



FiberEUse

Large scale demonstration of new circular economy value-chains based on the reuse of end-of-life fiber reinforced composites

1st October 2019

EU2019.FI

MANUFUTURE 2019 Conference
Sustainable smart manufacturing

Presenter: Giacomo Bonaiti

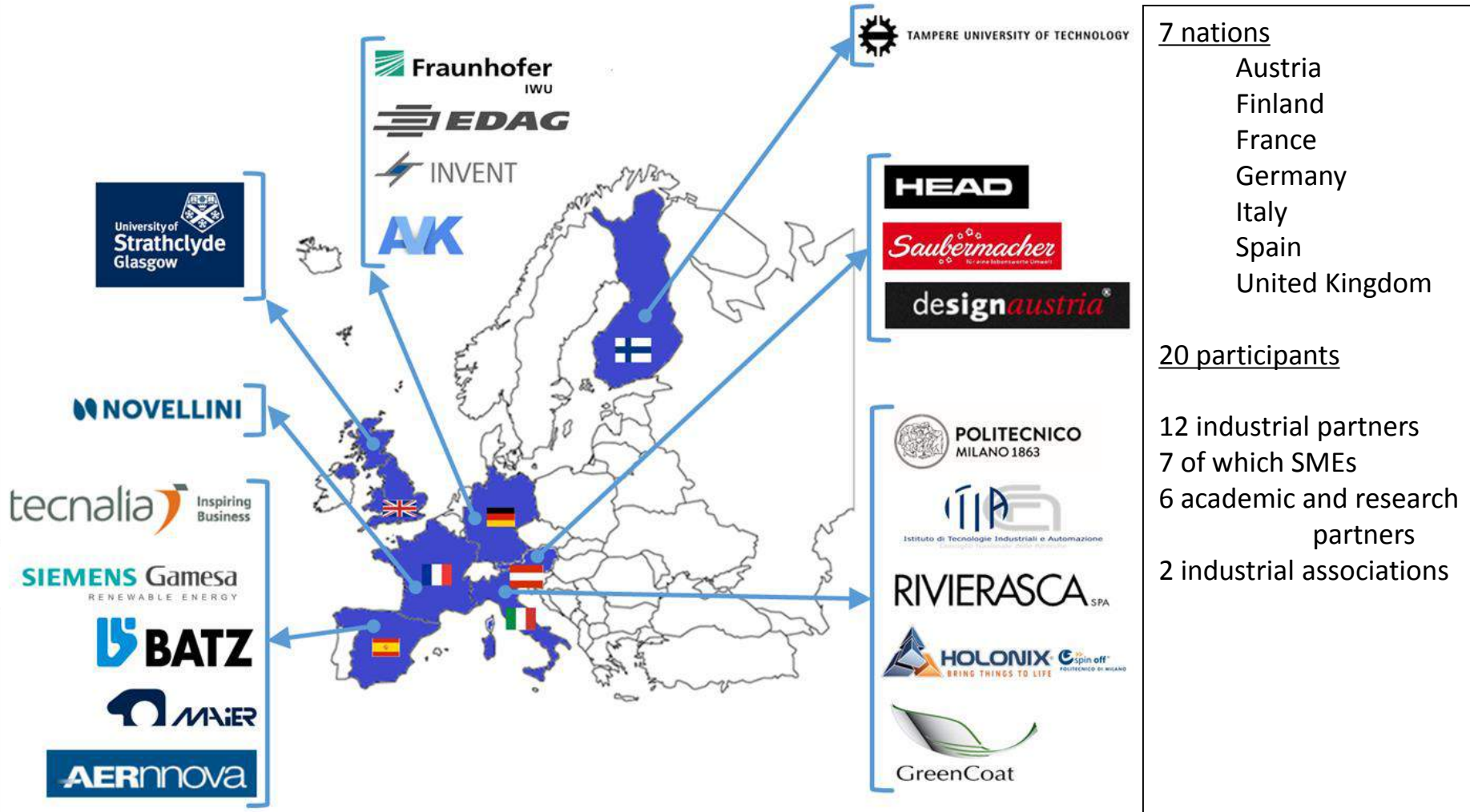
RIVIERASCA SPA

glebanite



- Funding body: **EU Horizon 2020** (Grant Agreement No. H2020-730323-1)
- Grant: **€ 9.8 million**
- Duration: **4 years** started June 2017, end May 2021
- Consortium: **20 partners**, from **7 EU countries**.
- Aim: **Integrating different innovation actions through a holistic approach to enhance the profitability of composite recycling and reuse in high value-added products.**

Project partners



FiberEUse aims to develop and demonstrate a large scale reuse of end-of-life (EoL) composites materials via:

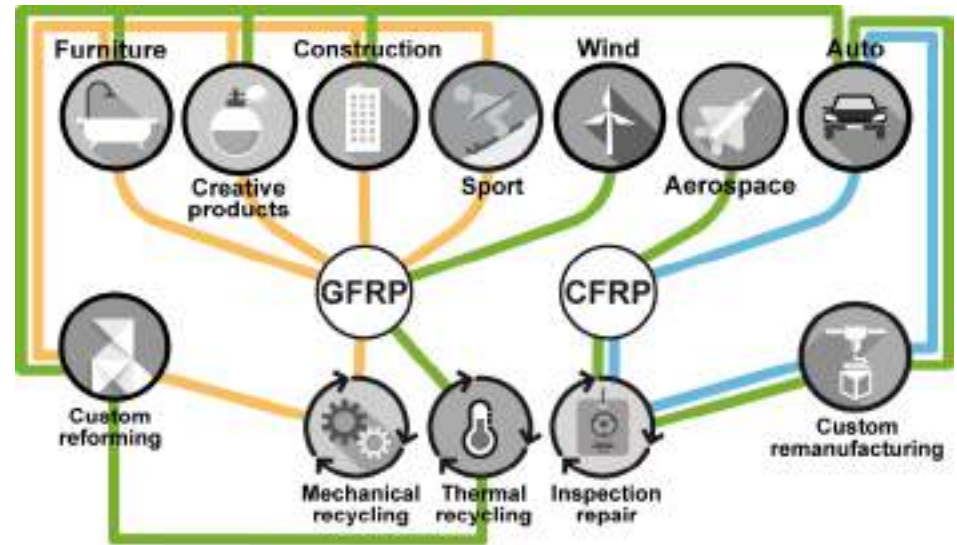
- **Integration of innovative remanufacturing technologies addressed to develop profitable reuse options for mechanically or thermally recycled EoL GFRP and CFRP composites** - enabling ease of operation, significant cost reduction, compliance with EU Directives
- **Development of an innovation strategy for mobilization and networking of stakeholders from all the sectors related to composites** - from original equipment manufacturers (OEMs) to tier 1 suppliers, logistical operators, technology providers and exploiters, designers, and end-user associations



FiberEUse Concept

FiberEUse is based on the realization of three macro use-cases, further detailed in eight demonstrators:

- **Use-case 1: Mechanical recycling** of short GFRP and re-use in added-value customized applications, including furniture, sport and creative products
- **Use-case 2: Thermal recycling** of long fibers (glass and carbon) and re-use in high-tech, high-resistance applications
- **Use-case 3: Inspection, repair and remanufacturing** for EoL CFRP products in high-tech applications



FiberEUse Use-Cases and involved industrial sectors



- RIVIERASCA S.p.A. is a SME founded in 1963
- 30 employees
- 10 milion € revenue
- Raw material consumption:
 - UP (uninsatured Polyester) 3.000 ton/year
 - GF (Glass fiber) 1.000 ton/year
- Production: 4,5 milion m²/year of GRP laminates
- Market: Do it Yourself, Industrial roofing, cold chain,
- Waste production: 250 ton/year





In 2001 RIVIERASCA starts looking for suitable solutions to recycle its internal scraps (250 ton/year) and develops/tests several technologies till 2012. At that time seven technologies were tested and the name “Glebanite” was given to this new material. Glebanite is GRP recycled into GRP again by using one or more of the seven technologies developed.

- Open mold casting
- Wrapping & plastering on mold (hand lay-up)
- Closed mold cast and press
- Continuous cold extrusion (patented)
- Continuous lamination
- Ibrid 3D printing and milling with robotic arm
- 7 axis milling and laser engraving
- more to be investigated...(BMC, centrifugal, filament winding)



Parfume packaging: Francesca Gotti design for Rubini Profumi. ADI INDEX 2016

Open mold casting:

Cheap technology suitable for single pieces and prototype. Mold are prepared using milling facilities with “soft” material like PU, PA, PP, HDPE, PET, PTFE. Metallic (steel or aluminum) mold are suitable too. Used to prepare the raw material for milling processing. Manual production.



Display for cosmetics



Inaccessible perfume: AYBAR Gallery ART BASEL MIAMI

Display for jewelry shop: prototype 360x410x50/160 mm



Wrapping & plastering on mold (hand lay-up):

Another easy and cheap way to produce thin wall (less than 3 mm) prototype and complex surfaces. Manual production.



Mustafà Sabbagh: personal show c/o Contemporary Cluster – Roma January 2017



GioMinelli design: Kernel collection, Glebanite table





«The art of free form modeling design»: academy of fine arts G. Carrara Bergamo – December 2016

Closed mold pressing:

More expensive than open mold technology but allow to grant better geometry of the piece (specially for plane surfaces). In some application is absolutely necessary. Semi automatic production. Today 80% recycled

Glebanite board for milling a mold.

- 1580 x 1400 x 25 mm
- 66 kg
- density 1,19 kg/m³



MDF (Medium Density Fiberwood) Vs. Glebanite for marine application?



Lombardy Region: Call “INNODRIVER-S3 -Edizione 2017 - Misure A-B-C”
“Glemould” project: GLEBANITE® FOR MODELS AND MOULDS IN SHIPYARDS
APPLICATIONS RATHER RESORTING TO MONOMATERIC SOLUTIONS



Glebanite technology: closed mold pressing



UNIONE EUROPEA
Fondo europeo di sviluppo regionale



Regione
Lombardia



POR 2014-2020 FESR / INNOVAZIONE E COMPETITIVITÀ





Tom Tjaarda: Glebanite model for car bodywork «Escondido» - Compotec April 2019

Continuous cold extrusion (patented):

Technology developed for high productivity (up to 950 kg/h) and low cost. Useful for continuous production of rod and axle.

Glebanite produced with this technology is extremely compact thanks to a vacuum camber in the equipment.

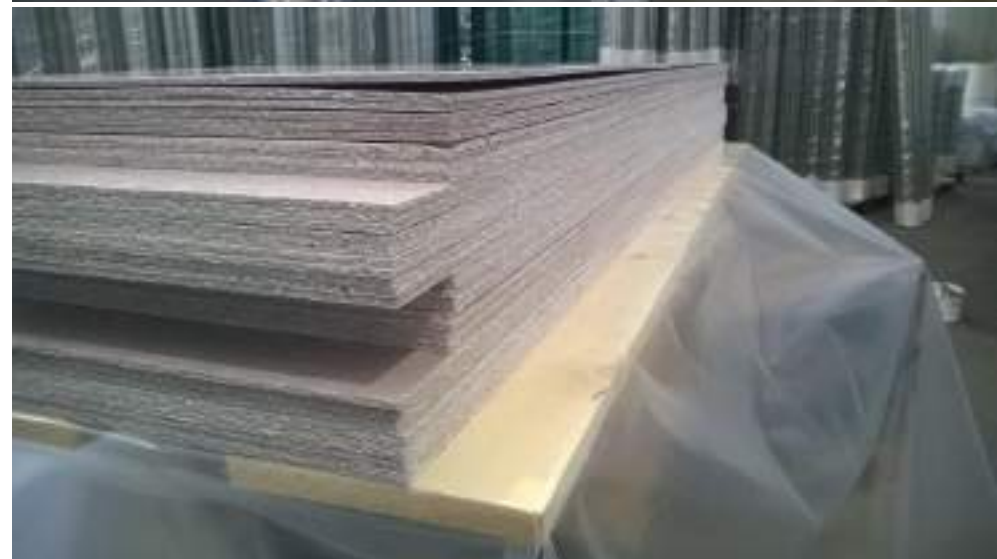




Continuous lamination:

Good technology for high productivity. It allows flat and corrugated sheets from 3,5 to 5 mm thickness (higher thickness on test).

Maximum width 1400 mm. Plant produce laminates adding glass reinforcement on top and bottom surfaces so to give good mechanical resistance. Flat laminates can be glued together.



3D printing (Additive manufacturing: FDM and SLA/DLP) with robotic arm for large 3D printed objects (KUKA KR120 with spindle 7kW and laser 60W). Powerful technology for complex pieces still needs developing (in 2019) specially for robotic arm movement and Glebanite's extruder integration.

7 axis milling and lasering
Ready to use equipment





Glebanite 44% recycled,
laminated, milled, assembled.



Glebanite laminate, closed molded, milled...for road sign?



Glebanite cast in open mold, milled...Vs marble for water tap





Glebanite
multilayer cast
in open mold
and milled.

Salone del
mobile Milano
2016

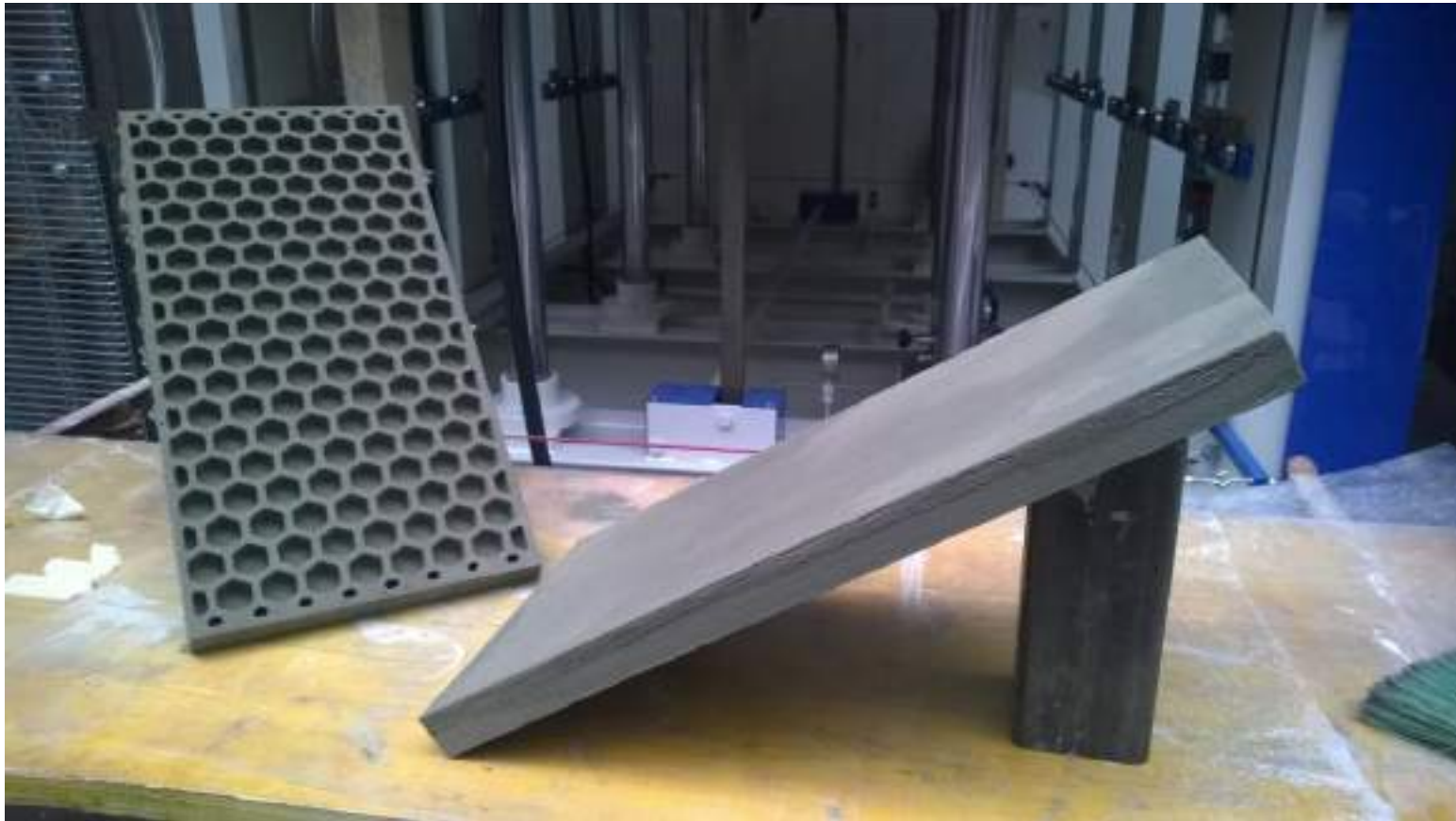
Gent Design
Museum
Bruxelles



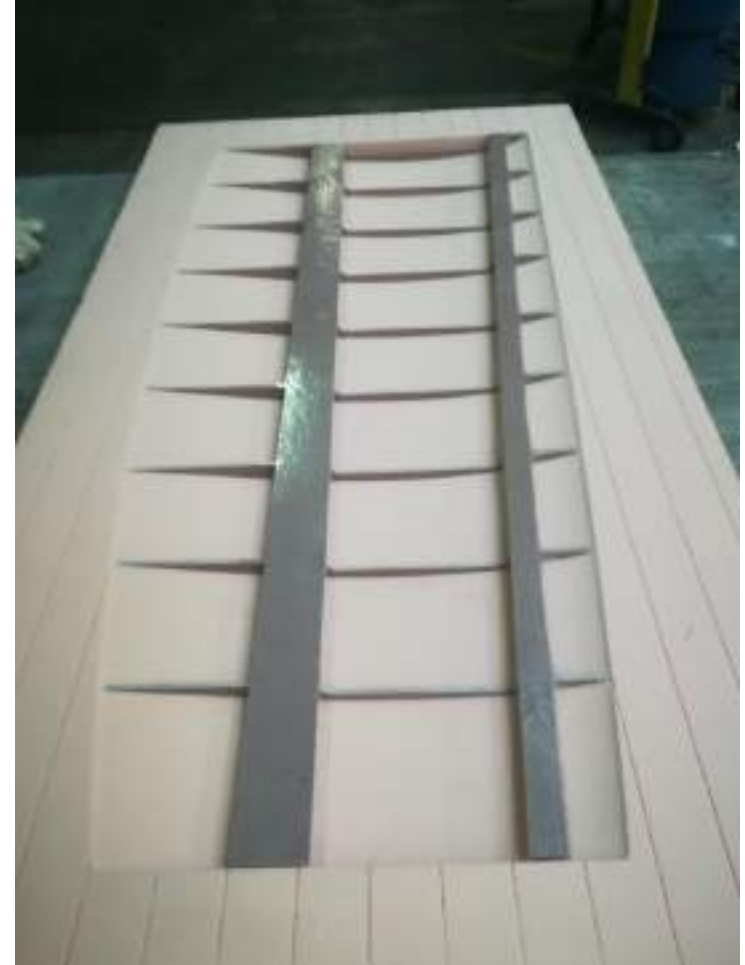
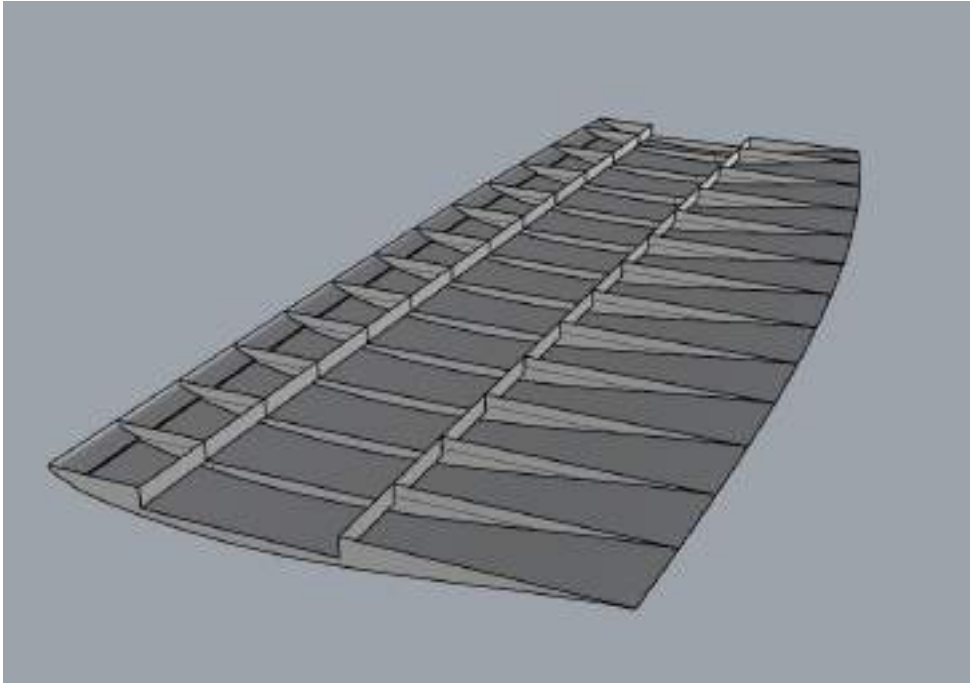
OneOfThose: “Inaccessible perfume” design Francesca Gotti ART BASEL MIAMI 2016



Structural laminates cast in open mold



Structural part: laminate, milled, glued.
Sailing boat kneel





Gio Minelli design:
Tiles (internal or
outdoor): closed
mold laminate,
water cutted



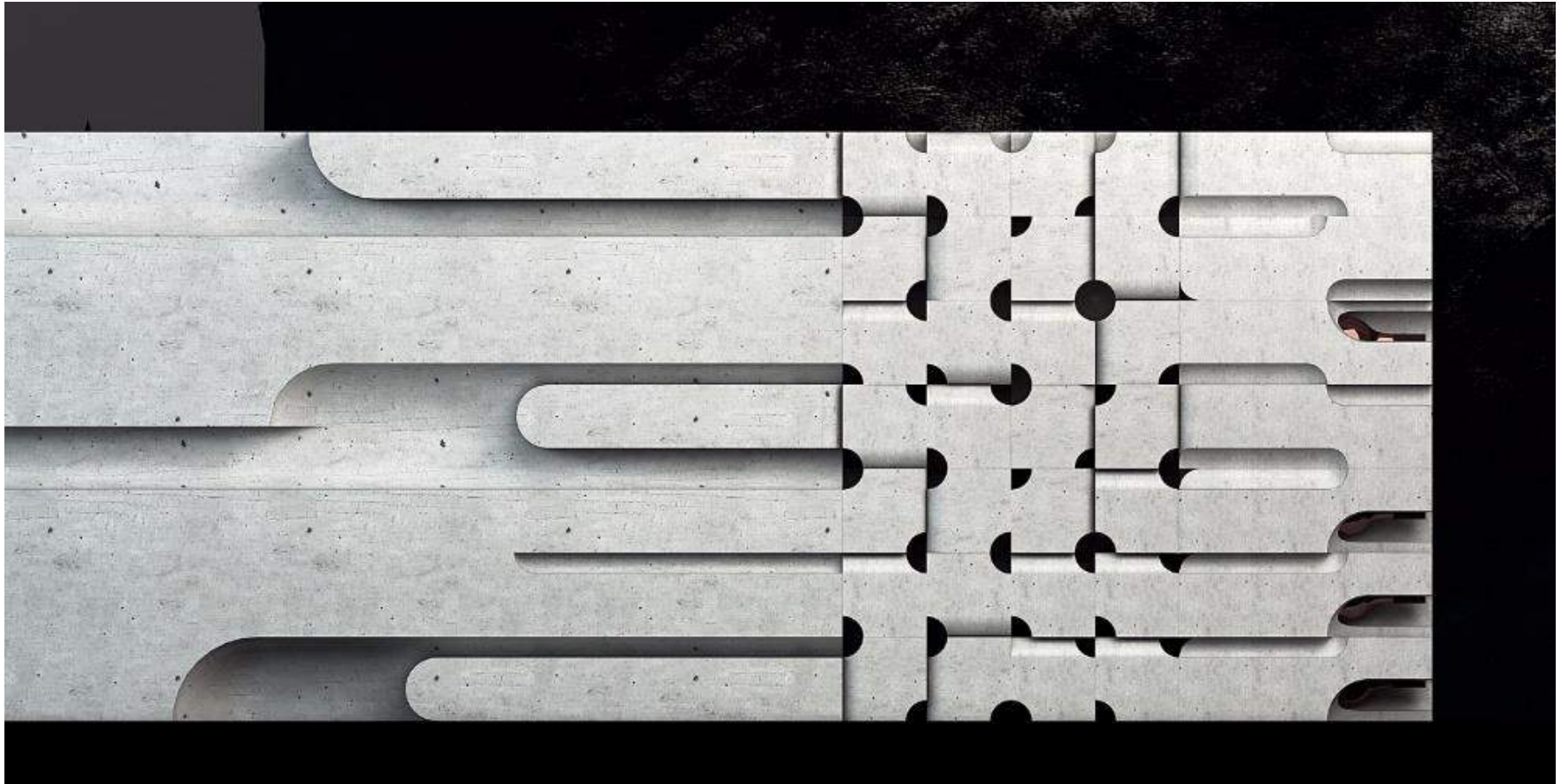
Gio Minelli design:
Table deck

Martina Hatzenbichler design for FiberEUse: Wine cooler, cast in open mold









Milano Fuorisalone

who participates?

Designers and companies participate in this widespread macro event with the aim of showing new products and technologies, in order to find new business partners and new audiences.

Design is here understood as a system that links companies from sectors that are only apparently distant, as for example:

- Furniture
- Construction
- Automotive
- Fashion
- Food
- Art



Arper – furniture



Cosentino – construction



Audi - automotive



Missoni - fashion

Business model for mechanical recycling



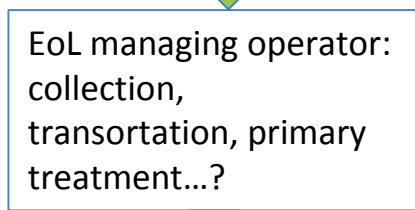
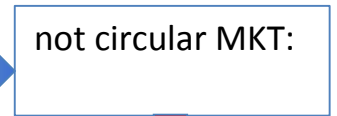
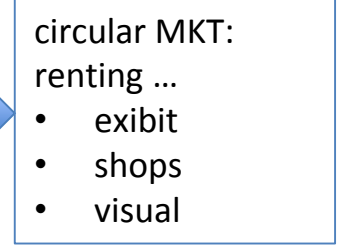
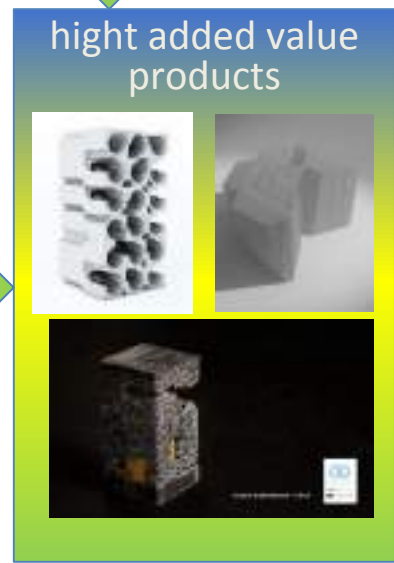
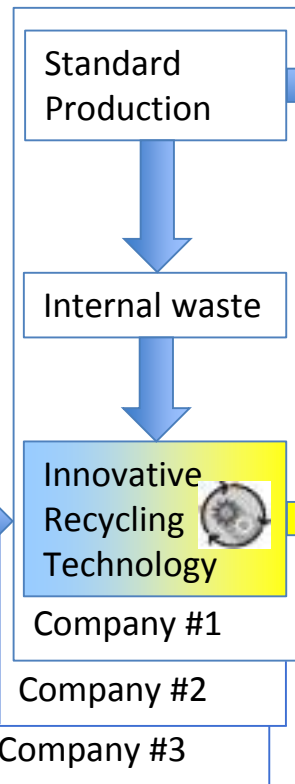
because a recycling chain doesn't exist for thermoset composites

Waste / EoL

- creative products
- construction: RIVIERASCA
- wind: SIEMENS Gamesa RENEWABLE ENERGY
- furniture: NOVELLINI
- aerospace: AERINOVA
- sport: HEAD

www.fibereuse.eu

let's start with a lot of small recycling plants



laws and regulation needed



*Thank you for your
attention*

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