



new technologies for hemp based advanced composites

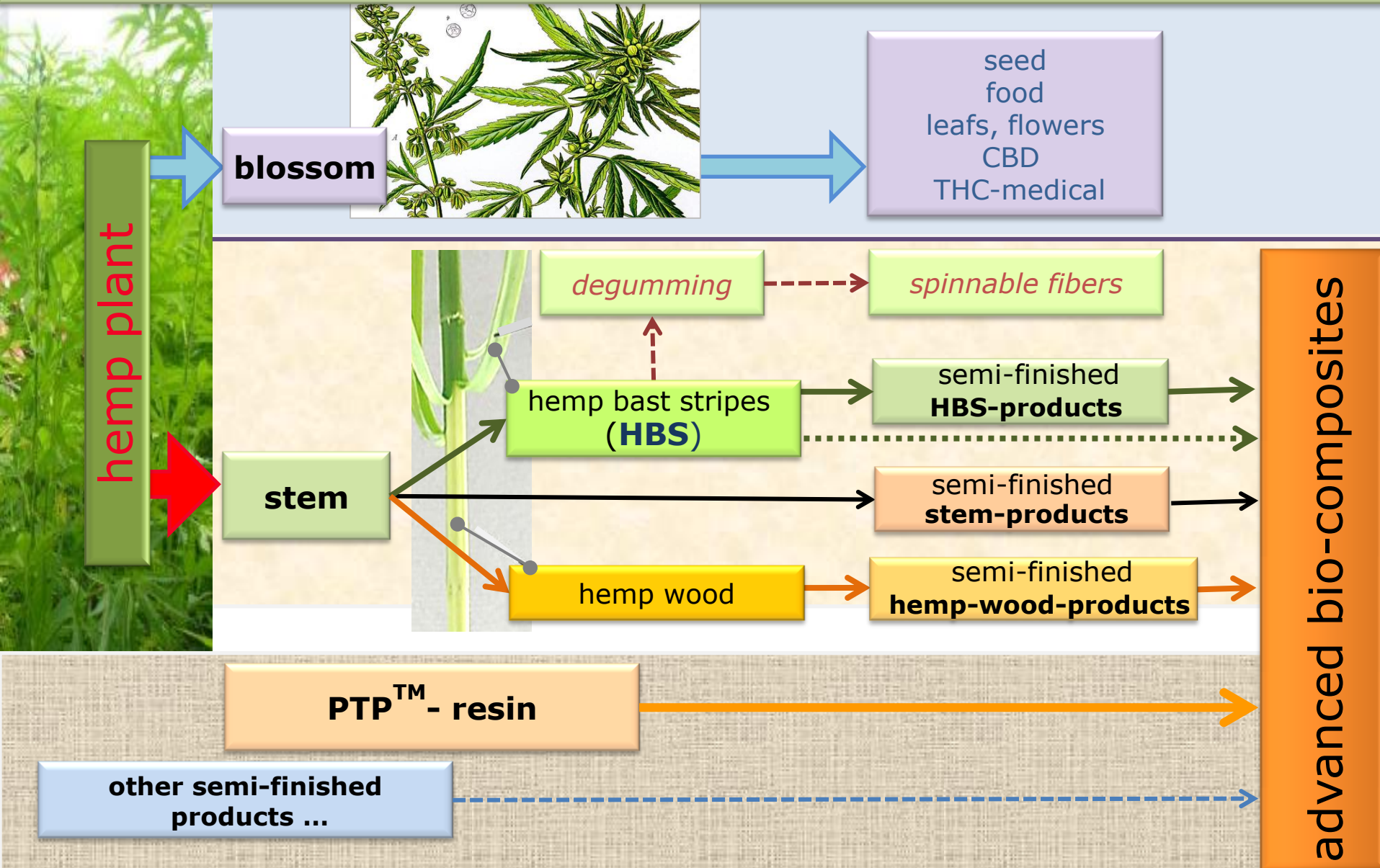


→ partners & summary ←

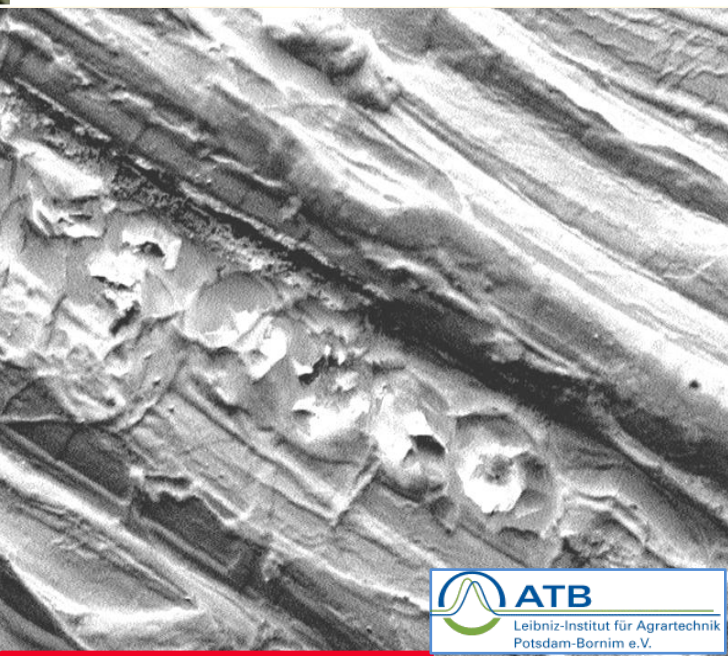
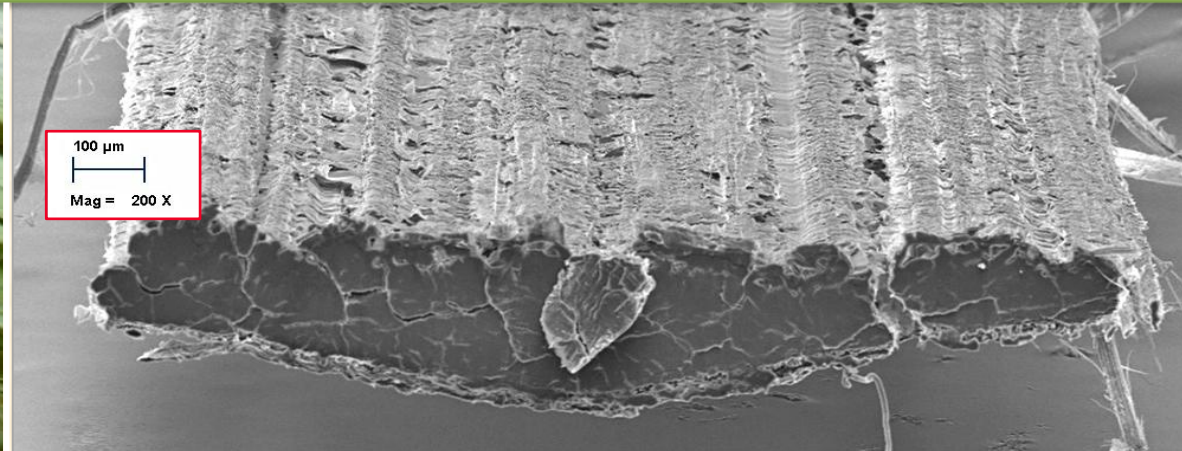
→ performance of new bio-composites

- applications for hemp based composites
- thermoset bio-based PTPTM-resin
- various unidirectional HBS-products
- new separation of hemp stems
- harvested hemp stem bundles
- new harvesting technologies
- flow chart & basics

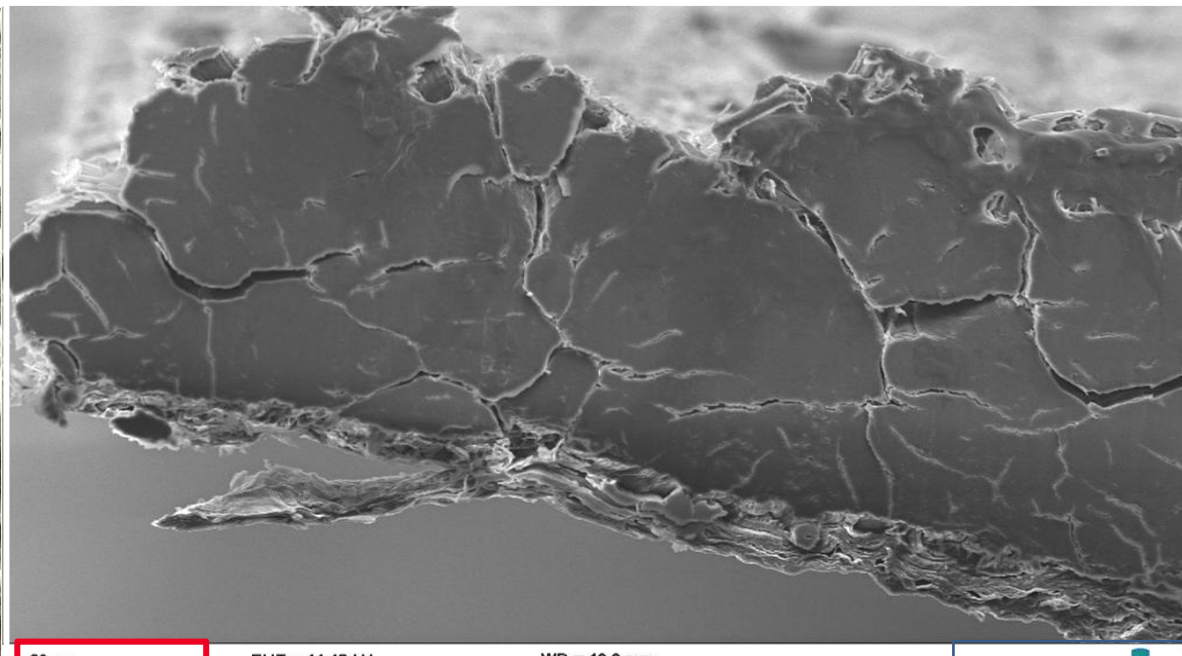
flow chart & basics



hemp bast stripes - HBS



5kV -Image
PH-CR



EHT = 11.43 kV
I Probe = 77 pA
Collector Bias = 300 V
Signal A = SE1

WD = 10.0 mm
Stage at T = 80.0 °
Chamber = 1.02e-003 Pa
Mixing = Off

28 Mar 2013
Time :10:22:10
EVO 40 XVP



new harvesting technologies



harvested hemp stem bundles



new separation technology of hemp stems



→ **absolutely non-destructive** separation method

→ patented **PCT/EP2014/002237** - US patent pending
"Device and method for isolating bast bark and wood bodies from a bast-plant stem"



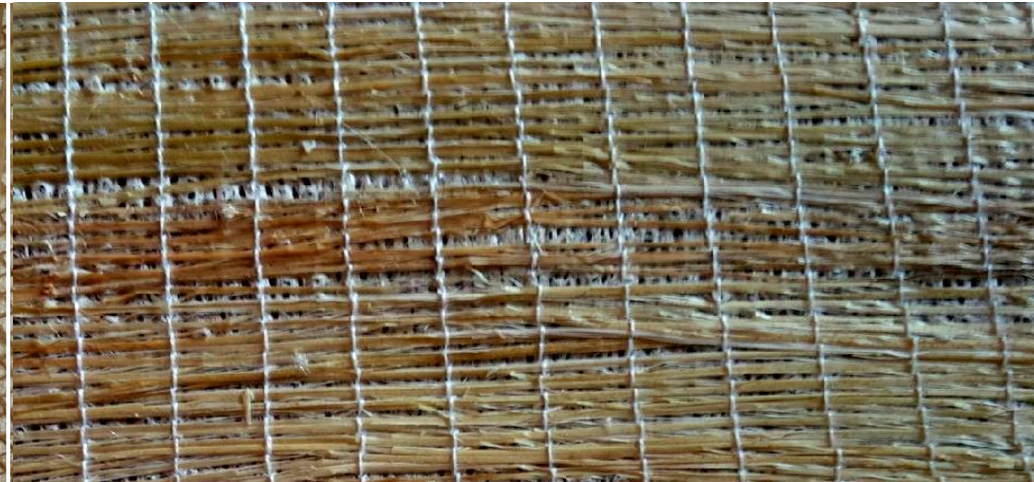
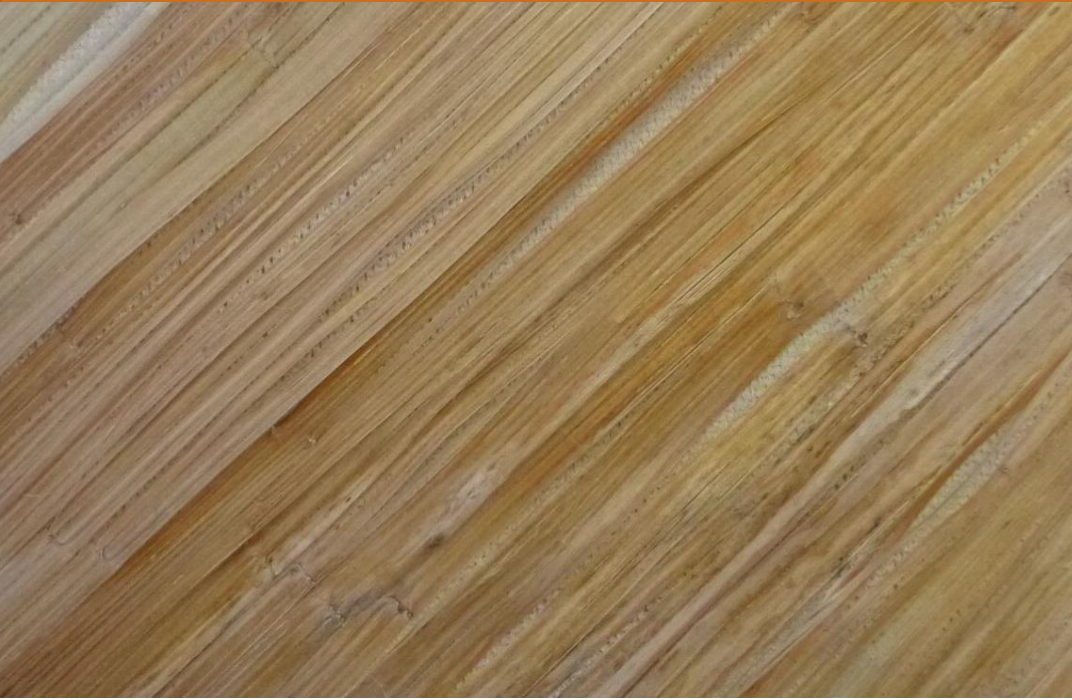
hemp wood



hemp bast stripes - HBS



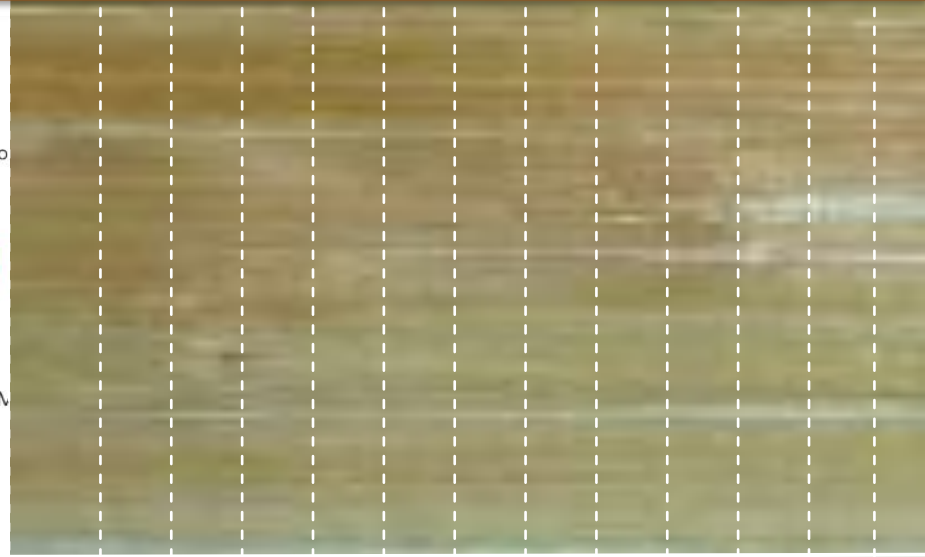
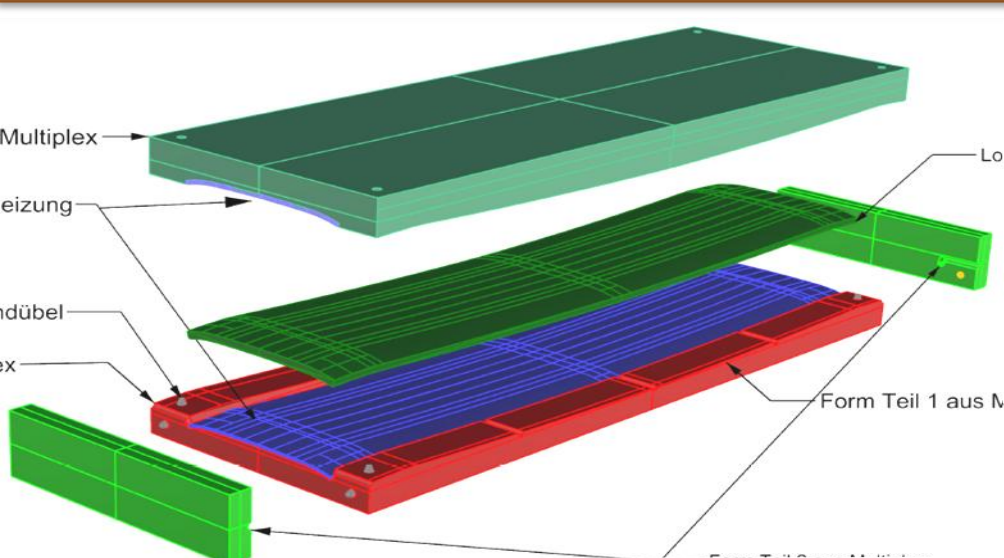
various unidirectional semi-finished HBS-products



thermoset-resin based on renewable resources



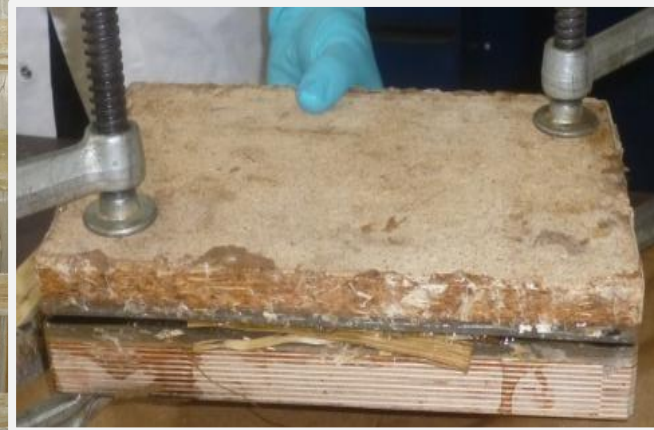
applications for hemp based composites (1)



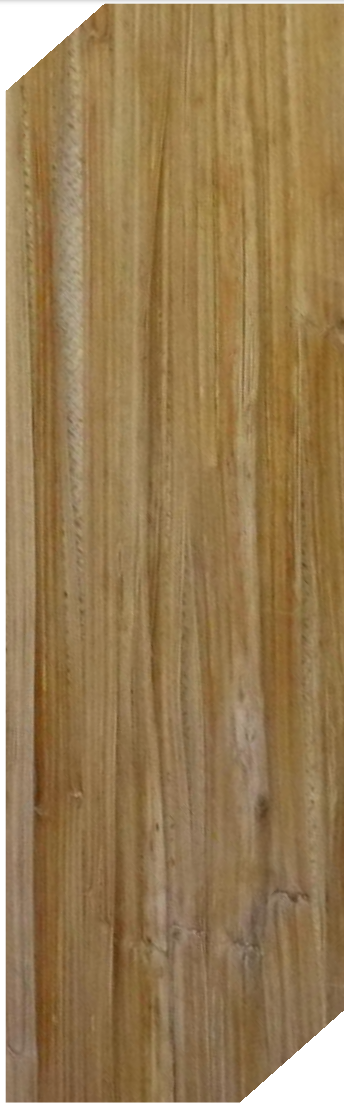
applications for hemp based composites (2)



applications for hemp based composites (3)



applications for hemp based composites (4)



HempWich *type A*

applications for hemp based composites (5)



HempWich type B



comparison of fiber reinforced composites



New hemp based
advanced composites

property		fiberglass unidirectional	natural fiber non-woven	hemp bast stripes - HBS unidirectional
flexural modulus	GPa	30 ... 45	4 ... 6	35 ... 40
	psi *10 ⁶	4.35 ... 6.53	0.58 ... 0.87	5.08 ... 5.80
density	g/cm ³	2.2	1.4	1.2
	lbs/in ³	0.079	0.051	0.043
energy demand		● ● ●	● ●	●

partners



**Bio-Composites And
More GmbH**

Marktplatz 12
D-91472 Ipsheim
Germany



Dr. Klaus Dippon

www.bio-composites.eu
info@bio-comp-gmbh.com



Bast & Faser GmbH

Industriestraße 14
D-91325 Adelsdorf
Germany



Dr. Juergen Paulitz

www.bastundfaser.de
contact@bastundfaser.de



Hanffaser Uckermark eG

Bruessower Allee 88
D-17291 Prenzlau
Germany



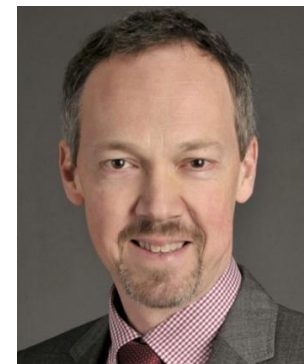
Rainer Nowotny

www.hanffaser.de
info@hanffaser.de



Transferstelle Bingen TSB

Berlinstr. 107a
D-55411 Bingen
Germany



Dr. Oliver Tuerk

www.tsb-energie.de
tsb@tsb-energie.de

summary

hemp: one of the oldest cultivated plants of mankind still has huge untapped potential & can be planted almost anywhere on earth

stem: a brilliant example of an ingenious lightweight structure – optimized by nature

processing: requires sensitive approach in order to maximize properties given by nature

- our strategy:**
1. make use of primary structure of the stems → **HempWich**
 2. unidirectional embedded **hemp bast stripes (HBS)** – required for high tensile strength applications
 3. absolutely non-destructive separation method needed to get most of the built-in properties of **HBS** and **hemp wood**
 4. a series of unidirectional **semi-finished HBS-products** will be available shortly
 5. advanced bio-composites make only sense in **combination with bio-based resins**

... ultimately

→ to speed up the implementation of our vision we need to work together very closely