# Lead by example

## A glass and zinc facade inspired by lead flashing on existing buildings has given students at Northbrook College clean lines on a contemporary building

**You could say** that the existing vernacular of West Durrington's Northbrook College in Worthing directly inspired its modern reinvention - despite the fact that it's been interpreted using completely different materials. 'The college buildings were all a dark brown brick and we wanted to contrast that with something striking, light and open,' says ECE Architecture associate Gary Kelly. 'We had to demolish part of the original building and its lead flashing got us thinking.' The result for the college, which offers a wide range of creative degree courses, is the modern zinc and glass clad facade of its new Learning Resource Centre, forming the social heart of the redesigned campus, with its new entrance, three-storey atrium, library and refectory.

Huge sloping steel V columns support the large span precast concrete hollowcore floors. These are one component of the building's aesthetic; the other is the partially glazed zinc shingle facade inspired by the lead flashing. Initial concerns that the pre-patinated NedZink NOVA sheet might be affected by salty air from the nearby coast were rapidly scotched and, having used it before, the firm was confident that the material had good general robustness.

ECE Architecture had decided at planning to go with strip windows, which had knock-on implications for the facade's shingle design as alignment was everything. 'We wanted strip windows on the first and second floors, which would either be 350mm high or 700mm ascertained from eye levels when seated or standing. In the end we ran with a 600x350mm standard shingle of 0.8mm NedZink NOVA,' says Kelly.

With a steel structure, the facade is supported on 150mm Metsec channels between columns with 150mm Rockwool running between them. The outer side is formed of 12mm cementitious board, 100mm thick PIR Celotex insulation and a 25mm ventilated cavity. Helping-hand brackets run out from the channels to support an outer layer of 18mm OSB smart plyboard. The NedZink NOVA was then attached to this via a Tyvek breather membrane between layers. Kelly explains that sealing the cementitious board joints with bituminous tape, an airtightness line is established at the outer face of the board, giving an overall wall U-value of 0.15W/m$^2$K.

Cladding sub-contractor Kingsley Group, which installed the shingles, advised that instead of alternate rows being offset at panel midpoints, they should run a third of the way along the panels to avoid an obvious 'zig zag' effect along the facade. ECE Architecture had originally thought to fold the shingles around the corners but, says Kelly, it was decided to run a folded section of the zinc along the edges to create a crisper line that would otherwise be achieved by folding it – a detail also used on the parapet.

It seems the new Learning Resource Centre has been well received by students and locals alike. 'There's a busy main road running alongside the Northbrook site so the LRC's zinc skin is visible to a lot more people than the 2500 students who use it,' says Kelly. 'And with its triple height atrium space, refectory and new study rooms inside it really does feel like the heart of the modernised campus – the college loves it!' ●

**Top** The front elevation of Northbrook College's new learning centre framed in its zinc shingle skin.
**Above** Non-centred shingle set-out creates a less zig-zag facade effect.

# Shingles' might

Architects will never tire of the diverse textures, colours and forms made possible by the humble metal shingle



**Left** MVRDV's stainless steel shingle clad Balancing Barn brings reflective drama to its context.
**Below left** Spain's Casa del Acantilado's zinc shingles adapt to every curve of the building's roof form
**Below right** Studio Egret West The Fold, Sidcup with it's KME TECU gold shingles.

**Metal shingles** may be traditional in origin, but today they can be manufactured in almost any size, orientation and texture, giving architects great flexibility to express building volume and skin, and adding new depth and interest to roofs or facades.

Interesting recent examples include the Amphibious House by Baca Architects, a family home on the banks of the Thames in Buckinghamshire designed to float on rising floodwater. The building is sheathed in a homogenous grey cloak of titanium zinc diamonds, a scaly lizard-like skin that reflects the river's shimmering water.

Meanwhile, the Balancing Barn holiday home in Suffolk, by Dutch firm MVRDV, features a highly reflective cladding of brick-shaped stainless steel shingles, a playful futuristic aesthetic that changes appearance in response to the seasons.

## Multiple colours

SIG Zinc & Copper supplies a range of zinc, copper, stainless steel and aluminium shingles in finishes such as natural or weathered zinc, copper alloys, tin plated stainless steel, and colours including green, gold, bronze, red, brown or blue.

All shingles are manufactured and supplied ready to fit, produced in standard versions by NedZink in the Netherlands, elZinc in Spain, Aperam in the UK or KME TECU in Germany. Bespoke versions are made by SIG partner companies in the UK.

Simon Walker, category manager at SIG Zinc & Copper, comments: 'It is possible to achieve vastly different aesthetics using shingles in different shapes, sizes and materials. We see it as part of a move by architects to contemporise older traditions, for example taking the small fish tail-type shingles seen on historic French mansard roofs or chateaux and opening up the spec to create a modern effect.'

The variety of shingle sizes and shapes gives scope to create continuous surfaces over complex curving or angular geometries, in a way not possible with a standing seam.

This effect can be seen on the Casa del Acantilado in Spain, by GilBartolome Architects, where bespoke elZinc Natural shingles give texture and definition to an undulating amorphous roof punctured with complex curved window openings. A more crisp contemporary effect was achieved on the West Durrington Campus building at Northbrook College (see p.65) in Worthing, where NedZink NOVA zinc shingles continue around walls and soffits.

The smaller the shingle, the smaller the radius that can be covered. Shingles from SIG Zinc and Copper are available in sizes from 600x1200mm down to just 142x240mm, or 72-90 shingles per square metre.

## Sustainable choice

Zinc, copper and stainless steel shingles score well on sustainability. Each offers a minimum 40 years life expectancy, and as natural non-ferrous metals they have a patina that protects the product, requiring zero maintenance, and no coatings or paints. All are fully recyclable, and, on average, 20% to 30% of zinc shingles include recycled material. That means strong BREEAM and general environmental credentials.

Shingles are most commonly installed on a vented plywood wall build-up, fixed over a breather membrane to an 18mm-thick plywood substrate with a clip. Subsequent shingles overlap and interlock. Behind the plywood layer is a 50mm ventilated cavity, then another layer of breather membrane, a layer of insulation and a vapour control layer.

Installing one shingle at a time is a fairly labour intensive process which can result in higher labour costs when compared, for example, to running a 500mm-wide aluminium sheet from ridge to eave.

The cost of zinc, copper and stainless steel shingles also depends on such factors as metal choice, finish, size and orientation. Using fewer large shingles means less manufacture than a large number of smaller ones, and bespoke shapes and sizes can be more expensive than standard off-the-shelf units.

### Avoiding waste

Architects should consider shingle dimensions and material wastage, says Walker: 'They like to see clean lines run through a building: for example a vertical line across a door frame that continues to coincide with the edge of a window. But asking for very specific dimensions late in the design can mean a lot of discarded material.'

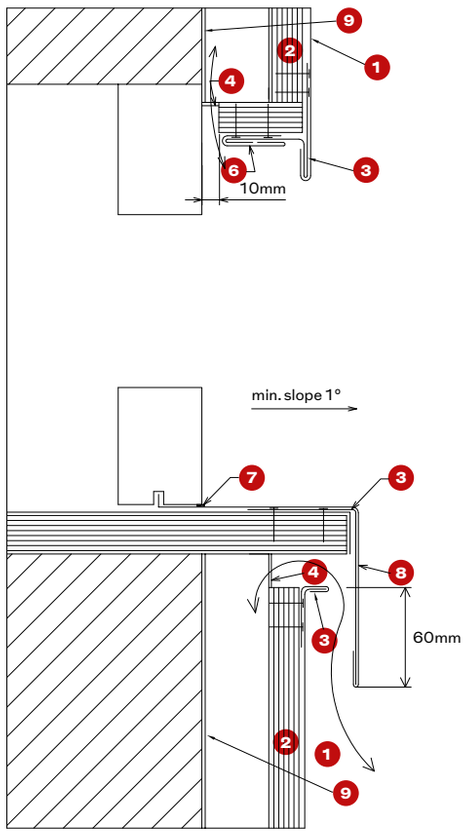
A 500mm wide piece of zinc will produce a standard 430mm-wide shingle (70mm is lost in the joints and folds), but a 228.4mm shingle would still have to be cut from the 500mm-wide sheet, resulting in wastage that must still be paid for. For those going the bespoke route, it is key to engage with SIG's designers early, says Walker: 'Shingle modularisation, wastage and cost effectiveness are key concerns. It is important to achieve the desired aesthetic within some form of modularisation if you don't want your QS to have a heart attack.'

SIG Design & Technology offers a complete and impartial design and supply service, covering all eight steps to help create the perfect roof and/or cladding. It first works with the architect's aesthetics and budget to develop several options. The preferred design is then developed into a full project proposal including a 3D build-up demonstrating how elements fit back to the substructure, the specification and detailed drawings.

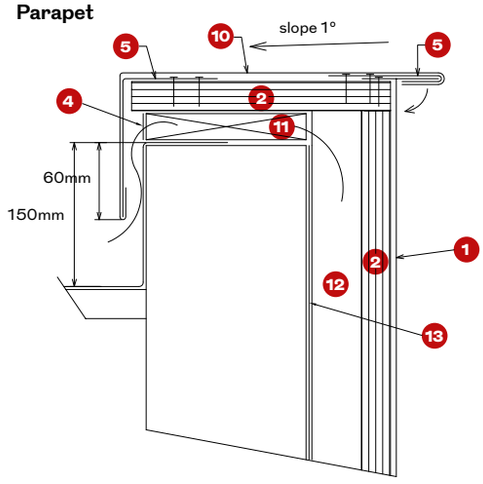
'We take a lot of the laborious work away from the architect because shingles are often not a specialist subject for them,' says Walker.

Guarantees of up to 30 years are available, if shingles are installed by SIG-approved contractors. Installation is relatively simple, but edge detailing, penetrations and so on are more tricky. A range of edging details is available, including for ridge, verge, penetrations, eaves, parapets, the base of cladding and more. If SIG Zinc and Copper is involved in the design and supply of the substructure then extended warranties are available for the full build-up. ●

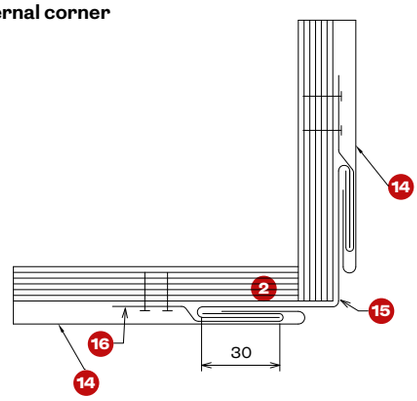
**Window details**




**Parapet**




**External corner**




1 NedZink shingle
2 Plywood
3 Continuous fixing strip
4 Insect mesh
5 Galvanized steel support angle
6 NedZink continuous welted fixing strip
7 Mastic sealant
8 Window cill
9 Breather membrane
10 NedZink parapet capping
11 Timber nogging
12 Ventilation gap
13 Breather membrane
14 NedZink shingle panel
15 Continuous corner strip
16 Shingle clip

# Common purpose

A strongly collaborative approach to school building has worked wonders for IID Architects, Wates, and Arnold Hill Academy


IID ARCHITECTS & ARES LASNDSCAPE ARCHITECTS

**Under the** tight budgets of school building programmes today, partnering has obvious efficiency benefits for main contractors and suppliers. But what does it mean for architects?

Richmond-based IID Architects found out for itself when working for contractor Wates on the design of Arnold Hill Academy in Nottingham, part of the government's Priority School Building Programme (PSBP). The £14 million project included a 3,640m$^2$ flat roof, designed in collaboration with supplier SIG, which is working in partnership with Wates across several schools.

'It was a very collaborative process for us, which was critical given the speed of the PSBP programme' says IID Architects associate David Moore 'We were able to benefit from lessons already learned and gain efficiencies by working with a team like SIG, which had already worked on similar projects as one of Wates key supply chain partners.'

## Old colleagues

The new school building is a three storey superblock incorporating all major teaching spaces. It uses Wates' ADAPT modular steel system, which IID was familiar with through its work on other Wates-built schools. The system includes typical construction details for dealing with roof junctions which can be tailored to suit each project.

'We worked very closely with SIG and Wates,' says IID director Richard Matthews.

**Top** Visualisation of the completed school.
**Above** Single ply was used to cover a storey-high change in roof height at Arnold Hill, removing the need for a render finish.

'We'd used SIG products before but not with this much collaboration, which arose from the batch nature of the framework appointment and speed of the programmes. On traditional one-off contracts or D&B we wouldn't normally get this level or speed of input.'

At an initial meeting, IID discussed its design intent with SIG and shared drawings. SIG then developed detailed drawings of the roof installation, drawing on its specialist experience of similar, but not identical, flat roof projects for Wates.

Once architect, supplier and contractor were happy with the design, SIG finalised details for manufacturer, and produced its own 1:5 drawings of the installation for the specialist contractor. According to the architect, build-ability for early weather-tightness and removing crossover of trades at roof level was key in adjusting the detailing to suit the sequence of site operations.

## Efficient and satisfying

'It's a very good, streamlined process – everyone knows what they're doing. The benefit for us is how quickly the programme moves forward without delays during procurement... It saves a lot of time as you get to the solution more quickly,' says Moore.

The installation by Advanced Roofing used mechanically-fixed IKO Amourplan P single ply waterproofing on top of 140mm thick IKO Enertherm ALU PIR rigid insulation board. This sits on a IKO Spectravap PE vapour control layer, which in turn rests on a concrete plank and metal deck roof structure. SIG designed all the interfaces with protuberances – such as sun-pipes, roof lights and air handling ducts – as part of its guaranteed system to ensure that waterproofing was maintained throughout the installation. While IID was more involved in detailing the parapet, there were no interface complications with the rest of the building.

This teamwork approach and resulting swift design solution was essential since the flat roof was an early package in the programme in order to make the building watertight as soon as possible.

'They were very keen to get the roof deck on so that the building was substantially watertight and they could start on the internal metal stud partitions,' says director Richard Matthews, adding that the collaborative nature of the partnering arrangement meant the architect had peace of mind in knowing that the installation would turn out as designed.

Arnold Hill was IID's first secondary school using the Wates ADAPT approach, and it would like to use the experience it has gained on more projects with the contractor.

The new school building will be complete in time for the start of the autumn 2016 term.●

**SIG Design and Technology provides certified roof build-ups to meet BB93 requirements: http://bit.ly/BB93acoustics**