













Plastic: a real opportunity







Bandera has developed and fine-tuned a virtuous response to the Circular Economy with a 360-degree impact on the entire life of Polyolefins and PET







Bandera background: Technology, Research and Innovation





1947 **Foundation**

1999

2017

the first patent for a co-rotating twin-screw extruder to process recycled PET materials

2009 Co-rotating technology received FDA no objection letter

2015 the **Lighter Packaging** campaign

Bandera launched the PUR^{e®} Technology







Bandera background: Technology, Research and Innovation





Today

Bandera focuses on innovative **Packaging Ecological and profitable** solutions from recycled and biodegradable materials, offering customized engineering services and an after-sales global network.

Bandera will design and manufacture top performance lines, improving the process to meet Circular Economy regulations and servicing them with the best after sales customer care.







Plastica: a real opportunity





SUSTAINABILITY,

is not only a word, it is a call to action

How to make it profitable?

In the extrusion industry, **ECOlogical** can be **ECOnomically** viable.

- Using 100% recycled materials
- Using biodegradable and compostable materials
- Creating easily-recyclable packaging

Bandera solutions for the packaging and converting industry are also focused on compostable and biodegradable materials.





Sustainability







How? **Through**

- Technology
- Collaboration
- Ongoing research & innovation
- Customer oriented approach









"THOE - The House of Extrusion®"





Since 2015, the largest innovation center in the extrusion sector has been based in Bandera. A center of excellence of 6000 m² for the creation of advanced technologies for the plastic industry to respect the criteria of the Circular Economy. **TEST AREA, MACHINERY** and **PEOPLE** with a focus on innovation for the opening of new markets.

The area has been modeled to **boost the R&D** of Bandera and its partner customers: a **HUB for WINNING IDEAS**.

















Up-Cycling Process - Polyolefin





plast



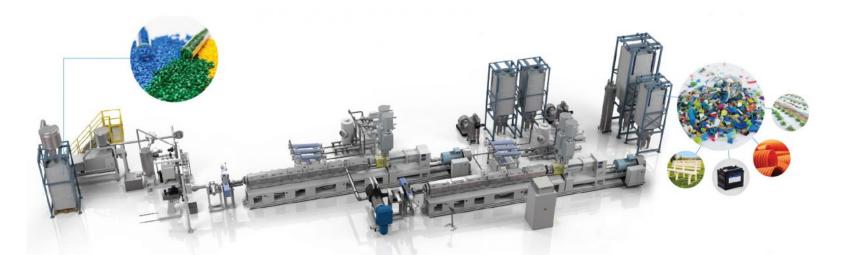
Polyolefin up-cycling process





Post-industrial and/or post-consumer wastes find their virtuous stream.

Differently from the existing recycling/pelletizing equipment currently available in the market, the definitive goal of Bandera technology is the ability to provide quality and pureness comparable to the virgin resin vide a recycled polymer having, sometime even including special features as mineral fillers or fibres inclusion.











Comparison table	Single screw extrusion	Twin screw extrusion	Twin screw cascade
Degassing efficacy (molten state purification)	•		
Odour extraction		••	
Filtration capacity (mechanical decontamination)	•		
Homogenization skills		***	
Polymer stress factor (shear, pressure, temperature)	•		
Compounding ability (dispersion of additives, mineral fillers, fibres,)			
Throughput achievable	•	***	
Self-cleaning features (switch-over time saving)		*****	
Energy efficiency	•	*****	
Overall flexibility			







Polyolefin up-cycling process





Bandera offers customized solutions based on high efficiency twin screw co-rotating extrusion technology supported by auxiliary equipment that enhance its characteristics.

ODOR REMOVAL IS DEFINITELY A CRUCIAL PART OF ANY EXTRUSION AND RECYCLING PROCESS.

The Bandera microwave based device allows to obtain a second raw material with high added value, minimizing residual odors and VOC which are removed in a really short time.











PET Process

Rigid Film

B to B





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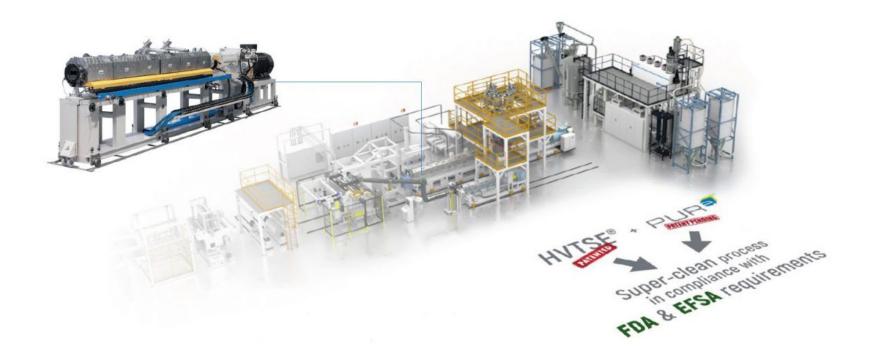


HVTSE® & PURe® for Rigid Film





The combination of **PURe**[®] and **HVTSE**[®] represents the market-leading solution for **performance & profitability**.



100% of recyclate

Energy efficient

IV Drop

OEEE® and Flexibility







PURe®





The PURe® system is the Bandera innovative solution for the purification of post-consume PET flakes material (suitable for direct food contact, as per FDA provisions and EFSA decontamination criteria).









Bottle-to-Bottle





It is important to be different, it is mandatory to do better.

Through the combination of its advanced technologies, Bandera created a prime solution to fulfil the highly demanding B-to-B market

NO thermic & NO shear stress:

Bandera knows how to care about PET, foresee **both solid and molten state decontamination stages** with **PURe**[®] and **HVTSE**[®] integrated technologies.







Packaging & Recycling





Tray-to-Tray/Roll-to-Roll





PET Mono Material – MISSIOM ACCOMPLISHED

Bandera proposes an extrusion coating solution processing customizable recipes suitable for the production of "PET mono-material" trays with equivalent characteristics to the "multi-material ones" currently present in the market.

100% recyclate to 100% recyclable

In order to meet the criteria of the Circular Economy.











Experience our THOE - (The House of Extrusion®)



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Test your material **Prove** the result **Lead** the market











Thanks for your attention.

Costruzioni Meccaniche Luigi Bandera S.p.A.

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