building Information Model itself, can be seen as a manifestation of that collaborative process of

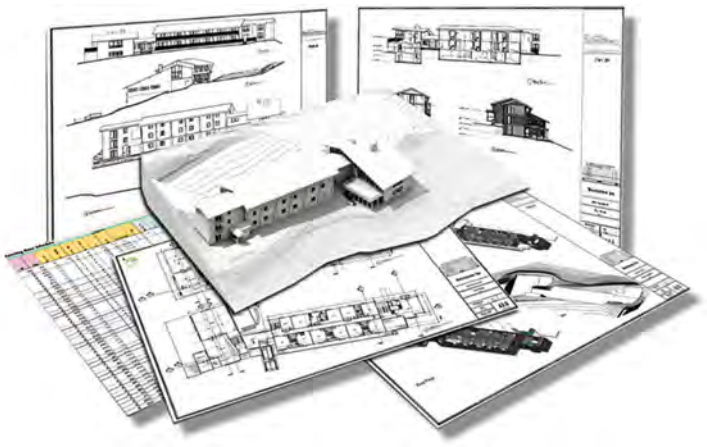

Fig. 1

communication and information exchange. It is most easily understood by the image below (Fig. 2), which shows a three dimensional digital model of the project to be constructed.

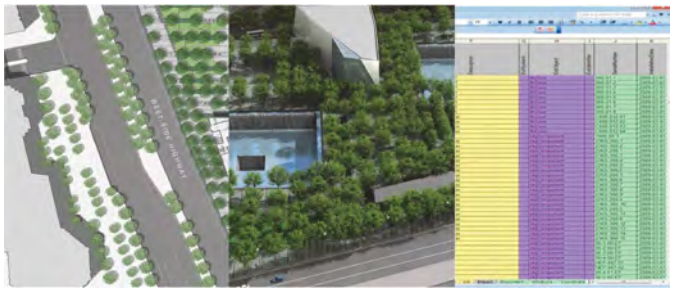

Fig. 2

From this model it is possible for the various parties involved in the project to extract both visual and data-based information back out of the model. For example, plans, elevation and sections can be taken or cut through the model and information can be

generated in the form of reports and schedules. Crucially, because the information can be taken from the live model, a great deal of the repetitive work encountered in traditional 2D CAD based drawing and schedule creation can be reduced and just as importantly, errors can be reduced or eliminated.

What can landscape BIM offer specifically?
In addition to the traditional documentation stage, the landscape BIM can offer terrain water flow analysis, minimum and maximum grading analysis, site cut and fill calculations, water volumes, existing tree survey and tree protection planning, planting schedules, material quantities, maintenance reports and clash avoidance with underground services.

Fig. 3

Both the Landscape Institute and the UK Government recognise that the software required to design and document architecture and engineering is not necessarily going to be the best software for landscape architects. It is one of the reasons that both institutions support the move to certified, but neutral file formats such as IFC and data exchange standards such as COBie and Product Data Templates.

Helping the industry change
One of the remits of the Landscape Institute's BIM Working Group, which was set up approximately two years ago, is to develop change within the industry. To highlight a couple of the group's recent activities, we are currently running a series of BIM Masterclasses around the country to present the BIM workflow within the context of the UK Government's Mandate for BIM Level 2, and the Digital Plan of Work within landscape architecture. The group is also involved in developing a series of Landscape Industries Product Data Templates which will feed directly into BIM Level 2 COBie datasets.

Conclusion
Change can be disruptive. Without a doubt, BIM will require an understanding of new processes and possibly the acquisition of new skills. But it is also important that as a design profession, we also maintain the values that make us unique. Too often, conversations about BIM exclude reference to quality of design, creativity and visual communication and it is really important that as we explore digital approaches and embrace the efficiencies of the new, that we also maintain the best of our traditional techniques and skills and expertise at the same time. It is an interesting time for landscape architecture as it is for the entire construction industry, but there has probably never been a time when the holistic perspective of the landscape architect has been more valuable. ■

For more information, please visit the BIM section of the LI website at: http://www.landscapeinstitute.org/knowledge/BIMOpenProject.php.

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Government Soft Landings within the BIM environment

Sarah Birchall, Sustainability Engineer with the research and consultancy organisation BSRIA Ltd, describes what is required by Government Soft Landings...

The word BIM is everywhere at the moment, and every now and then Government Soft Landings (GSL) is also mentioned in the same sentence, but there is still some confusion within the industry around what BIM and GSL are.

The UK construction sector is interested in these subjects because the UK Government has specified that all central government departments will be required to adopt fully collaborative 3D BIM (in terms of BIM maturity, this is Level 2 BIM which means, among other things, that all project and asset information, documentation and data is worked on electronically and collaboratively) on their projects as a minimum by 2016. Government has refined its definition of Level 2 BIM as compliance with the following seven components, one of which is GSL:

1. **PAS 1192-2: 2013** Specification for information management for the capital/delivery phase of construction projects using building information modelling

2. **PAS 1192-3: 2014** Specification for information management for the operational phase of assets using building information modelling (BIM)

3. **BS 1192-4: 2014** Collaborative production of information Part 4: Fulfilling employers information exchange requirements using COBie – Code of practice

4. **Building Information Model (BIM)** Standard Protocol for use in projects using Building Information Models

5. **Government Soft Landings (GSL)**

6. **Digital Plan of Work**

7. **Classification**

On the UK Government's BIM Task Group website BIM is defined as "value creating collaboration through the entire life-cycle of an asset, underpinned by the creation, collation and exchange of shared 3D models and intelligent, structured data attached to them". BSRIA views it more simply as a managed approach to the collection and exploitation of information about built assets.

GSL is a UK Government client requirement on projects that has been drawn up from the principles of a BSRIA published document called Soft Landings Framework BG54/2014. These requirements have been developed for use within Central Government's own procurement strategy. The key objective is about "aligning the interests of those who design and construct an asset with those who subsequently use it".

Although the GSL process generally follows the Soft Landings methodology described in the publication, it also adds the use of metrics to demonstrate compliance with construction project outcomes.

Under GSL, government departments will be required to define a series of high-level outcomes at the very beginning of a project. GSL also provides key questions that will need to be asked by the government department's GSL project champion (an individual assigned to each project to see the GSL process is followed through) and answered by the construction team as the project progresses. It is designed to aid decision making and focus on the defined project

Sarah Birchall, Sustainability Engineer, BSRIA

In 2009, BSRIA and the Usable Buildings Trust developed the core principles and published the Soft Landings Framework. The idea behind it is to make buildings perform better from day one.

The Soft Landings approach identifies specific gateways in the design and construction process where the performance needs to be reviewed and any issues addressed. By using the gateways to make changes and monitor improvements, a building can pass more smoothly from its build phase into occupation. This creates a "soft landing" rather than a "crash landing".

outcomes. There are four areas that these outcomes need to link with and each will need targets and monitoring throughout the project stages:

1. **Functionality and Effectiveness:** the needs of occupiers/users of the building must be met effectively.

2. **Environmental performance:** performance targets in terms of energy efficiency, water usage and waste reduction must be met.

3. **Facilities Management:** a clear, cost efficient strategy for managing the operations of the building is vital.

4. **Commissioning, Training and Handover:** it is important that projects are delivered, handed over and supported to meet the needs of the end users, operators and maintainers.

Exactly how the metrics will be set is still work in progress but GSL, along with its measurements for building performance, will help ensure that the building delivered meets the client's aspirations and objectives. GSLs main benefit is around meeting the needs of the end users and the required operational outcomes.

Further information about BIM, Government Soft Landings and Soft Landings can be found at the following websites:
http://www.bimtaskgroup.org/gsl/
https://www.bsria.co.uk/services/design/soft-landings/free-guidance/

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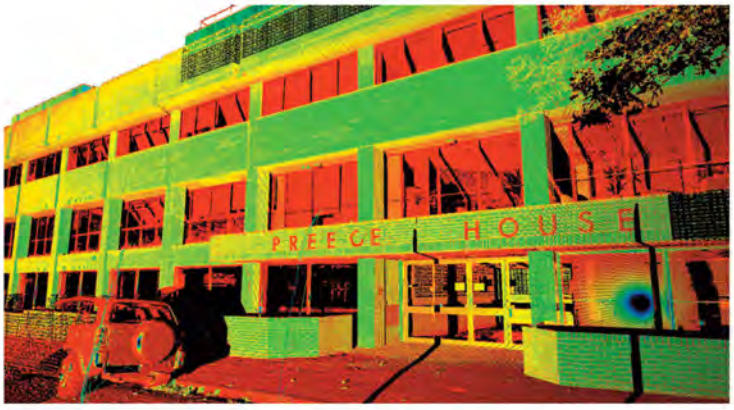
Surveyors



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CDM2015 and domestic projects

James Ritchie of The Association for Project Safety answers the questions most raised about the new CDM Regulations with regard to domestic projects...

Frankly, the APS phone line has been red hot since the beginning of the year. Everyone wants to know the implications of the new CDM Regulations; what they mean for their jobs, clients, designers and contractors. Can I be a Principal Designer? My client wants to appoint me to carry on giving him advice on his construction projects – is that allowed? How strict is the Principal Designer duty to ensure designers comply with the regulations? What is going to happen on domestic projects? What if my domestic client appoints all the contractors separately?

CDM2015 is aimed at small and domestic projects – the very area where most construction accidents and incidents are occurring – and many of the calls are about this area.

So what do Domestic Clients Need to do?
CDM2015 understands that most domestic clients will not be familiar with design or construction projects or associated legislation. If someone is about to alter or extend their house or buildings, thinking of putting up a new one or demolishing an existing one, then the Construction (Design and Management) Regulations 2015 (CDM2015) place a number of specific duties on them as a construction Client.

The aim of the CDM2015 Regulations is to make health & safety an essential and integral part of the planning and management of projects and to make sure that everyone works together to reduce the risk to the health or safety of those who work on the structure, who may be affected by these works, or who will use it once it's completed. A domestic client is someone who has construction work done on their own home, or the home of a family member which is not in connection with a business. Unlike CDM2007, domestic clients have duties under CDM2015.

The extent of these duties varies with the type of project involved. On projects that are likely to involve more than one contractor, the domestic client is required to appoint a Principal Designer before significant detailed design work starts so that they can advise and assist the client with their health and safety duties and plan, manage, monitor and co-ordinate the health & safety of the pre-construction phase of the project. The Principal Designer is a designer (architect, building surveyor or engineer for example) who can demonstrate to the client that they have knowledge, skill and experience of CDM2015 and understand the process of design risk management.

When clients are talking to a designer or designers about their project they should check that the designer has the capability and experience to do the work. A designer might be a member of one of the following professional bodies - ARB, RIBA, RIAS, CIAT, RICS, IStructE etc. and, in order to carry out the Principal Designer role, should have an accreditation in construction health & safety risk management (Registered membership of APS for example) or can provide evidence of having undertaken appropriate training on CDM2015.

The Regulations recognise that Clients hold the power to influence and control the designers and contractors they engage or appoint on a project, and therefore that the ultimate responsibility for the achievement of a safe and healthy project is in your hands as much as theirs.

The Regulations are about making sure that there is:

- Early appointment or engagement of capable key people or organisations that have sufficient skills, knowledge, experience and resources;
- A realistic project programme which gives enough time for planning and programming as well as carrying out the work itself;
- Early identification and reduction of construction risks and proper management of those that remain, so that construction is safe and does not damage the health of workers or others;
- Co-operation between all involved in a project and effective coordination regarding health & safety issues;
- Adequate welfare facilities provided from the start and throughout the construction phase; and that
- Appropriate information is made available to the right people at the right time so that work can be carried out safely and without risk to health.

However, it is very important that the amount of effort devoted to managing health & safety is kept appropriate and proportionate to the complexity of the project and level of risks. It is particularly important to be aware of, and avoid, unnecessary paperwork. Most domestic work should be relatively simple and therefore require minimal paperwork.

What type of domestic project is being planned? Irrespective of size or duration, the CDM2015 regulations separate construction projects into two types – dependent on how many contractors will be involved in the project.

The two types are:

Projects with only one contractor – where the project will only require one contractor working on the site. An example of this might be an electrician rewiring the house or a plumber installing a replacement boiler, when no other trades are required to do any work. Where the project only involves one contractor, the client duties specified in CDM2015 Regulation 4(1) to (7) and Regulation 6, must be carried out by the contractor. The contractor needs to undertake these duties in addition to their own duties as a contractor.

When clients are selecting a contractor, they should ensure that the contractor is aware of the client duties under CDM2015 as well as their own contractor duties. Clients are advised to ask for examples of how the contractor has done this on previous projects.

Projects that are likely to involve more than one contractor – this will be the majority of projects. For example, if the work will require a bricklayer, electrician, plumber, roofer and plasterer, then that is five contractors.

If it is likely that the project will require more than one contractor, then the client must appoint a designer with control over the pre-construction phase as Principal Designer and a contractor with control over the construction phase as Principal Contractor. These appointments must be made as soon as practicable and before the construction phase begins. If the client fails to make these appointments, then the designer in control of the pre-construction phase is deemed to be the Principal Designer and the contractor in control of the construction phase is deemed to be the Principal Contractor.

If the client is in doubt, they should assume that the project will require more than one contractor. The appointed designer or contractor should be able to help clients decide or alternatively clients can contact the free Public CDM Helpline as a source of independent advice on 0333 088 2015. ■

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A solution to combat fuel poverty

The NIA is calling on all political parties to recognise that home energy efficiency needs to be defined as a National Infrastructure Priority to combat fuel poverty...

The National Insulation Association (NIA) is advising that energy efficiency interventions provide the best long term solution to reduce energy bills and tackle fuel poverty. They are also the most cost effective way to reduce carbon emissions.

Neil Marshall, Chief Executive at the National Insulation Association said: "Following the significant reduction in insulation activity under the Energy Company Obligation and the closure of the SWI funding in the 2nd phase of the Green Deal Home improvement Fund, the government has to rethink its stop start schemes and incentives. It really needs to put in place a long term plan and funding mechanism if we are to insulate the UK housing stock in a timely manner. With over 7 million homes having inadequate loft insulation, over 5 million that require cavity call insulation and almost 8 million homes that need solid wall insulation, we need to significantly strengthen energy efficiency policies and programmes."

Make Energy Efficiency retrofit an Infrastructure Priority

The Energy Bill Revolution Campaign which the NIA supports is calling for 2 million low income homes to be brought up to EPC Band C by 2020, and 6 million low income UK homes up to EPC Band C by 2025.

To achieve these targets energy efficiency needs to be made a UK infrastructure investment priority on a par with energy generation and transport etc. To meet the 2020 target requires increasing annual investment to £2bn per year. This could be achieved by supplementing the ECO with either half of the £2bn annual proceeds of carbon revenue from the Carbon Emissions Trading Scheme and Carbon Floor Price projected for 2015 to 2020, or by using a small percentage of the UK infrastructure budget. An extra £1bn of government investment each year only represents 2% of the annual £45bn government infrastructure budget. Investment in retrofitting homes to make them energy efficient not only provides the best way to cut energy bills, reduce carbon emissions and tackle fuel poverty, it also represents one of the best economic investments the government can make in terms of growth, jobs created, value for money and tax revenue. The government's infrastructure programme and budget should be prioritised accordingly.

Marshall added: "The NIA is calling on all political parties to recognise that home energy efficiency needs to be defined as a National Infrastructure Priority with public investment to support the most vulnerable households and to create the confidence for the industry to scale up investment over the long term." ■

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Schöck performance values independently verified by the OISD

As a leading specialist in the provision of advanced solutions for thermal energy structural insulation, Schöck demands extremely high product performance standards. The company always ensures that all solutions exceed the necessary building regulations and that any performance claims are verifiable. To guarantee the accuracy of its current performance values, Schöck has submitted three of its main connectivity solutions for independent evaluation by the Oxford Institute for Sustainable Development (OISD), at Oxford Brookes University. One of the UK's largest research institutes dedicated to sustainable development research in the built and natural environments.

To identify areas where there is a risk of condensation and therefore mould growth in different design situations, a 'surface temperature factor' (f_{Rsi}) can be used. It allows surveys under any thermal conditions and compares the temperature drop across the building fabric, with the total temperature drop between the inside and outside air. The ratio is described in BRE IP1/06; a document cited in Building Regulations Approved Documents Part L1 and L2 and Section 6 in Scotland. Using the formula, the recommended (f_{Rsi}) value for offices and retail premises is equal to or greater than 0.5; and to ensure higher standards of comfort for occupants in residential buildings, equal to or greater than 0.75.

Three connectivity types were submitted for evaluation. Namely, concrete balcony connections (type K), steel balcony connections (type KS14) and steel beam connections (type KST). All three were tested using different construction methods. The purpose of the investigation being to determine the resultant heat loss, minimum surface temperature and therefore temperature factor (f_{Rsi}) to comply with UK Building Regulations Part L.

With the type K thermal break element, two situations were modelled. The first represents was a wall construction with balcony slab formed by projecting concrete floor slab through wall with balcony door. The second is the same wall construction, but with a Schöck type K50 isolating the balcony slab from the floor slab with balcony door.

Results:	**Without Isokorb**	**With Isokorb K50**
Temperature factor (based on wall surface)	0.725	0.912

The results obtained show a temperature factor of 0.725 for the connection without Isokorb and 0.912 for the connection with Isokorb. As in the UK, the temperature factor (f_{Rsi}) must be greater than or equal to 0.75 for residential buildings, the type K50 exceeds these values and meets the requirements of Building Regulations Approved Documents L1 and L2. The result for the model with no connector was a failure in this application.

The type KS14 modelled four situations. (1) Direct connection of balcony support bracket to concrete floor slab; (2) a 10mm 'thermal pad' using welded endplate on balcony support bracket; (3) a 20mm 'thermal pad' using welded endplate on balcony support bracket and (4) a KS14 unit connecting balcony support bracket to concrete slab.

Results:		
Description	**Min surface temp °C**	**Temperature factor f_{RSi}**
No balcony connection		0.949
Model 1 Direct connection	13.62	0.681
Model 2 Pad connection 10mm	14.26	0.713
Model 3 Pad connection 20mm	14.11	0.706
Model 4 KS14 H200	18.07	0.904

(All of the images show display Fig numbers as they appear in the published OISD report).

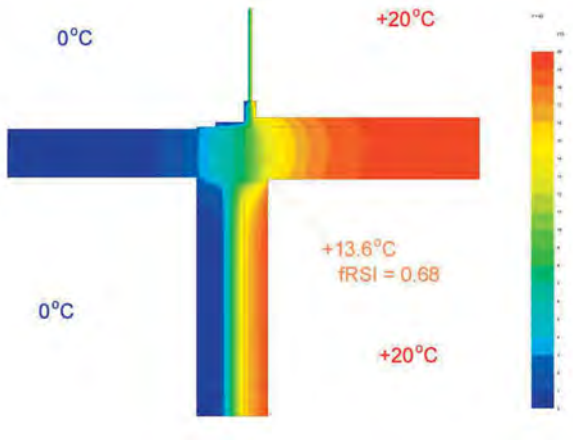

Fig 8. Direct connection (Case 1). This detail *DOES NOT* conform with UK Building Regulations Part L requirements for minimum temperature factor in dwellings (f_{RSi} = 0.75)

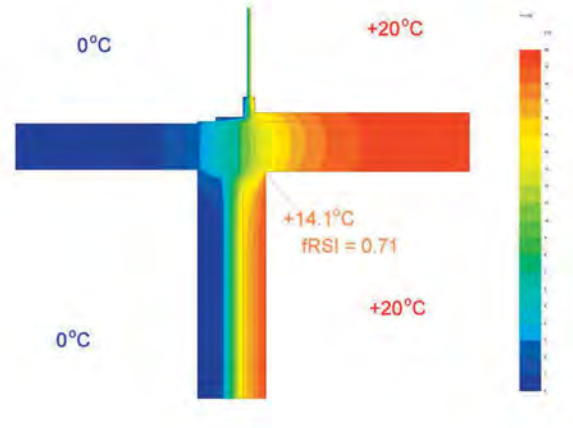

Fig 10. 20mm pad connection (Case 3). This detail *DOES NOT* conform with UK Building Regulations Part L requirements for minimum temperature factor in dwellings (f_{RSi} = 0.75)

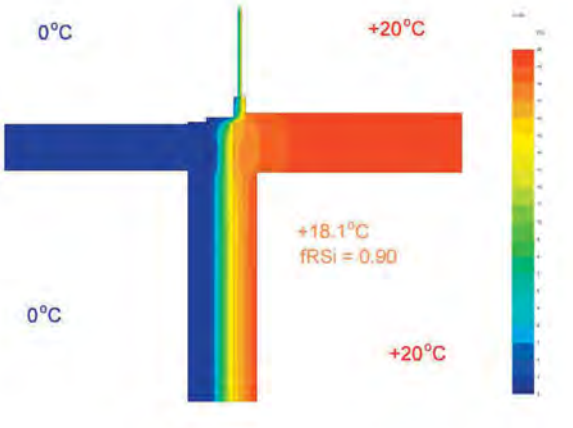

Fig 11. KS14 H200 connection (Case 4) where this detail DOES CONFORM with UK Building Regulations Part L requirements for minimum temperature factor in dwellings (f_{RSi} = 0.75)

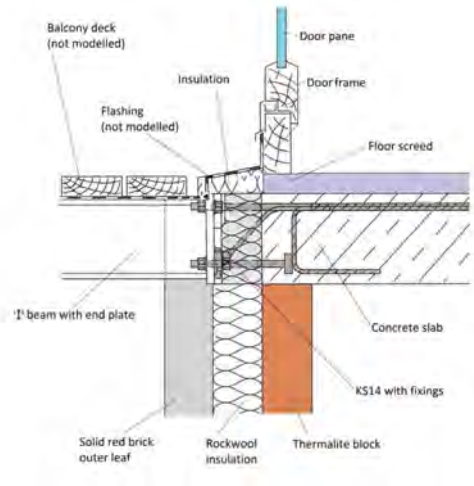

Fig 2. Schöck KS14 unit used with masonry wall and concrete slab

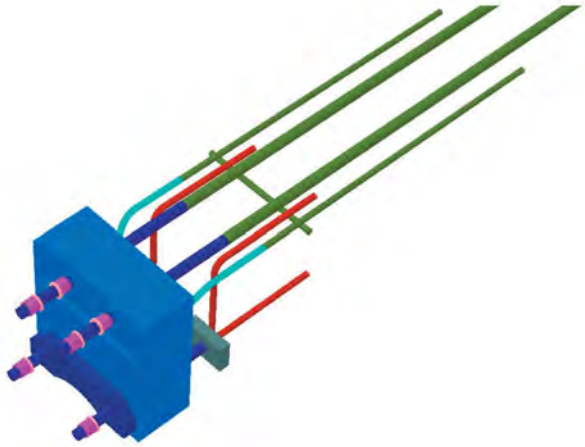

Fig 3. The KS14 unit SOLIDO model (surrounding construction omitted for clarity)

It is evident that the performance of the Isokorb KS14 is the only solution, with f_{RSi} = 0.904, to exceed these values by some margin and will therefore meet the requirements of Building Regulations Approved Documents L1 and L2. Further, the results demonstrate that where no unit is used (f_{RSi} = 0.681) and also with the 10mm and 20mm pad connections (f_{RSi} = 0.713 and 0.706 respectively) – all three would fail against the criteria required for residential buildings.

The third product to be studied was the KST module. A steel I-beam is assumed to pass through an 80mm layer of insulation, which could

represent a roof beam running through the building envelope to support an exterior canopy or overhang. Here three types of situation were studied. First an HEA200 I-beam separated by thermal isolator unit Isokorb KST16 and a HEA240 I-beam separated by thermal break unit Isokorb KST22. Second, a single HEA200 I-beam and a single HEA240 I-beam passing straight through the insulation layer. Third, an HEA240 I-beam divided by a PTFE 'thermal pad'.

Results:	
Description	**Temperature factor f_{RSi}**
Isokorb KST16	0.82
Steel I-beam HEA200 passing through insulation	0.51
Isokorb KST22	0.81
Steel I-beam HEA240 passing through insulation	0.50

The Isokorb KST16 and KST22 units, with f_{RSi} = 0.82 and 0.81, are the only solutions to exceed the required values, whereas the results for the continuous beams and beams separated by PTFE pads are marginal/failures for commercial buildings and are definitely failures for residential buildings.

The independent test results from OISD therefore all verify the product performance standards claimed by Schöck, with the various Isokorb solutions exceeding the necessary building regulations.

Technical Support Data

For the **type K Isokorb**, SOLIDO software from Physibel was used to construct three dimensional models of the applications described, in accordance with BS EN ISO 10211:1 (1996) Thermal Bridges in Building Construction – Heat flows and Surface Temperatures, General Calculation Methods BSI, 1996. Half a unit was modelled about its axis of symmetry. Steady state solution was by means of the iterative finite difference method.

For the **type KS14 Isokorb**, SOLIDO v3.1 software from Physibel was used to construct three dimensional models of the applications described, in accordance with BS EN ISO 10211:1 (1996) Thermal Bridges in Building Construction – Heat flows and Surface Temperatures, General Calculation Methods BSI, 1996. Steady state solution was by means of the iterative finite difference method.

For the **type KST Isokorb**, TRISCO software from Physibel was used to construct three dimensional models of the applications described, in accordance with BS EN ISO 10211:1 (1996) Thermal Bridges in Building Construction – Heat flows and Surface Temperatures, General Calculation Methods BSI, 1996. Steady state solution was by means of the iterative finite difference method.

Full test results are available on request:

Type K **Report Reference:** **121212SCH**

Type KS14 **Report Reference:** **120927SCH**

Type KST **Report Reference:** **060814SCH**

The report findings are based on the basic standard detail with cavity wall below the slab and glazing above.

For the above and for your free copy of the Schöck Specifiers Guide and/or the Technical Guide, contact the company on 01865 290 890 or visit www.schoeck.co.uk

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For low energy office buildings, keep it simple

The design, construction and operation of low energy buildings should favour a simple 'fabric first' approach wherever possible writes Tom De Saulles, building physicist at The Concrete Centre...

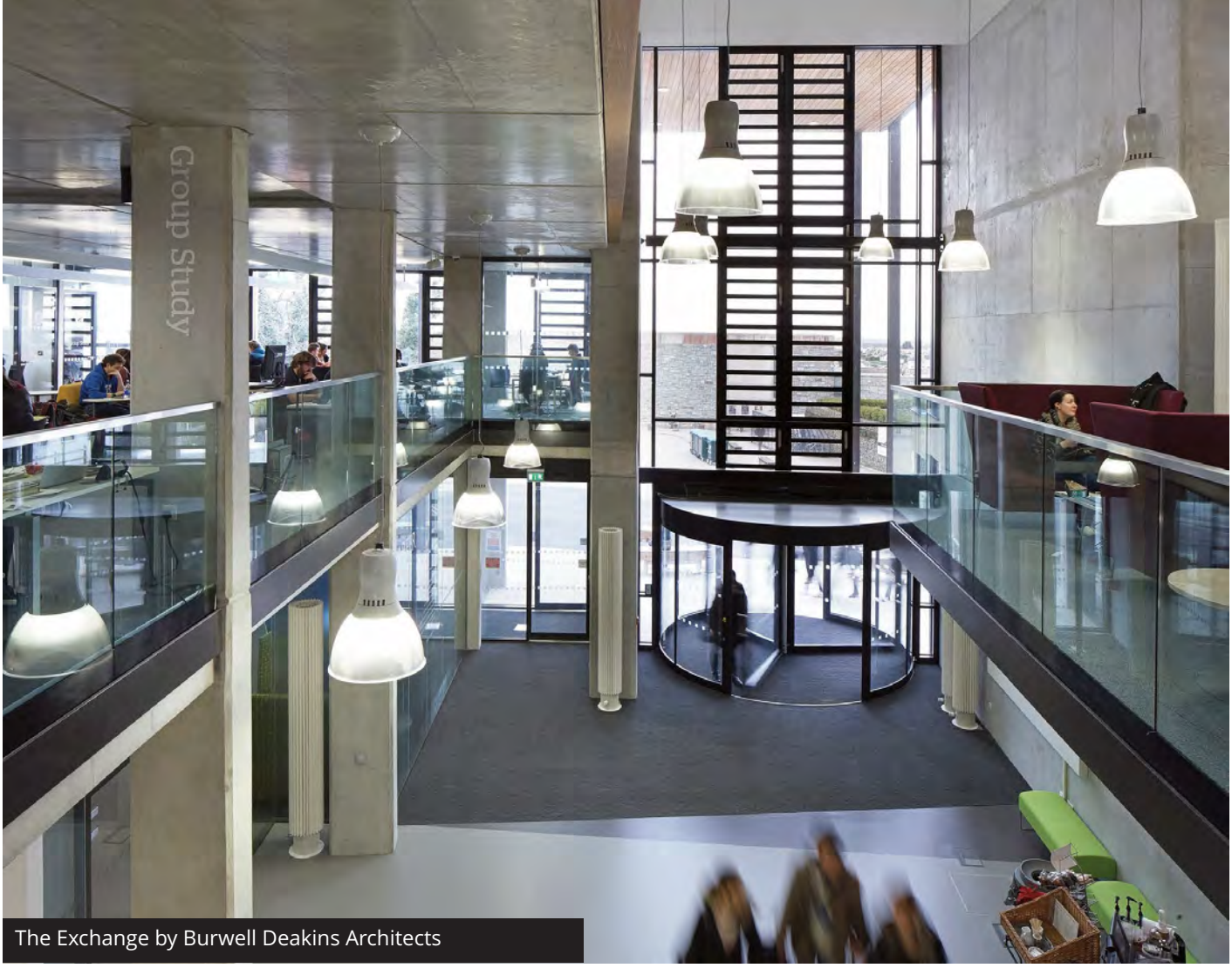
For effective long-term sustainability you need to get the fundamentals of building design right. Increasingly, architects and their clients are returning to fundamental passive design principles that allow fabric performance to be fully optimised. This integrates the thermal mass of exposed structural elements with the design of glazing, ventilation, shading and mechanical systems. This helps ensure comfortable conditions can be maintained during spring and summer, whilst avoiding or minimising the need for mechanical cooling.

In practice, thermal mass is typically provided by heavy-weight floors synonymous with concrete frame buildings. Lightweight timber construction and typical steel frame buildings cannot match the performance provided by concrete floors, which can be constructed with an exposed soffit to fully access its inherent thermal mass. The large surface area of the soffit absorbs unwanted heat, helping regulate the internal temperature and peak cooling demand. Using concrete floor slabs in this way makes good sense, as they typically provide by far the greatest source of thermal mass in non-residential buildings and can readily absorb heat during the day and release it at night with the aid of night-time ventilation.

A question often asked by architects and designers is 'how much concrete do you need to provide thermal mass?' The answer largely depends on the extent to which you want to optimise the building design. It is sometimes thought that 100mm of concrete is sufficient, but this fails to take account of a range of factors including how buildings actually respond to real weather conditions. For example, a naturally ventilated office with exposed 100mm composite floors (steel decking/soffit with in-situ concrete topping) should have sufficient heat capacity to cope with a simple 24 hour heating and cooling cycle. However, in addition to a building's daily cycle, there are also longer cycles related to a typical hot spell (usually three to five days) and also the five working days per week cycle, from which heat will reach different depths within the available thermal mass.

In the case of floors in a non-air conditioned building for example, the greater the slab depth, the longer the time period it responds to; the core of a 300mm thick concrete slab responds to the monthly average condition and draws heat in deeper over an extended period of hot weather. For longer time periods these factors are important because it is the longer-term average room temperatures that define the thermal storage core temperature and hence the temperature gradient that draws heat in. So, whilst a 100mm of concrete offers some element of thermal mass, the thicker slabs used in concrete frame buildings provide greater temperature stability and increased cooling performance across a range of conditions, including hot periods.

In terms of embodied CO_2, research shows there is little difference between concrete and steel frame office buildings. Perhaps of more relevance, is the operational CO_2 savings provided by thermal mass, through its ability to avoid or minimise the need for air conditioning. Over a 20 year period the savings achieved can account for around 75% of the initial embodied CO_2 of the concrete, or in other terms, the whole life CO_2 performance of a concrete frame office building is a tiny fraction of its initial embodied CO_2 when the thermal mass is exploited.



The Exchange by Burwell Deakins Architects

When another factor known as carbonation (the absorption of CO_2 by concrete) is factored in, along with a slightly longer life span, the initial embodied CO_2 of the concrete can be fully offset. As this demonstrates, it is always more useful to view concrete buildings in whole life terms.

So there you have it, the simplest approach in office design, which utilises thermal mass can significantly reduce energy consumption, help maintain comfortable conditions and deliver impressive whole life CO_2 performance. ■

Related Information:

Publication: Utilisation of Thermal Mass in Non Residential Buildings
http://www.concretecentre.com/online_services/publication_library/publication_details.aspx?PublicationId=786

Publication: Concrete Floor Solutions for Passive and Active Cooling
http://www.concretecentre.com/online_services/publication_library/publication_details.aspx?PublicationId=797

Publication: Thermal Mass Explained (2012 update)
http://www.concretecentre.com/online_services/publication_library/publication_details.aspx?PublicationId=781

The Concrete Centre will be exhibiting as part of the Concrete and Masonry Pavillion at Ecobuild – 3-5th March 2015, ExCel, London. North Arena.

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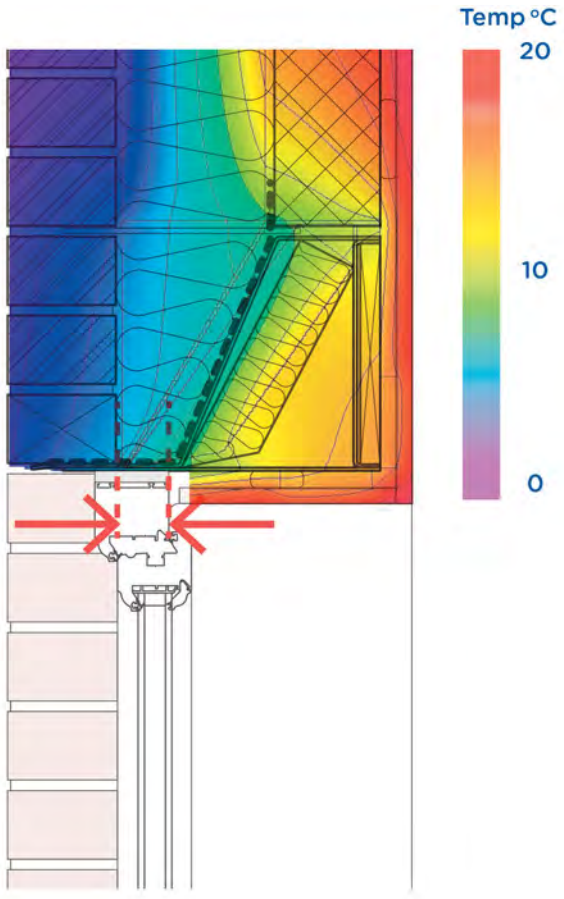
The challenges of thermal bridging

Alex Taylor, NHBC Senior Energy Consultant, examines the challenges that thermal bridging presents from an energy assessors point of view...

The Standard Assessment Procedure (SAP) now contains 42 separate definitions for thermal bridging details. As part of an energy assessor's role, they need to understand how each detail is applied whilst assessing a dwelling for compliance with Part L1a 2013.

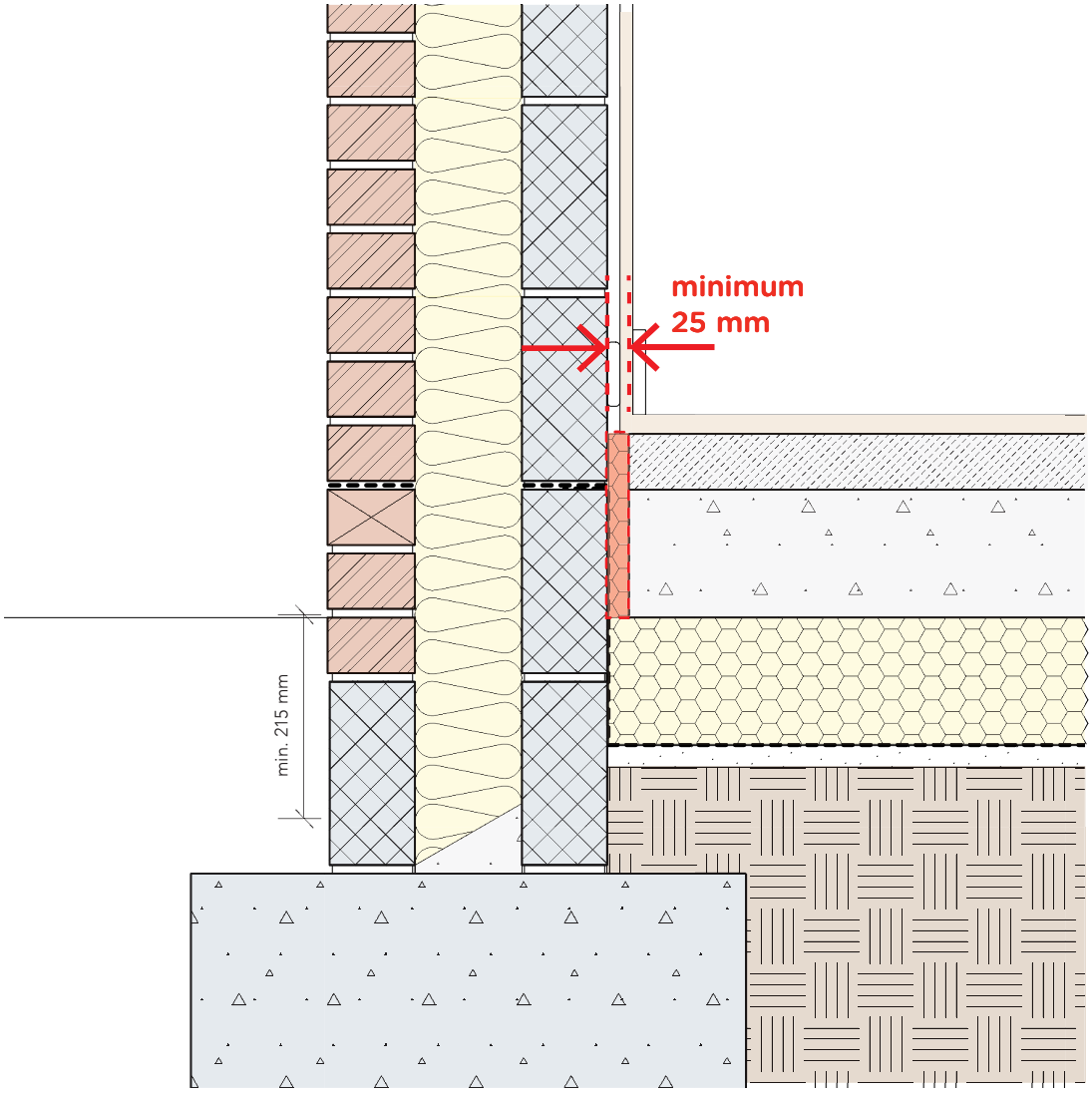
It is unlikely, but not completely impossible, that any one dwelling will contain all junctions, but spread across a single development all 42 may be encountered.

What does this all mean, and why has so much effort gone into this seemingly dark art? In 2006 as building regulations turned their attention to reducing carbon dioxide emissions, the amount of insulation going into a typical dwelling rose by 20%. This had an unfortunate consequence of exacerbating the effect of thermal bridges at junctions in the building fabric and at structural openings. These possibly unchecked paths had the potential for significant cold spots within the dwelling which could lead to internal condensation and mould growth.



Where combination steel box lintels are commonly used, considerable heat loss may occur because of the proportion of steel, the minimal and discontinuous insulation, and the length of the bridge

At the time, Accredited Construction Details (ACDs) were introduced as design/construction details aimed at preventing these problems. Additional heat loss from the dwelling was modelled in SAP by multiplying the total exposed area by a heat loss factor (or 'y-value') of 0.08 W/m²K. If ACDs were not followed, the additional heat loss almost doubled to a default y-value of 0.15 W/m²K. An alternative option in SAP 2005 was for the designer to provide a set of psi values for their proposed constructions (a psi value provides a measure of the heat loss per unit length of a junction). Once in receipt of these details the additional heat loss from thermal bridging would be determined by the SAP assessor by measuring the length of each junction (thermal bridge) and multiplying by the appropriate psi value. The summation of the heat loss from all junctions,



expressed over the total exposed area, would give the dwelling's y-value.

At this time SAP 2005 considered 16 junctions – many common junctions were excluded, and SAP conventions sought to plug the gap – any 'junction' which did not appear in SAP or have a convention was ignored (in the SAP calculation).

From Part L1a 2010 (SAP 2009) the y-value approach based on the adoption of a standard detail set was no longer permitted, and in order to determine heat loss through thermal bridging, the energy assessor had to adopt the 'lengthy' approach detailed above. In SAP 2009 the number of junctions also rose to 23 – now recognising that flat roofs and junctions to party walls had a part to play in this uncontrolled heat loss - and further conventions continued to address 'unreferenced junctions'.

Psi values can be provided from a multitude of sources, and although they should be prepared to the same standard (BRE 497) there is no formal accreditation scheme and therefore it is unlikely an energy assessor would be able to question the values presented. Energy assessors can be presented with psi values from a variety of sources:

- SAP Appendix K Default values – in the absence of a detail the assessor must resort to these – compliance with Part L 2013 is very unlikely if this is the sole source;

- SAP Appendix K Accredited Values – by adopting the ACDs published to support Part L in 2006, more favourable psi values can be adopted;

- Publicly-available details, such as those published by NHBC Foundation (Part L 2013 – Where to

Alex Taylor, Senior Energy Consultant

Start – Masonry & Timber Frame Construction), Constructive Details Limited, Concrete Block Association, Scottish Building Standards to name but a few;

- Product Specific Details – for example a lintel manufacturer may have commissioned details for use alongside their product;

- Bespoke Details – most likely the final resort (as the calculations can be quite expensive, and may not always return a favourable answer), these may be commissioned for junctions which are unique to a particular builder or development.

During the design of the project there needs to be consultation between the energy assessor and the builder's design team to provide a fully working specification which will deliver compliance with Part L. At the end of this work the SAP Ratings and supporting documentation should be provided to the builder for submission to building control and delivery to site. Within the package of information there should be a summary of all thermal bridge details used in the energy calculations with appropriate references. The builder should now be absolutely clear on what has been used to determine compliance and therefore what they need to build on site – if they are not it is very likely the performance gap between the SAP and EPC and the constructed dwelling will continue to exist.

In accordance with Regulation 27, building work should only commence once the above has been completed. So in order to ensure the dwellings continue to comply and to provide a degree of checking on site, what should Building Control be looking for?

- Is a detailed specification available on site which relates to the energy assessments?

- Does the specification include references to thermal bridges?

- Does the drawing pack on site include details of the referenced thermal bridges?

If the answer to any of the above is 'no', it is highly unlikely the homes are going to be constructed as per the specification agreed at the design stage. Does this mean the homes are going to be less energy efficient? Not necessarily, but any variations need to be fed back through the design office and remodelled within SAP, to ensure continued compliance with the requirements. ■

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Zero Carbon Buildings – the final countdown

Matthew Evans, Technical Manager at Kingspan TEK considers alternative methods of construction which can meet the legal requirements of zero carbon buildings...

After several years of preparation, the introduction of the Zero Carbon Housing Standard in England is now just a year away. Whilst the legislation poses new challenges for the industry, it is also an opportunity to properly consider alternative methods of construction which have been specifically developed for highly energy efficient buildings, such as Structural Insulated Panels (SIPs).

Zero Carbon Housing Standard

As indicated in the documents which accompanied The Queen's Speech[1], the 2016 Zero Carbon Home Standard will be set at Level 5 of the Code for Sustainable Homes. It will, however, still be possible to achieve Code Level 4 provided the remaining carbon is offset through off-site allowable solutions schemes.

Even with the allowable solutions schemes, the new regulations still require a 19% reduction in carbon emissions compared with ADL1A 2013, whilst the current 15% relaxation in the Target Fabric Energy Efficiency is expected to be removed. As a result, traditional construction approaches may struggle to bridge the gap without significant reliance on renewable technologies.

A Modern Solution

To look at this in more detail, three compliant scenarios have been modelled with SAP 2012 in Figure 1. Scenario 1 is a masonry construction, Scenario 2 is a timber frame construction, and Scenario 3 features a SIP construction with an additional 75mm of rigid urethane insulation. All three scenarios focus on a fabric-first approach to compliance, raising U-values

	Scenario 1 Masonry with XPS	Scenario 2 Timber Frame with XPS	Scenario 3 SIPs with rigid urethane insulation
Floor U-Value W/m^{2}K	0.11	0.11	0.13
Wall U-Value W/m^{2}K	0.11	0.12	0.10
Roof U-Value W/m^{2}K	0.11	0.11	0.11
Airtightness m³/m²/hr @ 50pa	3.0 m³/m²/hr @ 50pa	3.0 m³/m²/hr @ 50pa	1.0 m³/m²/hr @ 50pa
Thermal Mass	Medium (250)	Medium (250)	Low (100)
Thermal Bridging	29.332 (y=0.088)	29.332 (y=0.088)	17.707 (y=0.053)
Additional Measures	MVHR, 2.24m² flat plate solar hot water with very little overshading, 90 litre solar storage, waste water heat recovery	MVHR, 2.24m² flat plate solar hot water with very little overshading, 90 litre solar storage, waste water heat recovery	MVHR
TER	12.54	12.54	12.54
ADER	12.49	12.44	12.36
TFEE	48.26	48.26	48.26
DFEE	43.80	43.10	37.70

Figure 1. Example Specification Comparison[2]

above the minimal level to limit reliance on renewable technologies.

Despite the high level of thermal performance, both masonry and timber frame constructions require several additional technologies to achieve compliance. This reflects the difficulty in minimising thermal bridging and improving airtightness performance in these constructions.

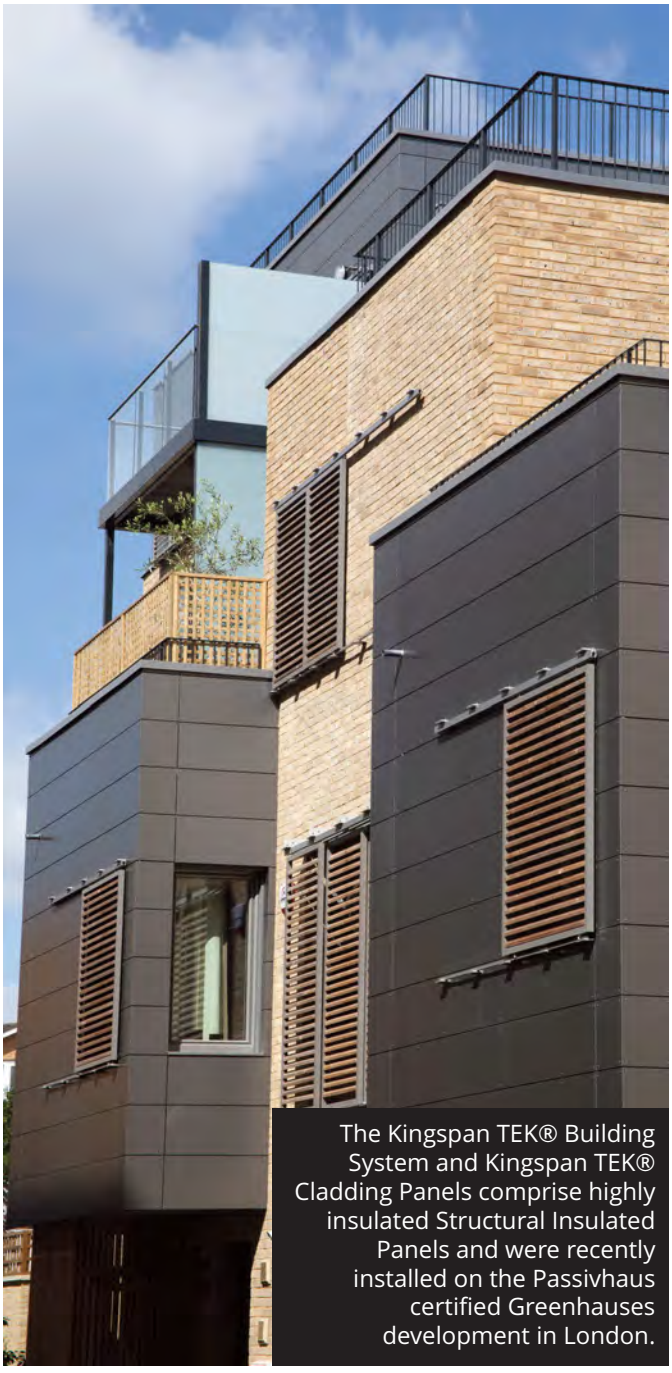
To achieve lower air tightness levels, masonry constructions require parge coats, whilst timber frame constructions would require lapping and sealing of air barriers around all openings and penetrations such as switches, sockets and ceiling roses. In contrast, SIPs' inherent jointing arrangement and OSB facing allows them to achieve the required performance virtually out of the box.

The level of airtightness in all three scenarios necessitates the use of an MVHR (mechanical ventilation with heat recovery) system. These systems use the heat from outgoing stale air to warm incoming fresh air, reducing the heating demand and ensuring a constant supply of fresh air. The SIP construction requires no other renewable technology to achieve the standard.

With construction space extremely limited, it is also essential to get the most out of every available metre of land. As Figure 2 shows, the SIP construction offers notable wall and roof construction depth reductions.

	Scenario 1 Masonry Wall with Mineral Fibre Full Fill and Sloping Roof with Mineral Fibre Between and Under Rafters	Scenario 2 Timber Frame Wall with Mineral Fibre Between and Inside Studs and Sloping Roof with Mineral Fibre Between and Under Rafters	Scenario 3 SIPs with Rigid Urethane Insulation Lining
Wall (mm)	555.5	484.5	407.5
Roof (mm)	418.5	418.5	323.0

Figure 2: Total build-up thicknesses



The Kingspan TEK® Building System and Kingspan TEK® Cladding Panels comprise highly insulated Structural Insulated Panels and were recently installed on the Passivhaus certified Greenhauses development in London.

Keeping It Simple

As with any change in legislation, the challenge is to find a cost effective solution which can consistently meet the new requirements. Whilst there will be a temptation to simply top-up traditional construction approaches with renewable technologies, these often prove costly in the short term and have a limited lifespan. In contrast, a fabric-first approach should deliver maximum savings to homeowners over the long-term. SIPs offer a tried and tested route to achieving this quickly and easily. ■

[1] UK Government – The Queen's Speech: what it means for you https://www.gov.uk/government/publications/queens-speech-2014-what-it-means-for-you/queens-speech-2014-what-it-means-for-you%E2%80%8E

[2] All scenarios assume: regular condensing boiler with a room sealed fanned flume (89.5% efficient), weather compensator, A-rated fuel heating pump, no secondary heating, 300 litre hot water cylinder (2.31 kWh/day loss factor), primary pipework fully insulated, 100% low energy lighting.

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Full Fill for the perfect fit

How fully filling with a mineral wool insulation can be the most practical and cost effective solution

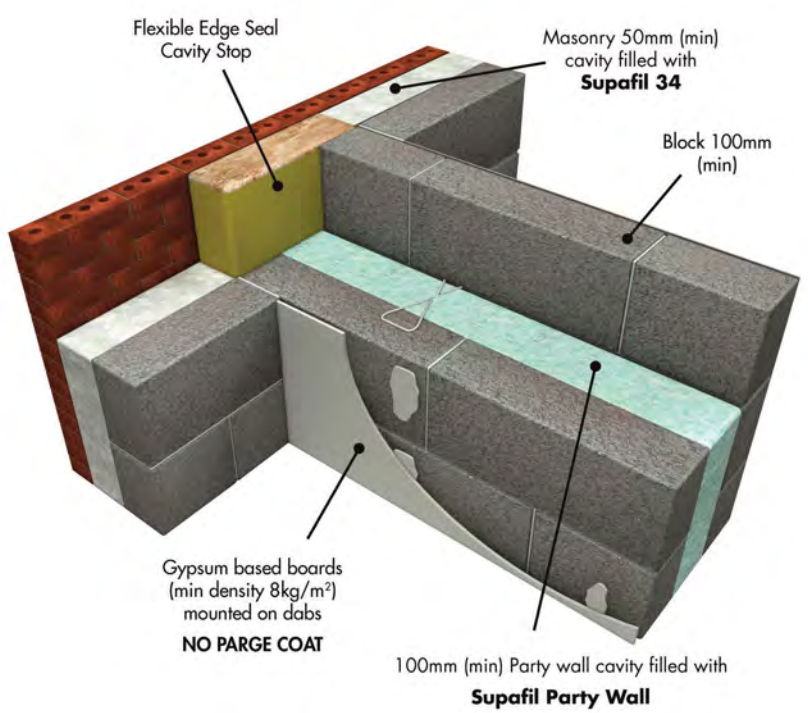
When it comes to installing any form of insulation, the performance characteristics of a product must always be considered. Indeed, when approaching a masonry cavity wall application, the fire and thermal performance of the insulation, in addition to the prevention of water penetration are vital issues that must be addressed – the selection of appropriate materials and jointing methods for the outer leaf are therefore crucial.

Alongside these factors, another key consideration can be cost. Fundamentally, housebuilders and developers require high performing products that can save them time and money. With this in mind, there is a solution that ticks every box. The recommended masonry cavity wall solution is full-fill mineral wool insulation, either injected (such as Supafil) or built in slabs (such as Earthwool DriTherm Cavity Slabs).

These systems not only provide U-values that comply with Building Regulations, but they are also the lowest in cost. Even with dense concrete blocks it is possible to achieve very high thermal performance in a manageable wall width; and a full-fill solution is suitable for all types of buildings.

Full-fill solutions are the most commonly used in the market with approximately 55% of new build cavity walls incorporating them, and 85% of all residential cavity walls when including refurbishment.[1]

Housebuilders using full-fill solutions will make significant savings, whilst still achieving the thermal performance required to meet compliance with Building Regulations. In fact, compared to partial fill solutions, specifiers can save up to 50 per cent of the cost, which can equate to up to £535 per plot – a substantial cost saving for housebuilders when they are building multiple plots.



Meanwhile, mineral wool insulation products are non-combustible and classified as Euro-class A1 to BS EN ISO 13501-1 – the highest possible "Reaction to Fire" classification – compared to a D or E typically achieved by foam plastic insulation materials.

Furthermore, there is a common misconception that water can bridge the cavity and a full-fill solution cannot be used in severe exposure zones. In reality, there are mineral wool insulation products available on the market that contain a water-repellent silicone additive to ensure that no liquid water is able to pass through and reach the inner leaf of masonry. Specifiers should only choose those products that are BBA certified for all exposure zones – even when a site is being insured by the NHBC[2].

Undeniably, a full-fill mineral wool insulation to cavity walls offers the most practical, high performing and cost effective solution. This all helps in contributing to keeping properties warmer and for the homeowner, saving money on their energy bills in the long run.

For more information please visit www.knaufinsulation.co.uk

[1] Building Insulation Market,Construction Markets 2011

[2] Consult NHBC Standards for guidance regarding wall construction in each exposure zone

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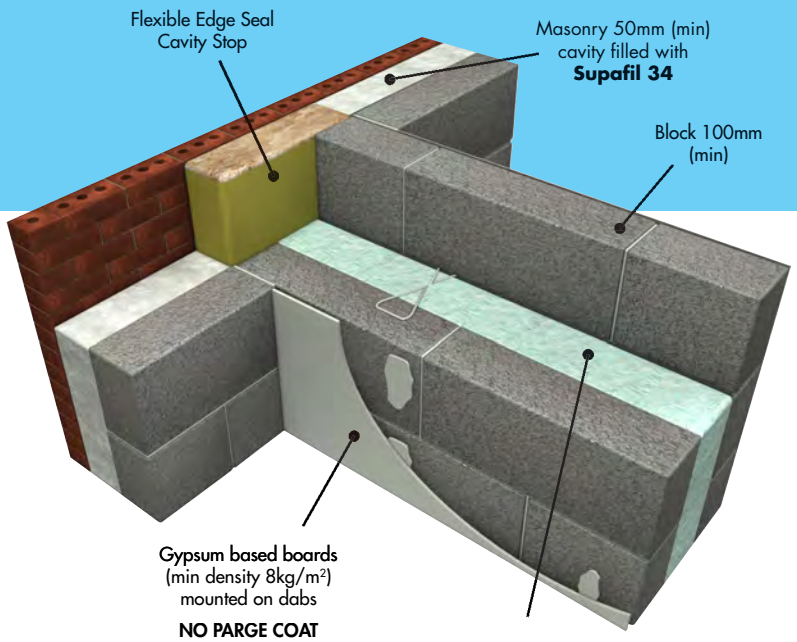

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Insulating party wall cavities – a crucial step

With the welcome announcement from DECC that insulating existing party wall cavities is now included as a measure in the latest RdSAP calculations for both the Green Deal and ECO funding, Nick Ralph from MIMA explains why measures such as this are so crucial...

MIMA was instrumental in influencing the latest changes to RdSAP, through its work with Leeds Beckett University and the BRE; which proved the case for retrofitting existing party cavity walls using blown fibre mineral wool.

Over recent years MIMA has funded a series of co-heating trials and forensic investigations by the Buildings and Sustainability Group of the School of the Built Environment at Leeds Beckett University, to gain a detailed understanding of the factors influencing and contributing to party wall bypass, as well as quantifying its effect.

Historically, there was an assumption that cavity party walls were an area of thermal equilibrium between two heated spaces and not a source of heat loss. However, initial studies between 2005 and 2007 showed that, for example, in a mid-terrace dwelling the heat lost through the untreated party cavity walls could be greater than that which is lost through all of the other external elements combined.

The study demonstrated that heat energy from both dwellings can escape into the party wall cavity. This causes free moving air in the cavity to warm and rise up through the cavity, bypassing the loft insulation and – in a majority of cases – continuing to the roof line where the air and heat energy escape to the external environment.

Where cold air enters the uninsulated cavity at exposed edges, the uninsulated cavity creates a 'chimney stack effect' as the cold air rises and is warmed by heat conducted through the leaves of the party wall from the adjoining homes, before escaping from the cavity to the external environment – either into the loft space or through the roof. Additionally, windy conditions can induce differential pressure that leads not only to heat losses at the junction of the party cavity with both external walls and suspended floors, but also increased heat loss due to the stack effect of the cavity.

Once this highly detailed work had been undertaken and widely accepted, it was possible to monitor a number of dwellings in lower detail, whilst still making quantitative measurements of heat flux, to show that the heat loss phenomenon was common to all party walls with cavities to the roof. The quantum of heat losses was also considered to be consistent.

Leeds Beckett University's work also demonstrated that filling the cavity with insulation would consistently reduce this heat loss. Taking a mid-terrace house, which was built between 1990 and 2001, the study demonstrated an annual saving of 1,978 kWh of energy and 0.38 tonnes of CO_2 – equating to a £70 reduction in household energy costs. RdSAP attributes a heat loss equivalent to an effective U-value of 0.50 W/m^2K to an unfilled party wall with a cavity to the loft and a U-value of 0.20 W/m^2K when it is filled.

When you take into account estimates that there are 3.77million bypass walls in England alone, equating to 5 million households, the potential to reduce fuel usage and CO_2 emissions through filling party cavity walls with blown fibre mineral wool is therefore

huge. In fact, the BRE has estimated it would save approximately £465m per year and 2.5 million tonnes of CO_2.

Putting that into the context of increasing fuel poverty and the government's ambitious CO_2 emission reduction targets and the importance of such a measure being included in RdSAP becomes clear.

According to a recent report from Cambridge Econometrics, millions of people are living in fuel poverty in the UK; and one of the biggest causes is the poor condition of our housing stock, which is one of the least energy efficient in Western Europe.

The report undertook detailed modelling to assess the economic, fiscal and environmental impact of a recommended investment programme aimed at bringing homes up to Band C on an Energy Performance Certificate. Included within the recommendations is a national super-insulation scheme that would result in £8.5bn annual energy bill savings for British households.

In addition to making all low income households highly energy efficient and reducing the level of fuel poverty, it also demonstrates the comprehensive economic benefits of taking radical action to fix Britain's energy wasting homes. Overall, it is estimated that a radical programme to make all homes highly energy efficient would add £13.9bn annually to the UK economy by 2030, with the government receiving £3.20 through increased GDP for every pound they invest.

With the UK's existing housing stock posing the greatest barrier to us achieving ambitious CO_2 reduction targets and over 5,000 people a year dying from cold housing, recognising those measures that can make a significant contribution to improving the energy efficiency of our housing stock – such as insulating existing party wall cavities – is crucial. And as per the Cambridge Econometrics report, tackling these measures has an economic benefit too. ■

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Capital allowances – boosting your bottom-line

Steven Bone, Director at The Capital Allowances Partnership Ltd explains the tax relief on offer under the capital allowance scheme and what it can mean for businesses...

Clients with building projects can save substantial amounts of tax by claiming capital allowances. This is tantamount to securing a Government-funded discount on the overall cost of their building, which improves the financial viability of projects and ensures that build quality remains high.

What are capital allowances?
A business pays tax on its profits, ie income less expenditure. However 'capital' expenditure is not a tax-deductible expense. Capital expenditure is money spent with a longer-term outlook, such as constructing new buildings or extensions, or altering or fitting out existing buildings (as opposed to maintenance or repairs).

Instead, tax relief is available through 'capital allowances' - which are given to property investors, owner-occupiers and tenants. The most common allowance in practice is something called 'plant and machinery allowances'. This provides tax relief when the business or investor spends money on 'plant' or 'machinery' (P&M). It does not assist for money spent to buy or alter land, or on bricks and mortar such as the substructure and superstructure (eg, walls, floors, ceilings, doors, windows and stairs).

What assets qualify as machinery or plant?
'Machinery' takes its dictionary meaning and most construction projects include lots of obvious machinery, such as pumps, motors, fans and the like, as well as more obscure machines such as door handles or closers with moving parts. Because these are all machinery, the money spent on them qualifies for tax relief.

'Plant' is more difficult to identify though. It is sometimes defined by statute, but generally by more than 100 years of case law. In essence, 'plant' is apparatus used in a business. The surprising thing though is that most of the assets which qualify for tax relief in buildings are standard fixtures that you would find in almost any commercial property. These include sanitary and water installations, heating, ventilation and air conditioning systems; electrical installations; lifts and conveyors; fire protection; communication, security and control systems; and many furnishings, finishes and fittings.

What types of properties benefit?
Because the definition is so wide, most commercial buildings contain P&M. However, some property types are more P&M-rich than others. For these, between 20% and 45% of the money spent can be allocated to P&M. Particularly good buildings from a capital allowances perspective are those which are fitted out to a high standard, including (amongst others):

- Hospitality – hotels, public houses, restaurants;
- Healthcare – care homes, doctors and dentists practices, veterinary facilities;
- Offices.

In most cases, capital allowances statute prevents tax relief being claimed for residential property. And because capital allowances are a tax relief they can only be claimed by businesses or investors who pay income tax or corporation tax. Therefore, they

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cannot be claimed by not-for-profit owners or occupiers, such as central or local government, charities or the like.

What is the benefit?
Capital allowances are a tax adjustment only and do not affect the market value of the property, or the business's financial accounts.

In effect, capital allowances reduce the taxable profits of the business or investor. This saves tax at whatever tax rate they pay. For example, if a company paying 20% corporation tax spends £100,000 on P&M and claims capital allowances, this can reduce its taxable profits by £100,000 and therefore save tax of £20,000 (ie, £100,000 x 20%).

For the vast majority of businesses all (or most) of the tax savings are immediate. This is because of an accelerated capital allowance called the 'Annual Investment Allowance' (AIA). The AIA is available for expenditure on P&M up to an annual limit or cap, which is currently £500,000. When working out the business's tax bill the AIA allows up to £500,000 of expenditure on P&M to be written-off for tax at 100%. In addition, certain energy-saving and water conserving or quality improving P&M qualifies for 100% relief under a scheme called 'enhanced capital allowances' (ECAs) – based mainly on specifying particular products listed on government websites.

To the extent that the money spent on P&M exceeds the AIA cap, or is not eligible under the ECA rules, tax relief is given over several years at either 18% or 8% a year. The 8% rate mostly applies to so-called 'integral features'. These are the electrical system (including power and lighting); cold and hot water systems; heating, ventilation and air conditioning; lifts and escalators; and external solar shading. Other plant usually attracts the 18% rate.

Why is this relevant?
Whilst there is an old saying in tax that "you should never let the tax tail wag the commercial dog", in any construction project there are always choices. These can affect the tax savings available to the building employer. If the client can identify ways to save tax this boosts the bottom-line and ultimately makes the project more viable. Taking an early interest in capital allowances permits the design and specification to be 'tweaked' to improve its tax-efficiency (for example, some floor finishes qualify for relief, whereas others do not; or ECA-qualifying assets can be chosen). It also allows the right paper trail to be put in place so the client can meet its tax obligation to submit a correct and complete tax return and avoid the time, hassle and cost of an unfavourable HM Revenue compliance check.

However, to ensure proper identification and compilation of a claim, it is often wise to obtain specialist input beyond the involvement of generalist quantity surveyors and accountants.

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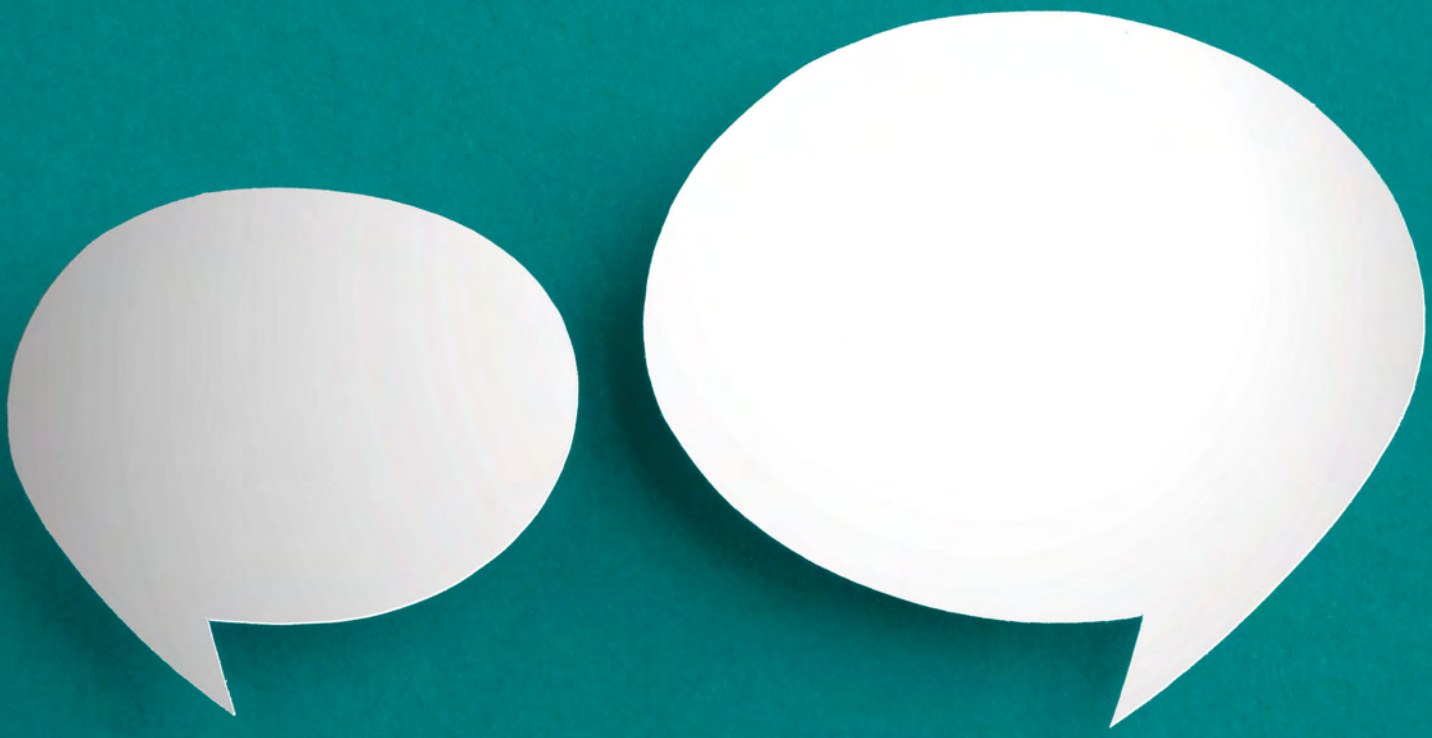

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We offer the full suite of asset finance options from Hire Purchase through to Leasing. Some of these have unique features and benefits to suit the construction industry. Our finance options are not restricted to JCB equipment but are also available for other new non-competitive machinery and all used machinery plus cars, 4x4's, commercial vehicles, access equipment and a whole lot more.

JCB Finance Key Stats:

- Total lending 1970-2012 – just over £8.0 billion
- Total lending in downturn (2008-2012) – c. £2.75 billion plus 4,604 new customers
- Many reports show that SME's have found it hard to access traditional sources of lending but in 2012 our lending grew by 31.7% with total turnover of £748 million
- In 2012 a total of 22,236 assets across 16,654 agreements were financed
- In 1993 we entered the Local Authority market lending c. £270m to date – current balances with 158 different Local Authorities
- Asset mix – JCB 62% and Others 38%
- In 2012 JCB Finance provided 21.3% (some months touching 40%) of all HP and Lease finance in the UK construction machinery market (according to Finance and Leasing Association asset finance statistics).

* JCB Finance Ltd is regulated and authorised by the Financial Conduct Authority. JCB Finance only provides asset finance facilities to businesses in the UK.

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JCB FINANCE

Northern Ireland Building Regulations

The Northern Ireland Building Regulations are legal requirements made by the Department of Finance and Personnel (DFP) and administered by 26 District Councils: http://www.buildingcontrol-ni.com//assets/pdf/building-regulations-ni-2012.pdf . The Regulations are intended to ensure the safety, health, welfare and convenience of people in and around buildings. They are also designed to further the conservation of fuel and energy.

DFP publish Technical Booklets for guidance in support of the Building Regulations: http://www.dfpni.gov.uk/index/buildings-energy-efficiency-buildings/building-regulations/content_-_building_regulations-newpage-3.htm . There is no obligation to follow the methods or comply with the standards set out in the technical booklets. You may adopt any form of construction you wish, however you will have to demonstrate to the satisfaction of district councils that the requirements of the building regulations have been met.

They allow the Department to set certain standards of performance and to provide a degree of predictability and certainty as to what methods and standards of building which, if followed, will satisfy the requirements of building regulations.

TECHNICAL BOOKLET B – Materials and workmanship:

http://www.dfpni.gov.uk/tb_b_guidance_booklet_2013_final_version.pdf

Including:

- **Fitness of materials and workmanship**
- **Urea formaldehyde foam**

TECHNICAL BOOKLET C – Site preparation and resistance to contaminants and moisture:

http://www.dfpni.gov.uk/tb_c_online_version.pdf

Including:

- **Site preparation and resistance to contaminants**
- **Subsoil drainage**
- **Resistance to moisture and weather**
- **Condensation**

TECHNICAL BOOKLET D – Structure:

http://www.dfpni.gov.uk/tbd_online_version.pdf

Including:

- **Stability**
- **Disproportionate collapse**

TECHNICAL BOOKLET E – Fire Safety:

http://www.dfpni.gov.uk/tbe_online_version.pdf

Including:

- **Means of escape**
- **Internal fire spread – Linings**
- **Internal fire spread – Structure**
- **External fire spread**
- **Facilities and access for the Fire and Rescue Service**

TECHNICAL BOOKLET F1 – Conservation of fuel and power in dwellings:

http://www.dfpni.gov.uk/tb_f1_online_version.pdf **and updated guidance here:**

http://www.dfpni.gov.uk/amendment_to_technical_booklets_-_2014.pdf

Including:

- **Conservation measures**
- **Target carbon dioxide emission rate**
- **Consequential improvements**
- **Change of energy status**
- **Renovation of thermal elements**
- **Notice of air pressure test**
- **Notice of commissioning**
- **Notice of emission rate**
- **Provision of information**

TECHNICAL BOOKLET F2 – Conservation of fuel and power in buildings other than dwellings:

http://www.dfpni.gov.uk/tb_f2_online_version-2.pdf **and updated guidance here:**

http://www.dfpni.gov.uk/amendment_to_technical_booklets_-_2014.pdf

Including:

- **Conservation measures**
- **Target carbon dioxide emission rate**
- **Consequential improvements**
- **Change of energy status**
- **Renovation of thermal elements**
- **Notice of air pressure test**
- **Notice of commissioning**
- **Notice of emission rate**
- **Provision of information**

TECHNICAL BOOKLET G – Resistance to the passage of sound:

http://www.dfpni.gov.uk/tb_g_online_version.pdf

Including:

- **Protection against sound from other parts of the building and from adjoining buildings**
- **Protection against sound within a dwelling or room for residential purposes**
- **Reverberation in the common internal parts of buildings containing flats or rooms for residential purposes**
- **Acoustic conditions in schools**
- **Sound insulation testing and notice of results**

TECHINICAL BOOKLET H – Stairs, ramps, guarding and protection from impact

http://www.dfpni.gov.uk/tbh_online_version_pdf.pdf

Including:

- **Provision of stairs in dwellings**
- **Stairs, ladders, ramps and landings**
- **Guarding**
- **Vehicle loading bays**
- **Protection against impact from and trapping by doors**
- **Protection from collision with open windows, skylights or ventilators**

TECHNICAL BOOKLET J – Solid waste in buildings:

http://www.dfpni.gov.uk/tb_j_online_version.pdf

Including:

- **Solid waste storage**
- **Waste chute systems**

TECHNICAL BOOKLET K – Ventilation

http://www.dfpni.gov.uk/tb_k_online_version.pdf

Including:

- **Means of ventilation**
- **Ventilation of car parks**
- **Notification of testing and commissioning**
- **Provision of information**

TECHNICAL BOOKLET L – Combustion appliances and fuel storage systems:

http://www.dfpni.gov.uk/tb_l_online_version.pdf

Including:

- **Air supply**
- **Discharge of products of combustion**
- **Warning of the presence of carbon monoxide gas**
- **Protection of people and buildings**
- **Provision of information**
- **Protection of liquid fuel storage tanks**
- **Protection against pollution**
- **Prevention of smoke emission**

TECHNICAL BOOKLET N – Drainage:

http://www.dfpni.gov.uk/tb_n_online_version.pdf

Including:

- **Drainage systems**
- **Sanitary pipework**
- **Underground foul drainage**
- **Rainwater drainage**
- **Cesspools, septic tanks and similar structures**

TECHNICAL BOOKLET P – Sanitary appliances, unvented hot water storage systems and reducing the risk of scalding:

http://www.dfpni.gov.uk/tb_p_online_version.pdf

Including:

- **Provision of sanitary appliances**
- **Sanitary appliances**
- **Sanitary accommodation**
- **Unvented hot water storage systems**
- **Reducing the risk of scalding**

TECHNICAL BOOKLET R – Access to and use of buildings:

http://www.dfpni.gov.uk/tbr_online_version.pdf

Including:

- **Access and use**
- **Access to extensions**
- **Sanitary accommodation in extensions**
- **Sanitary conveniences in dwellings**

TECHNICAL BOOKLET V – Glazing

http://www.dfpni.gov.uk/tbv_online_version.pdf

Including:

- **Impact with glazing**
- **Transparent glazing**
- **Safe opening and closing of windows, skylights and ventilators**
- **Safe means of access for cleaning glazing**

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