

BUILDING WITH EARTH IN AUROVILLE

VAULTED STRUCTURES

The research in Auroville with this kind of roofing aims to revive and integrate in the 21st century the techniques used in past centuries and millennia, such as those developed in ancient Egypt or during the period of Gothic architecture in Europe.

This R&D seeks to increase the span of the roof, decrease its thickness, and create new shapes. Note that all vaults and domes are built with compressed stabilised earth blocks which are laid in "Free spanning" mode, meaning without formwork. This was previously called the Nubian technique, from Egypt, but the Auroville Earth Institute developed it and found new ways to build arches and vaults.

The traditional Nubian technique needed a back wall to stick the blocks onto. The vault was built arch after arch and therefore the courses were laid vertically. The binder, about 1 cm thick, was the silty-clayey soil from the Nile and the blocks used were adobe. The even regularity of compressed stabilised earth block produced by the Auram press 3000 allows building with a cement-stabilised earth glue of 1-2 mm only in thickness.

The free spanning technique allows courses to be laid horizontally, which presents certain advantages compared to the Nubian technique which has vertical courses. Depending on the shape of vaults, the structures are built either with horizontal courses, vertical ones or a combination of both. All vault shapes are calculated to develop catenary forces in the masonry. Their thickness and span can therefore be optimised.



Building an Egyptian Vault with the Nubian technique



Egyptian Vault, 5 m span, 9 m long completed in 12 days with 4 masons



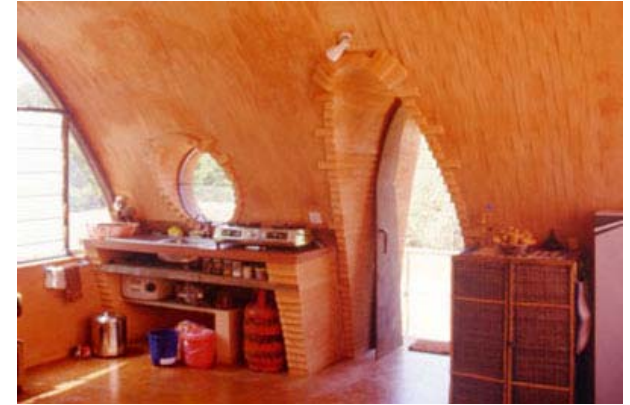
Training centre of the Earth Institute



Building a bull eye with the Free Spanning technique



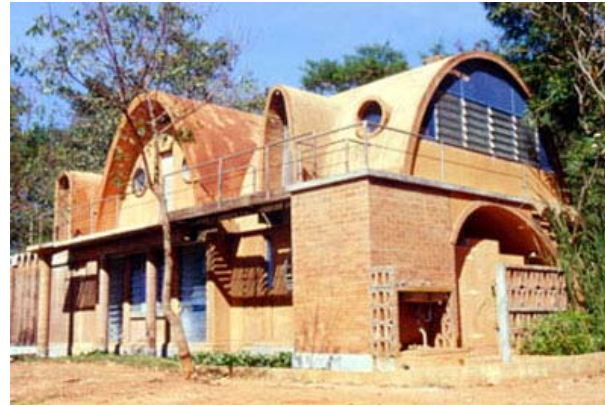
Building a Lunette with the Free Spanning technique



Trainee's Kitchen at the Earth Institute



Building a catenary vault with the Nubian technique



Training centre of the Earth Institute



Building a 10.35 m span Segmental vault, with the free Spanning technique



Segmental vault completed in 3 weeks with 4 masons - 10.35 m span, 2.25 m rise. ~ 30 tons, build with the free spanning technique



Building an equilateral vault with the free spanning technique



Equilateral vault - The vault of the European Cathedrals



Building a bucket pointed vault, 2.4 m span, with the free spanning technique



House at the Earth Institute



Building a semicircular vault, 6 m span, 11 m long with free spanning technique



Semicircular vault built free spanning in 37 days with 4 masons - 6 m span, 11 m long, ~ 40 tons



Building a hemispherical dome on pendentives



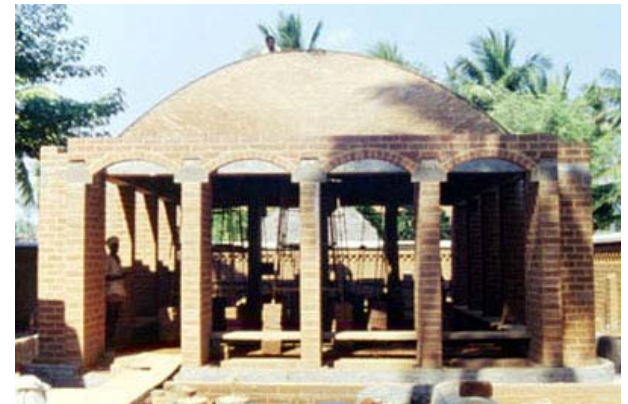
Office of the Earth Institute



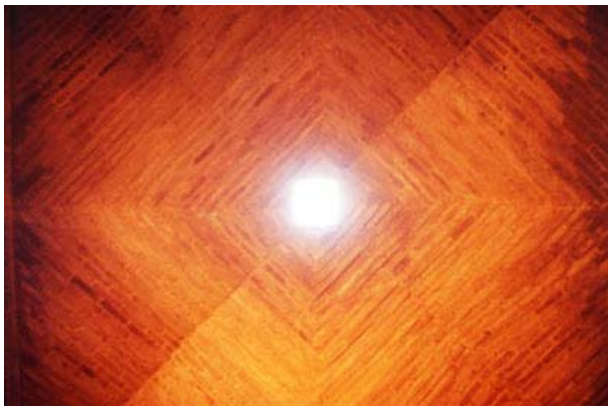
Building a groined dome with the Nubian technique



Groined dome and vault, 3.48 m span



Shakti Vihar School at Pondicherry, 5.76 m span



Cloister arch dome - Pattern of the squinches



Cost effective house



Gayatri dome



Building a cost effective house at Vikas community



Testing a catenary arch of 2 m span



Building a equilateral groined vault at Pondicherry



Equilateral groined vault at Pondicherry