

FORM-WORKS

Concept

I hope to experiment with an alternative to traditional wooden Formwork; Rubber. Concrete itself is harsh and unyielding, not necessarily susceptible to human touch and sensitivity, but what if its formwork encompassed those qualities while serving an initial structural purpose?

Can a 'soft' concrete be created that accommodates and entices human touch regardless of a perfectly polished finish or a biomorphic form that mimics the human body or nature?

Rubber has a high level of rigidity while also having a softer texture and endless texture possibilities. By attempting to use this material as primary formwork there's no need for it to be stripped away.

Aim: To determine which groove formation of the three given samples is most effective when bonding with concrete.

Test 1: The material is very soft rubber and its grooves weren't too deep. As a result, the rubber was extremely easy to remove.

Test 2: This material was a slightly harder rubber, its lack of grooves resulted in the concrete not bonding properly with it. At first it was difficult to remove due to its rigidity but was easily removable thereafter.

Test 3: This rubber was much more rigid and was difficult to remove. Its short grooves did not anchor it well to the concrete but it shows that a denser harder rubber is more suited as permanent formwork for concrete.

Note: galvanized steel nails enabled the rubber to bond completely with the concrete and I was unable to remove it from the concrete.

Test 4: Although difficult at first to pull away, the softness of this rubber shoe sole allowed it to peel off after pulling it upwards from the exposed side. Perhaps, if the rubber was more durable and hard (such as that of industrial rubber) it would be more difficult to remove.

Test 5: This test shows a shoe sole partially showing through the concrete. The sole appears as a pattern within the concrete enticing human touch.

Test 6: Reinforced industrial rubber tubing was also used. Its rigidity made it extremely difficult to remove. Its semi-circular shape allowed the liquid concrete to fill in when poured and bonded well with the concrete.

Real Life Application

Using recycled rubber as a formwork for small scale construction can have numerous advantages.

Recycled rubber predominantly originates as car tyres and can be melted down into cast of numerous shapes and sizes. This product helps to lower the overall carbon footprint of a building which is vital to a sustainable building economy and healthy environment.

On site, using a permanent formwork requires less labour as it isn't removed once the concrete has hardened. This reduces labour costs as well as the construction time of a building.

Three main real life applications of rubber within concrete construction are:

1. Car Bumpers in car parks.

A car bumper is long strip of recycled rubber embedded into the wall of a carpark, in the location that a car could possibly reverse into. These are easily created when positioning the formwork and could potentially save multiple cars from costly dent and crack repairs.

2. Low Rise Formwork of interior walls.

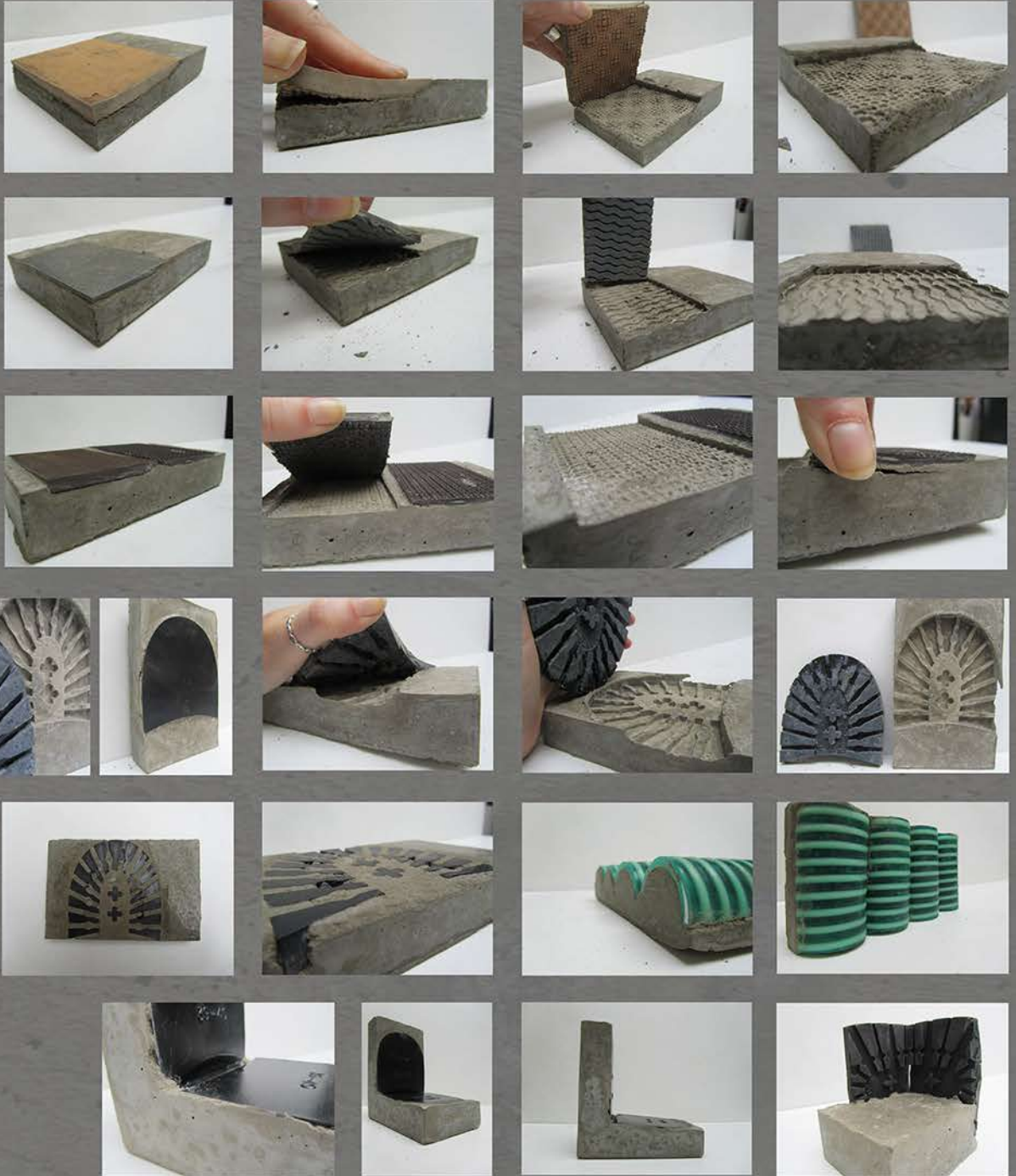
Large sheets of recycled rubber could be used as permanent formwork on the lower areas of internal walls. This could be used in kindergartens, day care facilities, schools, nursing homes or even a family home. The tactile wall would entice human touch and create a safer more humanised environment than one of solid concrete. Recycled rubber also has significant acoustic properties as its soft form absorbs sound. This can create a more tranquil and relaxed environment: i.e. kindergarten, etc.

3. Seating within the formwork.

It is popular within concrete construction to create shelving or seating within the concrete formwork as a permanent design decision. Recycled rubber seats can have numerous uses. Within subways, at the external sides of large buildings near bus stops, etc. and even for domestic seating.

Shown above at prototypes of a seat incased in rubber and the corner of a wall using rubber as partial form work.

Shown opposite are the materials used and prototype formwork.



Using recycled rubber as partial formwork can improve our living conditions and our carbon footprint. I hope these studies could benefit the concrete construction industry and help us to consider rubber as a healthy alternative to wooden formwork.