DIENES

Your Experts in Fiber Processing

Retail

Textile Manufacturing

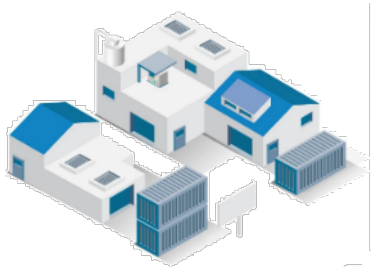
Users

Repair

Re-use as a product

Re-use as material

Recycling



Collection Sorting

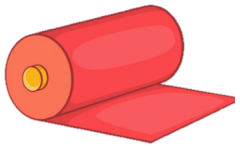
Industrial Processing

Chemical Recycling

Fibre Manufacturing

Mechanical Recycling

Yarn Spinning

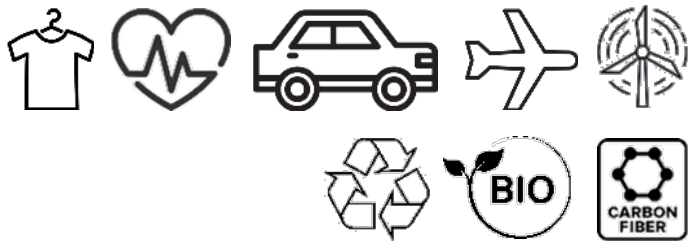


Fabric Manufacturing

Source: Ellen MacArthur Foundation / VTT Technical Research Centre of Finland Ltd

- German Company founded over 90 years ago with a long tradition in developing innovative electrical components and godets
- Located in Mühlheim am Main, Germany, approx. 20 min. from Frankfurt International Airport
- International renown footprint as partner for textile research
- Successful turnaround as an engineering company offering turn-key lines for fiber yarns processing – from lab scale to small production volumes
- Over 40 engineers and technicians
- Workshop and warehouse size: approx. 2.000 m^2

- Modular design of spinning and processing solutions of lab-, pilot- and small industrial scale for innovative textile and technical yarns such as
  - Special fibers including bi- and multi-component fibers
  - Medical fibers and membranes (hollow fibers)
  - Precursor, carbon and ceramic fibers
  - Other high-performance textile and technical yarns

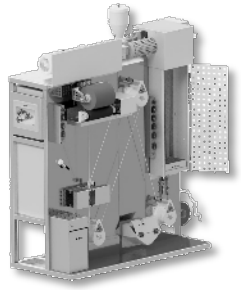


- MultiMode® System: Proprietary control system and modular design approach
- Engineering expertise in hard- and software design that allow customized solutions
- Workshop for assembly & FAT

- Development of spinning and processing solutions for **bio-based and/or recycled polymer feedstocks**
- Innovative textile and technical yarns demanding reliable **spinning and processing solutions**
- Scaling-up ideas and concepts from **lab** through **pilot plant** up to **semi-industrial and industrial scale**

LLC Lab-scale ▪ LLC

LLC WET | WET+ | WET-PISTON+



LLC MELT

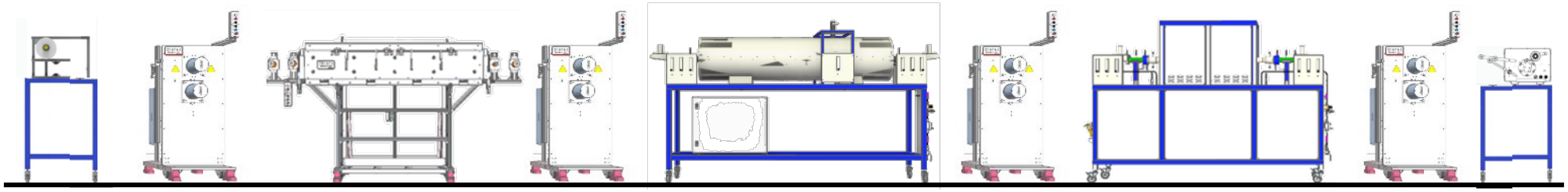
- Proof-of-concept in modular design
- Compact and versatile
- Various equipment options

Pilot-scale ▪ MultiMode® MM

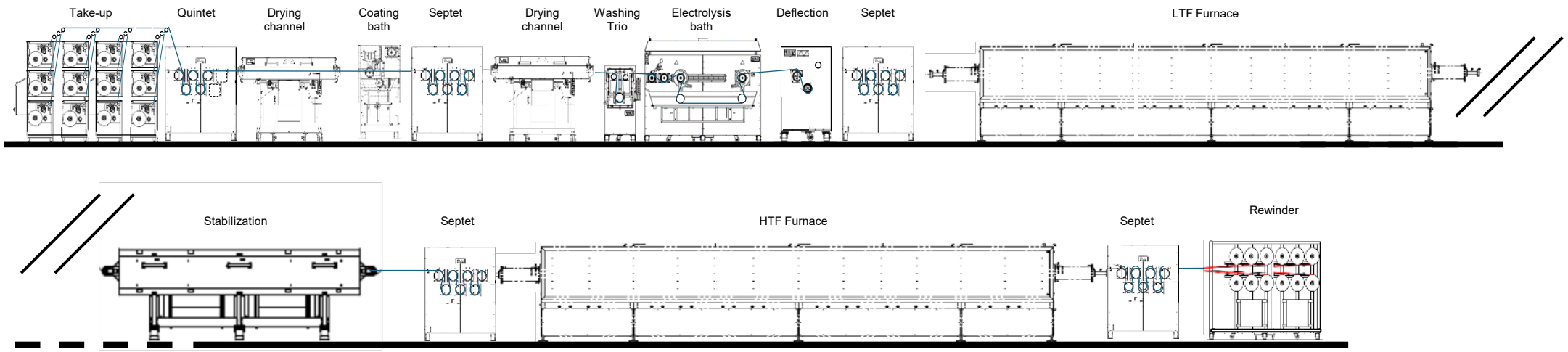
- Modular architecture for highest flexibility
- Plug & Play rearrangement and line extension
- Contemporary operation via HMI

Modular Solutions with MultiMode® topology

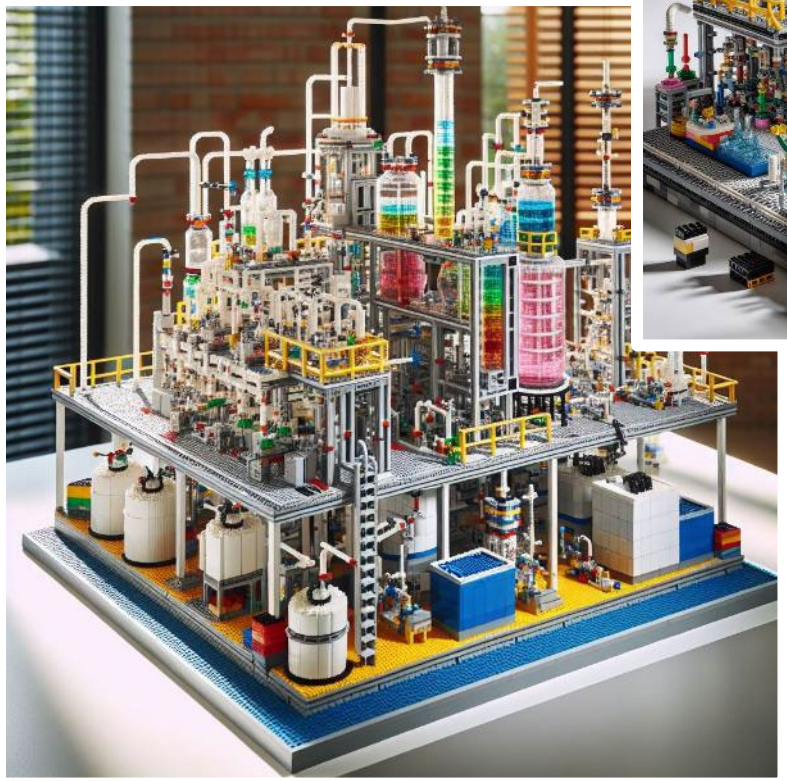
Pilot-scale ▪ Carbon Fiber Solution I



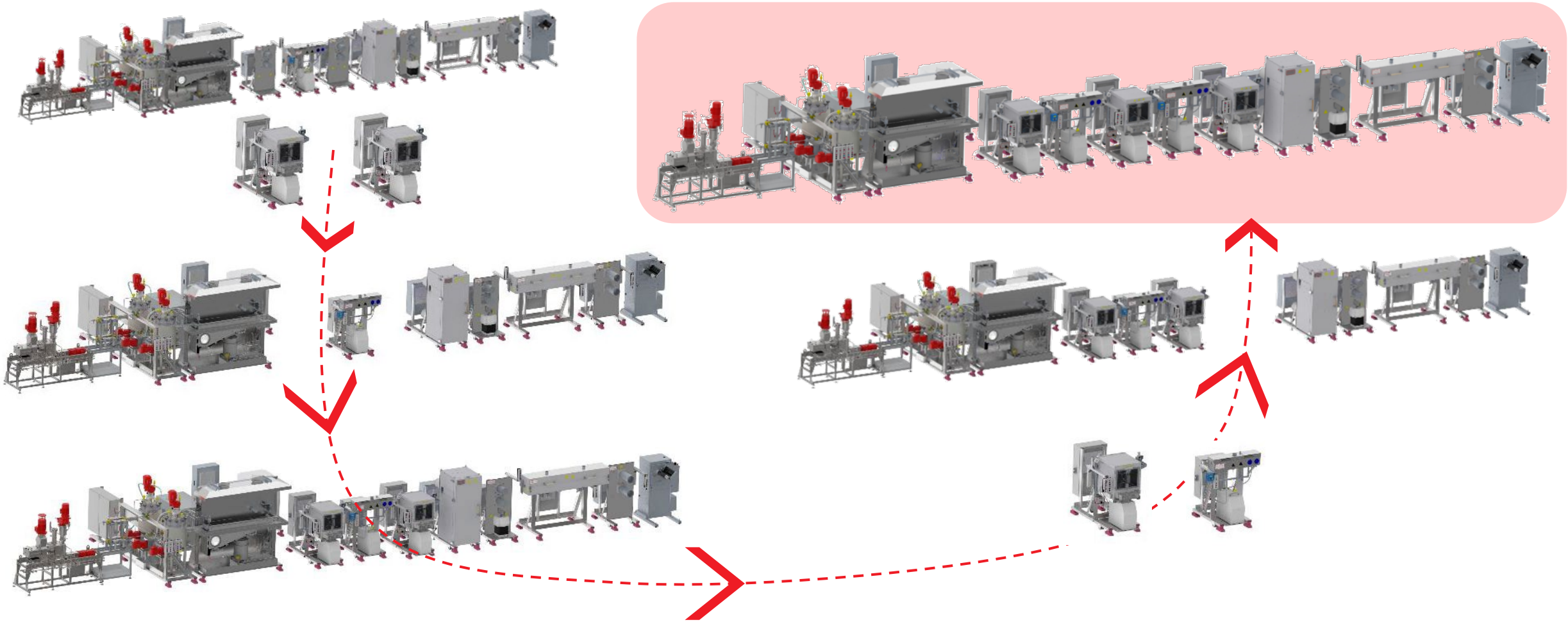
Pilot-scale ▪ Carbon Fiber Solution II



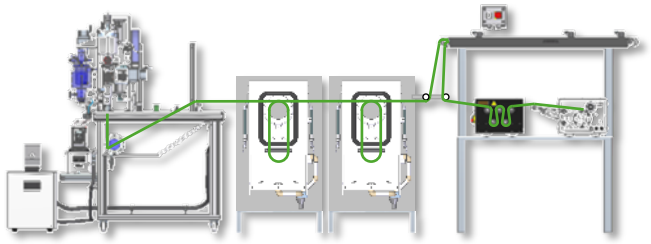
Modular platform approach | We call it brick building



Increase of module quantity for higher washing performance



	1st Phase Validation of Principle **Syringe | Bassin**	2nd Phase Validation of Process Lab-scale **LLC**	3rd Phase Validation of Product Pilot Scale **MultiMode®**	4th Phase Modular Production **MM_{FAB}**
Threads	1	1	1	4 – 16
Filaments (Thread)	1	1 – 100	500 – 3,000	3,000 – 12,000
Speed of line	N/A	1 –50 m/min	20 – 150 m/min	20 – 200 m/min
Throughput	1 – 10 g batch production	100 – 200 g batch production	120 g/h – 5 kg/h continuous production	20 – 3,000 ton/a continuous production
Machine footptrint	Lab table	approx. 10 -12 m^2 6m x 2m	approx. 20 – 40 m^2	approx. 50 – 250 m^2



Flexibility
Customized spinning processes for biobased and recycled materials, ensuring optimal performance.

Customization
Crucial for biobased materials with varying properties based on source and processing methods.

Scalability
Efficiently scales production by adding or replicating modules, important for handling recycled materials.

Rapid Innovation
Accelerates innovation by allowing independent development and testing of modules.

Cost-Effectiveness
Reduces R&D costs by focusing on specific modules, lowering barriers for smaller companies.

Sustainability
Promotes sustainability with energy-efficient modules and supports a circular economy by allowing upgrades, replacements, or recycling of modules

References of installed lines (extract)

Portfolio

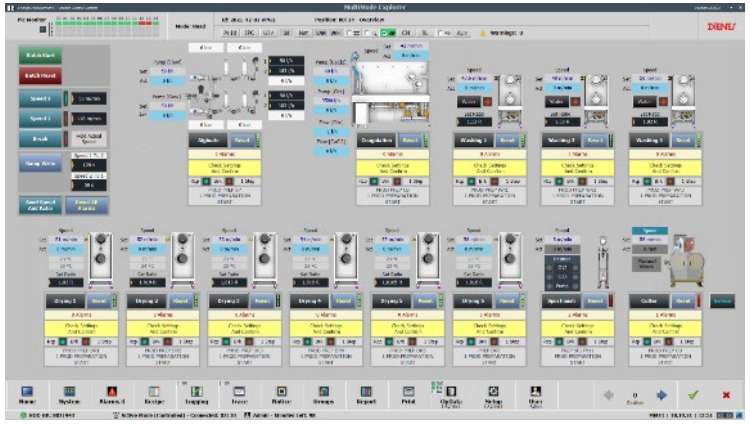
Wet Spinning Lines

Carbonisation Lines

Godets & Heated Components

Melt Spinning Lines

Nanofiber Lines



MultiMode® Control Systems

Thank you for your attention

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