Reinforce Sustainably with PalmFil

First High Performance Palm Fibers and Reinforcements
PalmFil is the world’s first textile fibers and reinforcements extracted from the byproducts of pruning of date palms, such as frond and fruit stalks.

PalmFil creates value out of the large quantities of underutilized byproducts of the 140 million date palms (FAO), which are otherwise open field burned!

It expands the palette of natural fibers and increases the biodiversity of fiber crops. Resulting in larger, more sustainable, and economical supply, which supports and encourages the industrial shift back to natural fibers.

PalmFil stands for:
- High performance palm fibers and reinforcements
- Available in many forms, including, long fiber, yarn, nonwoven, and woven
- Suitable for a wide range of industries, such as automotive and construction
- Obtained from renewable bioresources and 100% biodegradable
- Abundant and available in large quantities
- Strong, lightweight and safe
PalmFil can be easily blended with other long fibers such as flax, sisal, and abaca, or it could be chopped and blended with hemp, kenaf, and jute. PalmFil is compatible with existing spinning and weaving technologies of hard vegetable fibers. It bonds well with polymer matrix, thanks to its protruding side fibrils that create mechanical interlocks in a composite matrix.

PalmFil is very versatile and available in many forms, including, long fiber tows, chopped fibers, spun yarns/rovings, nonwoven mats, woven fabrics, unidirectional tapes, pre-impregnated, combed, and finely milled fibers.

PalmFil – Textile Forms
Textile Palm Fibers and Reinforcements

TOW

CHOPPED

YARN

NONWOVEN

WOVEN

COMPOSITE
The unique features and characteristics of PalmFil make it an excellent sustainable material base for a wide spectrum of industries. Ranging from natural reinforcements for composites in automotive and sporting goods, plaster reinforcements in construction, burlap sacks for packaging, ropes, and twines, non-wood papers, and other consumer products.

**Applications and Industries**

**Sustainable Material for Greener Industries**

Automotive
- Door panels
- Parcel Shelves
- Engine encapsulation
- Rear trunk cover
- Seat backs
- Acoustic insulation

Construction
- Gypsum plaster reinforcements
- Thermal insulation batts
- Façade composites
- Fiber-lime bricks
- Floor covering
- Acoustic insulation
Sporting
• Surf boards
• Snow boards
• Bicycle frames
• Skis
• Longboards
• Canoes and yachts

Packaging
• Burlap sacks
• Hessian fabrics
• Food & beverage containers

Ropes
• Ropes
• Twines
• Geomats and nets

Non wood Paper
• Bank notes
• Decorative papers
• Filter papers
• Capacitor papers
Features and Benefits of PalmFil
Performance Meets Sustainability

Sustainable & Biodegradable
PalmFil is obtained from renewable bioresources and it does not cause deforestation or compete with food production. It is 100% biodegradable and compostable, and has the ability to naturally degrade into its basic constituents and return back into the environment. It is a native cellulose, unlike regenerated cellulose that has issues with solvent recovery. PalmFil is carbon dioxide neutral and it preserves the local farming cultures and technical heritage.

Abundant
Date palm is the main element of flora in the MENA region, with very high populations in Saudi Arabia, Iran, UAE, Iraq, Egypt and Algeria. Their estimated global population is 140 mil palms, generating 4.8 mil tons/year byproducts of pruning. The estimated fiber availability from those byproducts is 1.3 million tons/year, ranking third after cotton and jute. Palm pruning is performed year round, hence consistent supply with no seasonality issues.

Economical
Palmfil is obtained from palm byproducts, and do not require extra investment in water, fertilizer, pesticide or land. Those byproducts are often regarded as agriculture waste, with zero price in field. The valorization of these byproducts can provide extra source of income to palm growers, and can generate thousands of decent jobs. In addition to, creating entire value chain within rural communities.

Strong
PalmFil specific tensile strength is 5 times higher than structural steel, and equal to those of flax, hemp and sisal. Its vibration damping and acoustical insulation is higher than those of glass and carbon and with thermal insulation higher than carbon. PalmFil has cellulose purity up to 70% and thermal stability up to 226 °C.

Light Weight & Safe
PalmFil is 50% lighter than glass fiber, and 8% lighter than flax and hemp. It is safe for working health and does not require special personal protective equipment while handling. It also does not erode machine parts and production tools.

Bonding & Blending
PalmFil has protruding side fibrils that create mechanical interlocks in a composite matrix. It can be easily blended with other long fibers such as flax, sisal, and abaca, or it could be chopped and blended with hemp, kenaf, and jute. PalmFil is compatible with existing spinning and weaving technologies of hard vegetable fibers.
PalmFil Technology
Contribution to Circular Bioeconomy

PalmFil is based on a proprietary technology for extracting long pure textile fibers from the date palm byproducts such as fronds and fruit branches. The process delignifies and fibrillates the vascular bundles and eliminates the hollow lumens without causing any damage or breakage to the fibrils.

The novel PalmFil fiber was well received by the scientific community. It was featured in research and review articles in some of the most prestigious scientific journals in the field, such as, Industrial Crops and Products (Elsevier) and Cellulose (Springer).

PalmFil was also well accepted by the industrial community in Egypt, and it has been processed on a full industrial scale spinning line at the Egyptian Industrial Center of Flax.

PalmFil contributes to the circular bioeconomy following a closed loop cycle from cradle to cradle. Palmfil extraction technology could be applied to byproducts of other palm species such as oil palm, sugar palm, doum palm as well as other agriculture byproducts such as broomcorn.
PalmFil is developed by a team of Egyptian innovators with more than 50 years of combined experience in fiber science, textiles technology and composites engineering. The team is led by Dr. Mohamad Midani managing partner of Intexive and under the guidance of the legendary Professor Dr. Hamed EL-Mously, the founding father of date palm byproducts development and research.

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The Food and Agriculture Organization of the United Nations (F.A.O) regards date palm as one of the most important resources of the future because it is:

1. Highly tolerant to difficult environmental conditions.
2. Very important for food and nutrition security in deserts and drylands.
3. Its by-products are considered renewable resources of lignocellulosic materials.
4. The utilization of its byproducts is part of a long technical heritage.
5. The main source of livelihood for the big proportion of the world population.

## Comparison of PalmFil Properties with other Vegetable Fibers

<table>
<thead>
<tr>
<th>Fiber</th>
<th>Physical Properties</th>
<th>Chemical Properties</th>
<th>Mechanical Properties</th>
</tr>
</thead>
<tbody>
<tr>
<td>PalmFil</td>
<td>1.32</td>
<td>239</td>
<td>1,000</td>
</tr>
<tr>
<td>Sisal</td>
<td>1.33</td>
<td>8 – 200</td>
<td>900</td>
</tr>
<tr>
<td>Jute</td>
<td>1.46</td>
<td>25 – 200</td>
<td>1.5 – 120</td>
</tr>
<tr>
<td>Flax</td>
<td>1.4</td>
<td>40 – 600</td>
<td>5 – 900</td>
</tr>
<tr>
<td>Hemp</td>
<td>1.48</td>
<td>10 – 500</td>
<td>5 – 55</td>
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We believe that there is a very promising future for PalmFil as a novel class of natural textile fiber, with an estimated annual market worth of US$ 2.5 billion. We are seeking partnership to further develop, scale-up, and commercialize PalmFil fiber technology.

The scope of partnership includes but is not limited to:
• Licensing/ technology transfer.
• Support further development.
• Sponsor building a pilot production unit.

Possible partners include automotive companies, OEMs of fiber extraction and spinning lines, developmental organizations, government agencies, and research funding organizations.

For inquiries, collaboration, partnership, sponsorship, and trial samples please contact

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