



Left and below Abutments to the copper domes and brick parapets were the biggest challenge.



Act of faith

A 25-year guarantee clinched the decision to reroof Westminster Cathedral in asphalt

When Westminster Cathedral's roof was first asphalted back in 1903, it would have utilised naturally occurring asphalt deposits dug up from an overseas lake.

These days, things are done a little differently. Instead, IKO's Permaphalt – a polymer modified mastic asphalt – was specified for the extensive reroofing of the Roman Catholic Cathedral by Cathedral Architect, Michael Drury from St Ann's Gate Architects.

'Asphalt had worked well for the Cathedral in the past and there was no reason why it shouldn't again,' he says, adding that the new roofing's 25-year guarantee clinched the decision for a like-for-like replacement.

Drury had identified the need to replace the roof surface as a priority in his quinquennial inspection of the Cathedral, which was designed in the early Byzantine style by JF Bentley. Although the roof had been repaired over the years, the report detected cracking in the surface and upstands and the presence of moisture within.

The subsequent reroofing project involved negotiating four copper domes within the rectangular roof plan of the nave and chancel

and dealing with deteriorating parapets at the perimeter. The logistical challenges of installing scaffolding at the grade I listed building – essential to facilitate the removal of the original roof surface and to bring up the new materials and equipment required – provided a further level of complexity.

After the old asphalt was removed, the concrete roof-substrate was found to be in good order and was cleaned and dried before a separating layer of Black Sheathing Felt was applied. This was followed by two coats of Permaphalt laid hot, to a thickness of not less than 20mm in total.

Once cool, the surface was covered in light grey solar reflective paint. This reduces heat build-up in the roof, maximising durability.

Abutments to the domes and perimeter presented the biggest challenges, along with negotiating the steps and curves of the chancel roof. The soft brick parapets required particular attention in order to avoid leaks occurring where the new asphalt is dressed against the brick.

This interface was managed by the introduction of a lead apron down over the asphalt kerb. The lack of such flashings

previously had led to water tracking behind the upstand and becoming trapped beneath the roof covering. Above the lead, a new three-coat lime render was applied on expanded metal lath to the back of the parapet to give further protection against water ingress.

New copper perimeter flashings were added as necessary where the asphalt meets the copper domes. Some panels and clips were also replaced on the copper coverings, which had been added to the concrete domes after the Cathedral suffered blast damage in the Second World War.

'With the right skilled specialists, when using traditional materials like this the project is relatively straightforward once safe access has been provided,' Drury says.

The £340,000 contract was carried out in a single phase over six months and was grant-aided by the First World War Centenary Cathedral Repair Fund. The project won in its category at this year's Roofing Awards. ●

Client: The Trustees of Westminster Roman Catholic Cathedral

Architect: St Ann's Gate Architects LLP

Contractor: Knight Asphalte Ltd

Choosing a flat roof

Ross Finnie, sales director, SIG Design & Technology explains the rules of thumb for making the right choice



Above: Single ply roof at Arnold Hill Academy, Nottingham.

Once an architect determines the desire, or need, for a flat roof, identifying the correct solution can be a complex process.

A range of factors have to be taken into account including length of guarantee, the supporting structure, impacts on BREEM ratings, build sequencing, aesthetics and cost.

Of course, along with the client and architect's requirements the compliance minefield of British building standards and codes of practice has to be negotiated.

Although architects are primarily concerned with design, their remit in selecting a roofing system is usually a combination of design criteria, performance requirements and cost.

Achieving the correct balance between these three factors will determine the optimum roofing solution.

There are four primary types of flat roof commonly used in the UK, each with their advantages and disadvantages. Of course an architect does not need a detailed understanding of every type of flat roof. However, a basic understanding of these four major systems will allow architects to make a well-informed decision – especially as sometimes the solution offered by an individual manufacturer may not be the best for the requirements of your particular project.

Single ply

A single ply membrane system provides waterproofing with a single sheet of roofing material. Managed and regulated by the Single Ply Roofing Association (SPRA), this is a well established and proven technology that has been used in the UK for over 50 years.

Single ply roofs are often considered for cost driven projects as they have a low capital cost and cost in use, are lightweight, flexible, swift to install, safe and available in any colour. These attributes make them an extremely popular choice for both cold and warm roofs, refurbishment and new build, with over 5 million m² installed in the UK every year. Single ply roofs provide an ideal surface for subsequent photovoltaic systems and, as long as the product chosen is FLL certified, can also be used with a green roof.

As it is constructed from a single membrane, this solution could potentially be damaged, making it inappropriate for areas that will experience heavy traffic. It is also advisable to protect the installed roof during construction, as it should not be used for on-site storage. However, as long as it is correctly installed, single ply is highly durable and will give long-lasting performance.

Built up roofing

With more than 50 million m² of built up roofing (BUR) installed every year, this is still the most common flat roof solution in the UK. Like single ply roofing, this membrane solution is often used on cost driven projects. It is extremely versatile and has a wide range of applications.

BUR roofs, as the name suggests, are made up of several layers of reinforced bituminous membranes. These bonded layers differentiate the product from single ply alternatives, and can help to make these roofs much more robust. This means a BUR roof is ideal for any area that will experience occasional foot traffic.

It is also useful for situations where the build schedule demands that the roof space be utilised during construction – however, protection would still be needed if it was to be used as a working platform.

Aesthetic considerations mean that BUR is often specified in areas that are not highly visible, or on projects where the look of the finish is lower down the list of priorities for those involved.

Hot melt

On a hot melt roof the waterproof membrane is applied, perhaps unsurprisingly as a hot liquid directly to a prepared structural deck. This creates a completely seamless monolithic layer that is extremely difficult to damage and has a very long life expectancy.

Along with being incredibly hardwearing, hot melt has the longest durability within third party British Board of Agrément (BBA) accreditation for these four products types. The BBA accredits hot melt systems for the design life of the building, an accreditation that can provide great peace of mind for a building's owners.

Ideal for concrete structures, as there is no need to drill into the deck for fixing, hot melt is primarily used on roofs larger than 300m². It is also used in situations where there are complex details or multiple penetrations.

A key consideration when specifying a hot melt roof is once again implied in the name, as this type of installation involves potentially dangerous hot works. Health and safety on site need to be well managed by an experienced installer.



Above: Hot melt was right for the complex roof at UBS' Broadgate HQ.

Waterproofing options: some things to consider

| | Good for... | Look out for... |
|-----------------------------|---|---|
| Single ply | <ul style="list-style-type: none"> • Cost driven projects • Cold and Warm Roofs • Lightweight structures • No/limited roof mounted plant • Green roofs if FLL certified • Coloured finishes (PVC) • Some UK made | <ul style="list-style-type: none"> • Heavy traffic needs walkways. • Needs protecting during construction • Complex details can be messy • Some aren't bitumen compatible • Not ideal for inverted roofs |
| Hot melt | <ul style="list-style-type: none"> • Inverted roofs • Green roofs • Concrete deck • Limited falls • Complex details and multiple penetrations • Some UK made • Long life expectancy | <ul style="list-style-type: none"> • Only suitable for inverted roofs. • Involves hot works • Only 4 manufacturers • Limited installer network |
| Cold applied liquids | <ul style="list-style-type: none"> • Roof refurbishment • Green roofs • Heavy plant areas • Restricted working space balconies • Complex details and multiple penetrations | <ul style="list-style-type: none"> • Some contain VOCs • Some require breathing equipment • Choose the right product for populated areas eg schools |
| Built up roofing | <ul style="list-style-type: none"> • Cost driven projects • Cold and warm roofs • Occasional foot traffic (eg PVs) • Green roofs if FLL certified • Some UK made | <ul style="list-style-type: none"> • Not attractive/limited colours/finishes • Complex details can be messy • Can require hot works on site |

Cold applied liquids

Cold applied liquid roofs are similar to hot melt roofs, with one obvious difference: the waterproofing is applied as cold. This makes installation easier as it doesn't carry the health and safety considerations of hot work.

Cold liquids are especially popular on refurbishment or repair projects as the liquid can usually be applied directly to the existing roof makeup, making it very cost effective.

Increasingly, cold applied liquid roofs are being specified on new builds. In areas with difficult access or restricted working space, such as balconies, the flexibility and ease of installation make them highly appropriate.

It is worth noting that some cold liquids contain volatile organic compounds (VOCs) and the installation of some liquids may require breathing equipment.

Seek expert advice

Each of these four solutions could be the right one, but numerous factors need to be taken into account. SIG Design & Technology offers a free advisory service to ensure architects select the most appropriate flat roof for their projects. Its independence from any brand means it can help them choose the best products for each application. ●

| | | |
|------------------------------|-----------------------------|---------------------------|
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| 4 Confidence in Supply | 8 STEPS TO THE PERFECT ROOF | |
| 5 Experienced Contractors | 6 Monitored Installation | 7 Full Guarantees |
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Timing is everything

Green roofs don't like being kept waiting for installation



With green roofs, timing really can be a matter of life and death for the major building component.

Getting this wrong is the most common pitfall for green roof installations, especially when the contractor is new to the process, according to Steve Vincent, technical director of green roof specialist – and SIG partner – Verdico. It is crucial, he says, that the roof is ready with necessary access for the installation team when the green roof kit is delivered.

'You need a lot of planning – when you've done three or four you get to know when to order the sedum,' he says. 'It should go in the same day as it arrives but can keep for up to 48 hours. In the height of summer we prefer to install straight away.'

Experience is invaluable at assessing how the foibles of the site and build conditions might affect the installation programme.

'I don't think there's a more difficult thing to do on site,' Vincent says, adding that weather is an additional complication. While rain is fine and snow no problem unless it lies, wind can hold up the process and affect the

method of installation.

'You're on a critical path and you have to make sure that everyone – the main contractor and the associated trades – understands that you are the priority at that point. Most trades aren't used to dealing with anything that's alive!'

Certainly planning was the main challenge for foreman Aaron Scanbrett of GR Regan Roofing, installer of an extensive sedum roof at a recently completed café pavilion on a country estate in Sussex. For



Left and below:
VerdiRoof installation on
the café in Sussex.

this 422m² application, Verdico supplied the VerdiRoof system, which took a week to install on the single storey building plus a further two weeks of watering.

'I'd never laid a green roof before but found the system really straightforward to use after the green roof supplier had showed us what to do,' says Scanbrett. 'The only tricky bit was the timing.'

The multi-layer VerdiRoof system was installed over FDT's Rhepanol single ply waterproof membrane. The system consists of the Verdi-Drain moisture retention layer overlapped by 100mm followed by a drainage and reservoir board and a filter layer. The growing medium was laid above this and raked before the sedum blanket was rolled on and watered.

Finally, pond-washed pebbles were laid around the perimeter of the roof and around the gutter to form a firebreak. Guy Regan of GR Regan Roofing says getting these and the other green roof materials up on to the roof was particularly labour-intensive, but the end result will be worth it.

'Green roofs are one of the best systems as they'll last indefinitely – as long as the waterproofing is laid properly – because the roof isn't exposed to the elements,' he says.

Timing isn't the only watchpoint according to Vincent, who says architects should avoid green roof systems that use just drainage boards rather than drainage and reservoir boards. The latter reduces the chance of the plants failing.

'A drainage and reservoir board will allow excess water off but also holds a chamber of water to evaporate back through,' he says, adding that some green roof companies cut corners by failing to have multi-purpose boards.

'Architects and specifiers need to be vigilant and should only specify the best components. It might sound daft, but why would you specify a drainage only board that does not hold water in reserve for the plants once the moisture in the growing medium has been used up?

'The GRO and FLL Guidelines are in place to help specifiers quiz the performance data of the green roof system,' Vincent says. ●