

Second International Conference of the European Industrial Hemp Association (EIHA)

Natural Fibre press-moulding processing

Dipl.-Ing.(FH) Dirk Fischer, R+S Technik GmbH (Germany)

18-19. November 2004, EuroMedia Hotel, Huerth (Germany)

R+S Technik GmbH

- R+S Technik : founded 1953
- Main Facility : Offenbach
- Employees : 130 persons
- Response : development, trials, design, plant manufacturing and assembly at customers site
- Subsidiary : Spengler Anlagentechnik Brno, CZ, 100 pers.
- Response : large machine parts, presses, tools, moulds
- Partnerships : DFI S.A.: Limoges, F, 60 persons
moulds and tools Bohemia, Brno CZ, 12 pers.
- KODAMA Chemical Ind. Co. Ltd., Japan
- patents/brands : worldwide more than 100
- Sales : 45 Mio. € in 2002



Intent

- introduction R+S Technik
- natural fibre / PP basics
- long fibre technology (composite R&D and process development)
- one shot production line concepts
- applications in automotive fields
- References
- Recycling concepts
- applications in non automotive fields

manufacturing program:

➤ turn key plants

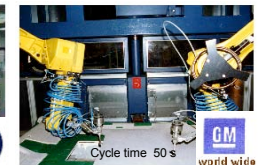
Composite R&D → Prototyping → moulds, tools → process R&D → turn key plants (semi-/fully-automatic solutions)



sun-roof heat-laminating



Form+laminating



water cut headliner



S - Class bumper weld+ trim



MAGNA wheel house mould+trim

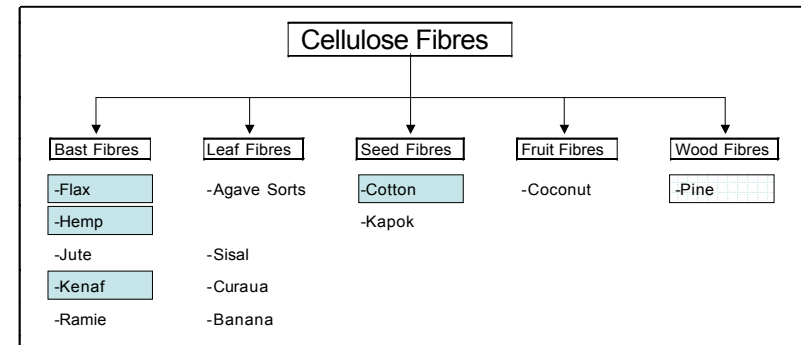


Parcel shelf new series 7

✓ **COST**

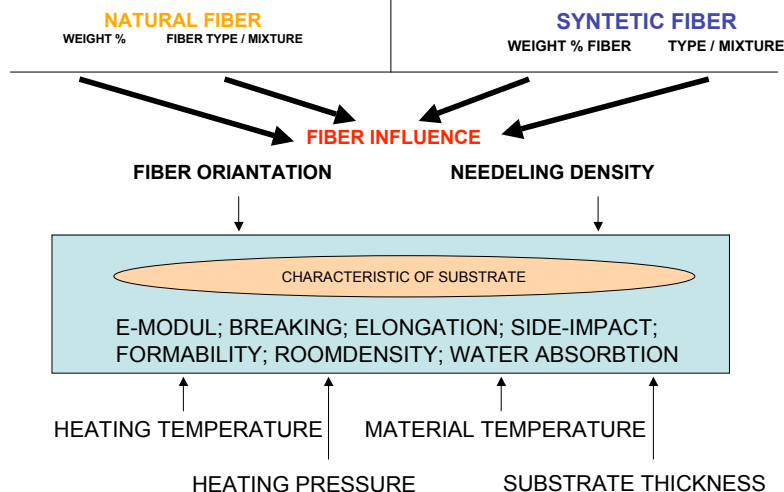
- ✓ **light weight (minimize up to 30%)**
- ✓ **high energy absorption capacity (side impact)**
- ✓ **best recycling possibilities (EU directive)**
- ✓ **good mechanic properties good formability ("one shot")**
- ✓ are favorable price raw materials
- ✓ have high noise absorption
- ✓ a very slight fogging rate
- ✓ slow burning rate
- ✓ slight friction noise
- ✓ good rigidity and notch toughness

Material Systems: Cellulose Fibres

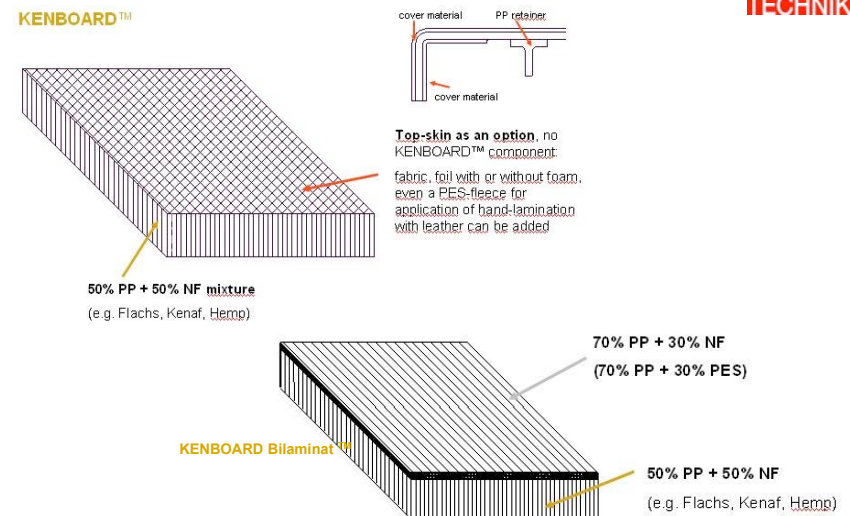


Basics

PROPERTIES OF SUBSTRATE CONSIST OF

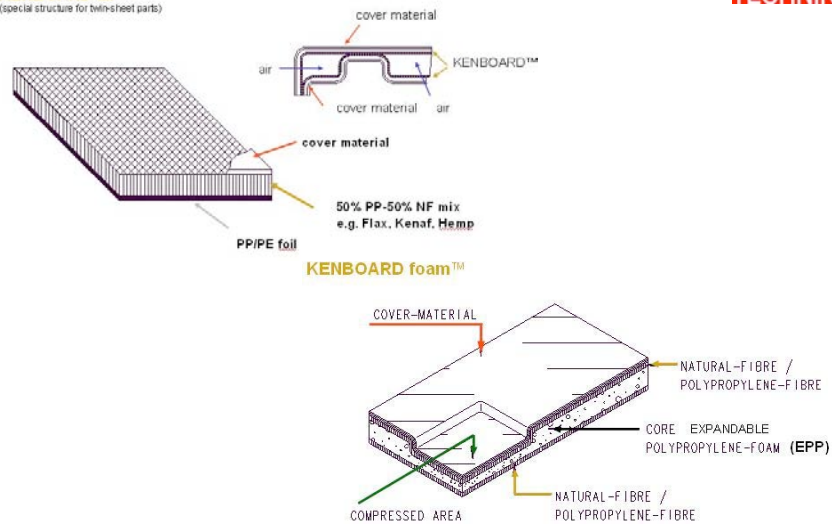


Substrate Technology (Semi-finished-mat)



Substrate Technology (Semi-finished-mat)

KENBOARD air™
(special structure for twin-sheet parts)



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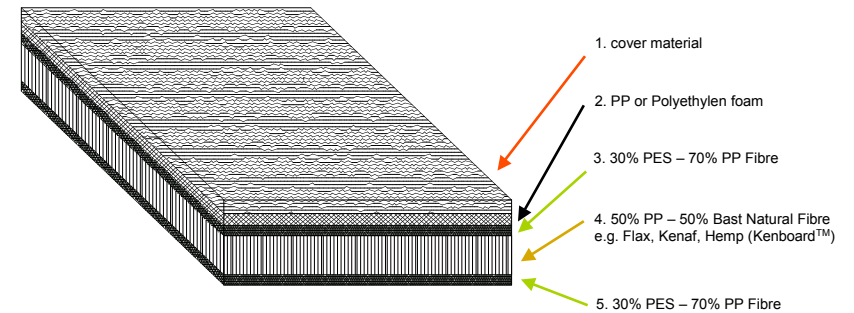


Substrate Technology

Semi-finished-mat

LoPreFin™ - Construction

US PATENT 5 703 927 - EUROPEAN PATENT EP0671259 B1 - JAPANESE PATENT PENDING
(USA/CANADA/MEXICO – License: Findlay-Industries)



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Natural fibre production line



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What is the “one-shot-process” ?

one shot means: Production of laminated Interior-Parts in “one-single-stroke”

•benefits:

- ✓no glue
- ✓no additional processes
- ✓NF process saves space
- ✓NF process reduces handling
- ✓NF process = less shrinkage
- ✓no additional energy for a separate lamination-process
- ✓no control of additional parameters like time, humidity
- ✓NF process avoids buffering



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R+S headliner production system



Example

YESTERDAY

- 1. PU headliner with reinforced glass fiber (PU-sheets)
- 2. PU spraying
- 3. fibre headliner with phenolic or acrylic resin

TODAY

- ✓ 4. R+S natural fibre material
- ✓ 5. R+S natural fibre reinforced EPP-foam
- ✓ 6. R+S Kenboard-cell™

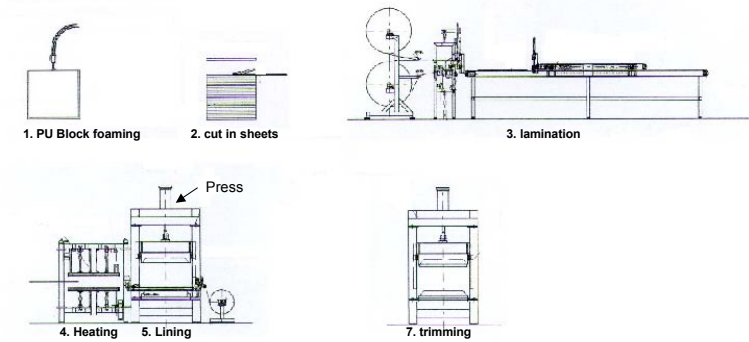
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R+S headliner production system



- 1. PU headliner with reinforced glass fiber (PU-sheets)



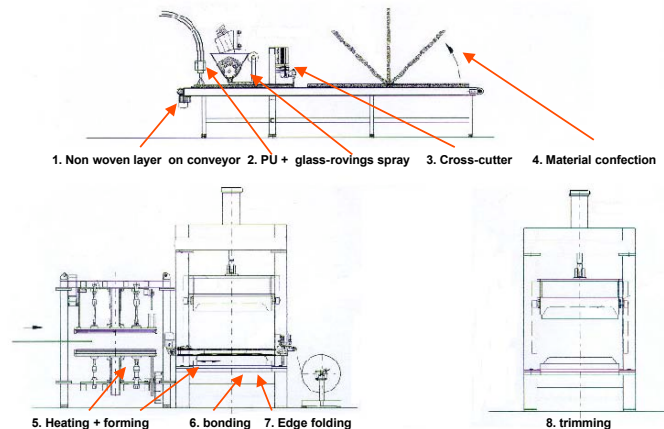
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R+S headliner production system



- 2. PU spraying



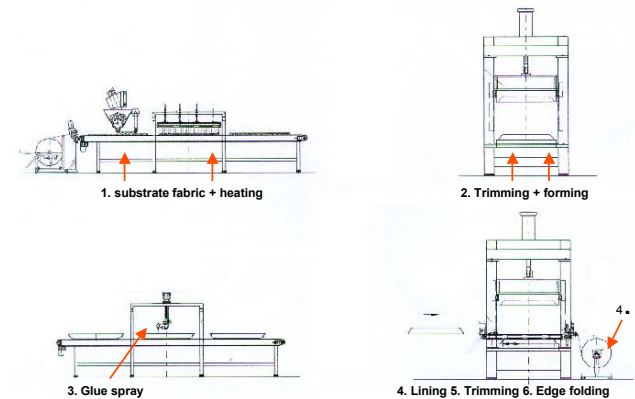
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R+S headliner production system



- 3. Fibre headliner with phenol or acryl resin

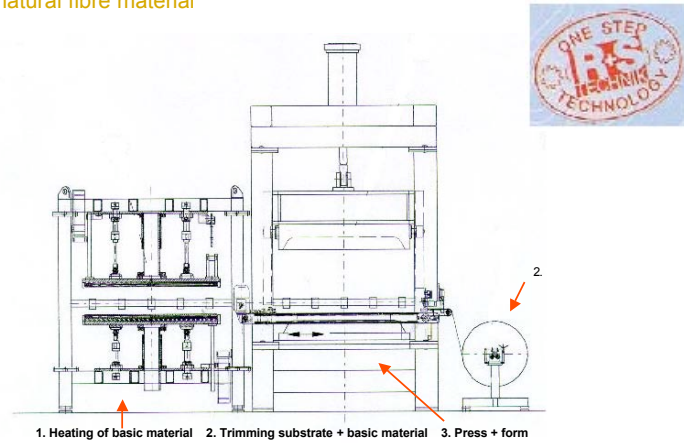


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R+S headliner production system

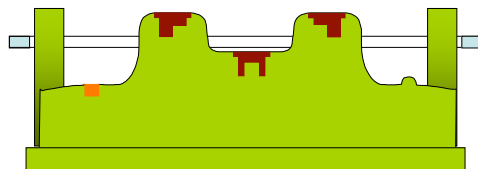
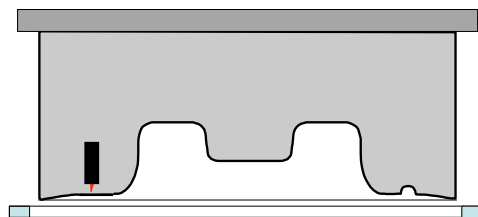
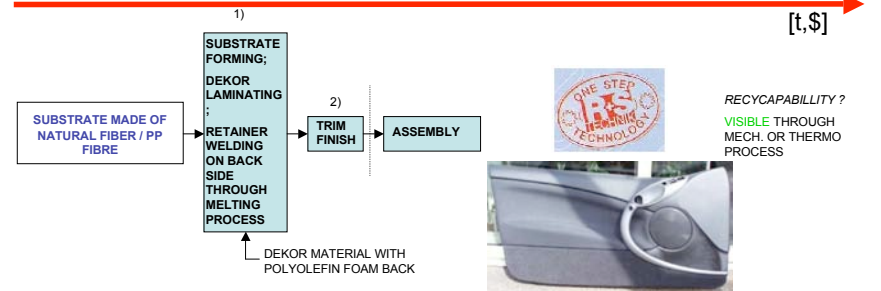
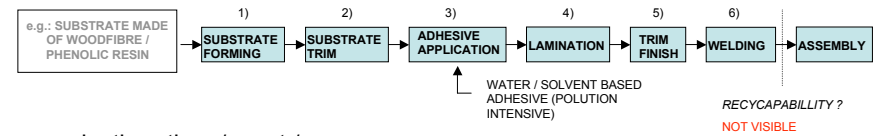
➤ 4. R+S natural fibre material



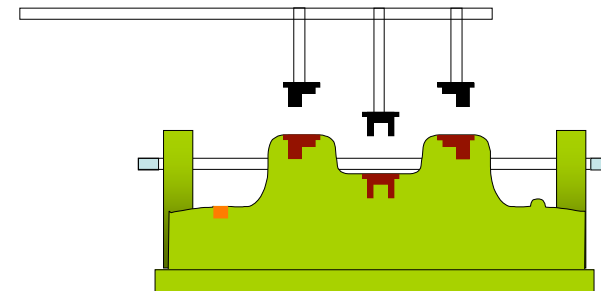
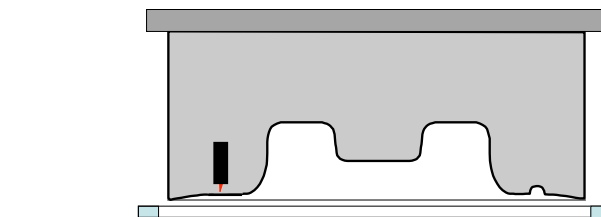
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Basics

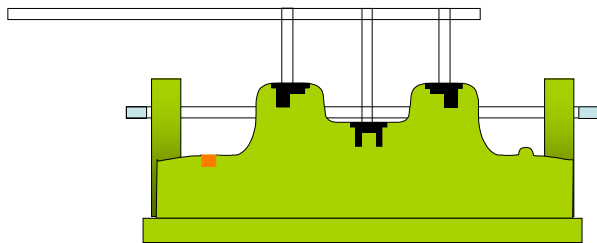
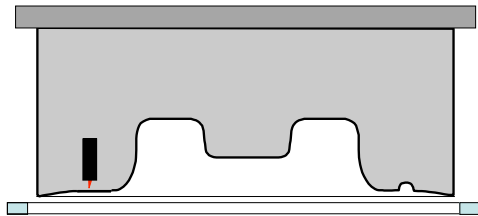
PROCESS COMPARISON MULTIPLE PROCESS VS. „ONE STEP PROCESS“



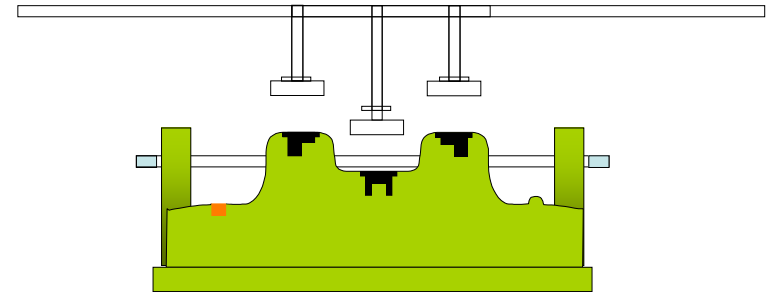
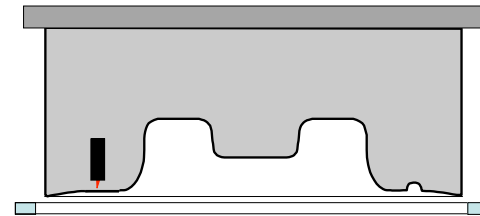
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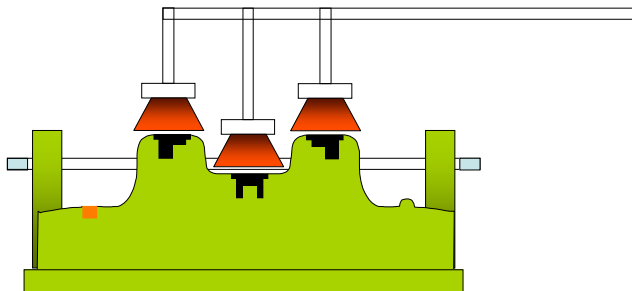
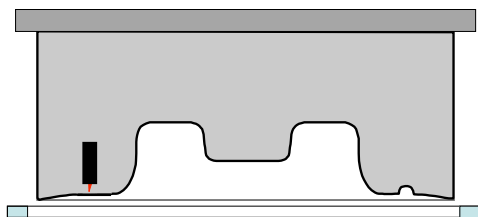
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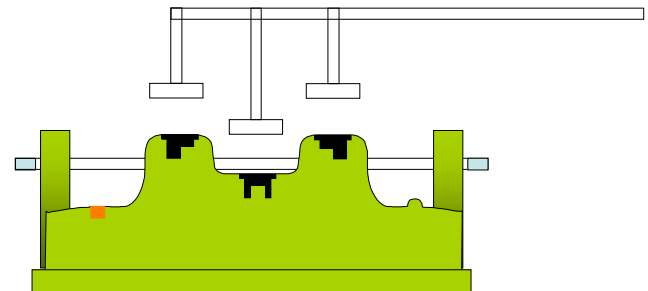
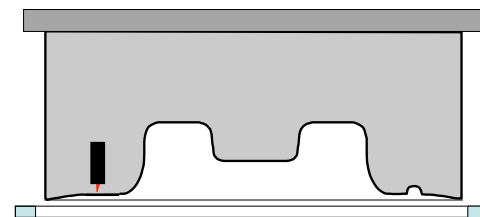
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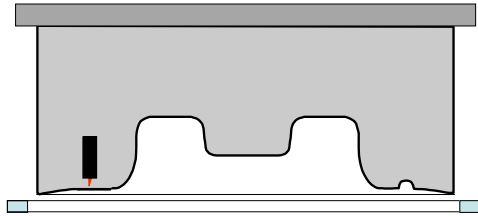
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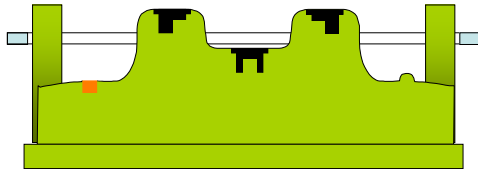
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DEKOR MIT PE SCHAUMRUECKEN (VORGEHEITZT)

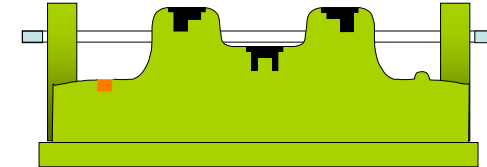
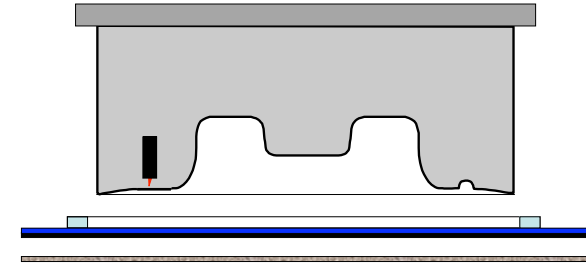


NF/PP (VORGEHEITZT)



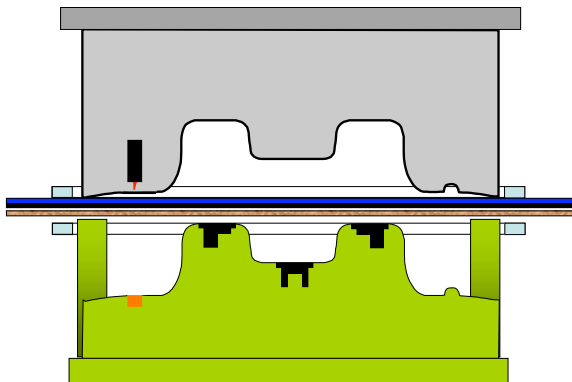
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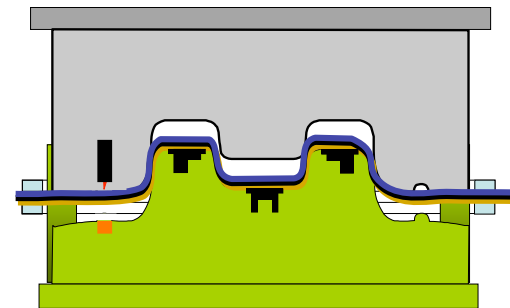
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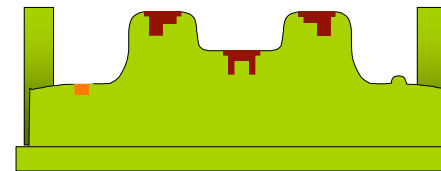
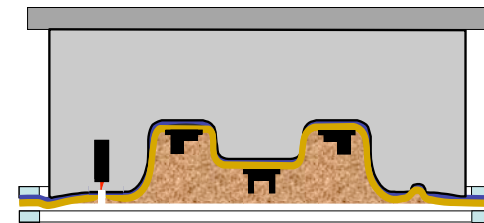
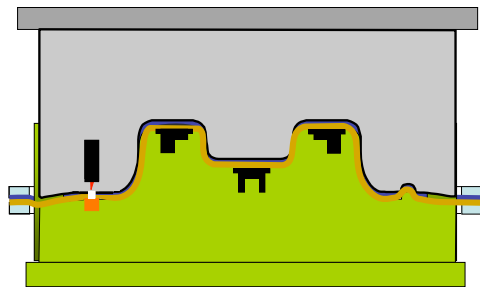
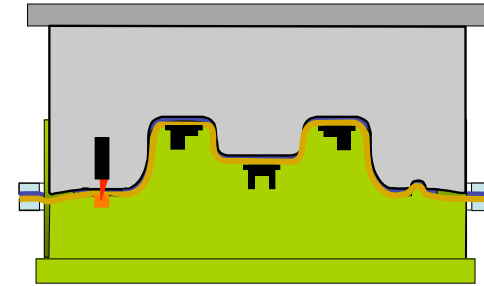
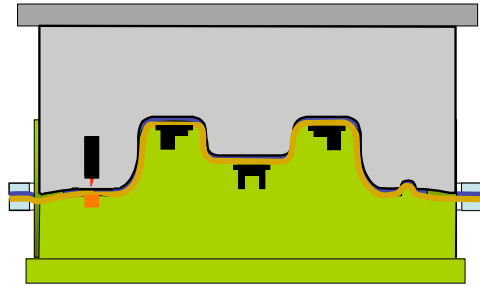
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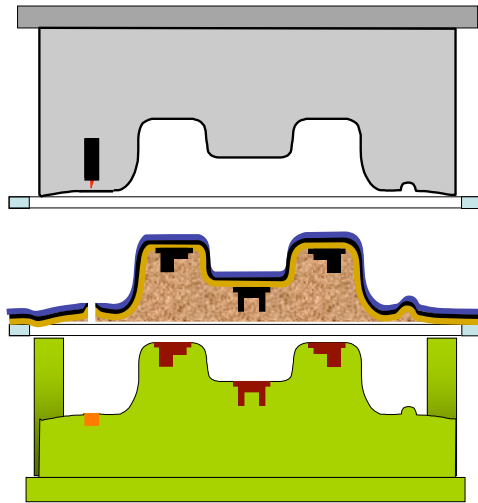
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R+S LoPreFin-Soft-Touch® (Patent pending)

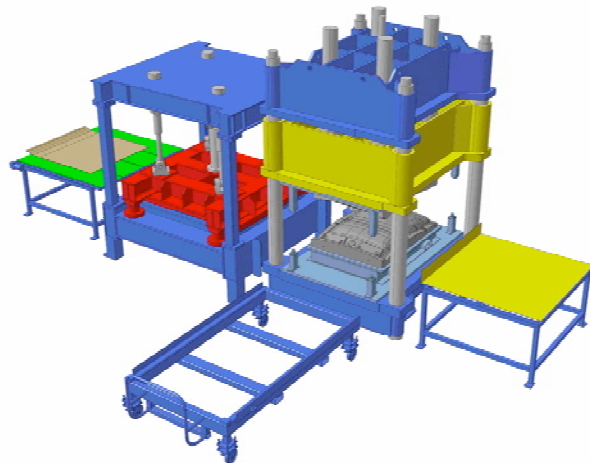


**Door insert
with soft-touch:**

Formed and laminated
in „one-shot“ Process

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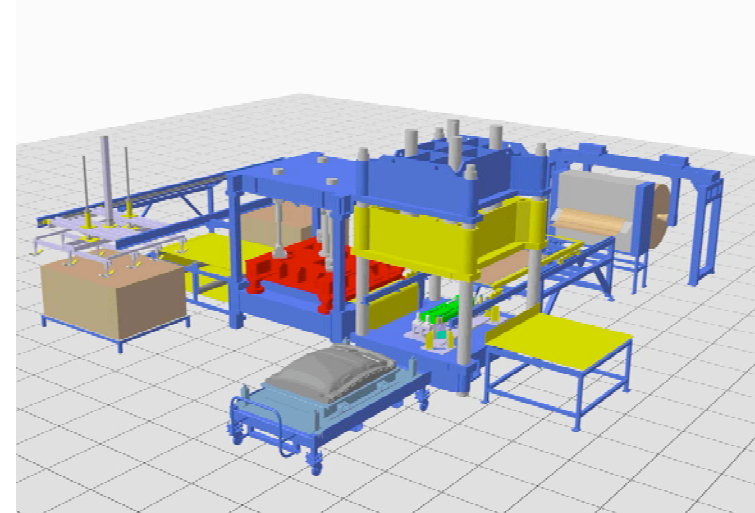
manufacturing program: turn key plants



patent pending

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manufacturing program: turn key plants



patent pending

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manufacturing program: turn key plants



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manufacturing program: turn key plants



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manufacturing program: turn key plants



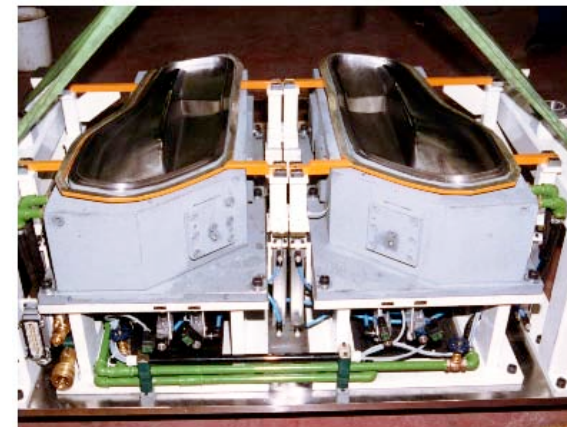
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manufacturing program:



➤ tools

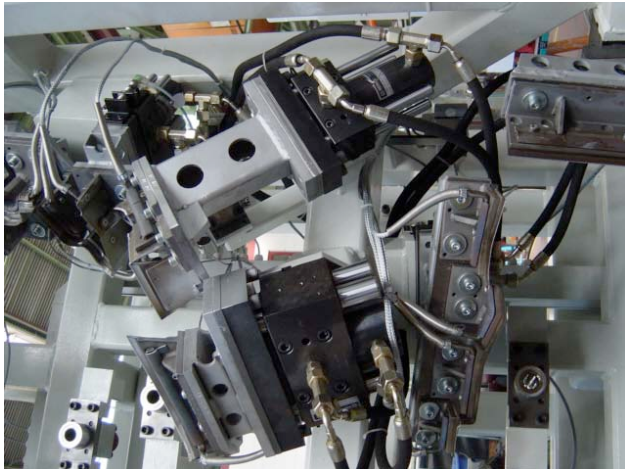


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manufacturing program:

- 3D cutting/trimming tools



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manufacturing program:

- 3D cutting/trimming tools



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manufacturing program:

- 3D cutting/trimming tools



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manufacturing program: turn key plants



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manufacturing program:

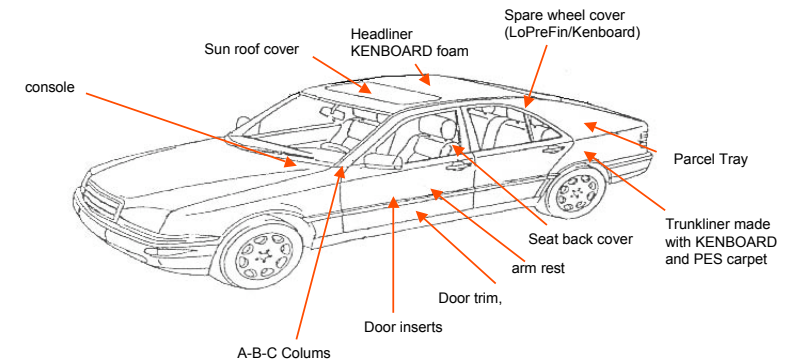
➤ Waterjet



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“one-shot” applications of Natural Fibers



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Practical Samples

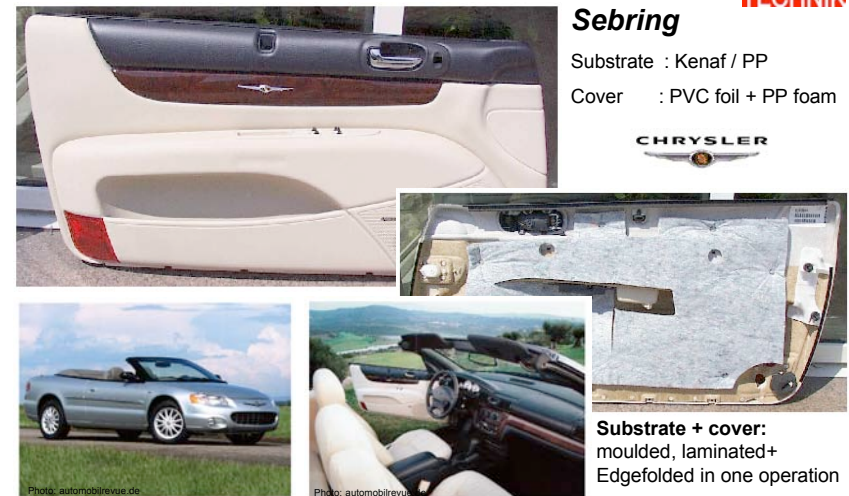


Door substrate: molding, trimming and welding of PP retainers in „one-step“ process

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Practical Samples



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Practical Samples

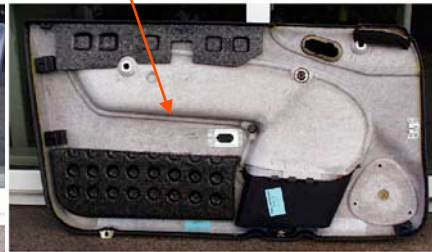


9-3 convertible

Substrate : PP+NF
Decor: PVC+PE foam backing



insert: mirror welded



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Practical Samples



Substrate : PP+Kenaf
Cover material: PVC with PP foam backing

Substrate + cover:
moulded, laminated, 90° edgefolded + trimmed in one operation



Photo: DODGE



Photo: DODGE

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Practical Samples



OPEL Astra

Substrate : PP
insert : PP+NF



Substrate + cover:
moulded, laminated in one operation

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Practical Samples



C70

substrate : PP
cover : PP+NF



substrate + cover:
Formed + laminated in one operation

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Practical Samples



Mondeo 2001

insert : KENAF/PP door frame :
injection moulded PP

Trick: Insert with 2 decors but 1panel



Photo: ford.de



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Practical Samples



Golf Variant Bora Variant

Substrate :
PP+NF+PES carpet

Substrate + cover:
moulded, laminated
in one operation,
retainer without glue



Photo: VW



Photo: VW



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Practical Samples



trunk liner



VW Passat

Substrate :
PP+NF+PES carpet



Photo: VW

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Practical Samples



SUV Touareg 4x4



Touren



SUV Cayenne 4x4



Photo: PORSCHE



Photo: VW



Photo: VW

Kenboard-foam™ process
(EPP) + Kenaf/Hemp / PP
core laminated with
Kenboard™ substrate on both
side, in melting Process
laminated with plastic part

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Practical Samples



Touran

Kenboard-foam™ process

(EPP) + Kenaf/Hemp / PP core laminated with Kenboard™ substrate on both side, in melting Process laminated with plastic part

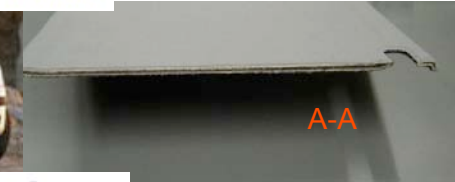


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Practical Samples



HYUNDAI



Getz

Sun shade

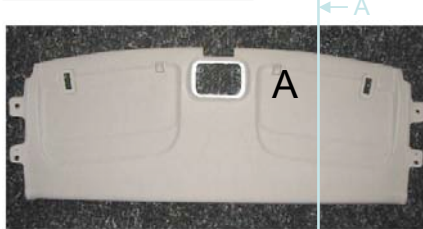
Kenboard-foam™

Substrate (PP/NF+EPP) +
decor

formed, laminated, pinched
in one shot

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Practical Samples



GM/Opel Combo

Kenboard-Air™ process

Substrate : PP + Kenaf/Hemp +
PE foil

WOOD PANEL



Compression-airflow-moulding:
substrate forming, textile cover
laminating in one operation



Photo: OPEL



Photo: OPEL



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Practical Samples

R+S – headliner with KENBOARD™



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2002 First CHINA CAR – all interior production lines turn-key by **R+S Technik**

中华牌轿车下线纪念

Brilliance Auto
华晨汽车

ABS/PU-applications:
carpet, soundinsulation,
motor insulation
instrument panel,

Natural fibre application:
Headliner, ABC-column,
door panel, inserts, parcel
shelf, trunk load floor.

Peripherie: Tools,
Waterjets, trimming and
thermoforming plants
included

Photo: Brilliance Auto

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R+S ThermoGrain® System (Patent pending)



R&D „Astra“
door trim



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R+S ThermoGrain® System (Patent pending)

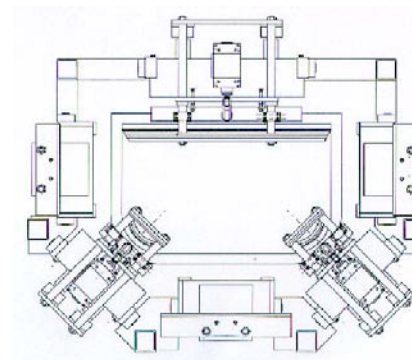


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R+S ThermoGrain® System (world wide patent pending)



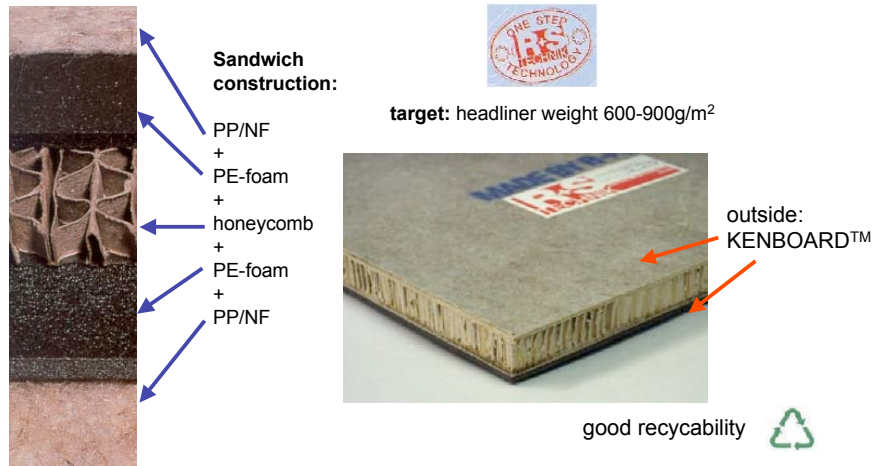
Edge folding device (90° or 180°) – door trim



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R+S Kenboard-cell™ (Patent pending)



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New Technology developments R+S fibre recycling system

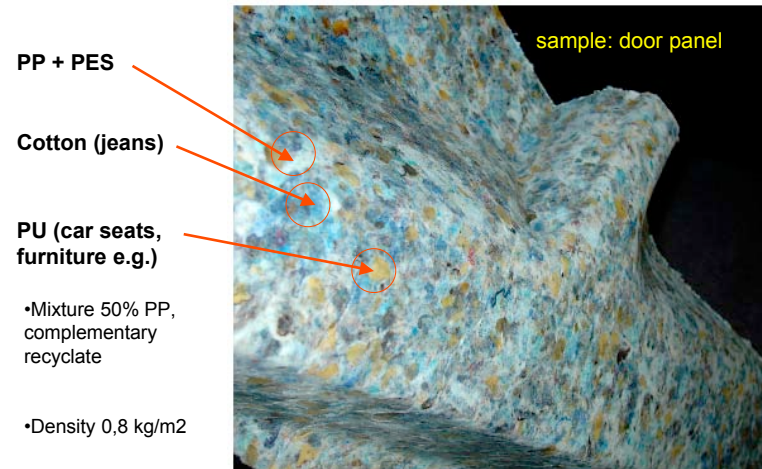


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New Technology developments R+S fibre recycling system



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Long Fibre-Technology (Natural or Glass/PP)



Reference List R+S Technik GmbH



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2. Natural fibre (NF) Technology

Reference List

customer	Year	Year/ Type	product
AUDI	1997	A4 Variant	Production line for rear side panel left/right
AUDI	2002	A6	Production line for carpet, trunkliner
BMW	2002	7-series	Production line and tools for trunkliner (LoPreFin)
BMW	2002	5-series	Production line for sound insulation of engine and gear
BMW	2003	5-series	Cutting for A-column moulding
BMW	2003	1-series	Production line for floor carpet
BRILLIANCE M1	2000	China	Production lines and tools for headliner, floorcarpet, wheel housecover, rear shelf, Tools for door inserts (Natural Fiber)
DAIMLER-CHRYSLER	2001	3R41	Tools for door panels (Natural Fiber)
DAIMLER-CHRYSLER	2001	3R27	Tools for console and door panel (Natural Fiber)
DAIMLER-CHRYSLER	2002	Viper	Tools for console and door panel (Natural Fiber)
DAIMLER-CHRYSLER	2002	complete vehicle	Production line for door panel incl. retainer
CITROEN	2003	M-class	Tools for door inserts front/rear (Natural Fiber)
DAEWOO	1999	Y-120	Door panels (LoPreFin)
FORD Australia	2002	Australia	Production line and tools for door inserts
FORD Europa	2000	Mondeo	Production lines for door inserts (LoPreFin)
FORD USA	1998	Cougar	Production line for door inserts (LoPreFin)
GM		Pontiac 2002	Production line and tools for door inserts (Natural Fiber)
LADA	1999		Tools for rear shelves+ABC-columns (LoPreFin)
Mazda	2003		Door insert with Kenboard Softtouch
MITSUBISHI	1997	Space-Van	Production line for door insert

Table: Reference List for NFApplication / R+S Technik GmbH Germany

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2. Natural fibre (NF) Technology

Reference List

customer	Year	product
OPEL	1997 T3000	Production lines for door inserts front/rear (Natural Fiber)
OPEL	1998 3001	Production lines for door inserts front/rear (Natural Fiber)
OPEL Spanien	2001 Spain	Production line and tool for storage tray (Natural Fiber) (LoPreFin)
OPEL	2003 Vectra	Production line for trunkliner
Porsche/Volkswagen	2002 SUV	Production line for load floor (Kenboard Foam)
RENAULT	1998 B65	Production lines for door inserts front/rear
SAAB	1998 Coupe/Convertible	Production line for door panels (LoPreFin)
SATURN	1999 Saturn	Production line for parcel shelves (LoPreFin)
VOLVO	1998 Coupe/Convertible	Production line for door panel left/right, door inserts left/right and parcel shelf
VW	1998 Golf 4 Variant	Production line for carpet kit with sound isolator
VW	2002 New Beetle	Door insert (Kenboard + Softtouch)
VW	2003 Golf	Production line for floor carpet

Research & Development:

OPEL	2001 Astra	ThermoGrain system (IMG) for door panel
OPEL	2003 Delta	Headliner (Kenboard Cell)
DAIMLER-CHRYSLER	2005 C-class	Door insert (LoPreFin + Softtouch)
VW	2005 Golf +	Door insert (LoPreFin)

Table: Reference List for NFApplication / R+S Technik GmbH Germany

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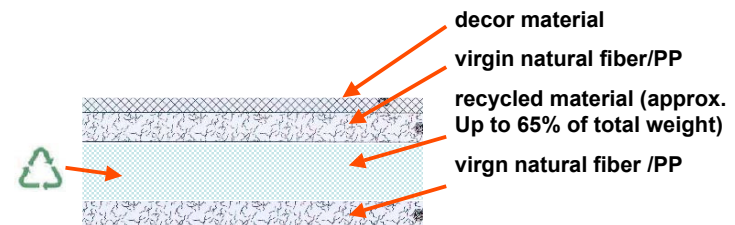
Recycling concepts for production waste

Production of tri-laminate material:

The processing of the agglomerate was done by heating-up, using a heated belt press, calandering and chilling.

According to the material abilities, different cover fleeces will be attached to produce a tri-laminate, like PP/natural fiber, PP/natural fiber fleece.

Because of the application of different cover fleeces, different flexing and moulding abilities could be realised.



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Recycling concepts for production waste



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Non Automotive



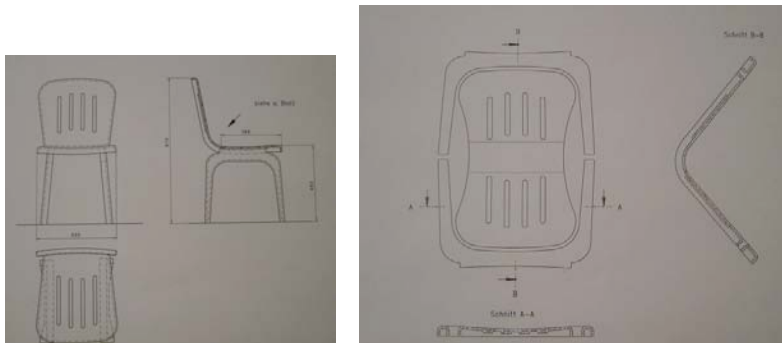
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Non Automotive

furniture:

Patent pending



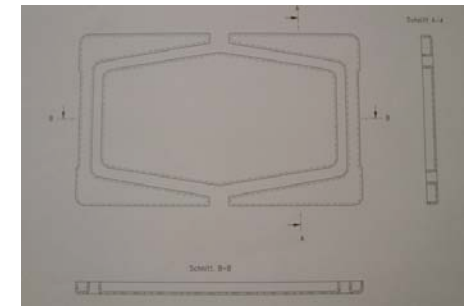
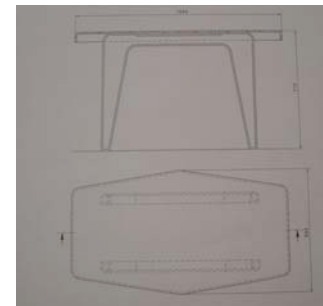
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Non Automotive

furniture:

Patent pending



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Non Automotive



Patent pending



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Non Automotive



LONDON SYMPHONY ORCHESTRA

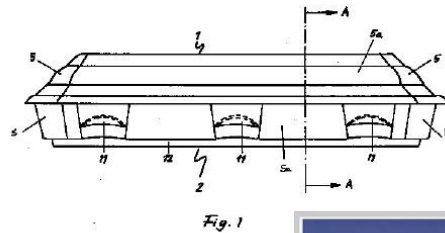
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Non Automotive



Coffin



EU patent pending



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Thank you for your Attention !



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