

Creating the classroom of the future



Chulmleigh in Devon is a thriving local community with shops, bank, post office, and modern health centre. Close to the school is the local community college, with its tennis courts, indoor sports facilities, public library, resource and information centre and, during the summer months, heated swimming pool. The school is able to share many of these facilities.

The school recently achieved an 'Investors in People Award' and is registered as an Eco-School.

When county architects Devon Properties were planning the model 'Classroom of the Future' they selected the rural location of Chulmleigh School for this landmark project. They then set out to achieve their brief of creating a teaching facility with the highest environmental standards. This facility was also designed as a community resource and they worked with Exeter University to develop a model energy strategy for schools with the target of near-zero net carbon emissions.

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The most recent building technologies have been integrated into the design, including directional photovoltaic cells, capable of generating solar energy, window locations to maximise solar gain, electromechanical window shading, heat pumps, underfloor heating/cooling and special low-insulation concrete floors, installed by Permaban.

The cool floor

A low-insulation concrete floor was needed to minimise insulation between heating/cooling pipes and the concrete floor surface. Applied finishes, such as carpet or vinyl, would result in undesirable thermal insulation. Bonded ceramic and terrazzo tiles would have a similarly detrimental effect in addition to making the finish thicker. Permaban was thus chosen to provide the ideal decorative, hardwearing surface together with a minimal lag-time contribution

Figure 1: Directional photovoltaic cells on the roof of Chulmleigh School.



(Photos: Mandy Reynolds.)



Figure 2: Low-insulation floors have been installed throughout.



Figure 3: The terrazzo effect is attractive and durable.

to the heating/cooling rates.

The concrete floor slab incorporated a mix design based on local materials. Careful mix selection enabled the desired aggregate distribution to be achieved within the concrete matrix. After curing, diamond grinding was used to expose the section through this concrete, showing the attractive colours and beauty of the local aggregates. Grey cement was used on this occasion, but cement pigmentation, together with varying the aggregate type and grading, enables an infinite variety of effects to be achieved.

Low-maintenance properties

The appearance of the floor is reminiscent of terrazzo. However, terrazzo tiles can only be precast with 10mm aggregate, whereas the Permaban system enables 20mm aggregate to be used. This makes it possible to achieve a variegated appearance and provides more scope for artistic design. The floor is seamless, with only the induced joints of the base concrete. This avoids maintenance, unlike terrazzo tiles which require regular repairs to grouting at 300mm centres for the purpose of hygiene and appearance.

When compared with bonded ceramic or terrazzo tiles from a structural perspective, the full slab depth is used in the design calculations, thereby reducing the slab depth and ground excavation by up to 80mm. There are also substantial savings on programme times. There is considerable use of electronic technology and computers in the facility. However, there were no static electricity problems as this is a concrete surface.

Concluding remarks

The concept of special aggregates set in coloured clay and stone-ground by hand to reveal the heart of the aggregate dates back to Roman times. Some wonderful examples can be seen in the floors at Saint Mark's Basilica in Venice, Italy. Modern technology has enabled this attractive finish to be realised on concrete floors which are durable and can be installed to satisfy today's tight programmes. ■