PRESENTED BY:
Bob Eller
President
Robert Eller Associates, Inc
Ph: 1 330 670 9566
bobeller@prodigy.net
www.robertellerassoc.com

Prepared for:
Auto Interiors Show
Detroit, MI

June 6, 2007
B/mydocs/papers/auto int 060607
BIOPOLYMER CANDIDATES

• NATURAL FIBERS –
  – VEGETABLE (BAST, SEED, LEAF, FRUIT, WOOD)
  – ANIMAL (WOOL, HAIR)
  – MINERAL (LONG/SHORT GLASS MATS, BASALT)
  – CARBON FIBERS (HIGH END AUTO)

• POLYLACTIC ACID (PLA)

• SOY
BIOPOLYMER CANDIDATES FOR AUTOMOTIVE APPLICATIONS

BIOPOLYMERS

MATRIX

HC-BASED (E.G., PP)
BIOPOLYMER
-PLA
-POLYAL-KANOATE
-SOY

FIBERS

NATURAL

VEGETABLE

ANIMAL
(E.G., WOOL, HAIR)

MINERAL

CARBON

SYNTHETIC

HC-BASED

BIO-BASED (BIOFIBERS)

BAST FIBERS

-FLAX
-HEMP
-KENAF
-HENNEQUIN
-JUTE

LEAF

-SISAL
-CURANA
-BANANA
-BAMBOO

SEED

-COTTON
-KAPOTE

FRUIT

-COCONUT

WOOD

-PINE
-OTHERS

WOOD FLOUR
WOOD FIBER

NOTE: (a) CANDIDATE FOR HEADLINERS (TOYOTA)

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2007
Natural fiber demand in Germany and Austrian vehicle production (tonnes/yr)

Estimates for Europe only automotive applications: 2005: 50,000 t
in 2010 up to 100,000 t per year
NATURAL FIBER APPLICATIONS

- HEADLINER KENBOARD-FOAM™
- SPARE WHEEL COVER KENBOARD™/LoPreFin™
- BUSINESS TABLE LoPreFin™
- ELECTRONIC COVER KENBOARD™/LoPreFin™
- INSTRUMENT PANEL LoPreFin™
- CARPET COVER KENBOARD™/LoPreFin™
- DOOR INTERIOR TRIM KENBOARD™
- DOOR INSERTS LoPreFin™
- PARCEL TRAY LoPreFin™/KENBOARD™/KENBOARD-FOAM™

SOURCE: R+S TECHNIK GmbH
Quelle und Foto: Daimler Chrysler
PATHS TO AUTOMOTIVE MARKET FOR NATURAL AND BIOFIBERS

SOURCE: ROBERT ELLER ASSOCIATES, INC., 2007
LoPreFin™ CONSTRUCTION

30% PES - 70% PP FIBER

50% PP - 50% BAST NATURAL FIBER
  (E.G., FLAX, KENAF, HEMP)

30% PES - 70% PP FIBER

SOURCE: R+S TECHNIK GmbH
re/mydox/biopolymer/nis-LoPreFin Constr
04.vsd
ln/myfiles/Visio/nis-LoPreFin Constr 04.vsd
PAPER HONEYCOMB SPARE TIRE COVER

VEHICLE: AUDI A3  SUPPLIER: IDEAL
PHOTO: ROBERT ELLER ASSOCIATES, INC., 2007
Front shelf (driver cabin)

Opel Corsa Combo

Substrate: Loprefin Air 1.434 g/m²
PP/foam
PP/KHF 60/40 1000 g/m²
PP/PET 70/30 300 g/m²
Front shelf (driver cabin)

Opel Corsa Combo

Substrate: Loprefin Air 1.434 g/m²
PP/foam
PP/KHF 60/40 1000 g/m²
PP/PET 70/30 300 g/m²
Front shelf (driver cabin)
Opel Corsa Combo

Substrate: Loprefin Air 1.434 g/m²
PP/foam
PP/KHF 60/40  1000 g/m²
PP/PET 70/30  300 g/m²
Load floor Mercedes C-Klasse, front

Substrate: Special Sandwich: Glascolite and Nafcolite with EPP-foam
Load floor Mercedes C-Klasse, rear

Substrate: Special Sandwich: Glascolite and Nafcolite with EPP-foam
NEW:
Sandwich with distance spacer
for parcel shelves, load floors, possibly headliners

Substrate: Nafcoform / Nafcolite PP/KHF 50/50
all mass/areas possible
also in Glass fiber available
Nipple Spacer used between two metalsheets, 
Metro Madrid

Substrate: Nafcoform / Nafcolite PP/KHF 50/50
all mass/areas possible
also in Glass fiber available
Door Trim Insert
Ford Mondeo

Substrate: Loprefin 3-layers 1.600 g/m²
PP/PET 70/30  300 g/m²
PP/K  50/50  1000 g/m²
PP/PET 70/30  300 g/m²
Headliner frame driver cabin
Iveco Truck

Substrate: Nafcoform PP/KHF 50/50 2000 g/m²
Sun roof cover, Webasto

Substrate: Loprefin Air
special construction
Parcel Shelf
VW Phaeton

Substrate: Glascoform PP/Glass 55/45 2000 g/m²
Load floor

Porsche Cayenne / VW Touareg

upper side

Substrate: Nafcoform PP/KHF 50/50 1400 g/m² or 1600 g/m²
EPP-foam
Nafcoform PP/KHF 50/50 1400 g/m² or 1600 g/m²
Load floor

Porsche Cayenne / VW Touareg

lower side
Oil-pan covering

VW Passat

(Pumpe Düse)

Substrate: Sandwich 1200 g/m²
PET  100   100 g/m²
PP/KHF 70/30   800 g/m²
PP/PET 30/70   300 g/m²
Spear wheel cabinet, Maybach

Substrate: Loprefin 2200 g/m²
PP/PET 70/30 300 g/m²
PP/KHF 70/30 1600 g/m²
PP/PET 70/30 300 g/m²

QUADRANT
NATURAL FIBER COMPOSITES
Cover air-conditioning unit, Daimler Chrysler Actros, front

Substrate: Nafcoform PET/Musa 20/80
Cover air-conditioning unit, Daimler Chrysler Actros, rear

Substrate: Nafcoform PET/Musa 20/80
Trunkliner, BMW 7

Substrate: Loprefin 2200 g/m²
PP/PET 70/30 300 g/m²
PP/KHF 70/30 1600 g/m²
PP/PET 70/30 300 g/m²