

Most Durable - Least Maintenance
Waterproof Adobe brick

Facade requirements :
Most durable - Least maintenance

You must construct a minimum 30cm x 30cm piece of a façade - assume it is for a London location. It needs to last for as long as possible without maintenance Think about the issues involved and consider the best material and form.

The facade needs to fullfill 3 main requirements :

- durable
- least maintenance
- waterproof (London climat)



Adobe brick is a building material made from earth and often organic material. Most adobe buildings are similar to cob and rammed earth buildings. Adobe is among the earliest building materials, and is used throughout the world. Adobe bricks are most often made into units weighing less than 100 pounds and small enough that they can quickly air dry individually without cracking and subsequently assembled, with the application of adobe mud, to bond the individual bricks into a structure. Modern methods of construction allow the pouring of whole adobe walls that are reinforced with steel.



Advantages of Adobe bricks:

Making use of Adobe bricks is probably one of the simplest forms of earth building. Adobe walls have a number of advantages and relatively few disadvantages.

As with other forms of earth construction, adobe bricks are a fireproof, durable yet biodegradable, non-toxic building material which provide sufficient thermal mass to buildings to ensure excellent thermal performance. Other benefits include low sound transmission levels through walls and a general feeling of solidity and security.

With adequate supervision this technique is highly suitable for owner builders, as no costly tools or equipment are necessary and the essential know-how can be easily acquired on a training workshop and through hands-on experiences.

One of the biggest advantages of the Adobe system is that it allows the individual units or bricks to shrink before they are placed in the wall. The risk of extensive shrinkage and cracking, which would otherwise occur in soils of high clay content in a large monolithic wall, is prevented.

The bricks can be cast from a wider range of soils and can cope with a higher clay content than is suitable for in-situ techniques.

This is normally done with the provision of adequate eaves.

The small Adobe units provide great flexibility in the design and construction of earth buildings. Adobe bricks can be easily cut for fitting and can be provided with holes for reinforcing and services.



Disadvantage of Adobe Brick:

Due to the production process and the nature of clay, Adobe bricks have medium water resistance. Nevertheless it is very important to provide adequate weather protection of the earth walls, especially in exposed situations.

In order to make the brick waterproof, i will use thermoplastic polymers that is a durable and waterproof plastic to cover each 30x30 brick. Therefore, i will use vacuum forming to create this waterproof shell for the brick.



Thermoplastic Welding Technology and Dohle Extrusion Fabrication: Robotic Fabrication Lab (RFAB)

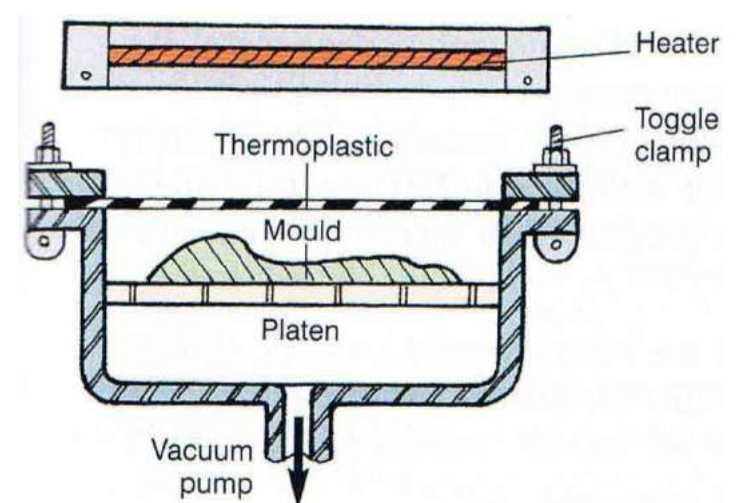


The Multiple Greenhouse Complex of the Eden Project Cornwall, England

A thermoplastic, or thermosoftening plastic, is a plastic material, polymer, that becomes pliable or moldable above a specific temperature and solidifies upon cooling. Thermoplastics are quite resistant and a wise option when a resistant and transparent material is needed.

Vacuum forming is a simplified version of thermoforming, whereby a sheet of plastic is heated to a forming temperature, stretched onto a single-surface mold, and forced against the mold by a vacuum is formed into permanent objects such as turnpike signs and protective covers. Normally draft angles are present in the design of the mold (a recommended minimum of 3°) to ease removal of the formed plastic part from the mold.

Relatively deep parts can be formed if the formable sheet is mechanically or pneumatically stretched prior to bringing it into contact with the mold surface and applying vacuum. Suitable materials for use in vacuum forming are conventionally thermoplastics. The most common and easiest to use thermoplastic is high impact polystyrene sheeting (HIPS). This is molded around a wood, structural foam or cast or machined aluminium mold, and can form to almost any shape.



Thermoplastic Vacuum forming



Clay - Terracota



Soil



Sand



Terracota



mix the clay with water



adding soil to the mix



getting the right proportion



adding sand to the mix



getting the right proportion



finding the right consistency



good consistency : paste

Making the mix of the brick

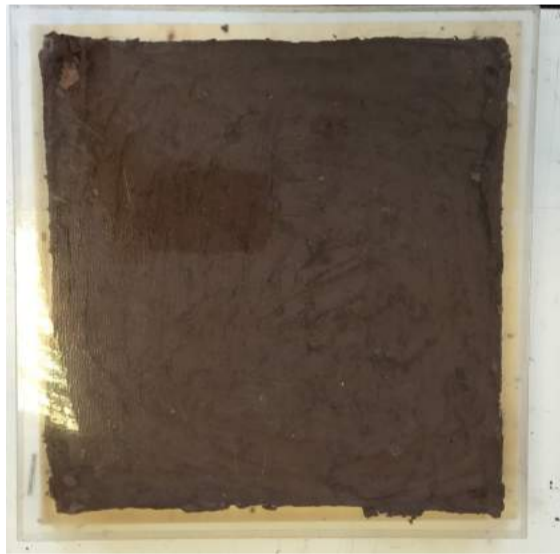
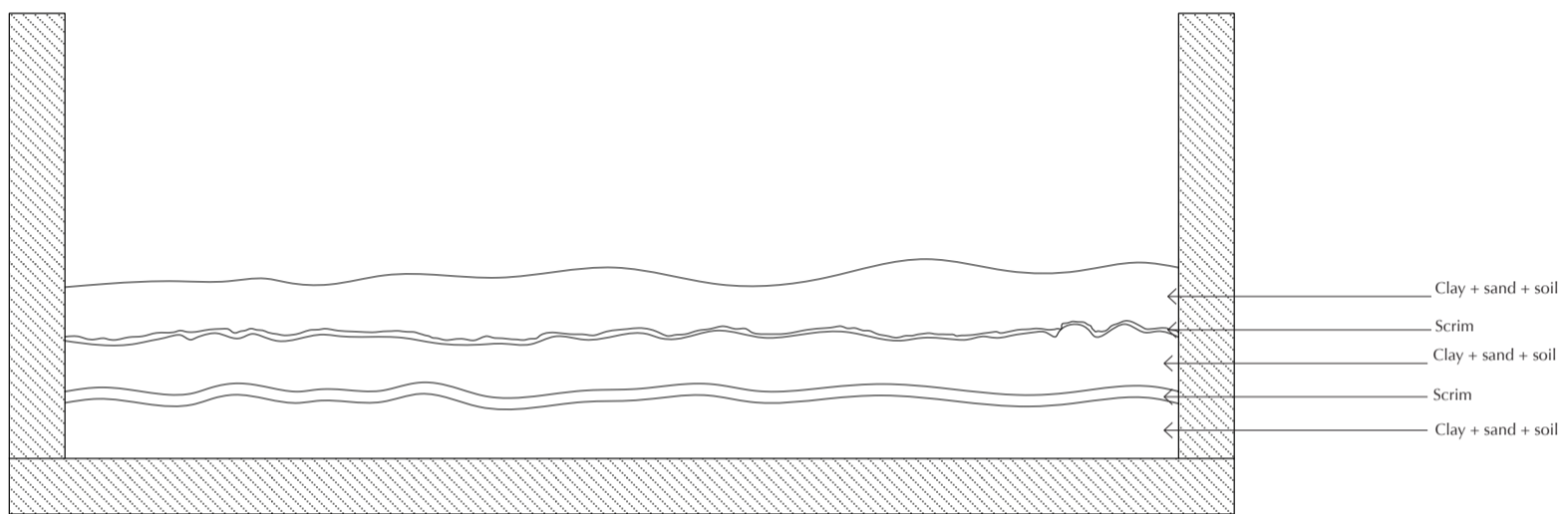


In order to reinforce the brick, i used a 30x30 sheet of scrim in order to avoid the clay to crack when dry.

To avoid leakage of water, the thermoplastic sheet is slightly bigger than the brick so that there is least contact between the two layers.

Vacum formed 33x33 square

Casting with the different layers



Nail connection between the thermoplastic and the brick