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EMERGENCY LIGHTING

EK212

This project is about light emitting concrete, achieved with fibre optic cables.

Existing examples of fibre optic concrete are used exclusively for decorative purposes, due to limited structural capabilities and the high cost of the material.

We are interested in pushing the concept to functional applications. We started with the idea of bending the fibre optics in the concrete, rather than running them straight through. This meant transferring light from one area to another.

Our chosen application is emergency lighting for refugee camps. Toilets in particular are places that require lighting that is cheap, secure and easy to maintain.

Most refugee camps in Africa do not have a lighting system installed for the toilet facilities and darkness descends as the sun sets. In high profile emergencies, toilets in camps are often provided with solar lighting. But donors and aid agencies rarely pay for long-standing camps in Africa to have the same facilities, making it more dangerous for women.

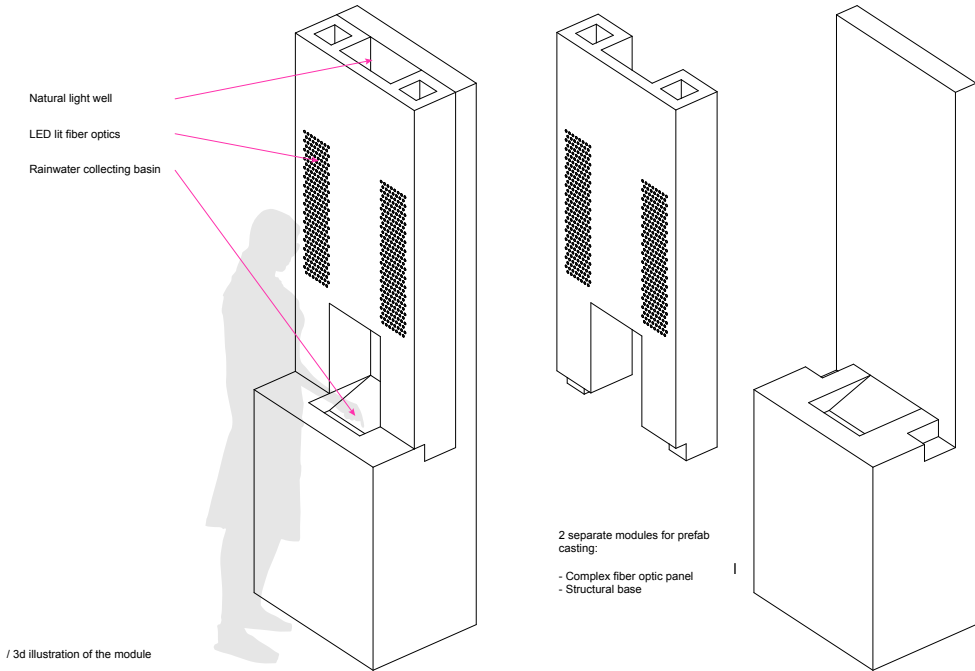
The requirements for the lighting in a refugee camp inform the design of the proposal:

Cheap, secure and easy to maintain. The light source is LEDs in a compartment set into the concrete. These would have to be replaced every three years or so. To access them specialist lifting equipment is needed - deterring opportunistic damage or removal.

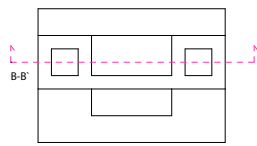
In this design daylight is allowed in through a lightwell, which also allows for some rainwater collection. At night the LEDs provide light which is integrated in the wall.

Due to the cost of the fibre optics there can only be a limited amount of lit panels. These are a prefabricated unit which sits on the water basin, which can be precast, cast in situ or made from whatever material that is available.

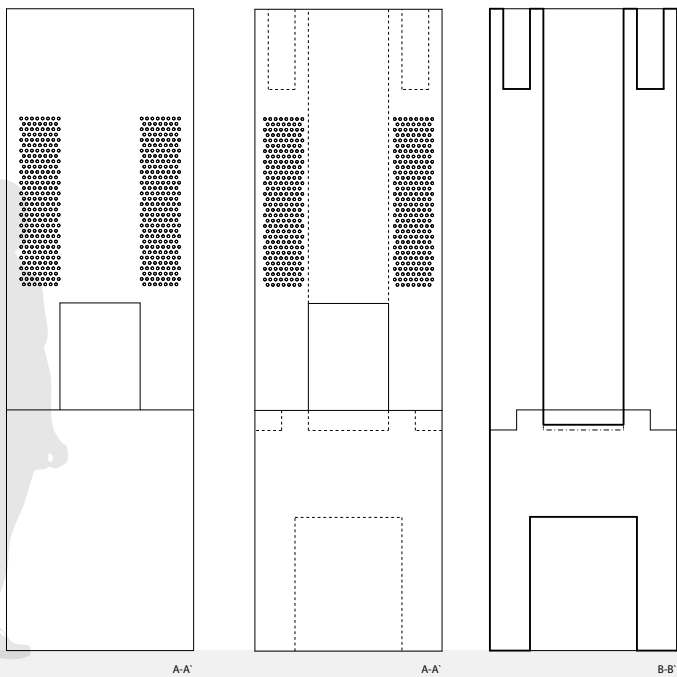
The concrete mix for the panel needs to be self compacting to get between the cables. For our experiments we used Ultra High Performance Concrete (HiCon) as it is self compacting, very strong and durable.



/ 3d illustration of the module



/ Plan, front elevation and sections through the module



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THE CAST EXPERIMENTS

EK212



/ THE SLAB



/ THE PERISCOPE
test of bending the fiber optics



/ THE APPLICATION
1:5 light panel, 5 % surface covered with fibers



/ The formwork process.
12 mm MDF with 1,5 mm drilled holes for the fibers.
Top lid with pouring holes and holder for the fibers.



/ The formwork process.
Taking off the formwork and trimming the fibers.



/ The application
the base and the lid



/ The application
the fiber optics bunched at the top
and the lid with LED light source



/ The application
indirect lit by daylight



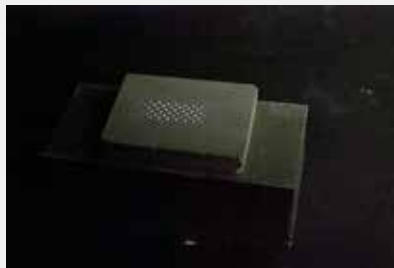
/ The application
indirect lit by daylight



/ The periscope
Lit from the bottom of the backside



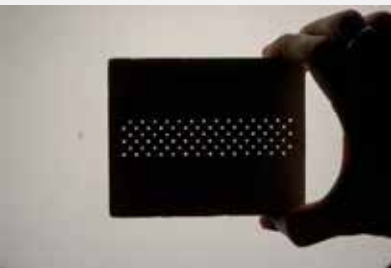
/ The application
Lit from above



/ The slab
on top of LED light source



/ The slab
on top of LED light source



/ The slab
in front of a photolamp

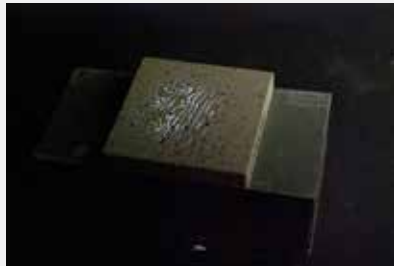
Testing our application with fibers as a light source against the precedent decorative panels.



/ Nighttime
illustration



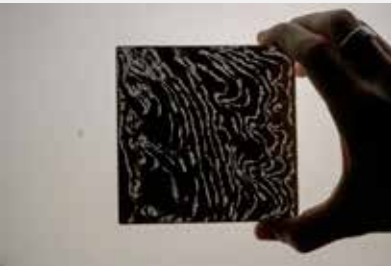
/ Daytime
illustration



/ LitraCON precedent 1
on top of LED light source



/ LitraCON precedent 1
on top of LED light source



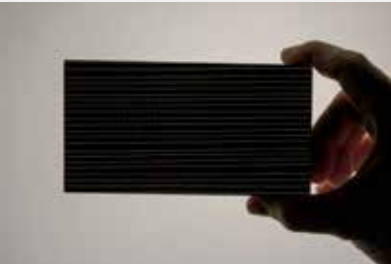
/ LitraCON precedent 1
in front of a photolamp



/ LitraCON precedent 2
on top of LED light source



/ LitraCON precedent 2
on top of LED light source



/ LitraCON precedent 2
in front of a photolamp