WOOD REPLACEMENT TECHNOLOGY

Please find illustrated below examples of the Wood Replacement Construction Products produced from Waste Tyres; these products are of high quality, environmentally friendly and economically viable.

CONFIDENTIALITY

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Dena Nano-Wood Ltd

Project Outline

- Convert End of life tyres into useful construction materials which can be used instead of wood.
- Reduce around 45,000 T/year of CO_2 and increase 30,000 T/year of O_2 from a single plant.
- High Profit Margin - ROI less than 2 years.

FAQ

1) Technical business requirements:-

I. **Build Space required and total land needed.**
II. **Size of Equipment**
III. **Cooling requirements for building and machinery**

Answers: -

- Space/Land required for 2 Wood- Replacement Product Production Lines.
  - Standard requirement for a manufacturing area: 40 meters x 50 meters
- Machine Dimensions –
  - (Around 40m long x 5 m wide).

  Plus

  - Space included for raw material
  - Space included for Finished product
  - Office areas
- Production Capacity: -
  - Each Production Line is capable of producing 0.5 tons per hour or (around 12 ton/day).
  - Production must work 3-shifts/day up to 6 days/wk
- Special cooling for the building is not needed, but each Production Line needs cooling for the Finished Products.

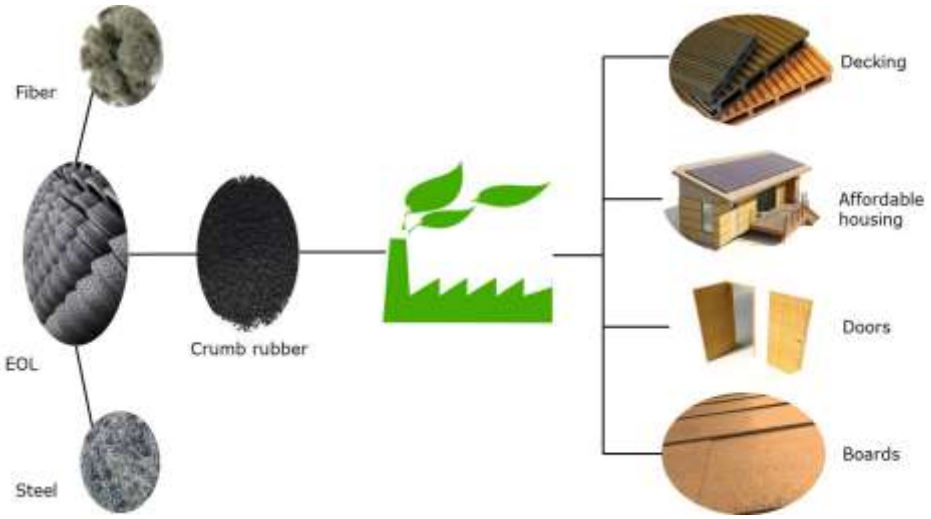
2) What raw materials are needed for production and what is the cost?

Answers: -

- The Main Raw Materials needed for production depends on the finished products being manufactured, the main materials are:-
  - Rubber crumb from waste tyres - powder size ≥ 0.5mm
  - Thermal scrap (e.g. UPVC powder) - size ≥ 0.8 mm size.
  - Dena Additive Powders
  - Pigment- mainly oxides
- In the United Kingdom the total cost per tonne of the above Raw Materials is approximately GBP £520.00, outside Europe they materials may be cheaper.

3) How does the Technology work?

Answers: -



4) What is the production capacity per day?

Answers: -

- Production Capacity: -
  - Each Production Line is capable of producing 0.5 tons per hour or (around 12 ton/day).
  - Production must work 3-shifts/day up to 6 days/wk

5) How many personal are needed per Production Line plus other Operatives for support?

Answer: -

- Manpower required: -
  - 3 Operatives (labour) needed per shift per Production Line
  - 1 Technician per shift to look after two → four Production Lines
  - 1 Supervisor per shift to look after two → four Production Lines.

6) What other equipment is needed?

Answers: -

- Fork Lift
- Overhead crane (Loading capacity 4 → 5 ton).
- Pickup truck (for local transport).
- Chiller (for chilling the machine).

7) What are the energy costs and other costs involved?

Answers: -

- Electricity/Power requirements - 450 kw/h/line
- Recycling of water for the Chiller.

Please note that the processing costs are based on UK costs?

It may be the cost of Labour is less and/or the cost of power used may be less.

8) What is the ROI on the investment?

Answers: -

Profit will be more if the Wood Replacement Products are manufactured in Saudi Arabia or elsewhere than UK, due to reduced costs in relation to Labour and power.

9) What are the types of product manufactured and how Dena can help in selling them?

Answers: -

➢ **Markets for End Products**

- ❖ Dena's Wood-Replacement products can be sold in all areas using wood and construction industry as well as furniture industry.
- ❖ Dena can assist you in selling by introducing you to different buyers, who wish to purchase our products.

Outdoor Products – Furniture & Flooring Applications

Product Examples

There are over 1,500 possible applications of Wood Replacement Products

Shuttering

Technology Transfer and Services in Return for Royalty on Sales

8% Annual Royalty on Sales for the life time of the project to cover: -

- Technical Support for the lifetime of the project with regard to any operational problems
- Exclusive Rights for your organisation to manufacture under Licence a Specific Product(s) in the country
- Technology Transfer & Know-how
- Formulation & Design of Products as necessary
- Manufacturing Licence for the Specific Products to be manufactured by your organisation.
- Marketing Support & Assistance utilising Dena Offices world-wide
- Standardisation Assistance
- Quality Control – ISO 9008
- Training: Dena Engineers to train your organisation's staff in order that the machinery can be operated safely at full efficiency to optimise production after completion of commissioning and as necessary.
- Assistance in reducing the costs for raw materials etc. as available
- Provision of New Developments in relation to Products and Market Quality etc. to be passed to the client

About Dena

We are the leading manufacturer of Nano-Processing Technology Systems which are capable of converting Rubber Waste recovered from End of Life Tyres into Wood Replacement Products (wood like products). We have been operating in the Advanced Nano Technology sector for the past 25 years and have developed this totally new type of system which capitalises on our expertise and experience in the field of Nano Technology to produce a viable and long lasting end product.

About Dena's Technology

Dr. Brian Sulaiman (CEO, Dena Group) has developed a process for converting waste tyres into wood like products. This recycling technology is driven by Nano technology and we hold patents for that. Our technology is a 100% green technology as the process uses only recycled materials to produce wood like products. The process does not involve burning of tyres hence there is no pollution and does not produce any by-products so there is no waste. The Products produced have superior qualities compared to natural wood. Return on investment can be achieved in less than 2 years.

Benefits and Features

- 100% water resistant (water will not penetrate or be absorbed) compared with wood or WPC
- 100% Insect proof
- Fire Resistant
- Ultra Violet resistant.
- Stronger and more durable than WPC
- Will not absorb most of the petrochemical products
- Resistant to salts of all types
- Designed to be reusable hundreds of times (finished products can be recycled several times to manufacture new products)
- Ideal for weather insulation (heat, sun radiation)
- Good sound insulation
- Ideal in humid areas.
- Several lengths available. Designed as standard sizes or as special request sizes (subject to quantity)
- Easy to clean.
- Totally safe to use.
- Impact proof
- Can be drilled, nailed and screwed. Will hold nails and screws better than wood or WPC.
- Supports adhesive use

- Paint and coating is not needed to our products. However, if needed can be done
- Easily to change the softness or the hardness of the materials by changing formulations to suit the product applications.
- Available in various colors and shapes
- All our products can be laminated or painted

Patterned Products

All our products can be patterned at the time of production itself. However, this patterning system will add addition cost to the project.

Examples of Patterned Sheets

Affordable Housing

Dena UK can provide a solution for making affordable housing using its state of art and innovative Nano tyre recycling technology. We are able to convert waste tyres into a wood-like material using our Nano technology for this use.

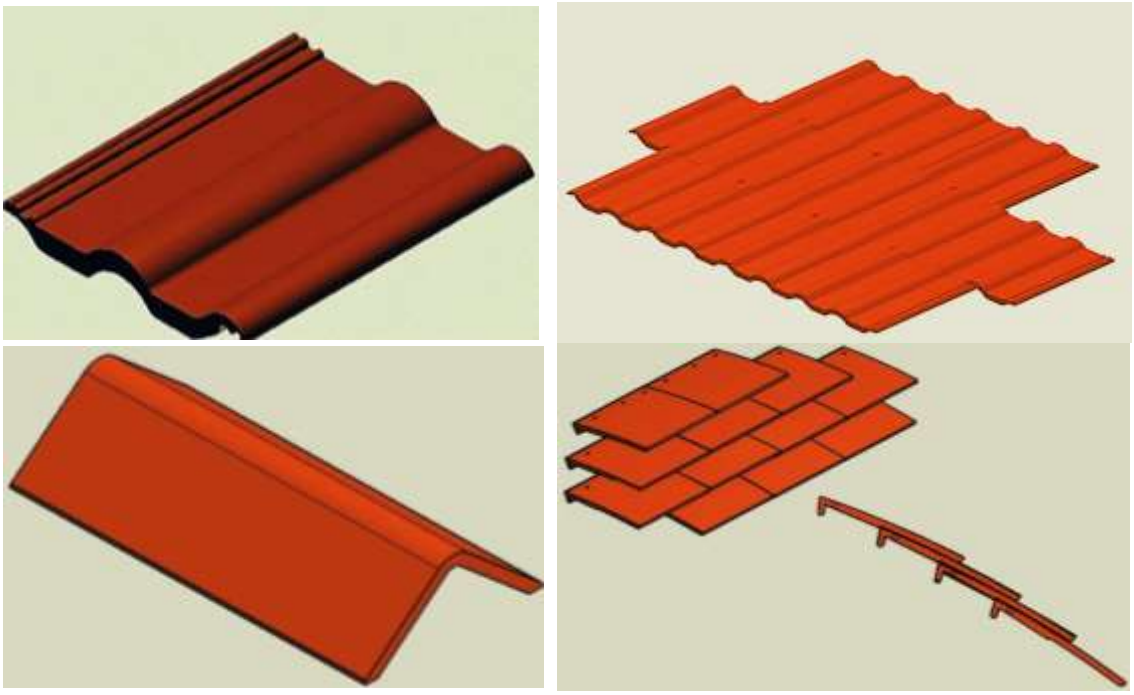
Our machines are capable of manufacturing almost all types of shapes and sizes required for building houses. We recommend using five production lines to manufacture five different products, which can be used to build affordable houses. Each production line manufactures one type of product as shown below: -

a. Dena Production Line for Roofing
b. Dena Production Lines for Flooring
c. Dena Production Lines for Pillars or Posts
d. Dena Production Lines for Sheets or Profiled Sheets for Walls
e. Dena Production Line for Doors and Windows

Components for Affordable Housing

1. Dena Production Lines for Roofing

Each Production Line is capable of producing one design of Roofing Tile, examples of various shapes, sizes and colours are illustrated below: -

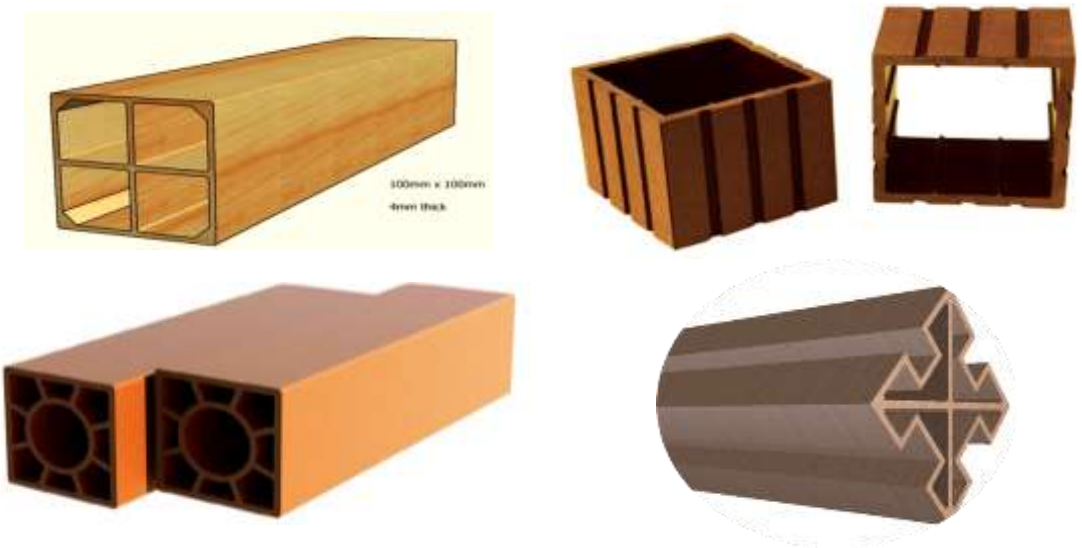


2. Dena Production Lines for Flooring

Each Production Line is capable of producing one design of Flooring Tile, examples of various sizes and colours are illustrated below: -

3. Dena Production Lines for Pillars or Posts

Each Production Line is capable of producing one design of Pillar or Post, examples of various shapes, sizes and colours are illustrated below: -

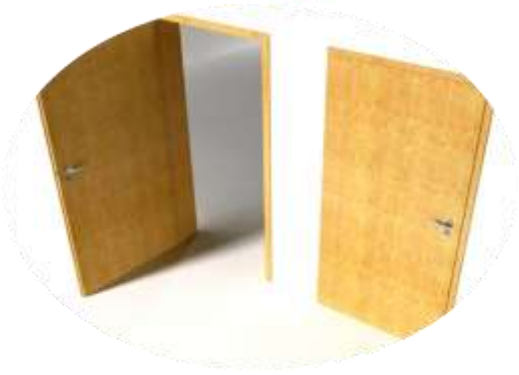


4. Dena Production Lines for Sheets or Profiled Sheets for Walls

Each Production Line is capable of producing one Design of Sheet or Profiled Sheet, examples of various shapes, sizes and colours are illustrated below: -

5. Dena Production Lines for Doors and Windows

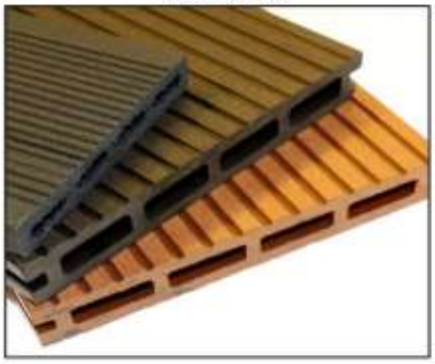
Each Production Lines is capable of producing one type of Door or Window Design, examples of various shapes, sizes and colours are illustrated below: -



PRODUCTS FOR THE CONSTRUCTION INDUSTRY

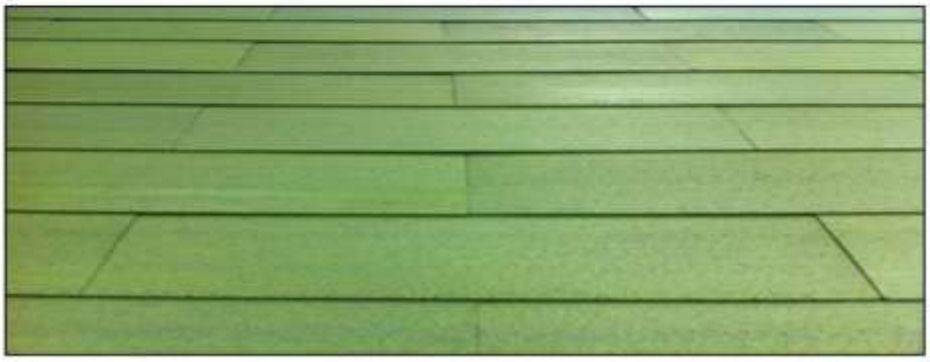
Sheets/Boards

Decking tiles



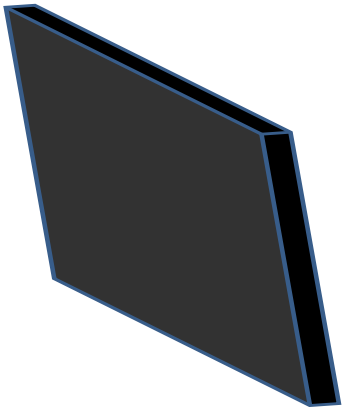
Roofing Tiles

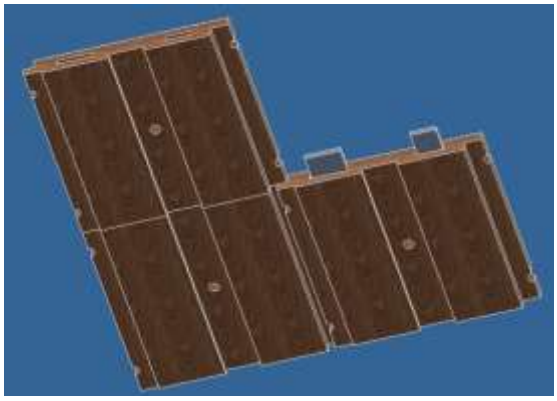
Flooring tiles



Examples of Construction Boards in use in Commercial & Industrial Applications

E.g. Reusable Boards for Walls, Ceilings and Pillars (Square or Round)





Low cost bottom line: - These products are the most cost-effective option as they are easy to maintain and last longer.

Application: - Replacement of plywood casing for production of concrete walls and ceilings.

OUTDOOR WOOD REPLACEMENT AND GENERAL PRODUCTS

There are a number of products with high market demand and others with seasonal demand in various countries worldwide. Products can be customised to suit client requirements or sold in the general marketplace.

These products are impervious to saltwater, treated water and U.V. rays, plus they repel gasoline, diesel and other fuels making them the perfect choice for, docks, seawalls, sea front footpaths seawalls, boat docks and other marina plus many related areas or residential uses.

They are also ideal for other outdoor uses such as roofing tiles, ordinary tiles, and provision of decorative shade, use in Military Installations, for livestock trailer boards and wall liners (e.g. Horse boxes), footpaths, and decking.

PRODUCT TESTS

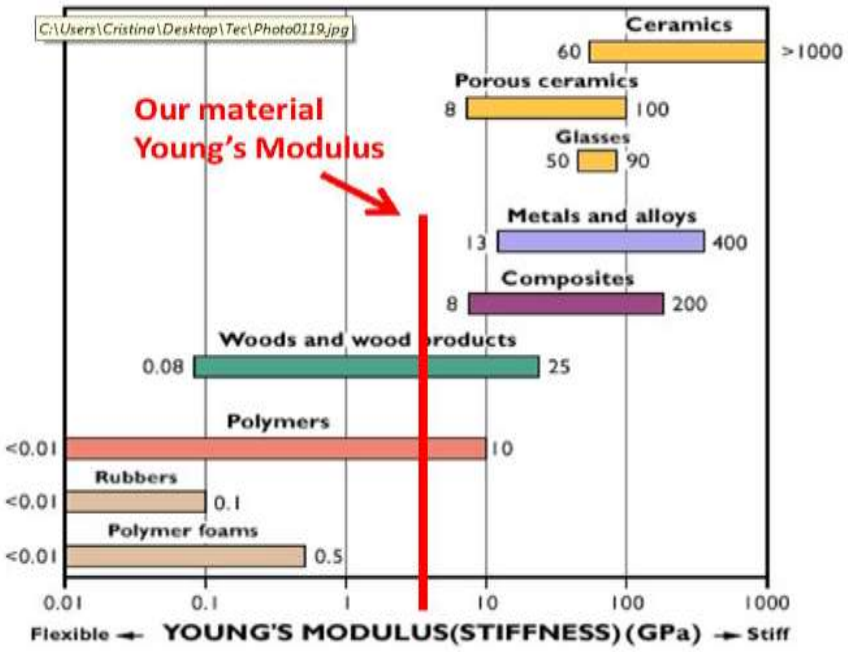
Flexural Strength Test

As can been seen from the image below, the material bends under the force applied, but does not crack or brake. This shows good pliability of the material, which is important if the material is to be used without full support over the entire surface.

Figure 1: Sample mounted for the flexural test in the Introns 5564 device

Tensile Strength

Figure 2: Young's Modulus for different materials.



As observed from Figure 2, the sample has a Young's Modulus comparable with typical high strength polymers, and of wood and wood products. This showed that the material has sufficient strength to be used for construction applications.

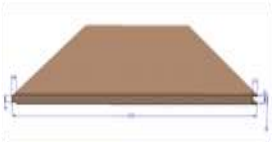
Water Absorption Tests

The water absorption test was performed in an oven at a constant temperature of 23°C and under airtight conditions. The sample weighed 18.3 g, and was placed in a beaker containing 800 ml water. The water absorption was monitored over 24 hours by measuring the weight. No weight increase was observed for the sample, indicating that the material does not present absorption properties over this time scale.

Affordable Housing

From

Dena Wood Replacement Products



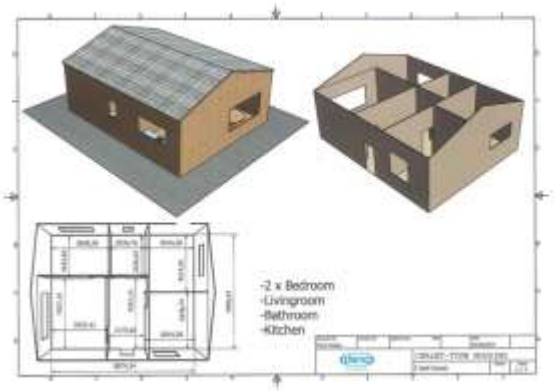
Roofing

Board/sheet

Flooring

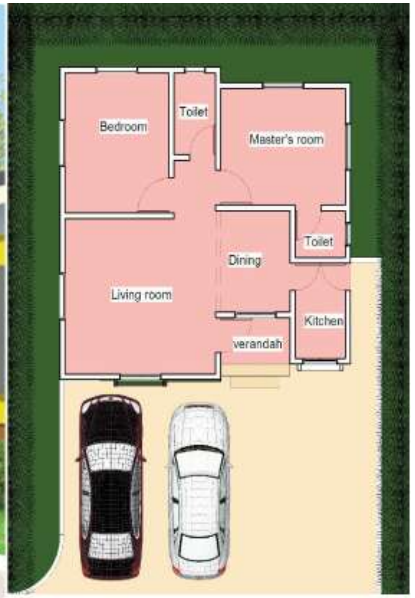
Post

Door



PROPOSED AFFORDABLE HOUSING PROJECT

ONE BEDROOM


Bedroom
Toilet
Master's room
Toilet
Dining
Living room
Kitchen
verandah

TWO BEDROOM

THREE BEDROOM

STUDIO APARTMENT

AFFORDABLE HOUSING (RESIDENTIAL)

ABOVE PICTURES ARE FOR ILLUSTRATION PURPOSE ONLY, ACTUAL HOUSES MIGHT DIFFER, THE ABOVE MENTIONED PROJECT IS A THIRD PARTY PROJECT.

Two-Bedroomed House Designs & Layouts

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