“Nano-cellulose Materials for the Furniture and Building Industry Made From Recovered Waste Paper”

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Process description:

1) Fines and fibers are recovered from wastewater/sludge.

2) Pulp runs through multi - refiner setup, water is extracted as f/f are beaten.

3) Enzyme treatment (not a must)

4) Micro pulp is dewatered and processed into powder/granule.

5) The customer adds water and ensures intense mixing (functional additives as are pigment, resin, wax, etc, are mixed into the pulp at this point).

The pulp is then molded using special techniques.

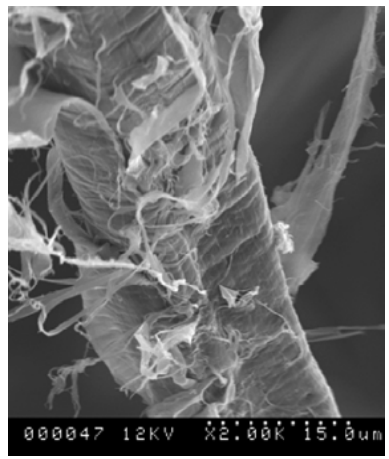
6) As the molded pulps dry (kiln-drying) they shrink and form horn/ wood like structural materials.

7) According to the molding technique, finishing (sanding/polishing) can be necessary. Most products do need water resistant/proof coating.

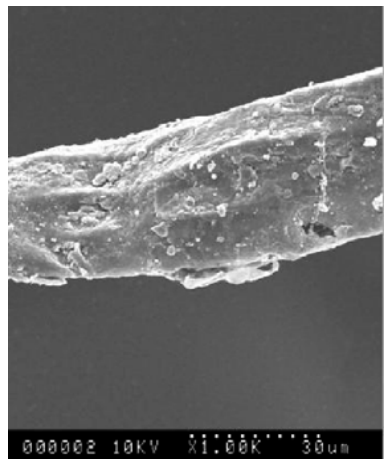
Paper mill sludge

„dead fines“

„alive fines“



Virgin fiber



Recovered fiber

What characterizes our compositions:

All cellulose, hierarchical granule/powder/pellets are mixed with water to form a stiff, amoldable pulp; which, when dried, form wood/horn like, structural materials.

Further parameters that determine our compositions:

Water Holding Capacity between 8.0-13.0g
An arithmetic fiber length between 0.2-0.3mm
Brookfield Viscosity of around 100 cP .
F/f surface area between 120-200cm2/g .

Micropulp

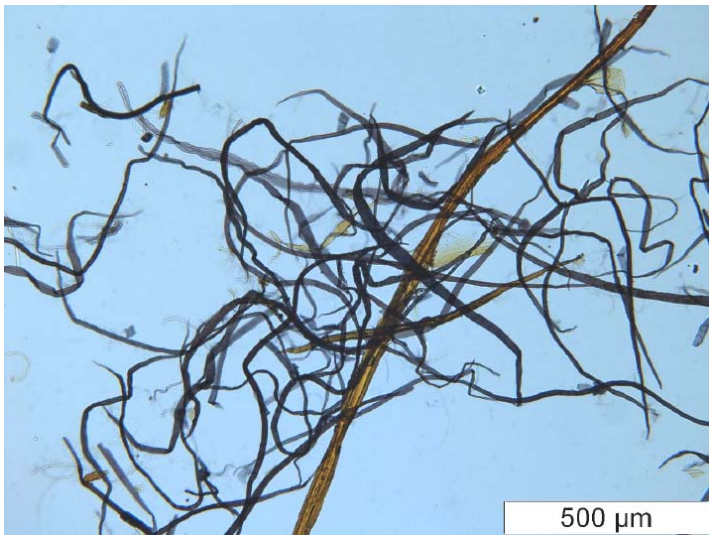
„Granule fines“

Pellets

Comparison of properties of 2 our structural materials with commodity plastics (PE-HD,PVC), wood meal filled phenolic resin (PF-HM) and chipboard.

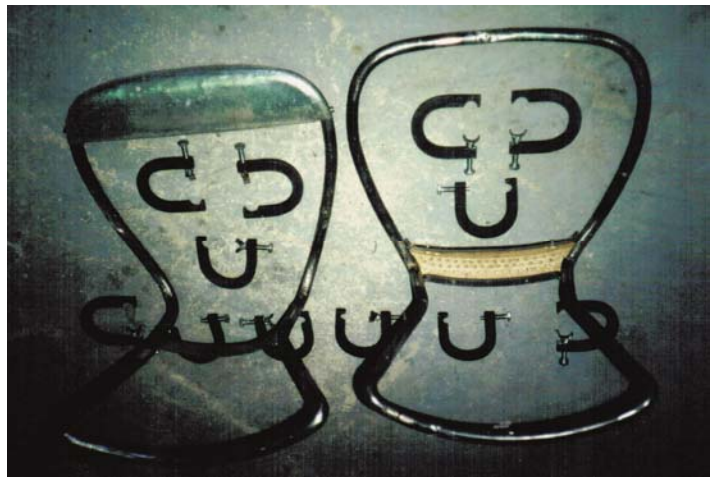
	Density	Tensile Modulus	Flexural Strength	Charpy Modulus	Impact Strength	Strength [kJ/m2]
	[g/cm3]	[MPa]	[MPa]	[MPa]	unnotched	notched
G6	0,5	3500	27	28	3800	4	2
G8	1,5	8550	95	105	10400	16a)	7a)
PE-HD	0,95	25b)	1000	-	-c)	15	
PVC-U	1,4	60b)	3000	100	-c)		2
PF-HM)	1,4	25	-	70	7000	6	1,5
Chipboard		0,7	-	18	1800	--	--

a) Unground specimens b) Yield strength c) No fracture



One of our raw material

Fractured edge



Ballendat for Wiesner Hager

Peanut chair Fuerst/Bartosch

Interieur

Interieur

Homeware edition for Armani

Interieur

Mada guitars

Trenner & Friedl

drums

Future, multilayer, sustainable building applications made out of recycled fiber/fines.