

**Waste Tyre Recycling
To
Wood Replacement Manufacturing Plant**



CONFIDENTIALITY

All written, oral and other information regarding this business proposal, in whatever way provided, either in documentary form, personal communication or otherwise, is confidential. It is provided for the personal information of the proposed project participants, and their business and financial advisors only.

Under no circumstances should the contents of this document, or other information regarding the project, be disseminated to second or third parties without the express written permission of the provider.

This document is copyright Dena Technology UK Ltd.

All rights reserved. (c) 2013

Dena Technology UK Ltd Registered in England number: 07920149
| Trading office: Beevor Street | Barnsley | S71 1HN | UK



Introduction

ABOUT DENA Group

Dena Group was established over 23 years ago in 1990 by Dr Brian Sulaiman, PhD, BSc, PGD, MAC, M. Auslmm, Founder and Chairman of Dena Group, in the field of advanced Nano-technology. The Company utilises a patented Reactor that modifies particles to achieve dramatic improvements in productivity, quality and profitability, with a diverse range of applications from pharmaceuticals to inks and more recently, in the eco-products arena where we are converting waste tyres in to high value and durable construction products. We have worked with Clients from different backgrounds include Glaxo Smith-Kline, ICI, CIBA, BP, Boots, BASF, 3M, Crown, Akzo Nobel, Astra Zeneca and many more, with Joint Venture projects world-wide exceeding sales in 2010 of £500M.

DENA TECHNOLOGY: - ZERO WASTE & ZERO EMISSIONS - END OF LIFE (EOL) TYRE CONVERSION

Dena Technology UK Ltd has developed an End of Life (EOL) tyre recycling technology that creates a range of high value and durable construction eco-products **whilst using zero emissions and zero waste**. As the tyres are available worldwide for a fraction of price compared to virgin rubber, the raw materials cost is negative and there is also steel and fibre that can be reclaimed and sold off to provide an additional income. Whilst tyre crumbing is established, the material forming technology is completely new and has no competitors as it is proprietary and covered by several International Patents since 1991. Dena Technology UK Ltd uses a unique process to produce these materials using micronized rubber and a special **Nano-particle composite**. The resulting material has an almost endless range of final products, **all of which are infinitely recyclable** using the same processes that created them in the first place. These range from super-strength and durable 'wood replacement' to special porous irrigation hose. A copy of one of the Patents registered for this technology is shown in **Appendix A: Patent Copy**

INTERNATIONAL CERTIFICATIONS

The products manufactured are available in different specifications, shapes and sizes and are all Certified to British Standards (BS) as well as meeting the equivalent European Regulations and International Standards. The Company is certified to Quality Standard ISO 9001 under the UK CCAS certification.

HELPING TO SOLVE A GLOBAL ENVIRONMENTAL CRISIS



- The demand for wood products is causing deforestation and severely damaging precious rainforests, killing thousands of species and ecosystems globally. Furthermore, **illegal logging is costing US\$10 Billion per annum and destroying lives.**
- In terms of atmospheric impact, **1 tonne of living trees produces 1 tonne of oxygen per annum and consumes over 1.5 tonnes of CO₂.**
- This is Nature's 'antidote' to excessive CO₂ and it is essential that we preserve it and by switching to replacement wood, we can achieve it.

KEY TYRE FACTS



- According to the WBCSD (World Business Council for Sustainable Development), a total of 1 billion end-of-life (EOL) tyres are generated globally every year
- There are approximately 4 billion EOL tyres in landfill and stockpiles globally and as they do not decompose, they can be a fire risk affecting the air with toxic fumes as well as a breeding area for mosquito's
- Some landfill tyre-fires have been burning for years

There are fewer places to dump EOL tyres and most developed Countries are struggling to find viable alternatives to landfill which is now illegal in most regions. In recent years, an increasing number of tyre crumbing Plants have opened up, only to find that the market is saturated with an over-supply of shredded and crumbed rubber with nowhere to go. As a result, thousands of such businesses have been stockpiling these tyres for the Gate Fee alone and in many cases have been shut down by the EPA (Environmental

Protection Agencies)

The EU Landfill Directive banned whole tyres from landfills in 2003. By 2006, tyres in any shape or form were banned from landfills in EU Member States. In order for the EU Landfill Directive to be implemented in a timely manner, new disposal routes for scrap tyres need to be developed with great urgency in all EU Member States.

THE BUSINESS OPPORTUNITY: Replacement Wood Products from scrap (EOL) Tyres

The Global Market for replacement wood products is in excess of **US\$ 300 Billion** per annum and is growing at a rate of 9% per annum, due significantly to the continued demand from emerging Global markets [*source: WBCSD 2010*].

The environmental impacts mentioned previously are serious and pave the way for a substantial opportunity for Dena Partners to do 'green business' that achieves the following goals:-

- Re-cycles end-of-life tyres that are impacting landfill sites and are an environmental hazard
- Reduces reliance on wood that is now superseded by Dena's synthetic material for thousands of applications like decking, external construction and marine applications
- Provides the marketplace with an alternative to wood that is cheaper, water-resistant, impervious to chemicals, will not rot or decay, is stronger and harder and incredibly, is 100% recyclable

Business Process

The Plant will manufacture finished products from waste materials like waste tyres and waste thermal materials. Crumb rubber of size 30 - 50 mesh and thermal waste of similar size is required for the manufacturing process. The plant is capable of producing 0.5 tons of finished products per hour. Mainly, the Business will involve manufacturing of finished products and then exporting those finished products worldwide as per required.



Technology to be used

<Insert your company name> will buy all the machines and Technology from Dena Technology UK Ltd. Dena Technology UK Ltd has developed a new technology, which is first of its kind in the entire world and has been honoured with 5 different business innovative awards. The technology is based on the principles of Nano-Technology, which is the technology of this decade and the future. Through this technology we can convert the waste rubber material from the tyres and similar products into useful and valuable wood replacement and different construction eco-products. These products perform and look just like wood and carry all the good attributes of wood but eliminate the negative side of wood, like effects from weather, insects and water. Our finished products are green and environmental friendly.

Competitors

This is a new technology and its process is patent by Dena Technology UK Ltd. No one other than Dena Technology UK Ltd knows how to use this technology. <Insert your company name> will be the first company to open Tyre to Wood recycling plant in <our country>. Because there is no other company involved in similar business the competition is almost zero. Not only the competition is zero in <Our country> but this is true for international market.

The machine can be used to produce range of products, which can easily compete against existing products. For example, construction tiles (cladding) currently are being manufactured using steel, aluminium, wood or PVC. All these materials are costly to buy and at the same time these materials are not durable and strong as our material. As known that our products are made up of 100% waste materials, which helps us lower the production cost.

Demand of the product

Being a green product, many big construction firms have approached us for our product. They have given a letter of intent, which clearly states that, their requirement for this product is huge. Currently, the capacity of the machine is limited to roughly 2400-3000 tons a year. From the above, one can figure out the demand of our product. This is just one client and we have many others buyers similar to this client.

Location of the plant

According to the plan, the plant is to be setup in <our address>. The land on which the plant will be setup should be connected via highway and ports are not too far.

The raw material and other inputs

Raw material, rubber crumb and waste thermal material will be bought from the local market. The only material that client needs to import from outside <our country> is the Nano particles, which is only produced by Dena Technology UK Ltd in UK. Raw material cost for making 1 ton of finish product will be around £ 600 and the operational cost per ton will be £150. The plant will produce around 250 tons of finished products each month.

The machine is capable of running 24 X 7. We accept it to run 24 X 6 and 1 day in a week for cleaning and maintenance. Labour required to run the machine for 24 hours is 10 (9 labours and 1 technician), Generally 3 labours are required to run the machine for 1 shift i.e. (8 hours).

Electricity consumption is around 350 Kw/h for running the full production machine all other equipment's

Cost of 1 ton material

Material	Cost
Rubber crumb	100
Thermal Materials	400
Nano Particles & Additives	100
TOTAL	600

Processing cost	
Electricity cost per ton	80
Labour cost per ton	60
Plant rent	10
Total	150

The Production capacity and the space required

The production capacity of the plant is 0.5 ton/hour. The machine can produce around 12 tons of finished products in 24 hours. The expected production per month is 250 tons, which will sum up to 3000 tons a year.

All the production activities will be carried in the plant. No work will be outsourced.

Space required for setting up the whole plant is nearly 50 X 40 meters. One Machine will take roughly 30 X 9 m and the remaining space can be used for storing raw materials and finished products.

Any by-products turned out in the Production Process

The production process is very efficient and due to that there is no waste during production. For example, if you put 1 ton of raw material in the machine, the machine will produce similar quantity of finished product. Efficiency of this machine is 99% and therefore there are no wastes and no by-products.

Packaging and shipment

Packaging will be carried out by the manufacture according to the requirements of the buyer. Shipment responsibility will be of the buyer and they will be responsible for collecting the packed products from production site. The buyer will be responsible for arranging and collecting the 20 ton container to and from production site in which the finished products will be shipped.

Power Consumption

300-350 Kw of electricity is required to run the plant for 1 hour or say to produce 0.5 ton of finished product.

The plant can be run using the normal electricity grid and there is no need of a captive power plant for this purpose. For backup, a diesel power generator producing 300 Kw is advisable to purchase.

TECHNOLOGY OVERVIEW

Dena Technology UK Ltd Tyres-to-composite Materials production line



The Stages of the complete process are as follows:

- | | |
|---------|---|
| Stage 1 | Mixing of all raw material together with Nano particles in Surface reaction chamber |
| Stage 2 | Processing the raw material through surface intensification extruder |
| Stage 3 | Moulding, forming and cooling process |
| Stage 4 | Cutting and packaging |

This is a proven technology that utilises the latest processes to transform waste tyres into replacement wood products and exhibits zero emissions and zero waste

Stage 1:

Mixing of all raw material together with Nano particles in Surface reaction chamber



To blend all the ingredients together and also heat the material to remove all moisture and unwanted gases. The surface reaction process occurs at this point (which facilitates material bonding later on in the process). This system also cools the material to the required temperature for further processing

Stage 2:

Processing the raw material through surface intensification extruder

- This is a key stage in the formulation process whereby Nano-composite particles are combined with waste plastics as a 'matrix binder' together with pigments as needed and transforms the raw materials into the unique replacement wood material.
- This Patented low-temperature process allows creation of a variety of finished products of varying density, shape, tensile strength etc. and utilises a unique zero emissions, zero waste process.

- Ultimately, all products are 100% RECYCLABLE, which is also a unique benefit of this technology

Stage 3

Moulding, forming and cooling process



- After the product comes out from mould it goes on to forming mould where it is cooled to retain its shape.
- Pulling table pulls the product at required and steady speed. The speed can be controlled by the controller provider as per required.

Stage 4

Cutting and packaging



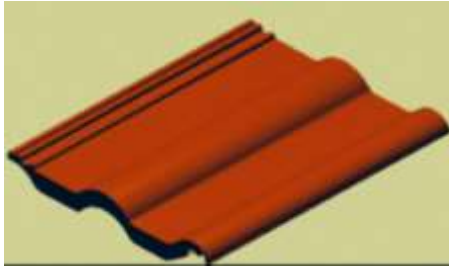
- The Cutting Machine is designed to cut the required length of sheet either automatically or manually
- Once cut, labour can collect and stack the products

Technology Transfer and Services

- ❖ **Technical Support – Remotely or In Person**
- ❖ **Exclusivity for a Specific Product in a specific Territory as agreed**
- ❖ **Technology Transfer & Know-how**
- ❖ **Formulation & Design of Products as necessary**
- ❖ **Manufacturing Licence**
- ❖ **Marketing Support & Assistance utilising Dena Offices world-wide**
- ❖ **Standardisation Assistance**
- ❖ **Quality Control – ISO 9008**
- ❖ **On-going Training**
- ❖ **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**

PRODUCT RANGE

Some examples of the Dena wood replacement products are illustrated below:-



The applications of this product are endless. As the **hardness and shape of the material can be totally controlled and customized**, it can be used to produce over 120 different wood replacement products including outdoor flooring/decking, roofing tiles, construction sheets & outdoor furniture etc.

Applications



The process can also be used to manufacture diverse solutions including special rubber matting for high-resilience applications (e.g. military) and a range of irrigation hoses, including a special **“leaky hose” that provides watering without wasting precious water**



KEY PRODUCT BENEFITS

There are significantly increased profit margins with the wood replacement products compared to alternative ‘plastic wood’ options.

Key benefits include:-

- Resistant to salts of all types
- Ultra Violet (UV) resistant
- Easy to clean and maintain even in extreme conditions
- Designed to be re-used hundreds of times
- Totally safe to use
- Water resistant
- Chemical resistant
- All products produced are Impact Proof
- The qualities / characteristics of the product can be easily altered for a wide range of uses
- Ideal for weather insulation (heat & sun radiation) and sound insulation

SUMMARY

This summary proposal has outlined a technology that is both timely in its development and critical in its Global demand for the following key reasons:-

- By utilising end-of-life tyres as the prime raw material, both profits and environmental efficiency is assured, because in most cases they are available at a “negative cost” (i.e. waste companies and authorities globally will pay a Gate Fee for EOL tyres to be safely disposed of away from landfill or open incineration)
- The Dena Technology UK Ltd technology is **Zero Emissions and Zero Waste**, as the finished products are themselves **100% recyclable**
- The resulting composite materials produced by this ground-breaking technology has a potential market of some **US(\$)** **300 Billion** and
- Our products are highly resilient to chemicals, completely waterproof, adaptable and delivered with a 20 year guarantee, meeting all World-wide standards for tensile strength, durability and safety.
- Typically, the materials produced can be sold at a 70% discount off their wood counterparts
- The demand for wood products is causing deforestation and severely damaging precious rainforests, killing thousands of species and ecosystems globally. Furthermore, illegal logging is costing US\$10 Billion per annum and destroying lives. In terms of atmospheric impact, 1 tonne of living trees produces 1 tonne of oxygen per annum and consumes over 1.5 tonnes of CO2. This is Nature’s ‘antidote’ to excessive CO2 and it is essential that we preserve it and by switching to replacement wood, we can achieve it

Installation and Commissioning:

- The installation and commissioning of the plant can be completed within 2 to 4 weeks from completion of the building works and delivery of all items to site.
- Dena will provide 2 experts and will utilise a local engineer who will be trained to assist in the installation and commissioning, and later the maintenance of the Equipment.

Installation & commissioning £50,000 per line

Delivery: 6-8 months from receipt of order and clearance of down payment

Packaging, Transport & Insurance: To be quoted prior to despatch

Client will have to buy some equipment's from the local market, which are

- Chiller for the Extruder
- Small Weighing machine

Example of product pricing compared to existing products

			£	
Decking Manufacturing Cost			Cost/Ton	raw material cost/ton
Rubber Crumb			150	50
PVC			600	325
Color pigment				50
Nano particles			1000	100
Raw material cost for producing 1 ton finished product				525
Additional Cost				
Electricity + Labour + factory rent				150
For safer side, we add more £ 50				50
Total production cost				725
Decking Price in Market				£ 30-80/sq. m
Dena Decking manufacturing price				£ 10.66/sq.m



Currency exchange 21/05/2013
 £ 1 = \$ 1.52
 1 us metric ton = 2204.6 pounds

£725 WILL BE THE MAXIMUM PRODUCTION COST FOR 1 M TON OF FINISHED PRODUCT.
 On top of the we need to include the packaging cost + other overheads like loan repayment, machine depreciation

By partnering with Dena Technology, you can help the environment and build a business with a high ROI, growing recurring revenues and incredible Global reach

For any query regarding this proposal and project, please contact the undersigned:

Sarabjeet Saini

Global sales and marketing Manager

Tel: +44 (0) 07424608908, +44 (0)1226 3888 05

Email: Sarabjeet.saini@dena.co.uk