

HOLDING IT ALL IN

Thirty-three years after the nuclear disaster at Chernobyl, work is still under way to contain radioactivity at the site, including the delicate construction of a €1.5bn steel arch over the exploded reactor. **Will Ing** speaks to UK consultants monitoring the internationally funded operation



The Land Rover has driven north from Kiev for two hours, much of it on a quiet road punctuated only by the odd farmer on a horse and cart. The vehicle stops when it reaches a military checkpoint, and two men hop out to scan their cards before going through a barrier and returning to their car.

As they drive on again, the surrounding meadows are soon surpassed by dense forest that rises up around the road, while occasional glades offer a peek deeper into the verdant wildscape. A family of miniature horses pause beside the road, their golden coats shining, then gallop off. The checkpoint ritual is repeated, and the navy car then flashes onward into the inner, 10km exclusion zone. Scores of abandoned cottages loom by the roadside, with many more stretching back into the woods, consumed by vegetation. There are no other cars or people around, only the two men in their Land Rover, and me.

They know they are close when four insect-like old cranes rear above the skyline, and beside them the unfinished structures of two reactors: enormous cuboids of weathered concrete and rust. Soon a silver arch, like a gargantuan pigsty, hangs over the horizon and glistens in the sun. And as the Land Rover pushes on, the rest of the decrepit Soviet nuclear site unfurls before its passengers.

The two men work for Edinburgh-headquartered property and construction consultant Thomas & Adamson (T&A), and they have come to this place several times a year since 2012. They first arrived here after winning a contract to work on two building projects with a combined multibillion-euro price tag – to contain Chernobyl’s nuclear contamination and spent nuclear fuel. Seven years ago the European Bank for Reconstruction and Development (EBRD), on behalf of the western donors funding the Chernobyl containment works, decided to appoint a monitoring consultant after repeated problems with budgets being breached and programmes running late.

The small Scottish firm pipped a handful of building services goliaths to nab the job in a consortium with US firm Black & Veatch and Ukrainian consultant MediaMax. Black & Veatch has since left, with T&A heading up the joint venture since January 2018.

The project manager and contractor on each of the two projects provide monthly reports, and the role of T&A as monitoring consultant is to write a third, roughly 30-page report interrogating these reports, to keep the EBRD and the big western donors as well informed as possible. “Donors were told everything was okay for a long time, and then suddenly there was a problem. In reality things were probably not okay before this,” says Ross. “That’s why we were brought in.”

On a day-to-day basis, on their visits to Chernobyl, Ross and Addington-Barker read the project managers’ and contractors’ reports, attend meetings, and go on site visits. Their job is to report mainly on the risks and constraints to the budget and programme.

THE VERY FIRST TIME WE DROVE UP ON OUR OWN WE HAD A GPS TO GET THERE BUT IT JUST STOPPED – IT HIT A BLACK BOX WHEN WE GOT TO THE EXCLUSION ZONE

ANTHONY ADDINGTON-BARKER, THOMAS & ADAMSON

So what are the difficulties of building a giant shed around an exploded nuclear reactor? How did a small Scottish consultant land work on a critically important international project? And what is it like to work at the site of the world’s worst nuclear accident?

Entering the exclusion zone

“The very first time we drove up on our own, we didn’t know where we were going,” says Anthony Addington-Barker. “We had a GPS to get there but it just stopped – it hit a black box when we got to the exclusion zone.”

“It was really weird,” recalls Colin Ross. “It is still such a surreal place.” The tall and bespectacled Ross first joined T&A as a QS in the Ukrainian capital, Kiev, in 1997 and is now regional director. He is accompanied by wily senior project manager Addington-Barker, a highly trained nuclear specialist who previously worked for Gleeds and the UK Ministry of Defence, who has also spent most of his time since the late 1990s in Ukraine, although he only joined T&A in 2007.

Both men say they felt drawn to the exoticism of the post-Soviet capital when they first came to the region two decades ago, and both have since married locals. Schemes they have worked on here with T&A include the Dutch embassy, a Coca-Cola factory and a Mormon temple – as well as various jobs for oligarchs.

Ross admits he is “sometimes surprised” T&A managed to win a role on such an important job as the Chernobyl containment, but ascribes it to providing a proposal that carefully followed what the tender documents requested. “The smaller consultancies like T&A have an opportunity, in my opinion, to provide a better service because we have a tighter management structure and can manage projects more closely,” he adds.

T&A’s work at Chernobyl is on two separate building projects: one is to construct a new containment structure for the reactor that blew up (Reactor Four) and the other is to build the facilities for extracting, treating and storing the spent nuclear fuel from the other three reactors.

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It was an awkward job to begin with. “Nobody »

» wanted us there when we started. They thought we would be very difficult and intrusive,” says Addington-Barker. Actually, say he and Ross, the opposite is true – the job of monitoring consultant is about quietly bearing witness. “We’re not here to give nuclear advice, or to project manage, and that was hard for both of us to begin with,” adds Ross.

The revolution interrupts

Living in the Ukrainian capital, they were shaken by the violence that struck in 2014 with so-called Euromaidan revolution, which saw thousands of citizens descend upon the streets of Kiev to protest at then-president Viktor Yanukovich’s pivot away from the EU and towards Russia. Both men were among hundreds of thousands of protesters, with Ross’ wife, Irina, and their grown-up daughter helping cook food for activists in the freezing winter.

More than 100 protesters were killed by government forces, with many shot by snipers and others burned alive following an arson attack on a temporary hospital. Western workers at Chernobyl followed the news with trepidation, and all had planned their emergency routes out of Ukraine. Expats working for the project managers on both schemes were sent out of the country but returned after a couple of weeks.

The revolution – which led to the overthrow of the government and the ousting of the president – still casts a long shadow over the nation, in particular the economy. It paved the way for Russia’s annexation of Crimea, as well as the ongoing conflict in eastern Ukraine between government forces and Russia-backed separatists.

Ross and Addington-Barker agree that working at Chernobyl is now “both special and normal” to them. “We’re going there all the time and it’s kind of normal, but then you will have the anniversary of the event and it can be quite upsetting,” says Addington-Barker. “You suddenly remember why you’re there.”

Containing the reactors

The first and largest of the construction projects at Chernobyl is slowly drawing towards a close.

THE OTHER JOB

The other job Thomas & Adamson are monitoring for the EBRD and donor nations is the €300m (£267m) Interim Storage Facility Two (ISF-2).

Construction started about 20 years ago to build a rail line to transfer spent nuclear fuel to a new facility that can process it – cutting the fuel cells in half and removing the water from the fuel – before transferring them on again to safe bunkers where they can be stored for 100 years. The project is challenging because the storage facility has to be resistant to any imaginable threat – including intruders, thunderstorms and earthquakes. This scheme is expected to finish later this year, or early next and is currently undergoing testing without using real nuclear fuel. Also, it is near-impossible to undertake construction on some parts of the site once treatment of the nuclear fuel starts, due to the danger to human life – so there is no chance of remedial works. The contractor, Holtec, was appointed in 2007 after the initial contractor was unable to fulfil its contract.

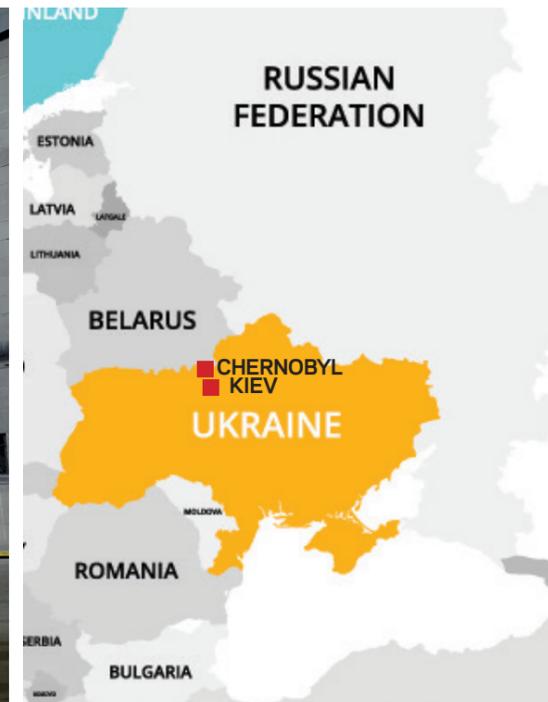
The project manager is another Scottish consultant, Wood.

Previous page: The huge steel arch, being built to contain the remains of the exploded reactor, is nearing completion after seven years on site, with 3,000 workers at peak

This page, top: The exclusion zone – from which more than 300,000 people have had to be resettled – has been abandoned to nature for three decades, with abandoned houses reclaimed by the forest

This page, bottom left: Supports have been placed around the original containment structure, now within the new steel arch, to stop it collapsing before it can be dismantled

This page, bottom right: A map of the region



The New Safe Confinement is the €1.5bn (£1.3bn) steel arch – part of a wider €2.1bn (£1.9bn) containment project – that has been placed over the reactor that exploded in April 1986 with devastating consequences, including dozens of deaths from the effects of radiation within weeks, and one of a man who was vaporised on the spot.

The original containment structure, a concrete sarcophagus built around the reactor to limit contamination in the immediate aftermath of the explosion, is in a poor state of repair, and any collapse risks throwing out radioactive dust into the atmosphere – so international donors led by the US, the UK and the EU have been racing to cover it up.

Planning for a new containment structure began in 1995, with the design approved in 2004 and contractor Novarka – a Vinci-Bouygues joint venture – appointed in 2007 to build the New Safe Confinement. At the peak of construction some 3,000 Novarka building workers were on site, while the project management unit, led by Bechtel, had 150 members of staff.

Putting the new steel arch in place was no easy task. “You couldn’t build it over the reactor because the radiation would fry the builders – and also because you don’t want to drop anything on the structure because it is so fragile,” explains Ross. The structure is thought to be the heaviest thing ever lifted by humankind, weighing approximately 35,000 tonnes, and was jacked onto a rail system by 16 jacks at either side. The width of the arch was 257.5m, but each pair of the 32 jacks could not be more than one or two millimetres out from each other, or the structure would twist too much when moved.

“There were lots of problems – it didn’t really go to plan,” chuckles Addington-Barker, remembering. Moving the arch was beset by several issues, with Novarka having eventually to work around the clock in order to finish the movement in time for a planned ceremony with the Ukrainian president. “But it’s hardly surprising,” says Ross. “It’s a huge-unknown project.”

For Cyrille Fargier, the Frenchman who is »

A DEEPLY WEIRD DAY OUT

BY WILL ING



When the two T&A consultants visit Chernobyl, it’s always an early start. Colin Ross and Anthony Addington-Barker usually have a meeting on site at 9am,

and the day I come along with them is no different. Halfway through the drive up to the check-point, we stop at their favourite breakfast spot: a roadside cafe/bar that serves decent omelettes for the equivalent of a couple of quid.

The exclusion zone has about double the amount of background radiation as in the UK, but that’s still fairly low, and everywhere apart from the spaces immediately around Reactor Four is safe to work in over a period of years. Nevertheless, everyone on site has a story about their family panicking when they announced they were moving to Chernobyl.

Chernobyl itself is beautiful, until we reach the power plant. In the medieval period the area was a hunting ground for the Russian tsars and was famed for its forests and stocks of game and fish. My visit is in early summer and the region’s natural wildlife, three decades into respite from human interference, appears ripe and primordial once more.

Abandoned houses appear and quickly begin to litter the roadside. I had expected such sights to feel poignant, but with all suggestion of residence long forgotten they instead seem only to provide the forest with a touch of fantasy.

As we reach the reactor site, the old Soviet buildings and sub-stations provide a stark juxtaposition to the surrounding wilderness, but once on the site and inside the buildings, they seem much like any other beaten-down offices.

Despite the fact it is safe to be in the exclusion zone, hazards are still everywhere. I start wandering off onto grass or sand countless times before being reminded I could inadvertently release radioactive contaminants in the ground. I am also dragged away from numerous wild dogs. I stop to take pictures on the road that circles the plant in a place that happens to have gamma rays pounding through it. And my biggest infringement is to dare attempt sandwich consumption outdoors. Repeatedly I find myself standing in a scanner and pressing my hands against a tin-foil lined surface – until a ping indicates I am not steeped in radioactive contamination.

The most evocative part of the day is seeing the Monument of Those Who Saved The World, a roadside statue dedicated to the firemen who rushed in to put out the fire at the reactor on the night of the explosion in April 1986, unaware the inferno was anything more than a common electrical fire.

It was also deeply weird to see, inside the new containment arch the crumbling concrete sarcophagus encasing the original reactor, where people died – and from where deadly contamination plumed out and spread around the continent.

1970	Start of construction on the town of Pripjat, where nuclear engineers and construction workers will live.
1972	Start of construction on the Chernobyl Nuclear Power Plant.
1977-83	Reactors One to Four completed and brought into use.

1986	Reactor Four exploded during a test event simulating a power outage. Scores of firemen arrived to put out the blaze, many of whom lost their lives from radiation. Four days later the world learned of the disaster, after the contamination was detected in Sweden, which sourced the location by looking at weather patterns. A 30km exclusion zone was evacuated, originally temporarily but ultimately permanently. At the same time an object shelter was hastily erected around Reactor Four to limit radioactive contamination. Estimates for loss of life – though difficult to define – are understood to be in the thousands, if not tens of thousands, with some claiming over 100,000.
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1995	Memorandum of understanding is signed between the G7/EU and Ukraine, with the former pledging to fund better containment of Reactor Four.
1997	Chernobyl Shelter Fund to pay for containment work is set up by the European Bank for Reconstruction and Development.
2000	Chernobyl’s Reactor Three is finally shut down.

2001	Decision on New Safe Confinement strategy is approved.
2004	New Safe Confinement design is approved. Four-year scheme to build supports to stabilise the original containment structure begins.
2007	Contract to build New Safe Confinement signed with Novarka.

2012	Arch assembly begins. T&A wins role as monitor in consortium with a US and a Ukrainian firm.
2017	Deadline named for completion of New Safe Confinement after Novarka signs fixed-fee contract.
2019	Official completion expected on the New Safe Confinement. The official deadline is July, but some doubt this will be reached.

» Novarka's head of construction on the project, the whole job was a challenge: "This is a prototype from beginning to end - we had to invent everything and make everything validated by the nuclear regulator. It takes a lot of time."

The inside of the shelter was hard to build as well. "When I came out here I thought the project was just to build a big, dumb steel arch. I didn't know until I got here how sophisticated this thing was," admits Oscar (aka Mac) McNeil, an ex-US navy engineer and now Bechtel's head of the project management unit on the New Safe Confinement.

The arch has a sophisticated ventilation system that pushes air out of the main chamber, filters out contamination and shuts down the system if it exceeds safe levels. It also contains two 750-tonne bridge cranes that will be used for the process of dismantling the original containment structure that now sits within the New Safe Confinement, in a separate process not within the internationally funded construction project but that will be led by the Ukrainian authorities.

The project is made more difficult, observes Addington-Barker, by the west-meets-east set-up. "It's a western-funded project, and a lot of the norms are western-orientated in terms of how they tackle problems," he says. "Then there is an old Soviet system, with old Soviet regulators, that are saying you have to do it this way."

"There is a lot of red tape and bureaucracy," adds Ross. "You might have 60 comments on a snagging report, with one or two just being about some dirt being somewhere it should not be. But each comment needs a protocol with a form and an explanation and several signatures."

Hazards of the job

On site, builders and consultants face packs of feral dogs with bloodshot eyes and puffy faces. Their presence is officially not permitted, but past efforts to sterilise and rehome the hounds were unsuccessful. Mostly the dogs just lie in the sun, but workers are told to dash away if one starts following them.

Their presence is all the more bizarre given the countless layers of security checks humans must go through. State security services are responsible for on-site security because of the dangerous potential of spent nuclear fuel; they have erected

IN SOME AREAS, WE COULD ONLY WORK FIVE MINUTES AND THEN THE PRE-ALARM BEEPS, AND THE GUY HAS TO GO OUT. YOU CAN IMAGINE THE NUMBER OF PEOPLE AND THE TIME IT TAKES

CYRILLE FARGIER, NOVARKA



COLIN ROSS

Left: Behind our intrepid reporter Will Ing, the ventilation stack on the New Safe Confinement can be seen

Right: The Monument of Those Who Saved The World, dedicated to the firemen who tackled the explosion in 1986



rows of razor wire to deter would-be trespassers.

Potentially rabid dogs are only one of the unique threats posed by working at Chernobyl. The gravest is exposure to radiation: either from radioactive particles or gamma rays. Labourers are furnished with dosimeters, devices that record how much radiation they are being exposed to - with the machine beeping once it reaches a certain threshold. "In some areas, we could only work five minutes and then the pre-alarm beeps, and the guy has to go out," says Fargier. "You can imagine the number of people and the time it takes."

The hardest part of the job from a safety perspective was the excavation work to create the end walls for the arch. This involved removing 75m³ of radioactive concrete that was poured onto Reactor Four immediately following the disaster. As Ross explains, the job was a problem from lots of angles: "You had radiation, confined spaces, poor lighting, height, working in debris. You couldn't pay me enough to do that work."

The job was so dirty that Novarka refused to take it on, but problems were confounded by the appointment of a local Ukrainian contractor not used to the western safety standards demanded by donors. "They just had absolutely no safety culture whatsoever," says Bechtel's McNeil. "And because of the radiation limits, once a worker had reached his maximum dose he had to leave the job. But I guess it was a fairly well-paying job, so we would find dosimeters that they would hide so they could work longer hours."

"The old man who ran the company died fairly soon after I got here [in 2015] from leukaemia. He had been around the plant for many, many years, and I suspect the radiation caused it. About three weeks before he died - after we had been ripping the hell out of him on safety - he came and sat down and he said: 'I appreciate what you are

doing, because when I grew up in the Soviet Union there was no concern at all about safety. Because if a worker was killed on a job, there was always somebody to replace him."

Novarka is racing to finish the remaining works on the New Safe Confinement in order to receive a certificate of completion from the Ukrainian government by the end of July, the latest deadline named in the contract. Novarka's Fargier insists it will happen, adding when pushed on the date: "There is always a risk, but the risk on the activity remaining is not so big." But Bechtel's McNeil is sceptical: "With the amount of work they have to do, I don't believe that is possible."

Either way, construction is wrapping up at Chernobyl sooner rather than later, and testing is expected to finish at Interim Storage Facility Two by the end of the year. Ross is doubtful whether T&A will be reappointed in the new year, given that construction work is so near completion. Both T&A consultants say they will miss working at Chernobyl and that their future in the country is uncertain, given the decreasing workloads there since the 2014 revolution. "I can't see problems ending in the east of Ukraine or in Crimea, and so people are just not willing to invest," laments Addington-Barker. "We're not sure what will happen."



BUILDING
PODCASTS

Hear more about Will Ing's trip to Chernobyl in **this week's Building podcast**, which also covers the first Building Live Club event on next steps after the Hackitt report.

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Upset pandas see Interserve ditch the high-vis at Edinburgh zoo

By [Will Ing](#) | 6 September 2018

Staff also stop using leaf blowers when koalas are mating

Interserve has renewed a £2m FM contract with Edinburgh Zoo after agreeing its staff ditch their high-vis jackets – because they were upsetting the pandas.

The zoo is home to the UK's only giant pandas, including female Tian Tian, while two Asiatic lions are also among the animals put off by the presence of the reflective clothing.

Zoo keepers were initially unsure why animals were becoming distressed but they later realised it was linked to the fluorescent garments.

Tian Tian arrived in the Scottish capital nearly seven years ago along with a male panda called Yáng Guāng on a 10-year loan, as part of a £2.6bn trade deal between the UK and China.

Jeff Flanagan, managing director of commercial at Interserve said: "It's a challenging but exciting place to work. Our teams work...[to] respect the needs of its animal residents."

It is not the first time the pandas have been upset by builders with Jeremy Peat, chairman of the Royal Zoological Society of Scotland, claiming earlier this year that a plan to develop the nearby former Corstorphine hospital into flats could lead to their deaths because of the noise and vibration.





Source: Shutterstock

Tian Tian arrived at the zoo in 2011 as part of a breeding programme

Interserve staff at the zoo, which has 600,000 visitors annually, have also been asked to keep the noise down during lions' and koalas' mating seasons. Workers don't use noisy air blowers and clear up leaves and debris with a broom instead.

The head of business operations and visitor experience at Edinburgh Zoo, Bruce Ritchie, said: "Interserve understands our work and plays a key role in keeping the zoo running, making sure it looks its best for visitors as well as providing a safe and comfortable home for our animals."

Interserve first began working at the zoo, which opened in 1913, back in 2013.

OFFSITE: REDESIGNING THE UNIFORM



A consortium of firms aims to create a standardised way to construct hundreds of school buildings a year – and the Department for Education is right behind them. **Will Ing** looks at whether schools could soon be built in a fortnight

Who actually goes to the school? It's mostly children ... so why can't they design it?" That was the question posed by one year five pupil at Shacklewell primary school in Hackney, during a visit from architect and consultant Bryden Wood.

The thought was prompted by an hour playing around on an iPad with an app launched by the Seismic consortium. The program allows users to design a new school for a specific site in just minutes, and the design will be fully compliant with the Department for Education's (DfE) extensive regulations.

"You could imagine having a competition where everyone designs a school and parents and teachers can vote on the one they like the most," says Jaimie Johnston, head of global systems at Bryden Wood. "And it wouldn't really matter who designed it."

There is just one condition – the schools must be built using offsite manufactured components designed by other partners in the consortium – which is led by consultant Blacc, and includes the Manufacturing Technology Centre, and two offsite contractors: Elliott and The McAvoy Group. These parts will soon be used to build schools up and down the country – and for some partners in the consortium, that prospect is a lot more significant than the configurator app.

Seismic has created standardised parts which it wants everyone to use when building schools. The lightweight steel frame and connector is better for the environment than existing solutions, says the consortium, but all eyes are on the real prize. Could this system finally crack offsite's longest-standing puzzle: making production efficient enough, and on a large enough scale, that it can bring down costs and uproot traditional construction methods?

Two years ago, construction consultant Blacc was asked by the DfE to help solve a problem. The department is responsible for 80,000 buildings across 24,000 schools in England, all with a design life of 60 years. That means it needs to replace roughly 400 school buildings every year – on top of the new buildings needed for extra capacity. And money is, of course, a consideration.

"We got asked by the DfE to have a look at how we could help them with some of their smaller schools in the South-east, where they could not get traditional contractors building for their rates," recalls Richard Crosby, director

at Blacc. "So, I came in to help them develop a new procurement option."

Modular approach

Crosby set about trying to broaden the market – and he turned to modular companies, who he quickly realised have a very different business model from rest of the industry. Traditional construction is supple: use of subcontracted labour means when work dries up, much of the payroll can also disappear. Offsite manufacturing, in contrast, requires a constant flow of work to generate a sufficient return on investment in manufacturing – the more of something you manufacture, the cheaper it is.

At the moment, all offsite firms have their own proprietary systems for building schools. And although there are small differences between offsite suppliers, many of the leading firms produce very similar frames, made by the same fabricator.

Seismic was formed at the beginning of 2018 from firms on the DfE's first MMC framework. It is one of the first projects to receive funding from UK Research and Innovation (UKRI) and Innovate UK as part of the £170m allocated by government for the construction sector deal, part of the Industrial Strategy. Roughly £700,000 came from funding, with consortium »

SEISMIC AT A GLANCE

■ **Members of the consortium:** Blacc (lead), Bryden Wood, Elliott, The McAvoy Group, The Manufacturing Technology Centre

■ **How much has it cost?** £1m – with roughly £700,000 funding from UKRI/Innovate UK

■ **When did it start?** Early 2018

■ **What's the vision?** "The overriding aim was to increase efficiency and to reduce cost by standardising the offsite frame dimensions across the industry to create a componentised system for building new schools, beginning with primary"

■ **What type of system is it?** Light-gauged cold-rolled steel sections frame with fabricated connectors



Left and right: The recently finished 630-place Concordia Academy built by the McAvoy Group in Romford



Suky Atwal, commercial director at the DfE, says he has set his team the task of doubling the number of schools that are done using modular every year.

Given the different business model enjoyed by manufacturing, this target could be smashed quickly if the consortium's offsite system is used widely – and the DfE would benefit as offsite contractors compete not on cost, but on who can deliver the better service.

The consortium started by engineering a single way that McAvoy and Elliott could interconnect their respective modular building systems. To do this, the firms shared and reviewed their current structural designs – which were very similar but had different-sized sections and different connection methods.

Getting connected

Having created a standardised connection solution, the firms then set out to create a standard structural frame. The Manufacturing Technology Centre led the way on reducing the number of components needed, while Elliott and McAvoy fed back expertise on logistics and transportation of the proposed product. Bryden Wood worked with the designed components, and in-put them to the configurator it was building.

The emerging design is for a light-gauge, cold-rolled steel-sections frame with fabricated connectors. While some further fire testing is ongoing, prototypes are set to be made in four to eight weeks, while talks with steel fabricators are ongoing so that full manufacture of the system will be up and running by the end of the year.

The frame is strong enough to allow a building of up to five storeys to be built, and although tweaks may allow this number to grow, five floors is more than most schools need. The consortium claims the system uses fewer components than

other offsites school systems, allowing for faster module assembly in-factory which could increase productivity by 50%. This also makes work onsite to connect modules quicker.

Patent pending

At the moment there is a pending application for a patent over the design of the components, which would be held by all the JV partners besides Bryden Wood. The intention is to hold the patent until the frame and connector are being fully manufactured. For some in the consortium, this approach risks being an obstacle to making the products completely standard – such that most or all firms building schools would use them.

The patent raises the prospect of other offsite contractors having to pay the patent-holders to manufacture or order the parts – which is unlikely happen. And because of that, the DfE cannot specify it wants these parts to be used when procuring schools as it would create a market advantage to the patent-holders.

However, David Clark, McAvoy's manufacturing director, claims the advantage of having a patent is being able to “protect the product, to keep it standard – so we don't end up with the product and many different versions of it”.

Crosby agrees that for now, this is vital. When manufacturers are creating the frames and connectors in bulk, then access to them will be opened up to the rest of the market. But currently, the products are not created on a significant scale – so if allowed, competitors would be better served by creating their own cheaper imitations, which might be of a lower standard.

Crosby adds that the DfE does not need to specifically promote Seismic's solution. It could do it tacitly through its spatial specifications and by requiring the need for connectors to other parts. There is also a sense that the consortium partners are entitled to gain an early-adopter advantage, as they have put their own time and money into the JV. But Elliott's Colin Sargeant, managing director for offsite solutions, is clear.

He says: “Although there is a patent on it, as far as I am concerned, we have only done it to protect it over the next 12 months. We have no intention to hang on to the patent. We want to give it to the market because it will increase the size of the cake. The more people that use it, the more embedded it will become in the industry, the more government sectors will use it.”

Crosby is hopeful the frames will be available for use by the time the DfE's latest £3bn framework is properly up and running, around the middle of next year. The DfE is still assessing applicants to the framework, which formally launches in autumn this year.

“We're trying to tailor it to suit that, and we're wanting to try and make the frame available to

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COLIN SARGEANT, THE McAVOY GROUP

anyone on that framework to use,” Crosby tells a packed room at an event unveiling work by Seismic. Several of the guests were from other offsite contractors, such as Caledonian, Premier and Portakabin.

A common platform

“As this gets traction, other parts of the industry will join us, and produce a common platform,” predicts Elliott's Sargeant.

“The DfE has quite a lot of modular frameworks out there at the moment, and what they are doing is encouraging the market – not just ourselves and McAvoy – to use and benefit from the work we have done. The technical stuff, DfE is promoting.”

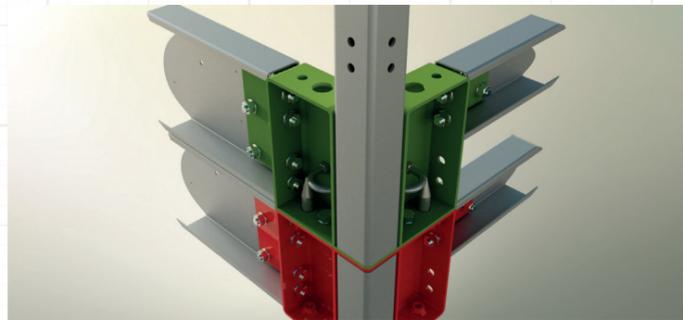
Sam Stacey, director for transforming construction at UKRI, acknowledges: “We are already realising the benefits in new DfE procurement framework.”

We're not on the brink of all schools being entirely volumetric modular. Other firms must start using the connector and frame for it to become standard and even then there will be some schools best suited to other techniques such as offsite panelised systems or even traditional construction. Even so, there are still more areas of building that are not yet offsite, but which could be – for example, mechanical, electrical and plumbing, which consortium members have their sights on for the future. But from shipping containers, to the automotive industry, standardisation has radically changed productivity in areas where it has been embraced by all.

If that happens, the big winner will be the DfE – which has worked hard to broaden the market so it can build more schools, more speedily and for less money. Other parts of government are already looking on with envy, with the health department known to be interested in building more hospitals and clinics using offsite methods. But in the long run, one of the most important things to come from this for the industry, and the DfE, might be the configurator – which can inspire generations of children able to design their own primary school in 20 minutes.

Right: A connector designed by the Seismic consortium

Below: Seismic's steel frame elements can be reconfigured according to the site



REDUCING EMISSIONS

Seismic says solution uses 25% less than steel than the average primary school that is currently built using offsite methods. The consortium says this can reduce costs by up to 25% and reduce carbon emissions for a typical 40-module school by the equivalent of 1.55,000 miles of car driving or 17 flights from London to Sydney. The use of a standard connector, rather than welding, also means schools can be disassembled and the components kept and reused elsewhere.

» members stumping up around a further £300,000 between them.

Its scope was to create a series of steel-frame elements and connectors that could be reconfigured together in different ways according to the site – so complex designs do not have to be created from scratch for every new school. These parts are based on pre-existing specifications set out by the DfE.

Crosby explains: “On top of just giving [offsite contractors] a pipeline to fill their factories, we had to make the whole process simpler to derisk it, so they don't have to invest in high-quality [consultants] and architects. If the process is simple, it's just manufacturing.”

The use of offsite techniques for school buildings received a boost in 2011 with the James review and its call for more standardised designs, and since around 2014 the DfE says 58 schools have been delivered using the method.

