

- ❑ **Catalogue of Up-graded performances for Pilot Lines (PLs) for nanoscale structures (nanomaterials) in unprocessed form with intrinsic functionalities:**
 - **PL1.** *FUNCTIONALIZED NP.* SiO₂ NANO REINFORCED AEROGELS. FUNCTIONALISED NANOPARTICLES (UCLM).
 - **PL2.** *NANOWET.* WET CHEMICAL NANOPARTICLES AND NANOMATERIAL SYNTHESIS (CEA).
 - **PL3.** *NANOCOMPOSITES.* MAGNETIC AND FLAME-RETARDANT NANOPARTICLES AND NANOCOMPOSITES (FhG).

- ❑ **Catalogue of Up-graded performances of Pilot Lines (PLs) for nano-intermediate products:**
 - **PL4.** *BUCKYPAPER.* SELF-SUPPORTING CONTINUOUS SHEETS OF ENTANGLED MWCNTS “BUCKYPAPERS” (TECNALIA).
 - **PL5.** *CNT DOPED VEILS.* LIGHTWEIGHT AND THERMOPLASTIC NONWOVENS DOPED WITH CNTs (TMBK).
 - **PL6.** *R2R.* CNT TREATED PREPREGS (ADAMANT).
 - **PL7.** *PICTIC.* SHEET TO SHEEP PRINTED DEVICES (CEA).
 - **PL8.** *SIMPNANO.* NANOREINFORCED METALLIC ALLOY INGOTS (TECNALIA).

- ❑ **Catalogue of Up-graded performances for Pilot Lines (PLs) for nano-enabled products:**
 - **PL9.** *METcast.* NANO-ENABLED LIGHTWEIGHT INJECTED CAST PARTS. FUNCTIONALITIES: MECHANICAL AND WEAR RESISTANCE PROPERTIES (TECNALIA).
 - **PL10.** *RTM.* NANO-ENABLED FUNCTIONAL POLYMER BASED COMPOSITES PARTS (IPC).
 - **PL11.** *HCIM.* NANO-ENABLED FUNCTIONAL HYBRID AI/COMPOSITE/PLASTIC PARTS PRODUCTS (IPC).
 - **PL12.** *NanoPUL.* NANO-ENABLED AI/COMPOSITES HYBRID PRODUCTS (FhG).

TECHNOLOGICAL OFFER

The Pilot Line can be used to:

- Develop innovative materials
- Optimize synthesis conditions.
- Obtain experimental data that allow to model and simulate the process at industrial scale.

COMPETITIVE PRODUCTS

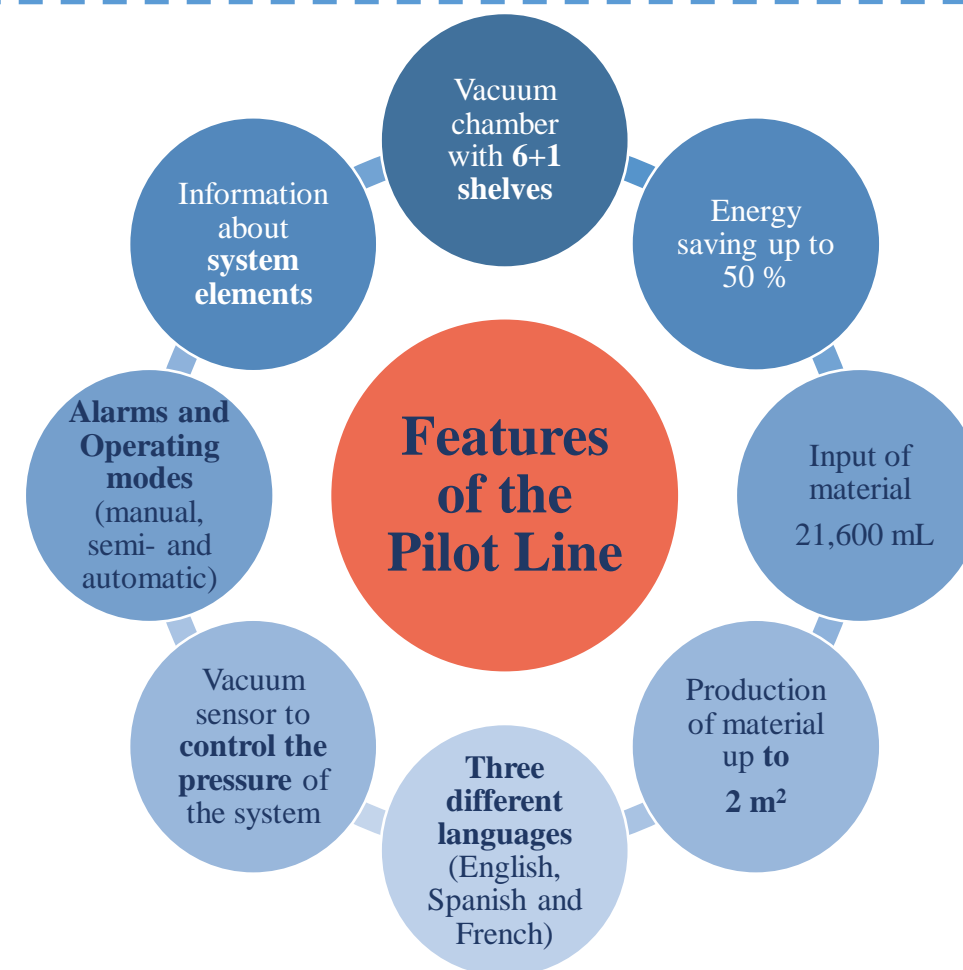
- Ultralight materials.
- High thermal insulation.
- High porosity.
- Optimization of the thickness upon request.



APPLICATIONS



Open access single entry point for scale-up of innovative Smart lightweight composite materials and components
This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 814581



UPGRADED TECHNOLOGY

- Lyologger software for data supervision, control and data acquisition: to know the status of the entire freeze-drying process along the runs.
- Pirani and MKS Baratron type 626 devices: to detect the end of the primary drying process.
- Energy consumption measurements for a more environmental process.



TECHNOLOGICAL OFFER

The Pilot Line can be used to:

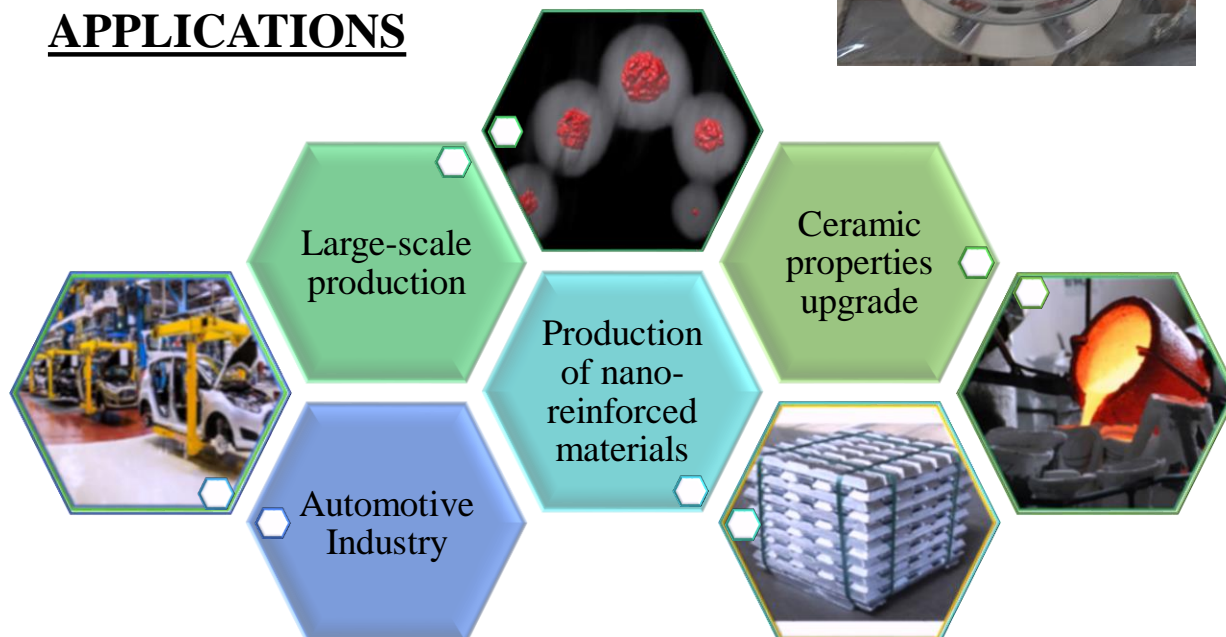
- Perform large-scale synthetic chemistry.
- Control the key synthesis parameters “in line”.
- Develop advanced nanoparticles and nanomaterials.
- Ensure high-quality production of nanomaterials in compliance with the applicable regulations.

COMPETITIVE PRODUCTS

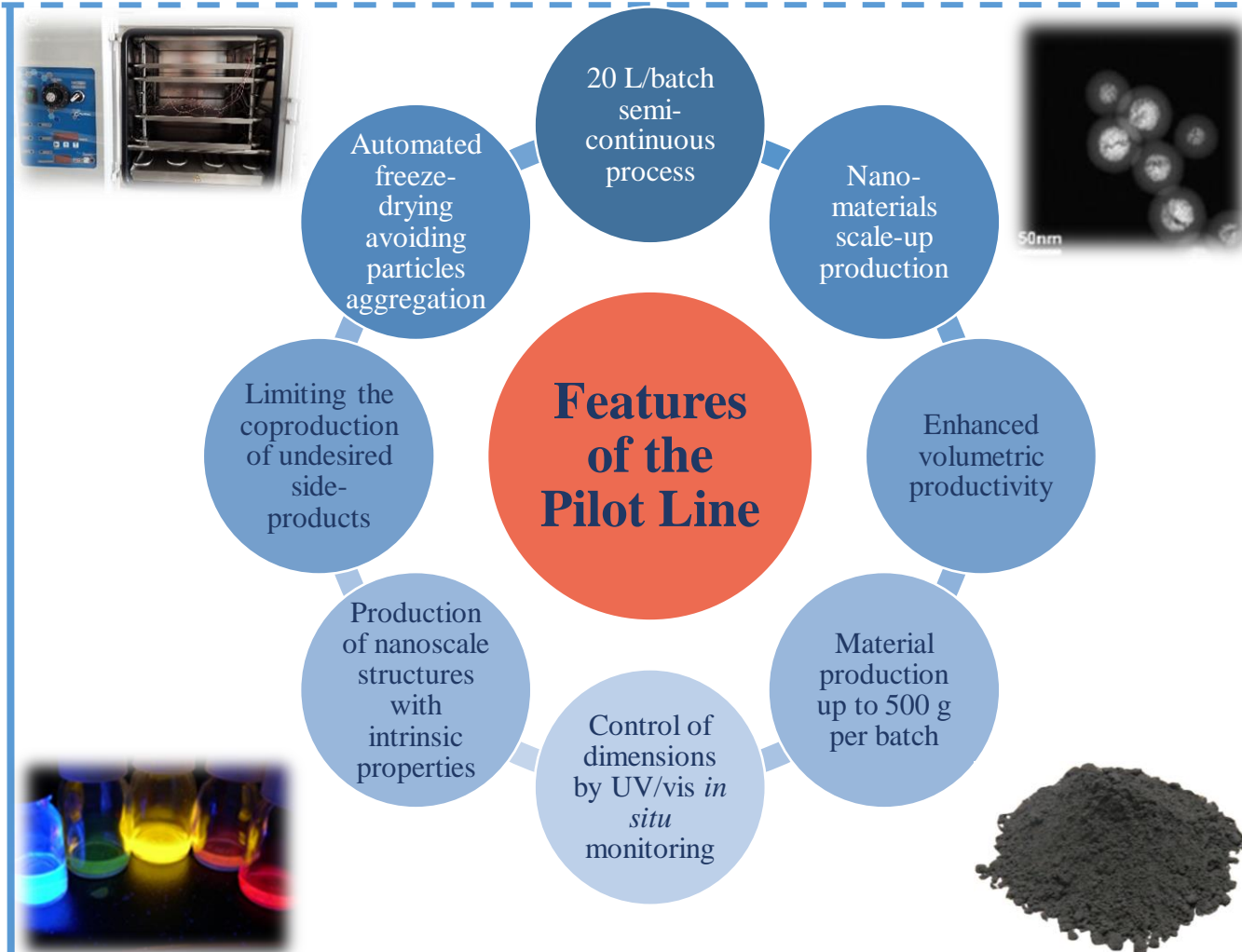
- Nanoparticles large-scale production.
- Coating/Encapsulation improving matrix incorporation.
- Properties enhancement.
- Synthesis repeatability.



APPLICATIONS



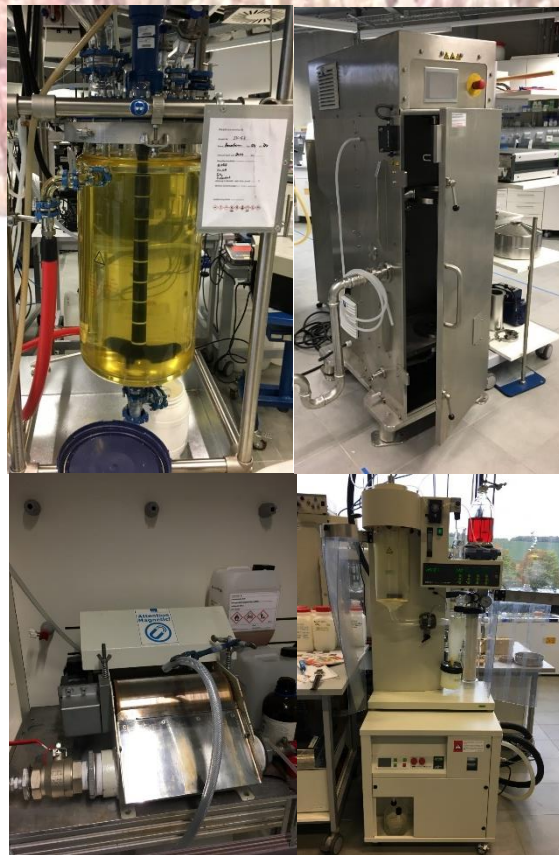
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UPGRADED TECHNOLOGY

- *Large connected reactors*: two 20 L connected reactors with injection by dosing pump (pump flow max. 85 L/h) with 10 L and 5 L side reactors.
- *In-situ monitoring*: accurate UV-vis spectrophotometer Agilent Cary 60 UV-Vis with fibre optic probe (working at 190-1100 nm) with fast data collection.
- *Nanopowder drying*: automated freeze dryer with process control interface from Cryotec for non-aggregation of nanoparticles.





TECHNOLOGICAL OFFER

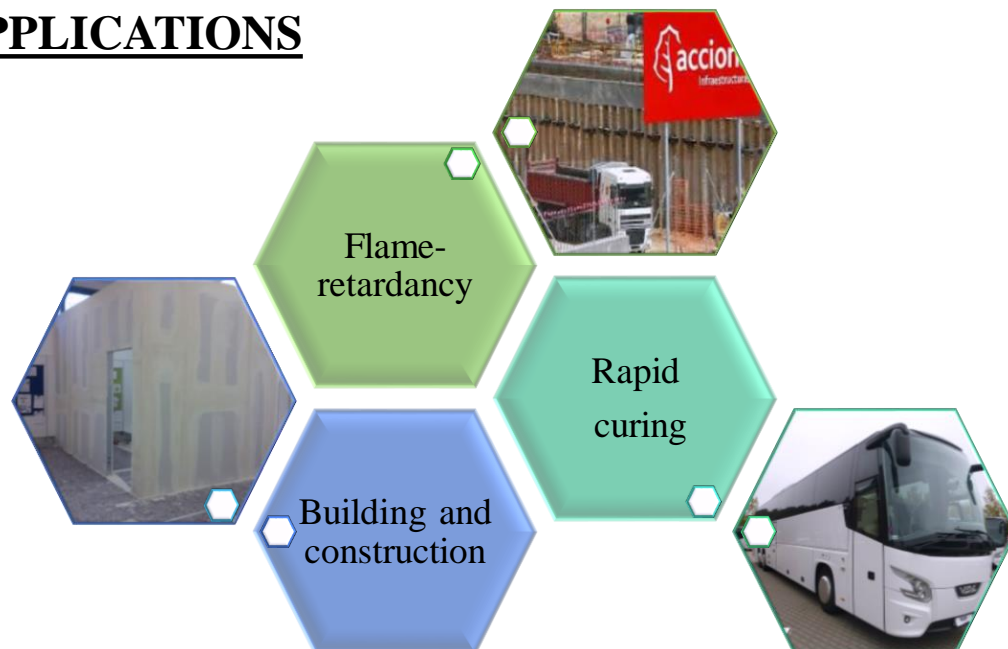
The Pilot Line can be used to:

- For wet chemical synthesis of nano- and micro-particles.
- Upscaling of wet chemical synthesis.
- Separation of magnetic and non magnetic nanoparticles.

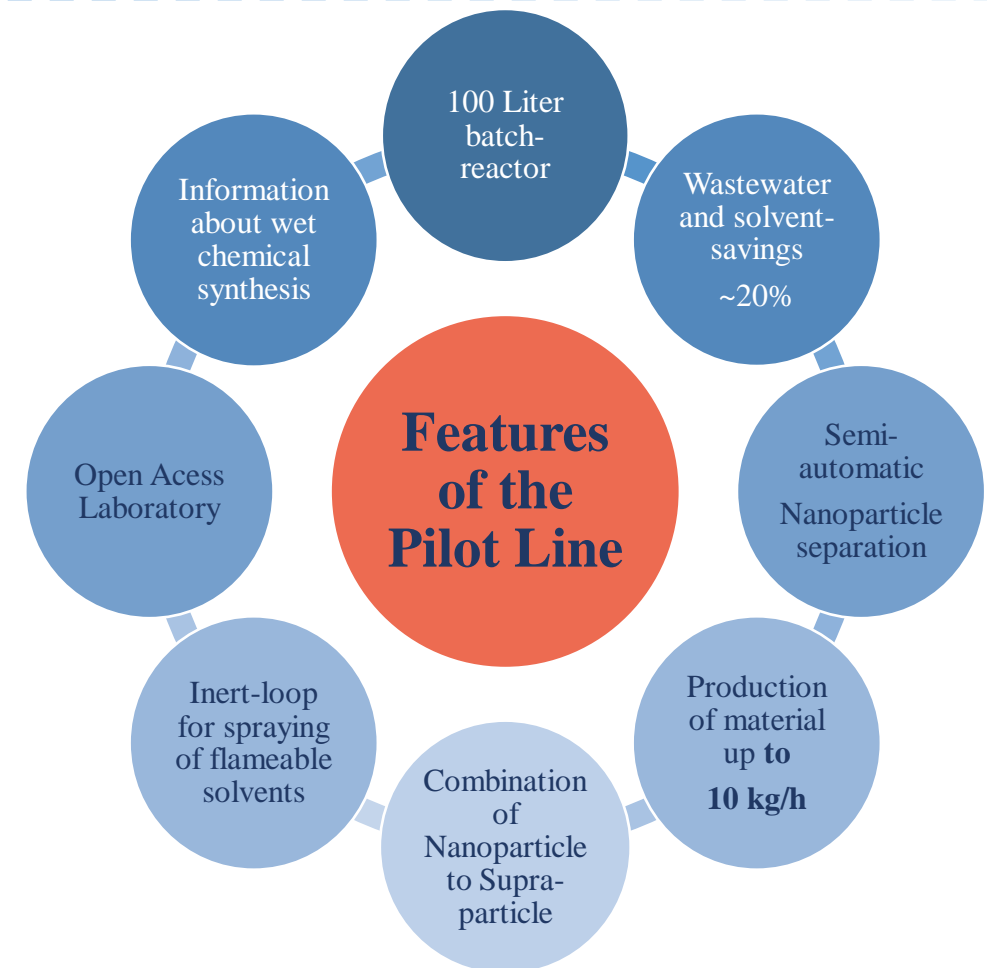
COMPETITIVE PRODUCTS

- Inductive heatable additives.
- Flame retardant additives.
- Combined additives through supra-particle design.

APPLICATIONS

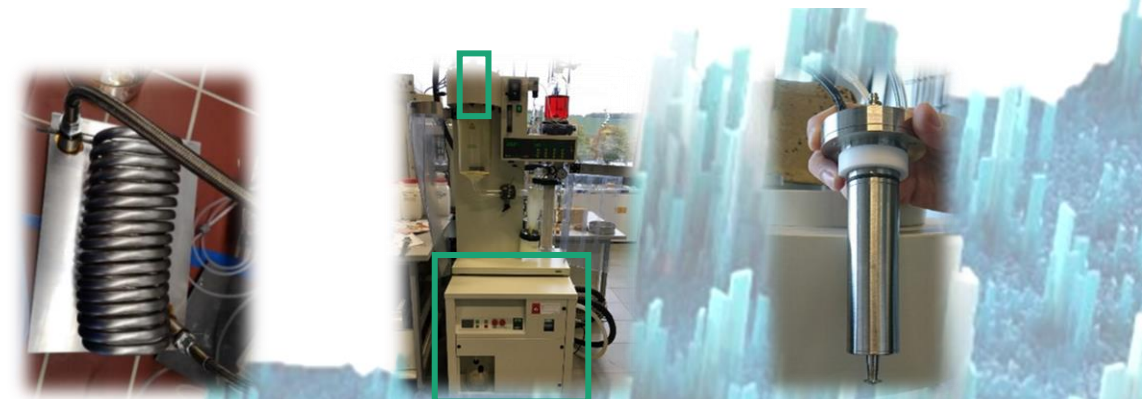


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UPGRADED TECHNOLOGY

- Inert-loop for spray drying of flame able solvents.
- Ultrasound nozzle for spraying micrometer particles.
- Continuous heating equipment for magnetic particles synthesis.



TECHNOLOGICAL OFFER

- Manufacture of continuous CNT sheets using a dynamic vacuum filtration process.
- Properties tailored to industrial application requirements.
- Scalable production.



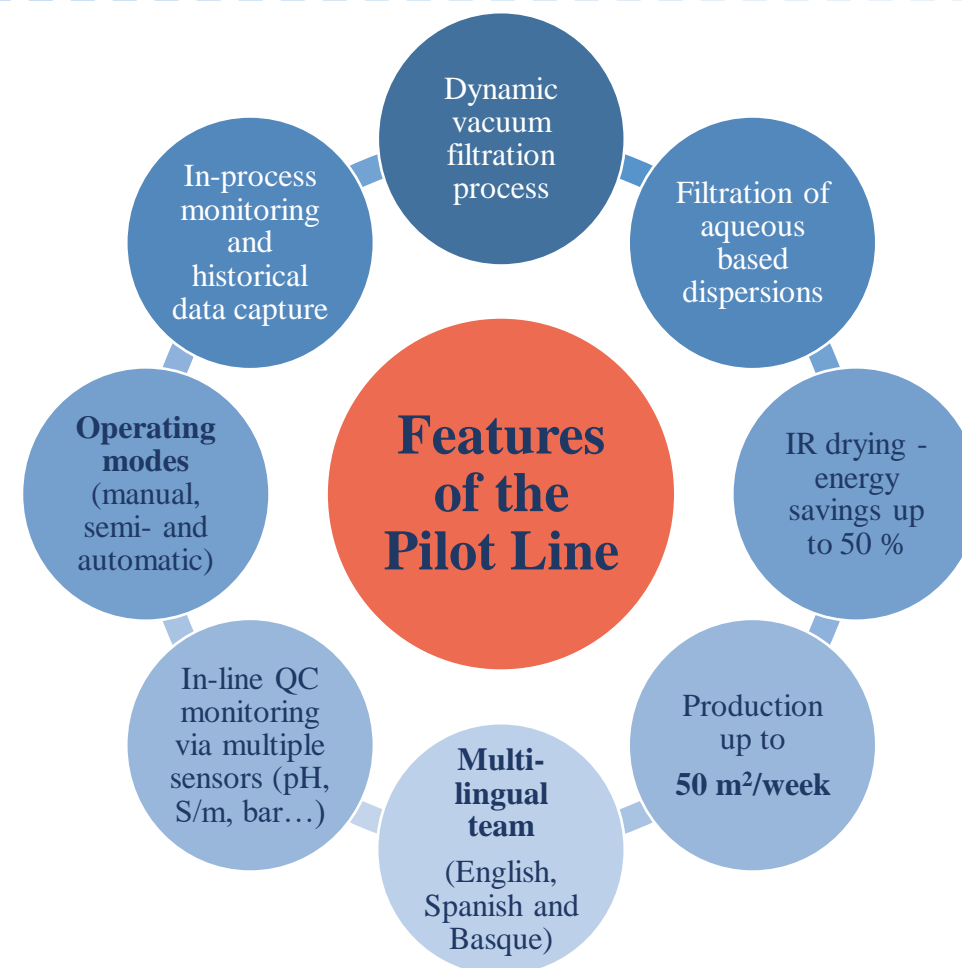
COMPETITIVE PRODUCTS

- High electrical conductivity.
- Large specific surface areas.
- Low density.
- High flexibility.
- Material compatibility (metals, polymers and redox).

APPLICATIONS

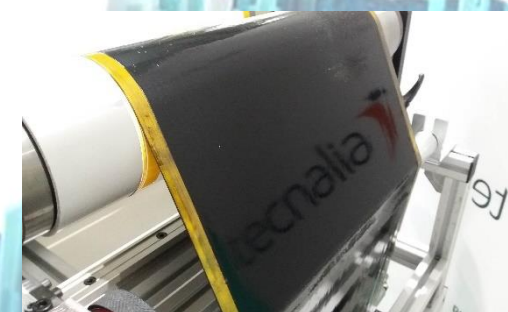
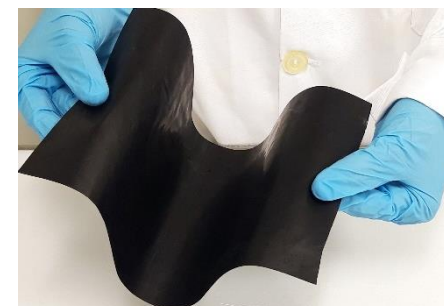


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UPGRADED TECHNOLOGY

- Beckhoff software for process control, data acquisition and supervision
- New washing module (contaminants removal and BP property enhancement)
- Increased production capacity - supportive transport belt for filter membrane
- Filter vacuums up to -1 bar.
- Online QC sensors (pH, electrical conductivity, vacuum level).



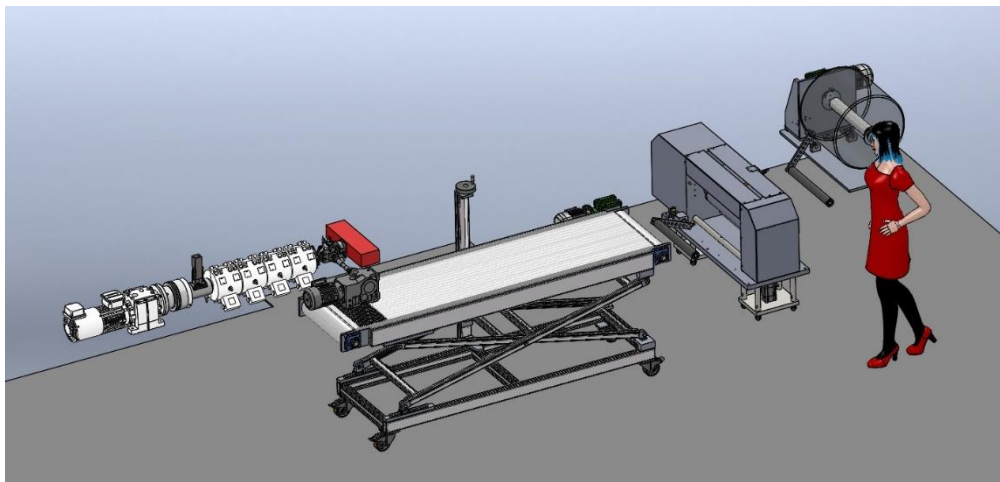
TECHNOLOGICAL OFFER

The Pilot Line can be used to:

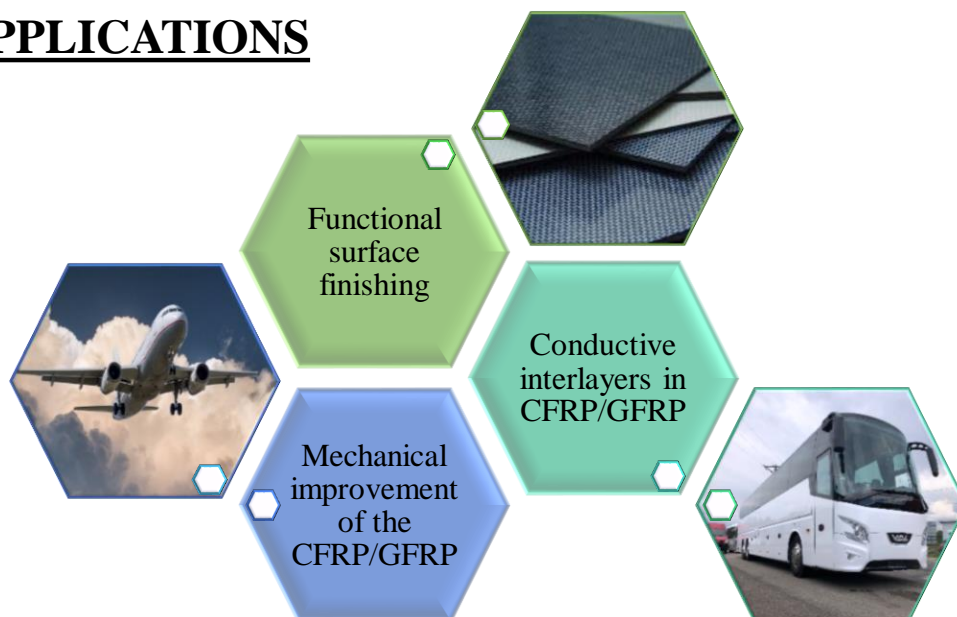
- Development of innovative and functional meltblown veils.
- Various possibilities for the optimization.
- Production trials with „difficult to process” polymers/nanocomposites.

COMPETITIVE PRODUCTS

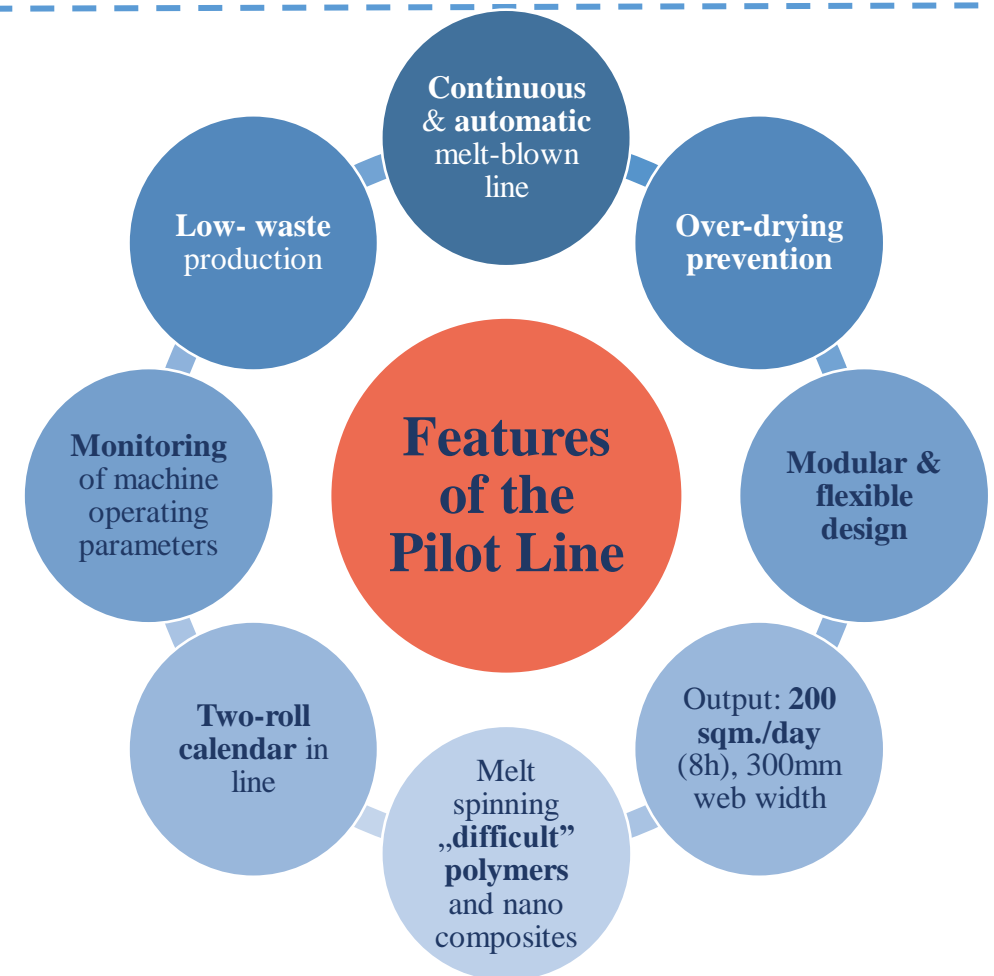
- Advanced nonwovens.
- Light-weight structures.
- Reduced electrical resistivity.
- Compatibility with end user resins
- Wide range of areal weight.
- Easy & safe way to implement nanofillers to final product.



APPLICATIONS

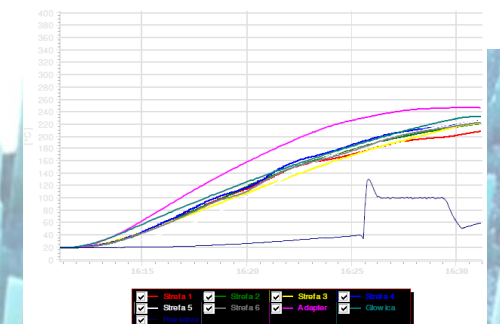


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UPGRADED TECHNOLOGY

- High output consistency – improved proces stability.
- Reduced moisture absorption.
- Limited polymer degradation, upgraded die geometry.
- Continuous production with significantly less waste and a reduction in manual handling of the nonwoven fabric.
- On-line quality control system.



TECHNOLOGICAL OFFER

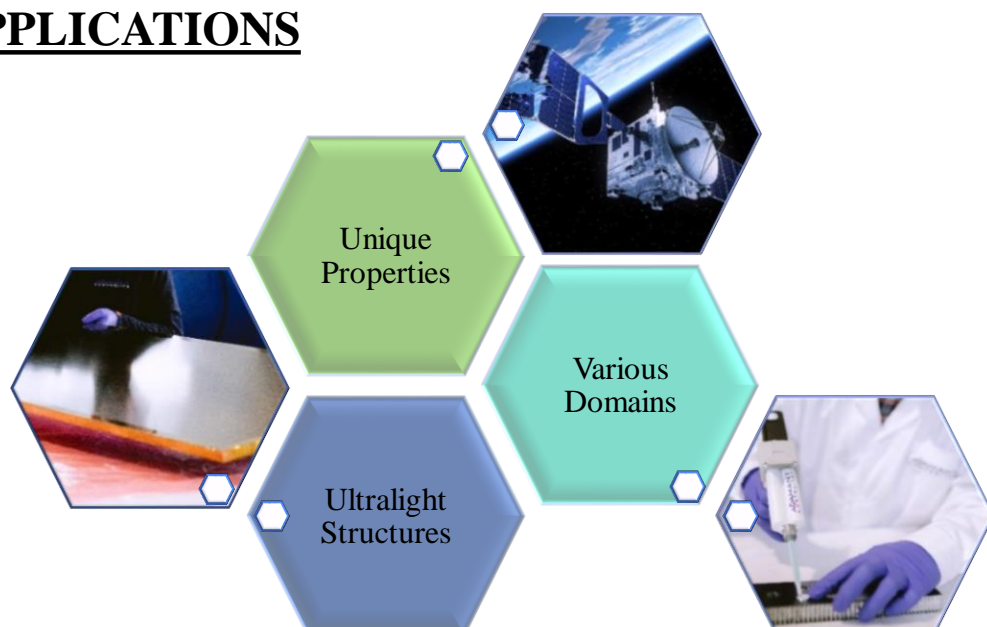
FXply™ Prepreg Technology enables conventional prepregs to deliver additional functionalities such as:

- Toughness
- Electrical Conductivity
- Thermal Conductivity

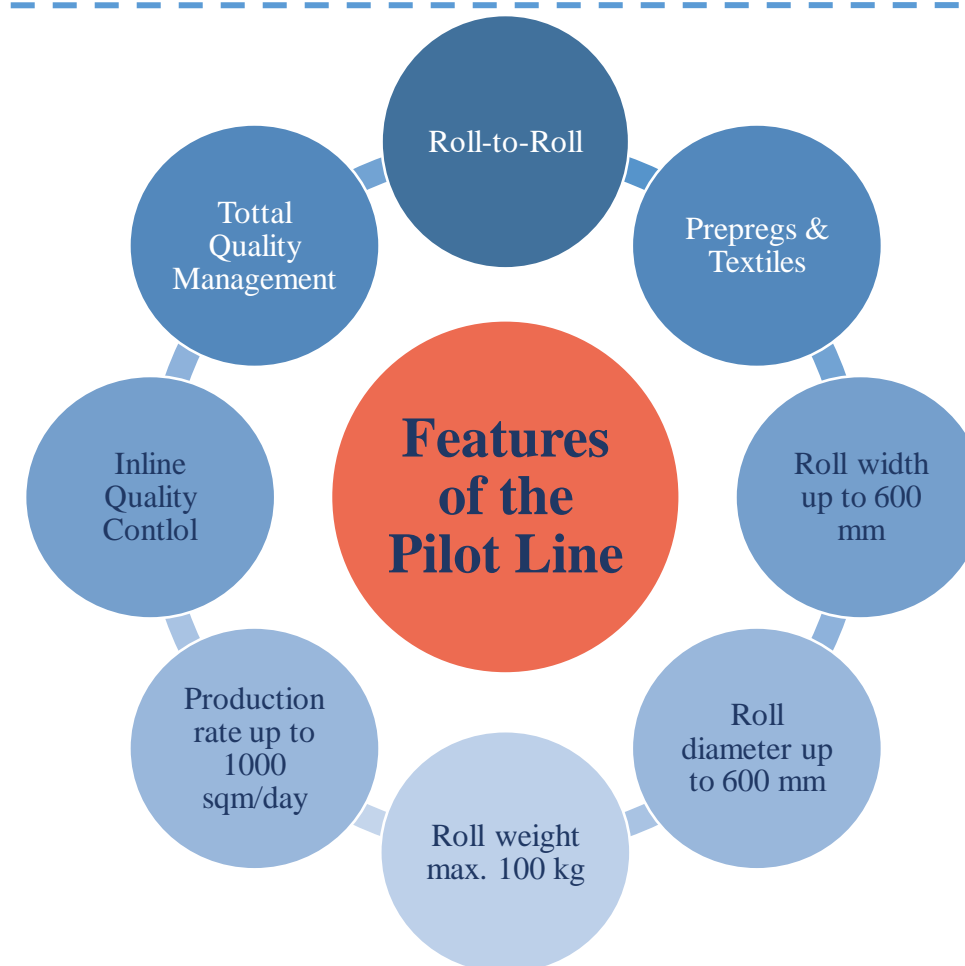
COMPETITIVE PRODUCTS

- Ultralight materials.
- Composite materials with enhanced properties.
- Tailored composite products.

APPLICATIONS

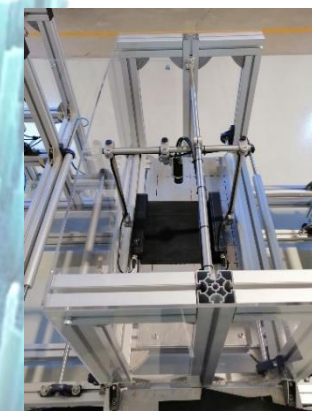
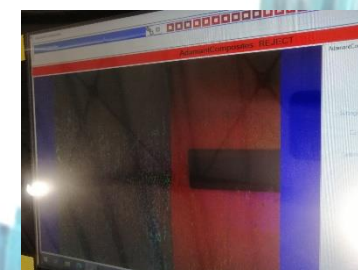


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UPGRADED PILOT LINE

- Full automated and traceable production with increased robustness & quality while having decreased operational costs.
- Improved Quality Control via Camera Visual Inspection (Machine Vision).
- Fully controlled manufacturing process through dedicated production space with industrial levels of cleanliness, where the conditions are monitored constantly.
- Improved H&S in terms of H&S instrumentation & Scatterer enhancements.





TECHNOLOGICAL OFFER

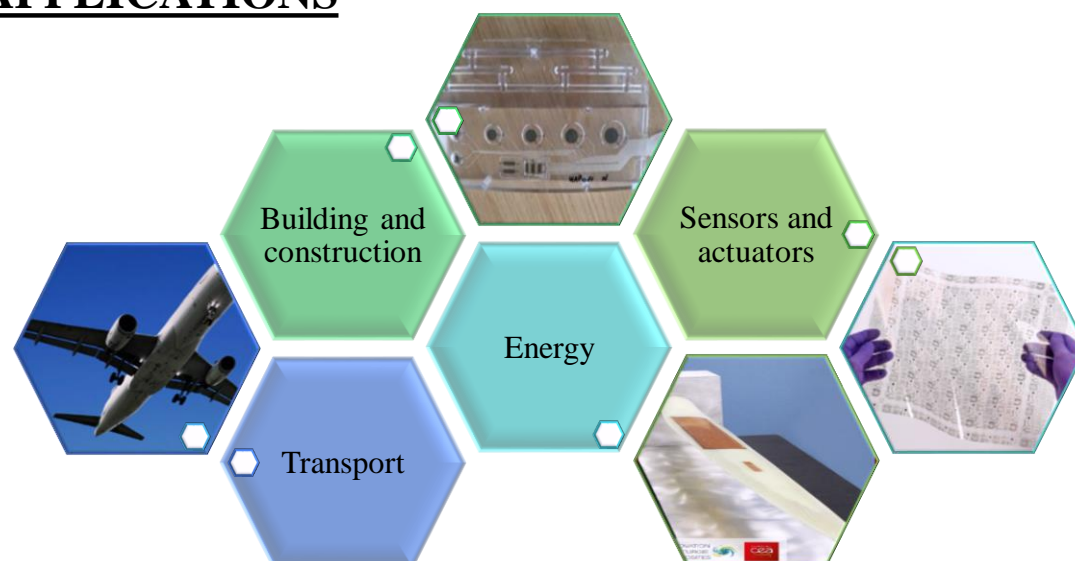
The Pilot Line can be used to:

- Develop innovative sensors.
- Optimize semi conductive organic devices.
- Integrate printed electronics in devices.

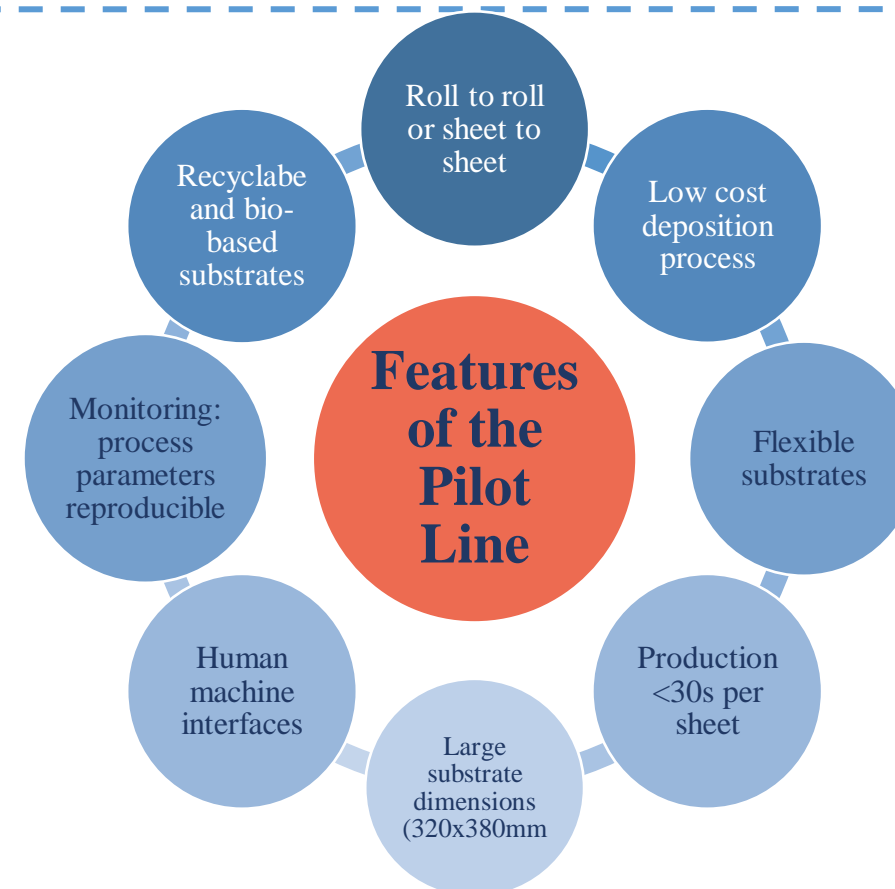
COMPETITIVE PRODUCTS

- Structural electronics.
- Electroactive sensors and actuators.
- Flexible Hybrid electronics.
- Integrated sensors in components.

APPLICATIONS



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UPGRADED TECHNOLOGY

- Human-machine interface : control unit with recipes. Process parameter and reproducibility.
- Very precise control of foils **temperature** with infrared camera temperature mapping for each foil: Possibility to **localize** heating on foils (as example to avoid heating components).
- **High pressure forming** to Ensure a good conformability with mould (CAO).
- **High production rate of forming** (<30s cycle with 250µm thick PC foil).



TECHNOLOGICAL OFFER



The Pilot Line can be used to:

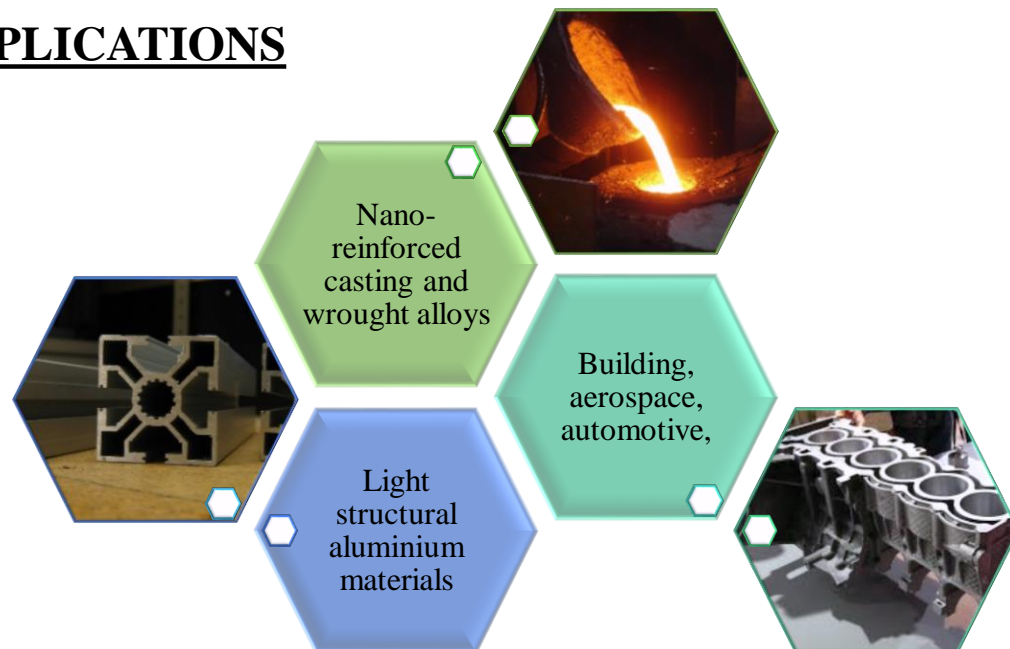
- Develop innovative materials.
- Optimize dispersion of nanoreinforcements.
- Production of large batches in a controlled and repeatable conditions.

COMPETITIVE PRODUCTS



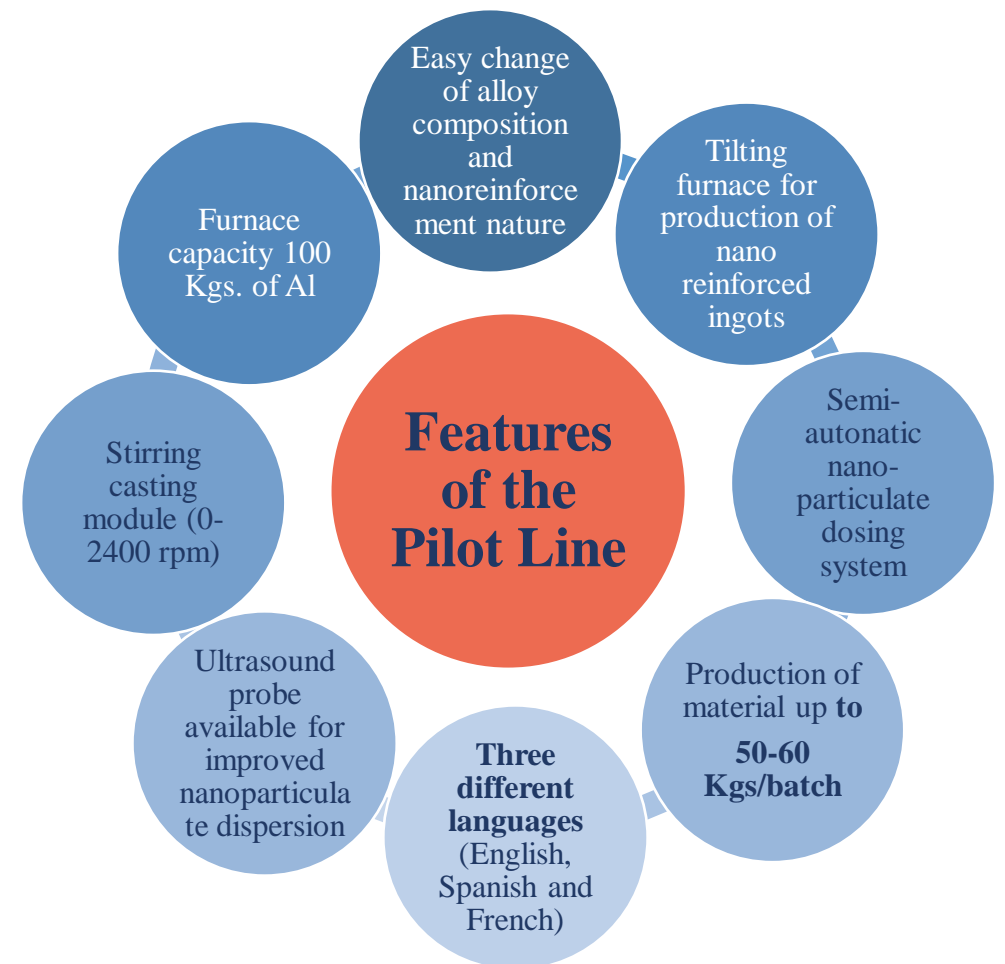
- Light metallic materials.
- Good performance/cost ratio.
- Capability of production of a large range of aluminium alloys and nanoreinforcements.

APPLICATIONS



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Features of the Pilot Line



UPGRADED TECHNOLOGY

- Semiautomatic nanoparticulate drying and dosing system.
- Mechanical stirring and ultrasonic modules to increase dispersion of nanoparticulates.
- Safe handling of nanopowders and melt aluminium.





TECHNOLOGICAL OFFER

The Pilot Line can be used to:

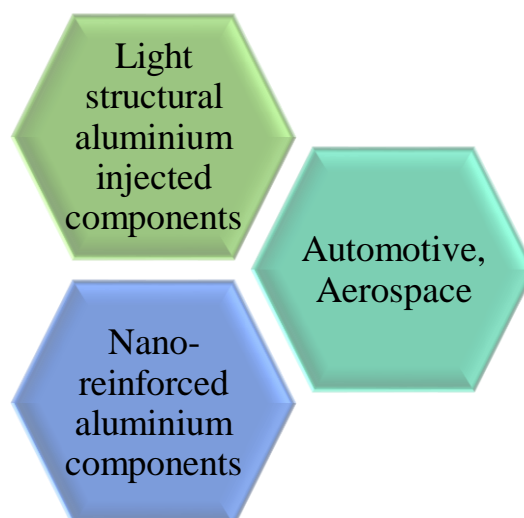
- Inject nanoreinforced aluminium alloys.
- Optimize dispersion of nanoreinforcements.
- Production of large batches of injected components.



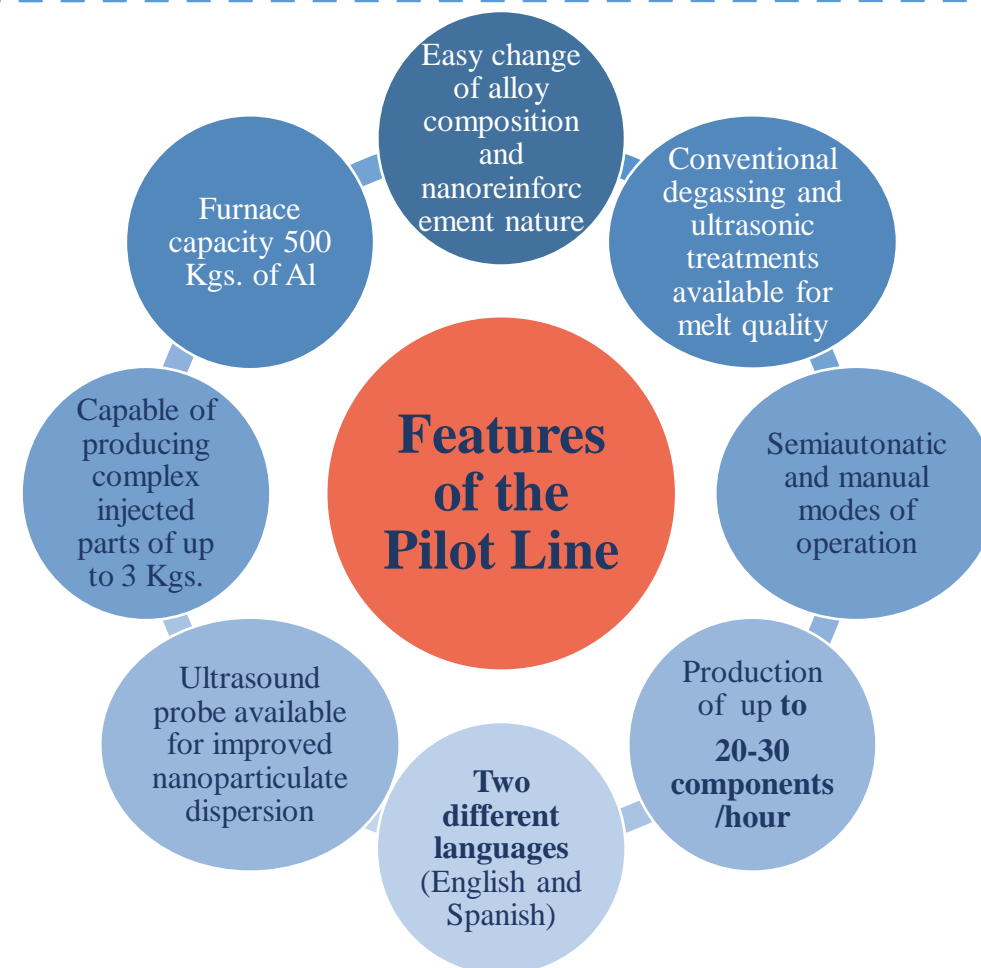
COMPETITIVE PRODUCTS

- Light metallic high performance complex components.
- Good performance/cost ratio.
- Capability of injecting a large range of aluminium alloys and nanoreinforcements

APPLICATIONS



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UPGRADED TECHNOLOGY

- Semiautomatic nanoparticulate reinforced Al alloy injection process.
- Ultrasonic modules to increase dispersion of nanoparticulates.
- Safe handling of nanoparticulate containing melt aluminium.
- Process parameters and chemical composition data integrated in control unit.



TECHNOLOGICAL OFFER

The Pilot Line can be used to:

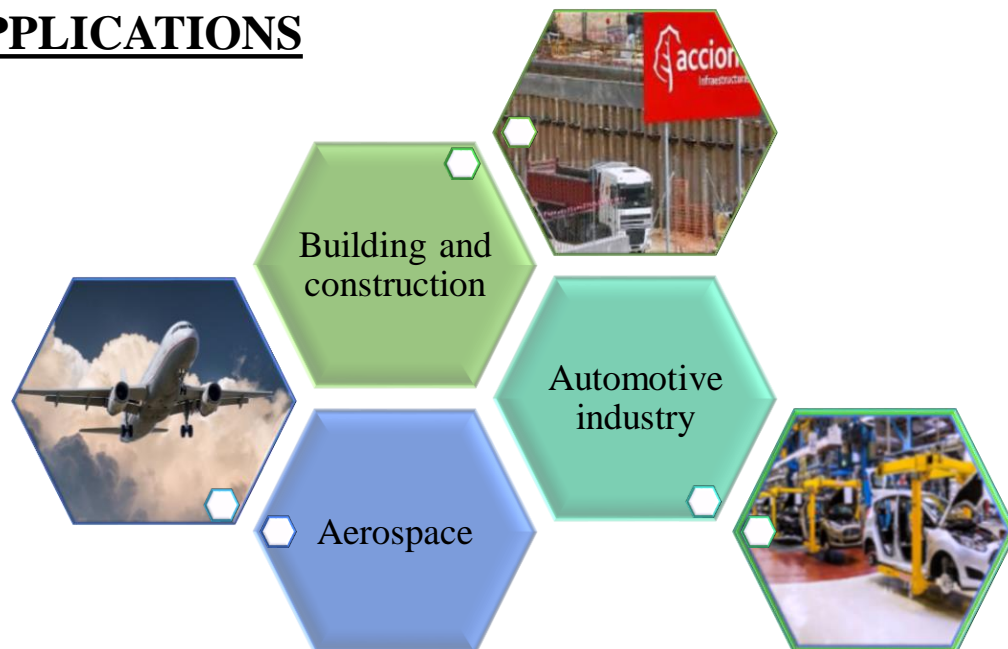
- Develop smart composite parts.
- Perform in-line control of the process parameters, including viscosity.
- Perform in-mold control of the curing stage and pressure.



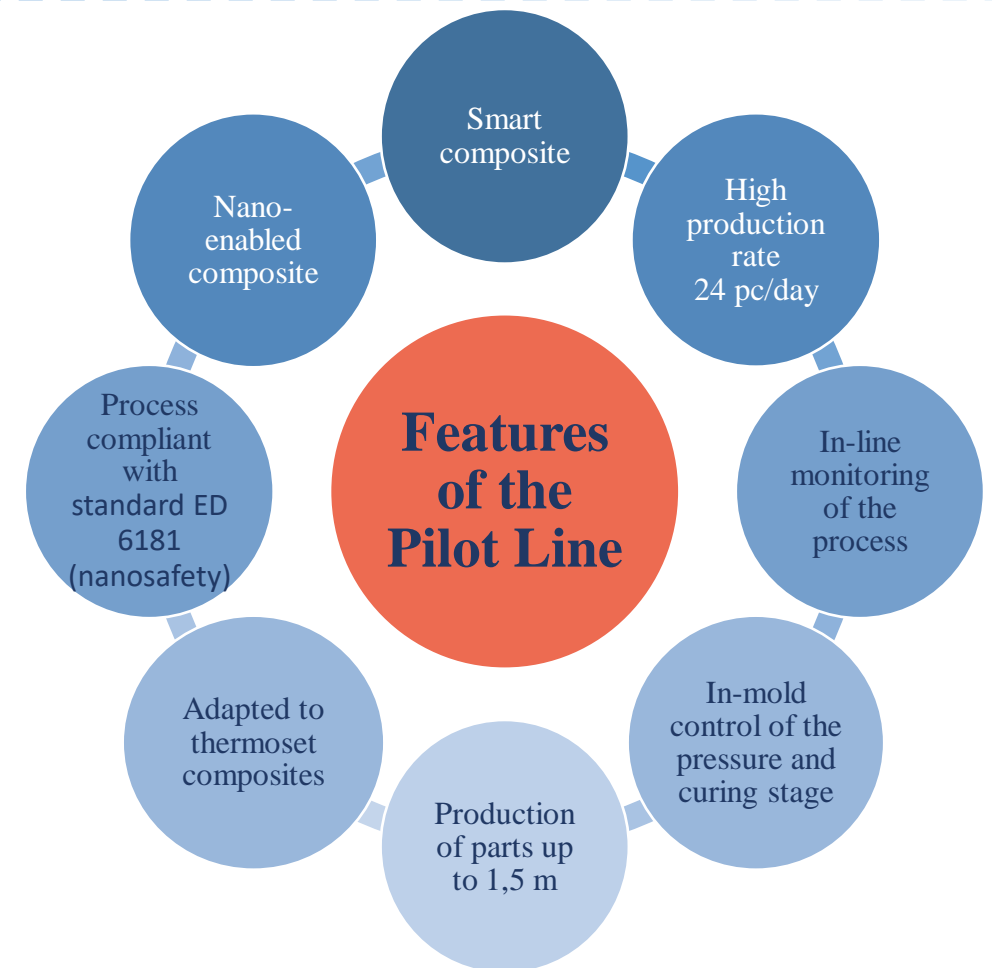
COMPETITIVE PRODUCTS

- Large smart composite parts.
- Functionalised materials.
- xxx.
- High production rate

APPLICATIONS



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UPGRADED TECHNOLOGY

Implementation of the monitoring at different stages of the process to guarantee homogeneity of nano-filled compositions including:

- In-line monitoring of the curing stage of the thermosetting resin.
- In-mould pressure has been successfully monitored.



TECHNOLOGICAL OFFER

The Pilot Line can be used to:

- Develop smart composite parts.
- Perform in-line control of 100 % product.
- Apply non-destructive testing technologies.

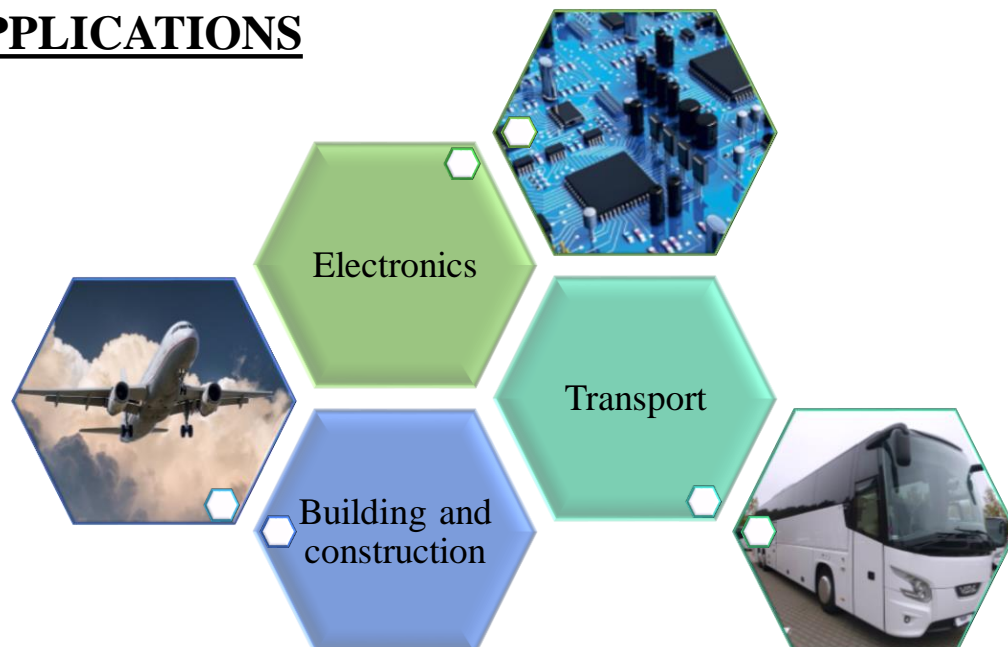


COMPETITIVE PRODUCTS

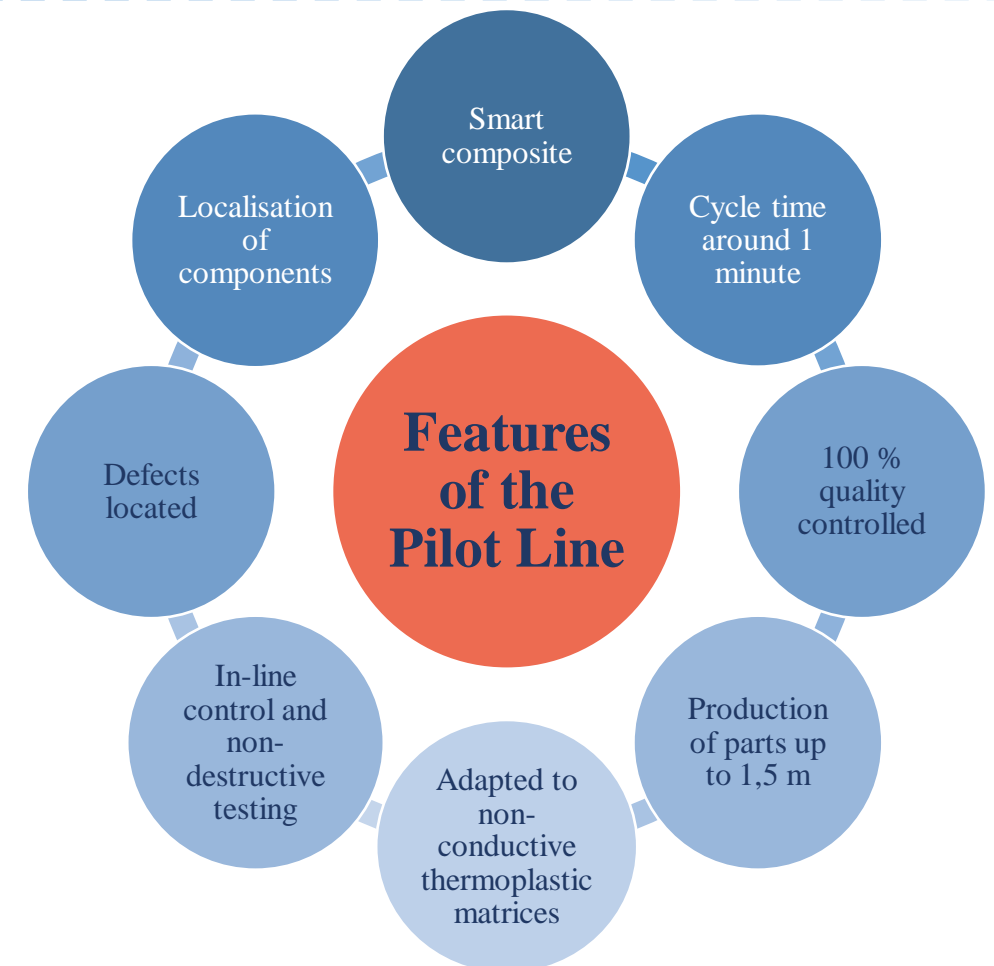
- Large smart composite parts.
- Functionalised materials.
- 100 % quality controlled.
- Short cycle time.



APPLICATIONS



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UPGRADED TECHNOLOGY

- Implementation of thermography equipment enabling pulse and lock-in thermography in cycle time.
- In-line control with terahertz technology.



TECHNOLOGICAL OFFER

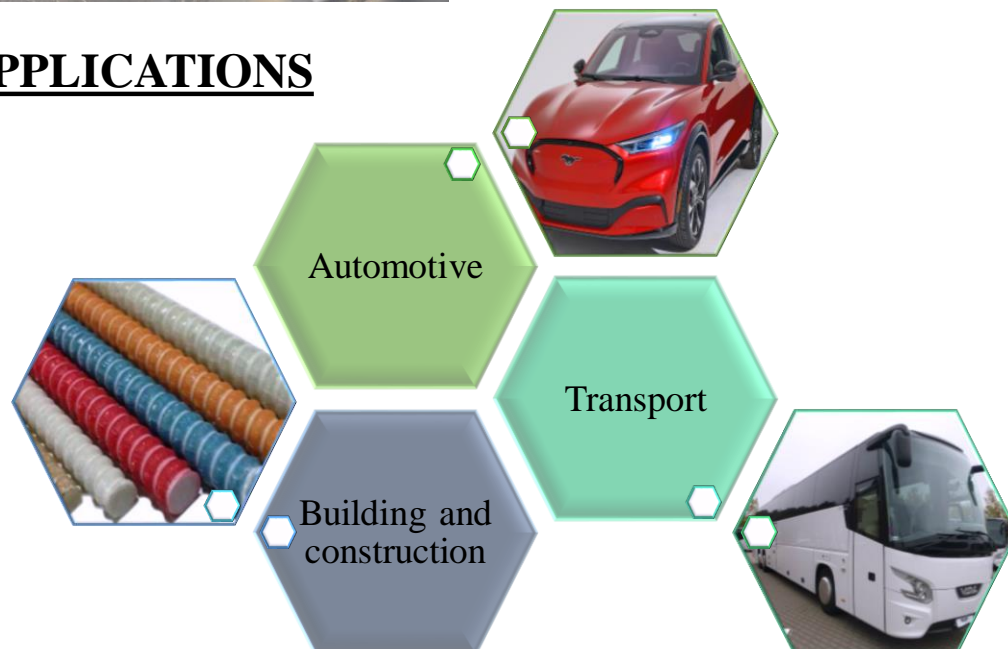
The Pilot Line can be used to:

- Pultrusion of nano-enabled resins.
- Different profiles, resin systems and reinforcement materials.
- Evaluate and monitor process parameters.

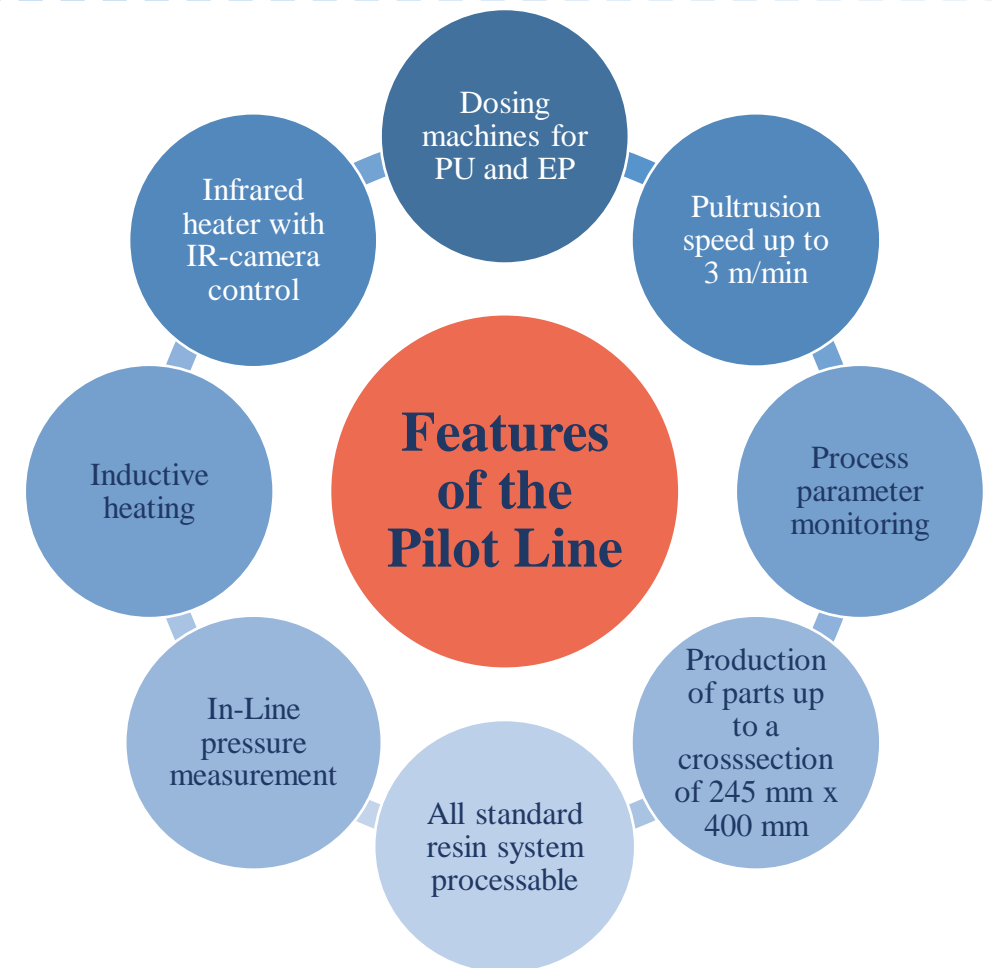
COMPETITIVE PRODUCTS

- Different curing methods.
- Functionalised resin systems.
- Faster pultrusion speed.
- Wide range of pultrusion profiles.

APPLICATIONS



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UPGRADED TECHNOLOGY

- Implementation of an IR- Heating tunnel.
- Implementation of an Induction Heating unit.
- Implementation of an IR - Camera control system (Online Monitoring) for IR-Heating tunnel and Induction Heating unit.
- Implementation of a Modular Injection chamber.
- Upgrade for modular fibre guidance system.
- Implementation of pressure sensors.