CPD Seminar Handout:

Roof Refurbishment: Choosing the Best Solution

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Roof Refurbishment: Choosing the Best Solution

CPD handout: November 2017

This document contains the key resources from SIG Design & Technology's RIBA Certified CPD Seminar, Roof Refurbishment: Choosing the Best Solution, in an easy to use format.

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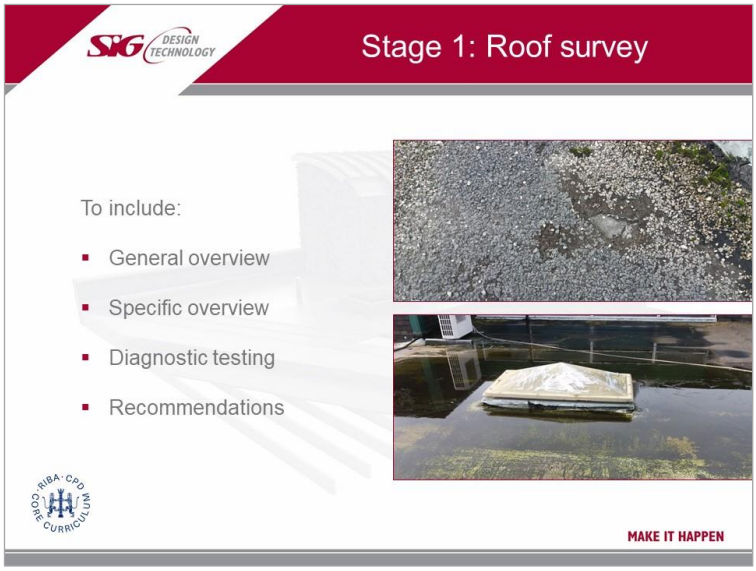
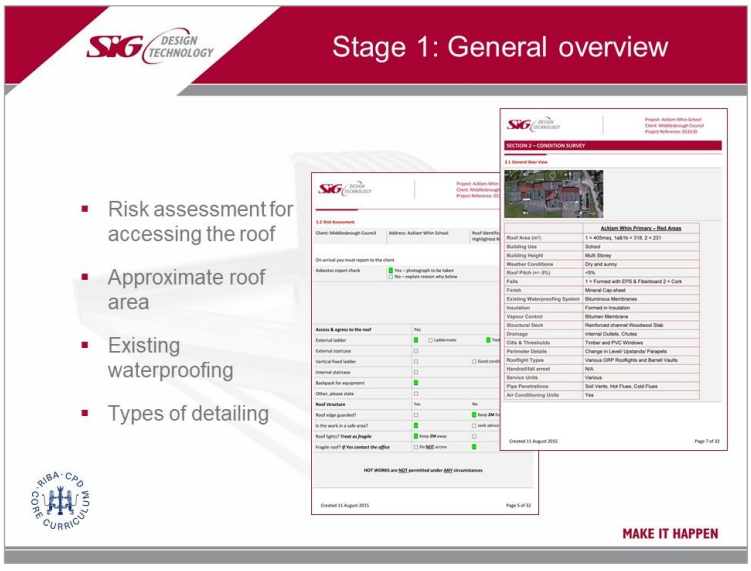
Roof refurbishment – 3 stages

There are 3 stages in the refurbishment process; what should be included in the roof survey, how the condition of the roof will influence the design and finding the right solution for your roof.

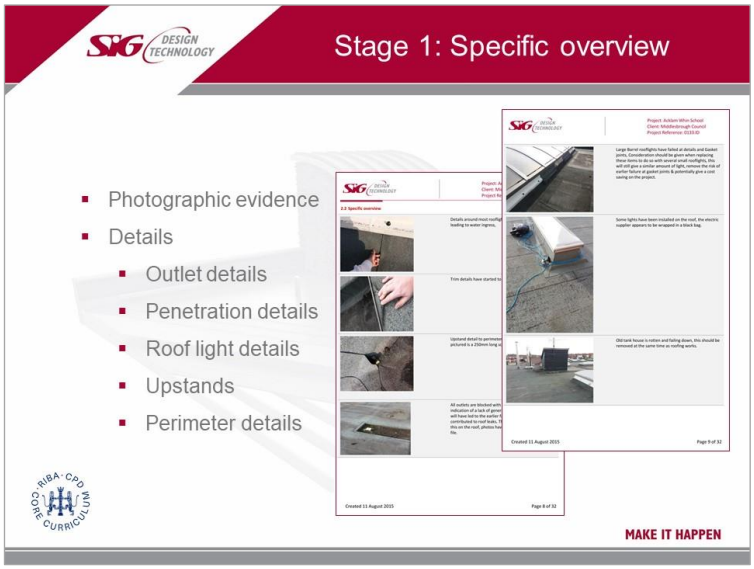
Roof refurbishment – Stage 1



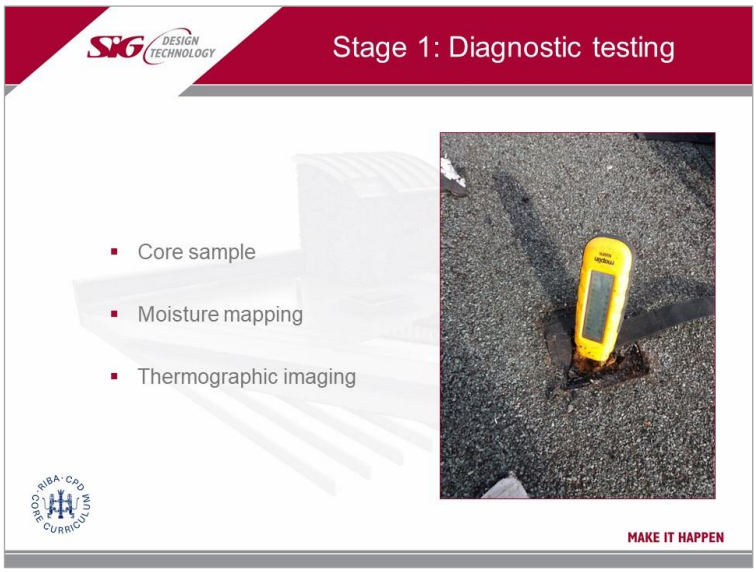
If you have a failing roof the first step is to get a roof survey done by a professional. The roof survey should a full detailed report on all issues internally and externally



The general overview in the roof survey should include; risk assessment, roof area, existing waterproofing and detailing on the roof. The building owner should also be made aware that they have responsibility for the person on the roof.



This section of the roof survey includes detailed descriptions and photographic evidence of any issues both internally and externally.



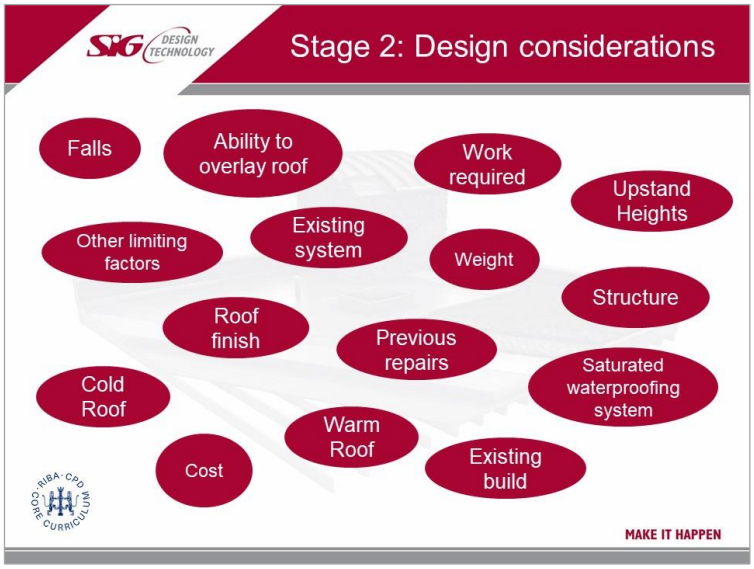
Diagnostic testing is essential to help understand the existing condition of the roof.

Core sampling a roof involves physically removing a portion of the membrane and insulation layers to ascertain condition of roofing system components.

Moisture mapping uses meters to provide photographs or drawings of moisture areas beneath the roof.

Thermographic imaging uses an infrared camera to locate cold spots on a roof caused by wet insulation.

Roof refurbishment – Stage 2



So what factors of the roof do we need to consider before proceeding with the design? Its design and construction must meet a matrix of complex and strategic variables.

The results from the survey will determine whether you should strip or not strip a roof. If the roof includes any of these points you should strip the roof.

If the roof includes any of the following you can overlay the system.

Stage 2: Detailing

Upstand heights

Weep holes / cavity trays

Rooflight

Penetrations

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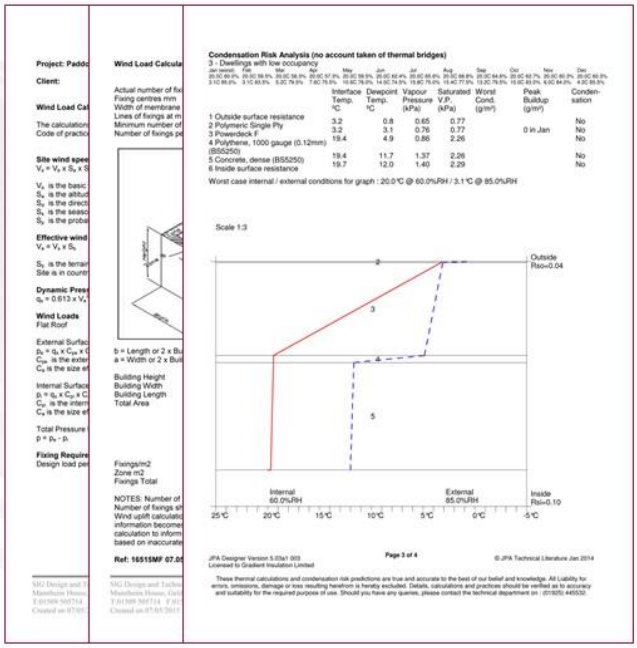
Stage 2: Performance requirements

- Fire risk
- Wind uplift calculations
- Rainwater calculations
- U-value calculations and interstitial condensation calculations
- Odour



Condensation Risk Analysis (no account taken of thermal bridges)

3 - Dwellings with low occupancy

	Interface Temp. °C	Dewpoint Temp. °C	Vapour Pressure (kPa)	Saturated V.P. (kPa)	Worst Cond. (g/m²)	Peak Buildup (g/m²)	Conden-sation
1 Outside surface resistance							
2 Polymeric Single Ply	3.2	0.8	0.65	0.77			No
3 Powerdeck F	3.2	3.1	0.76	0.77		0 in Jan	No
4 Polythene, 1000 gauge (0.12mm) (BS5250)	19.4	4.9	0.86	2.26			No
5 Concrete, dense (BS5250)	19.4	11.7	1.37	2.26			No
6 Inside surface resistance	19.7	12.0	1.40	2.29			No

Worst case internal / external conditions for graph : 20.0°C @ 60.0%RH / 3.1°C @ 85.0%RH

Scale 1:3

Outside Rso=0.04

Internal 60.0%RH

External 85.0%RH

Inside Rsi=0.10

25°C 20°C 15°C 10°C 5°C 0°C -5°C

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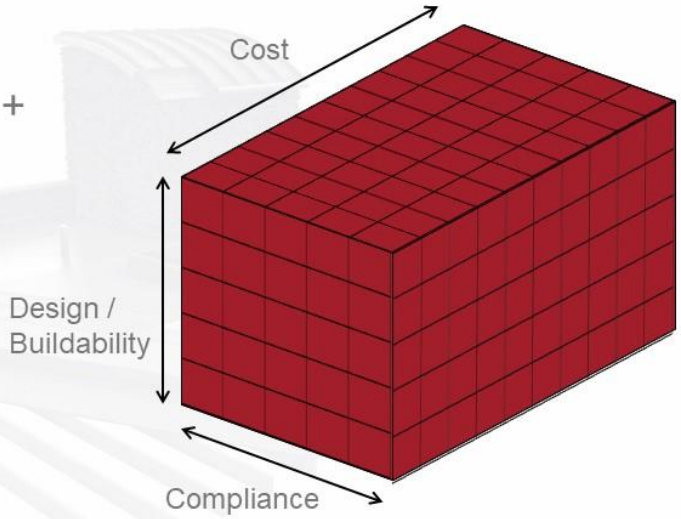
Stage 3: Finding the solution

Cost + Design + Compliance = Best Solution



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Stage 3: Why specify bitumen

- Over 100 years of experience and development
- Robust product
- Access to roof
- Non-slip hazard
- High durable, long-lasting performance
- Environmentally friendly
- High resistance to mechanical damage and puncturing

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Stage 3: Why specify single ply?

- Over 50 years track record
- Low capital cost and cost in use
- Safe, rapid, clean installation
- High durable, long-lasting performance
- Design flexibility – wave form, cupolas, colours etc
- Easy repair, modification and refurbishment
- Ideal surface for subsequent photovoltaic systems
- Environmentally friendly & good reflectivity

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Stage 3: Why specify liquid coating?

- A wet-on-wet, cold applied liquid waterproofing product
- Fully reinforced with a polyester fabric
- Free of solvents and isocyanates
- Very low in VOCs, fume free, virtually odourless
- Seamless waterproofing system, ideal for complex detailing
- Can apply in cold temperatures above 0°C
- Water repellent on application

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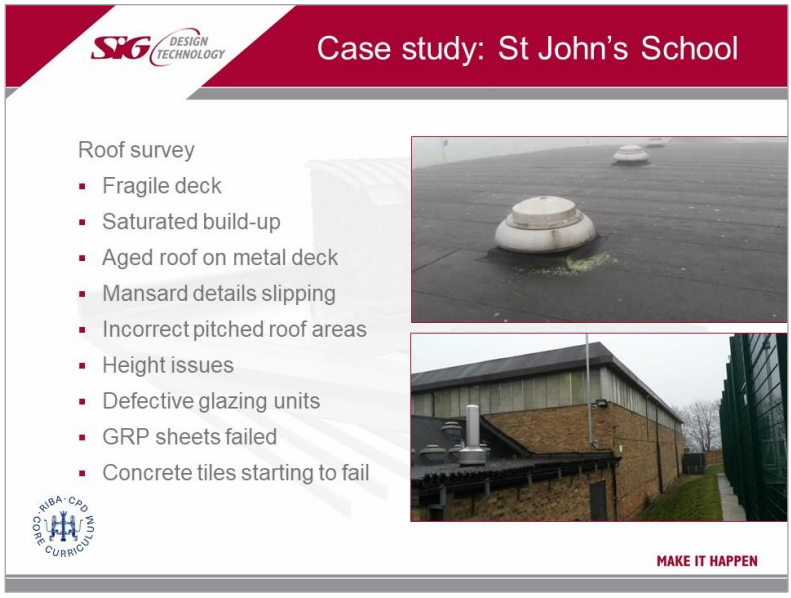
Case Study – St John's School

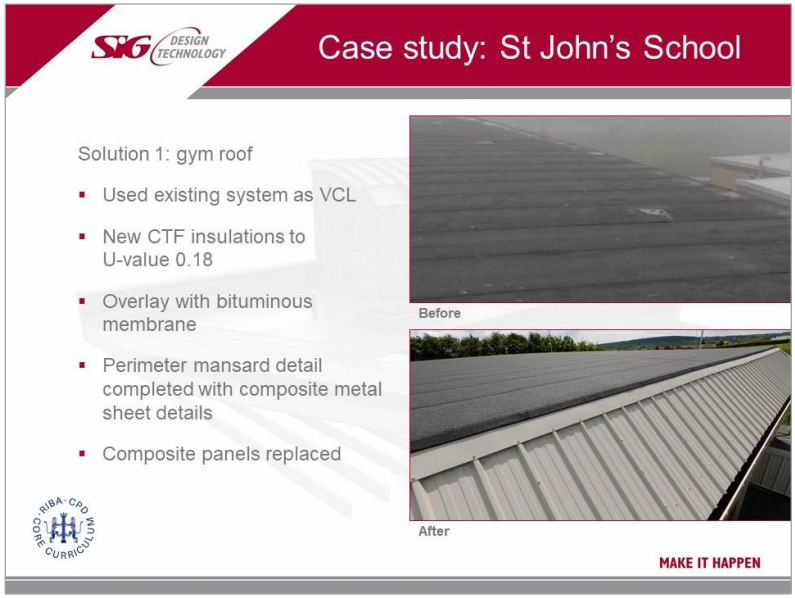
We will now look at the results of a roof survey determined the roof choices at St John's School

Built some 50+ years ago, the school's original roof system had come to the end of its useful working life and persistent water ingress was a significant problem.

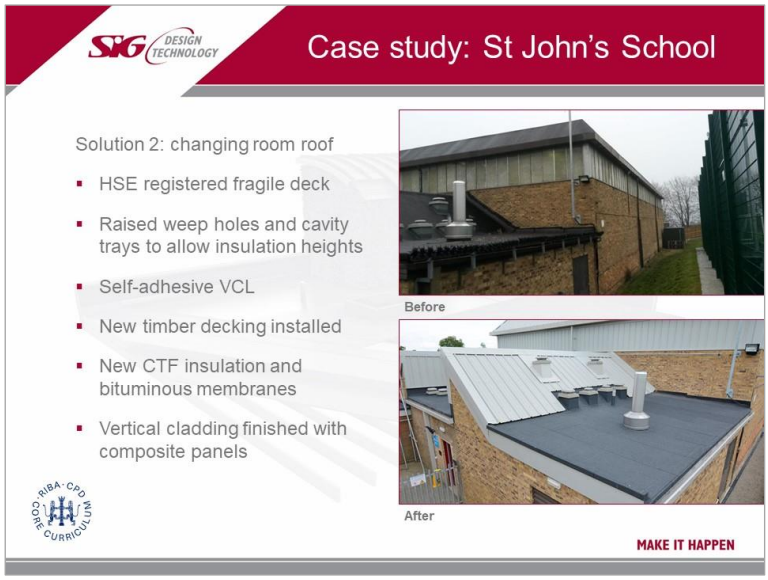
Complex in parts the three separate roof areas comprised of a mix of complementary interfacing products comprising bituminous roofing system, single-ply PVC membrane and composite panels.



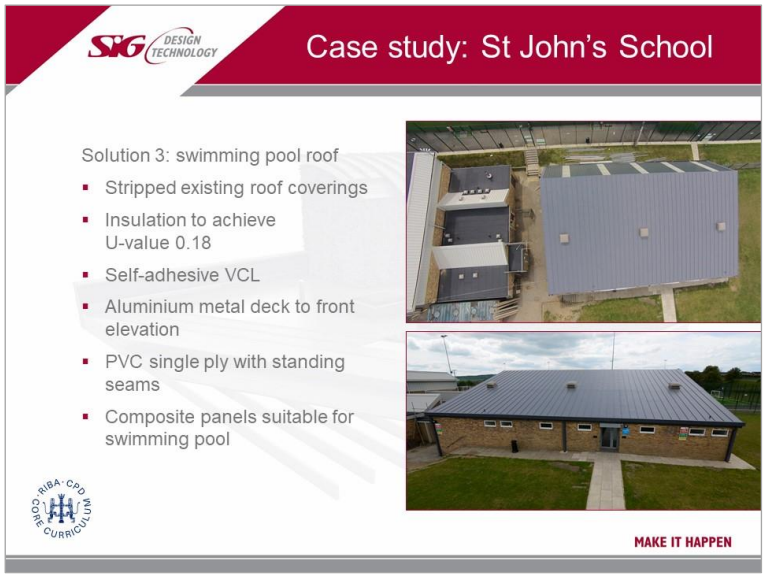
The roof survey identified a number of problems



The roof deck to the gym hall used the existing system as a VCL and was overlaid with bituminous torch-on system comprising vapour control layer (VCL), Cut-To-Falls insulation together, underlay and cap sheet. Perimeter mansard details were completed with composite metal sheet details.



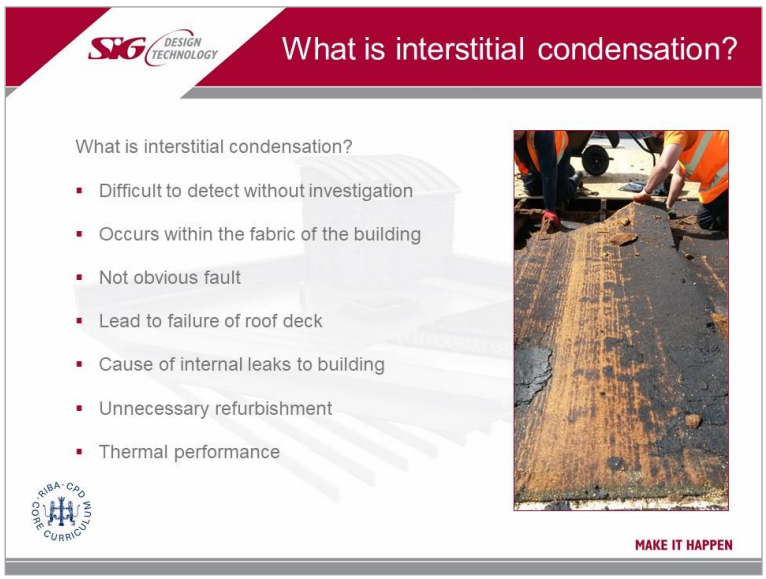
The roof to the changing rooms was an HSE registered fragile deck and contained asbestos. It was completely refurbished with new timber deck, self-adhesive vapour control layer (VCL), new Cut-To-Falls insulation together and the bituminous torch-on system. Composite panels were used as cladding on the roof and careful detailing was required where they interfaced with the BUR.



The swimming pool was stripped of its original concrete tiles and an aluminium structural deck installed to receive the 390m^2 single ply system with standing seam.

Careful thought needed to be given to the method of attaching the membrane to guard against potential wind uplift factors. The structural deck couldn't be penetrated as it was essential to prevent chorine and humidity contaminating the system. So, SIG Design & Technology developed a project-specific detail to provide mechanical restraint.

What is interstitial condensation?



Interstitial condensation occurs within the fabric of a building, at the point (known as the dew point), where the atmospheric temperature of a given concentration of water vapour drops to a point when water droplets begin to condense and dew can form.

Interstitial condensation is different from surface condensation such as that caused by cold bridging, and its occurrence within the roof or wall structure of a building is difficult to detect without investigation.

Case Study – John Paul School

The school has been leaking for well over 16 years. The costs of misdiagnosis are high, several overlays of new membranes have been applied, ceiling tiles replaced and a suspected leaking gutter replaced.

Core samples indicated that there was no VCL (vapour control layer) in the construction. and discovered no butyl mastic seal to the laps either. If there is no control to water vapour travelling through the roof, then it is at risk of interstitial condensation.

For 5/6 years the 1600m^2 deck has gradually rotted and now 90% of the timber deck has completely failed. If the problem had been identified earlier the deck would have been saved, but now the entire roof will have to be replaced.

What to expect from suppliers

Technical support:

You should receive comprehensive technical support from a manufacturer or supplier and this should comply to all relevant standards.

Technical information should include standard details, NBS Specifications, Cut To Falls insulation design, wind load and thermal calculations and third party accreditation.

SIG Design & Technology now has several products as BIM objects available in the NBS National BIM Library.

Early involvement in a project by a supplier will make the membrane system choice and technical support process simpler in the long run.
Suppliers can offer advice, not just on which products to use but more importantly when those products are not suitable and an alternative should be sought.

On-site support:

A manufacturer or supplier should offer on-site support to protect the long term integrity of the chosen waterproofing system. This is not just important to ensure the long term performance of the waterproofing system chosen, it's also a requirement of British Standards (BS6229:2003) to maintain a roof and guidance on how this should be done can be demonstrated during a site support visit.

Guarantees

Here's a checklist covering the essential manufacturer support you should receive:

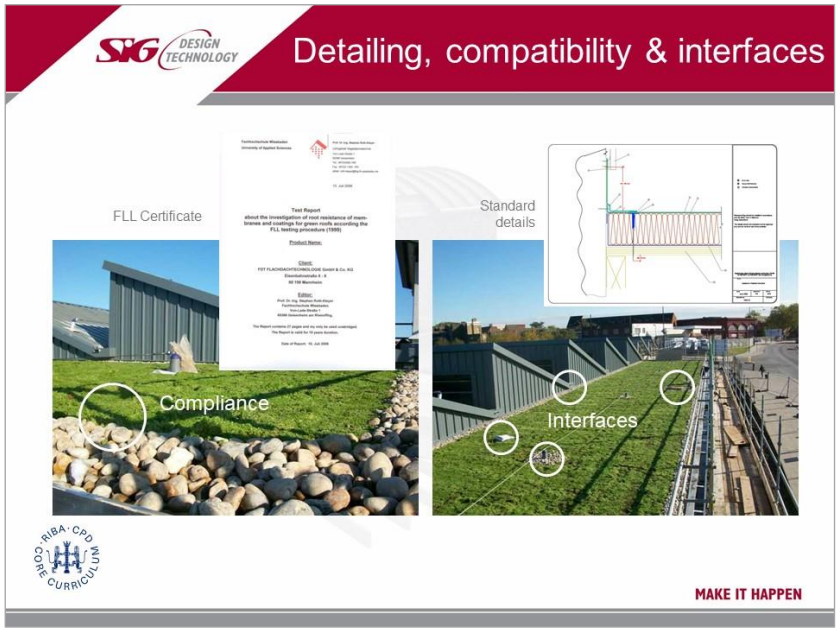
- ✓ Project specific technical support
- ✓ Bespoke design
- ✓ Wind up-lift calculations
- ✓ Cut-To-Falls design
- ✓ Drainage calculation support
- ✓ National Building Specification: J42 waterproofing, Q37 green roofs, H71/92 zinc
- ✓ Registered installer network
- ✓ On-site support & assessment
- ✓ Guarantees/warranties

Detailing, compatibilities & interfaces:

A modern single ply roofing system is more than just a waterproofing membrane and incorporates a number of key system accessories. The key ancillaries that should be considered by the specifier to ensure the integrity of the membrane is not compromised are:

- Vapour control layers
- Geotextile separating fleece
- Adhesives and sealants
- Liquid detailing
- Standing seam profile
- Edge trims and outlets
- Pre-fabricated details & coated metal
- Walkway membrane
- Thermally efficient insulation
- Rooflights

These two images show where the integrity of the membrane can compromise the NBS specification by puncturing the membrane, ultimately leading to water ingress



However, by using the correct materials (in the case of this membrane with a FLL certificate) and standard detailing to avoid puncturing the membrane, these roof membrane systems are not punctured at interfaces and do not risk water ingress.

Summary

So hopefully you will go away equipped with three sets of knowledge:

Knowledge

- Defining your client's brief
- Ensuring compliance with UK British Standards and Code of Practice
- Choosing the best roofing system for the job
- When to specify single ply / hot melt / hard metals / liquid coating
- Green roofing options
- Further sources of information / contacts

Modern roof performance

- Waterproofing
- Insulation
- Sustainability
- Energy capture

Manufacturers' responsibilities

- Design bespoke roofing solutions to meet a client's specific brief
- Ensure compliance with UK British Standards and Code of Practice
- Supply, install and guarantee complete roofing solutions
- Ensure performance through effective detailing, compatibility and interfaces

About SIG

SIG Design & Technology is part of SIG Roofing, a leading division of SIG plc, a FTSE 250 listed company and the UK's market leading specialist supplier to professionals in the building and construction industry.

We design and supply flat roofing solutions including green roofing, zinc, copper and stainless steel roofing and cladding and pitched roof coverings including natural slate and clay tiles.

We have put together an 8-step guide to identify the challenges and ensure that a roof's design meets a building's requirements. Called #PerfectRoof, the eight steps follow the process from product selection and design expertise through to full guarantees and planned maintenance. Our know-how is just part of the service that is provided absolutely free to customers.

More information

Website: www.singleply.co.uk

SIG Zinc & Copper website: www.sigzincandcopper.co.uk

Technical blog: www.singleply.co.uk/blog

Technical product downloads: www.singleply.co.uk/resources/downloads/

Find your local advisor: www.singleply.co.uk/about-us/meet-team/

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