

PRESENTATION 2
INDEGENOUS
MATERIALS BY ISAAC
VUSI HARTLEY



City Centre Sustainable Design Housing Competition



Indegenous Materials

In South Africa, only 898,000 households out of approximately 16 million live in what are considered traditional structures made from traditional materials. A 2012 Stellenbosch University study explained that this low number is the result of institutional limitations.

To receive approval to use traditional materials, a request by an engineer must be lodged with an accreditation body, which confirms the fitness-for-purpose of the structure. This arduous process can cost up to R300,000 and take between three months and three years to complete.

As a consequence, traditional structures are rarely built in regulated urban areas due to the high costs and delays associated with accreditation. This bubbles into a culture of brick-and-cement building, where people in urban areas associate proper structures with these materials.

This is also true for the way university students of architecture and engineering are taught about building. University courses are structured around prevailing building standards. This creates a cycle where engineers and architects have little interest in developing traditional structures, and systems of education have little interest in teaching students about traditional structures.

Clearly then, housing in urban areas will reflect the predominant standard of carbon-based building.

Indegenous materials



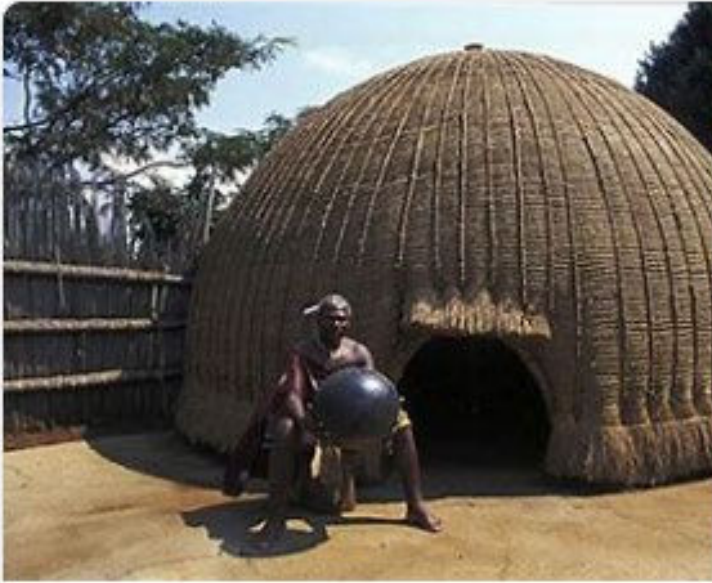
INDIGENOUS MATERIAL

The South African government, too, can create clear regulations for traditional materials, while learning from existing structures and methods. This would eliminate the barriers to traditional building, encourage engineers and architects to build using these methods and teach university students about this form of indigenous knowledge. To achieve this, the government needs to reach out to local policy and advocacy organisations to help develop a less daunting framework for the regulation of traditional structures.

One such organisation is [Qala Phelang Tala](#) in the Free State. It trains activists in traditional building methods, replaces shacks in informal settlements and was part of a group of natural builders that travelled to Nhanhembra, Mozambique, in June 2019 to build climate-resistant housing after [Cyclone Idai](#) destroyed homes in the village in March that year.

This organisation has already partnered with the [University of the Free State](#) and the [University of Hasselt in Belgium](#) to train South African architectural students and an assortment of Belgian students in traditional building methods, while also constructing units for beneficiaries in informal settlements.

INDIGENOUS MATERIAL



The People of South Africa | HubPages

Traditional African House Designs :
After visiting the pendjari ...



Contemporary

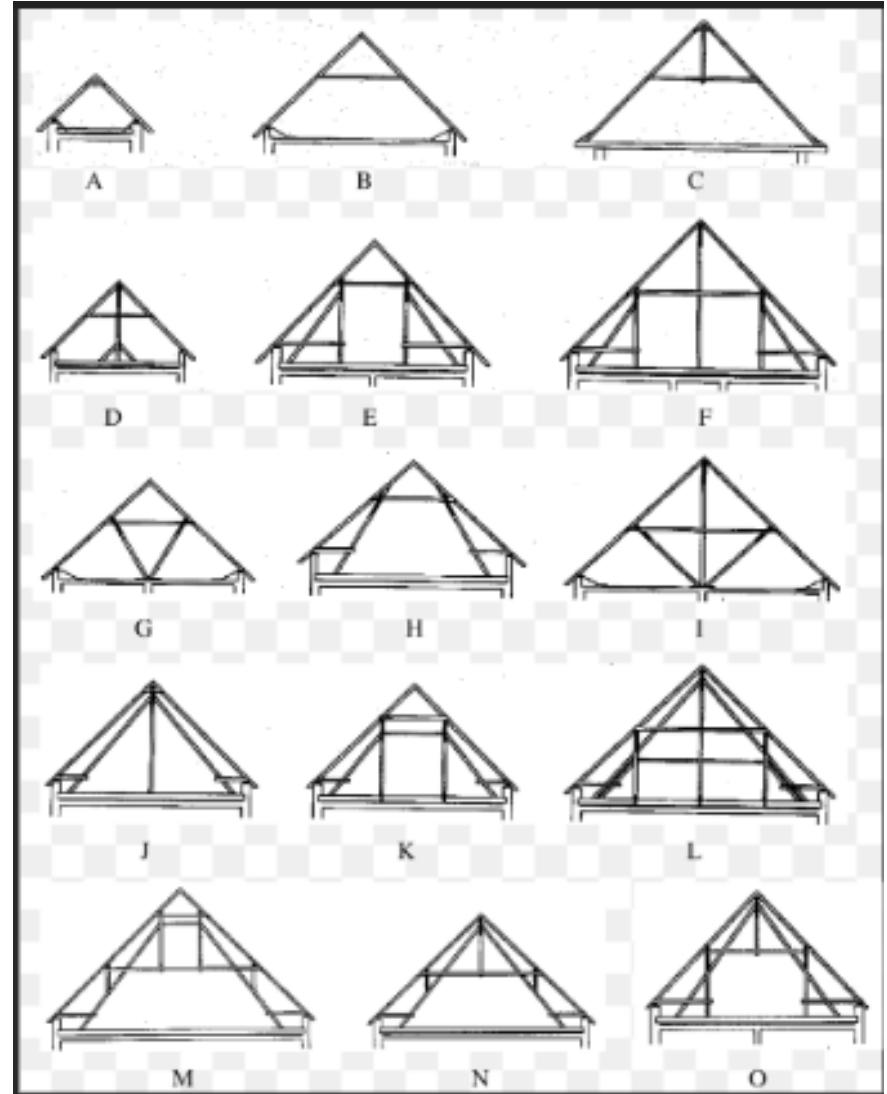
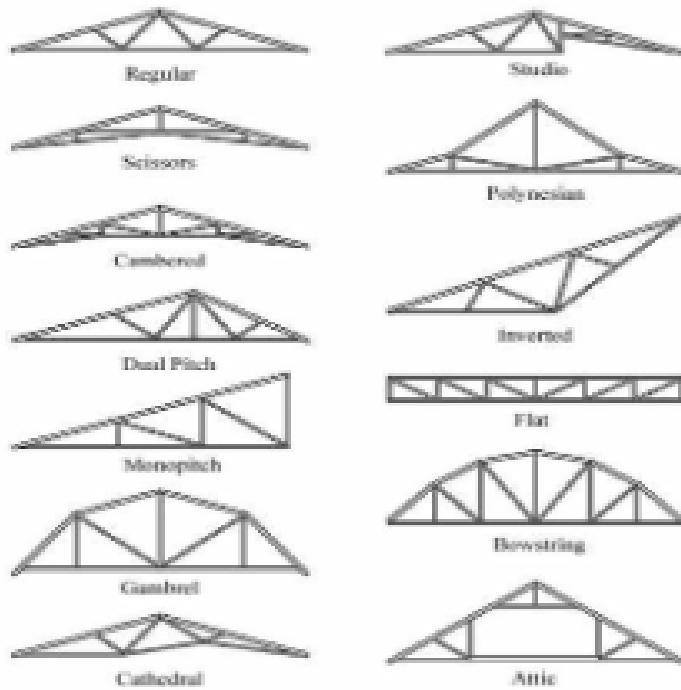


Top South

INDIGENOUS MATERIAL

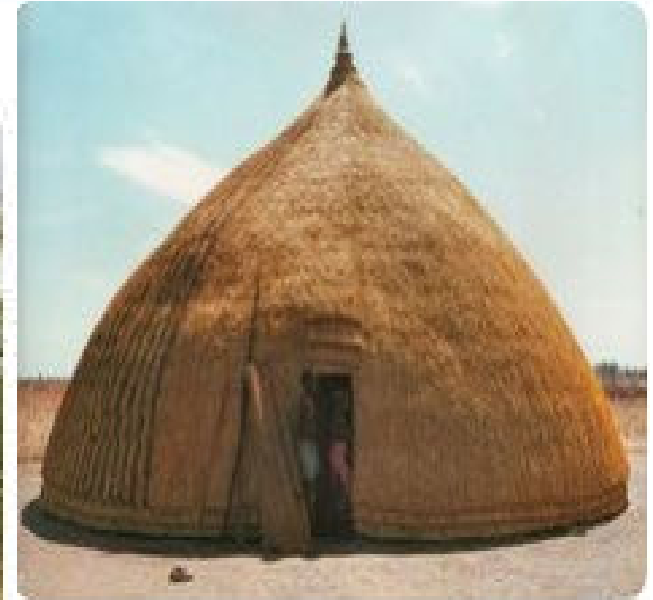


Roof Structures



Types of Building Materials Used in Construction

5. Thatch (SOUTHERN AFRICA)



Walling Systems



This home in Swaziland is constructed with wooden poles. The walls are filled with rocks, which will then be plastered over with mud. (Jon Sojkowski)

Inspection on IBT



Inspection on IBT



Inspection on IBT



Panel System



Panel System services



Panel System



Twin Wall Technology

The twin wall technology is a hybrid solution of wall system that combines the qualities of erection speed and precast concrete with the structural integrity of in-situ concrete. This type of wall system guarantees structural integrity and waterproof reliability for the structure.



Fig.6: Twin Wall Technology

Precast Flat Panel System

This method of construction involves the procedure of making floor and wall units off site. For this, separate factory outlets and facilities is required.

Once the panel units are made as per the design specification and requirements, they are brought to the site and placed. This method is best suited for repetitive construction project activities.

The panels manufactured has the services of windows, doors and the finishes. This method also brings building envelope panels which are provided with insulation and decorative cladding that is fitted by the factory which can also be used as load – bearing elements.

Precast Flat Panel System



Fig.1. Precast Flat Panel System



3D Volumetric Construction

As the name implies, the 3D volumetric construction involves the manufacture of 3D units in the form of modules in off site.

At the time of installation, they are brought to the site and assembled module by module. Each modular unit manufactured are 3D units, hence this construction is called as 3D volumetric construction or modular construction.




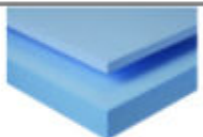




Fig.2: 3D Volumetric Construction

INSULATION MATERIAL

- There are acoustic insulation material



INSULATION MATERIAL

Materials	Picture	Manufacturing	Thermal conductivity (W/m.K)	Properties	Conditions of use
Expanded Polystyrene (EPS)		Crude oil - balls compression-bonded during molding	0,029-0,038	<ul style="list-style-type: none"> - Fragile in the face of fire: requires associating it with plaster, for example - Releases CO₂, H₂O and CO in case of fire - Unstable over time - Sensitive to the action of corrosives and rodents 	<p>Recommended on regular surfaces for roof, wall and floor insulation</p> <p>In the form of plates</p>
Extruded Polystyrene (XPS)		Crude oil - balls compression-bonded during molding	0,029-0,037	<ul style="list-style-type: none"> - Compression-resistant - Waterproof, cold, heat resistant - Fragile in the face of fire (combine it with plaster) 	<p>Basements, flat roofs, floors, heated underfloor, double walls</p> <p>Panels with smooth or flush edges</p>
Polyurethane (PUR)		Polyurethanes are produced by the reaction of an isocyanate and a polyol of various types.	0,022-0,030	<ul style="list-style-type: none"> - Good compression support - Moisture does not alter it - Micro-porosity of its structure: allows water vapour to migrate from the inside to the outside => no need for a vapour barrier - Dangerous in case of fire: releases toxic gases 	<p>Roofs, flat roofs, floors, wall lining</p> <p>Suitable for renovation and construction</p> <p>Foam or panels</p>
Phenolic foam		Phenol-formaldehyde resin	0,018-0,035	<ul style="list-style-type: none"> - Fireproof and low smoke emission during combustion - Sensitive to moisture: requires water repellent 	<p>Roofs, walls, floors</p> <p>Panels</p>
Thin insulating		Lightweight and thin material Aluminum layers + other layers (felt, wadding, foam...) => multi-layer or reflective insulation	0,1-1 Prevents heat losses	<ul style="list-style-type: none"> - Lightweight - Low thickness - No health risk - Water vapour tight 	<p>Handy, flexible</p> <p>On all surfaces</p> <p>Not irritating to the skin, so wearing a glove is not necessary</p>
Vacuum insulating panels (VIP)		Composed of a central material (= aerogels) confined in a sealed film and placed in a vacuum	1 cm VIP = 6 cm EPS and 9 cm of mineral wool	<ul style="list-style-type: none"> - Water vapour permeable (installation of a vapour barrier recommended) - Good compressive strength 	<p>Suitable for flat surfaces</p> <p>Disadvantage: must not be drilled and the panels cannot be cut out</p>



ecopassivehouses.com

INSULATION MATERIAL



AGREEMENT CERTIFICATION

CONSTRUCTION PRODUCTS FIT FOR PURPOSE
SYSTEMS TESTED, CERTIFIED AND APPROVED FOR SPECIFIC USE BY
MANUFACTURER.

AutomaPolyblock Building System

Tested and approved fit for
purpose when constructed as
specified in

CERTIFICATE 2007/336

AGRÉMENT
SOUTH AFRICA
innovative construction product assessments

AGRÉMENT
SOUTH AFRICA
innovative construction product assessments

CERTIFICATE NO:
2012/407

Confirmation of Certification
AGRÉMENT CERTIFICATE 2012/407
is awarded to:

**United Fibre Cement Company
(Pty) Ltd**

in recognition of:

UCO SolidWall Building System

which certificate provides detailed information on the performance in use and the uses of the subject of the certificate. When presented as proof of certification this document must be accompanied by the abovementioned certificate or by a certified copy of the typescript of the certificate approved by the Board.


CHAIRPERSON
Mr Pepi Silinga

The master copy of this document appears on the website:

<http://www.agrement.co.za>

Validity

Users of any Agrément certificate should check its status: all currently valid certificates are listed on the website. In addition, check whether the certificate is [Active](#) or [Inactive](#).

The certificate holder is in possession of a confirmation certificate attesting to his status.

SANS 10400 – The application of the National Building Regulations

Quick guide

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Use

The certificate covers the use of the Robust Building System in all areas of South Africa for the erection of single storey buildings for the uses (SANS 10400: Table 1 of Regulation A(20)(1)) set out below:

- places of instruction (A3)
- moderate and low-risk commercial service buildings (B2 and B3)
- moderate and low-risk industrial buildings (D2 and D3)
- small shops (F2)
- offices (G1)
- dormitories (H2)
- semi-detached and row houses (H3)
- dwelling houses and related outbuildings (H4)

This certificate and Agrément South Africa's assessment apply only to Robust buildings that are designed, manufactured and erected as described and illustrated in this certificate, and where the terms and conditions of certification are complied with.

INSPECTION REFERENCE TO SANS 10400.

Aspects of performance	Opinion of Agrément South Africa	National Building Regulations satisfied
<i>Fitness-for-purpose of materials used</i>	The materials described in Part 3 meet the requirements of the regulations.	A13(1)(a) Materials
<i>Behaviour in fire</i>	<p>Walls are classified type FR (non-combustible) with a fire-resistance rating of 60 minutes.</p> <div style="border: 1px solid green; padding: 5px; width: fit-content; margin: 10px auto;"> <p>SANS 10400 – The application of the National Building Regulations</p> </div>	<p>K4 Walls, J1(1)(B), T1(1)(b) and (c) and in so far as the walls are concerned, T1(1)(b) is satisfied. They are also deemed to satisfy the regulation T1(1)(d) in so far as the walls are concerned.</p> <p>Comments made in the section on Supplement to certificates must be taken into account when building plans are scrutinized by local authorities to check compliance with Regulations T1(1)(a), T1(1)(d) with regard to spread of smoke, and T1(1)(e).</p> <p>The following deemed-to-satisfy rules of Section 3 of SANS 10400 have been met: TT5.1(c) ,TT5.2(c) and with regard to occupancy and tenancy separating elements and party walls between adjoining dwellings units, 90 mm thick Robust walls built up to the underside of roof coverings, TT6, TT8 and TT9</p>
<i>Structural performance</i>	Satisfactory, provided the requirements of this certificate are complied with.	<p>K1, K3 & K4 Walls</p> <p>Regulations B1(1) and (2) are deemed to be satisfied:</p> <p>When Robust buildings are built in accordance with the dimensional limitations given in <i>PART 3: Technical Description</i> of this certificate.</p> <p>When these limitations are not complied with, the structural design and erection of each building is the responsibility of a professional engineer or approved competent person and deemed-to-satisfy rule BB4 of SANS 10400 is applicable.</p> <p>Regulations H1(1) and (2), <i>Foundations</i>, are deemed to be satisfied as follows:</p> <p>H1(1) on non-problematic soils;</p> <p>H1(2) in all buildings where foundations are designed by a professional engineer or approved competent person and deemed-to-satisfy rule HH1(a) applies.</p>
<i>Water penetration and rising damp</i>	Satisfactory. Robust buildings meet Agrément South Africa's criteria for resistance to water penetration and rising damp throughout South Africa.	<p>K2 Walls</p> <p>J1(4) Floors</p> <p>L1(b) and (c) Roofs</p>