

PET FOIL DIRECT EXTRUSION PROCESS WITH BANDERA TWIN SCREW CO-ROTATING EXTRUDER



INNOVATIVE CHOICE WITH EXCELLENT RESULTS

Since the years 2000 **Bandera** developed and improved an extremely innovative extrusion system for the production of **PET sheets and foils** from both virgin material and particularly **from recycled PET material**. Up to present, this unique **Bandera twin screw co-rotating technology** has been applied to more than 60 extrusion lines for the production of **high quality PET sheets and foils**.

System has been **PATENTED** by **Bandera** (Patent EP 1226 922 B1)



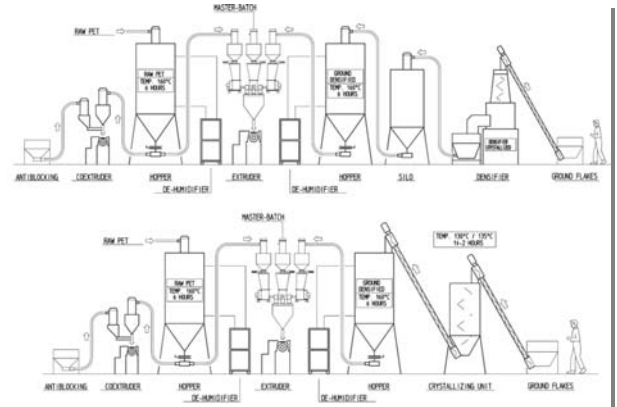
FROM PET BOTTLE FLAKES TO PET PACKAGE WITH BANDERA PET FOIL EXTRUSION LINE

As you may note, the throughput achievable with our extrusion lines is more than 2 tons per hour. Raw material (in the twin screw "core" layer) is typically composed of **100% recycled PET flakes** coming from post-consumer PET bottles and/or PET skeleton waste from thermoforming and/or PET reground bottle pre-forms; our Customers usually include some virgin PET material as external capping layers (functional barrier, up to 7,5% each layer) to obtain the classic A-B-A structure.

PRELIMINARY TESTS WITH SINGLE SCREW

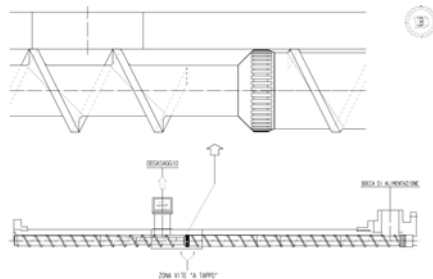
At the beginning of the research, **Bandera** tried to improve the processing features of single screw extrusion in order to avoid the disadvantages of PET raw material pre-treatments, such as:

- High maintenance costs for the crystallizer, dehumidifier and raw material feeding system;
- High energy consumption of extrusion equipment;
- Hard management during recipe and colour switching operations;
- High space engagement;
- Low lines throughput).



TRADITIONAL SYSTEMS WITH SINGLE SCREW EXTRUDER AND RAW MATERIAL PRE-TREATMENTS

Thanks to our long experience in PET sheet extrusion, we modified our standard equipment in order to improve PET melt purification and humidity extraction. Screw design and vacuum system (particular multi-degassing devices) were deeply tested and implemented in order to achieve the goal of the research.



SOME PARTICULARS OF SINGLE SCREW EXTRUSION SYSTEM EQUIPPED WITH VENTING DEGASSING DEVICE

Unfortunately, even using the highest technological solution with a single screw extrusion machine, the following problems occur:

- High energy consumption by the extruder motor;
- Lengthy machine cleaning operations and recipe / colour changing with big quantity of production waste involved;
- Raw material degradation owing to screw high speed (resin wear stress) and low material residence time (especially at high output rates);
- Poor optical qualities with reground material use, owing to low efficiency of the venting device (yellow appearance, black spots, less transparency, fish-eyes...);
- Difficult use of flakes with more than 0,3% humidity;
- Need of oversized vacuum pump system causing problems on the venting device pipeline.

THE IDEA OF TWIN SCREW TECHNOLOGY

After all these single screw results, our R&D dept. turned their attention to a completely different kind of machine, the **Twin Screw Co-rotating Extruder**, which was used with the widest applications: compounding, pelletizing, filaments, recycling, etc...

Bandera is one of the biggest manufacturers of twin screw extruders worldwide: a PET version of the machine was ready for testing within a few weeks of its original design.



TWIN SCREW CO-ROTATING EXTRUDER MOD. 2C 105mm – THROUGHPUT PROCESSING PET FOIL: 1300Kg/h

Since the beginning, the results were absolutely encouraging both for us and our Customers; **at the end of 1999, the first PET sheet extrusion line was successfully installed** in the south of Italy (line designed with double twin screw configuration). After that, **our technology was patented**.



ONE OF THE FIRST BANDERA PET FOIL EXTRUSION LINE INSTALLED – YEAR 2000



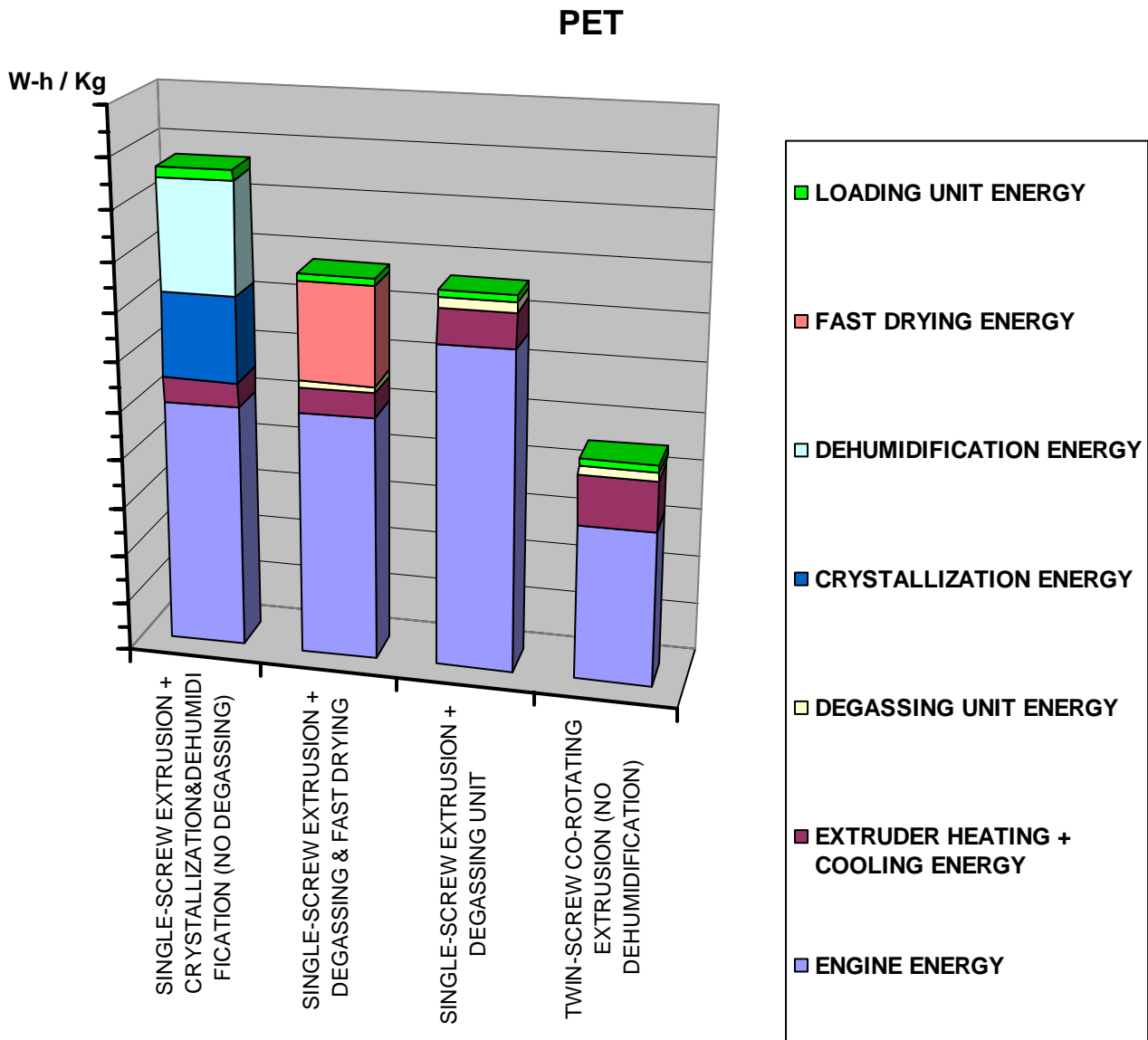
ONE OF THE MOST RECENT BANDERA PET FOIL EXTRUSION LINE SUPPLIED – YEAR 2010

From that moment, **Bandera** has continued developing this reliable technology, achieving amazing results in terms of process flexibility, melt purification and cost-effective aspects. **Our Customers are constantly supplying packaging products to the most important food industries worldwide.**

See following pages.....

TWIN SCREW TECHNOLOGY MAIN ADVANTAGES

- ✓ **Energy consumption savings: ~ 35% lower than single screw extruder + dehumidifier**
 Bandera recently measured the energy consumption of one of its PET lines: **~ 0,35 KW/Kg including chiller for a whole line of 2,3 tons per hour.**
 The twin screw co-rotating extruder processes plastic polymers with a gentle performance. The extruder machine is long enough (42:1 L/D or 52:1 L/D) to process the resin without any hurry and/or stress. The extruder motor is never strongly exerted.
 Here below it is shown a basic energy consumption plan comparing different current technologies.



(amorphous material, post-consumer or from industrial waste)

Δ Energy Consumption Differences

Single-screw extruder (no degassing) + crystalliz. & dehumidif. – Twin-screw extrusion (no dehumidif.) = **258,5 W-h/Kg**

Single-screw extruder + degassing unit & fast drying - Twin-screw extrusion (no dehumidification) = **162 W-h/Kg**

Single-screw extrusion+ degassing unit - Twin-screw extrusion (no dehumidification) = **155 W-h/Kg**

TWIN SCREW TECHNOLOGY MAIN ADVANTAGES



- ✓ **Possibility to work up to 100% of PET flakes and/or reground (thermoforming skeleton) material with initial humidity up to 1,5% (residual moisture) without dehumidifying process**

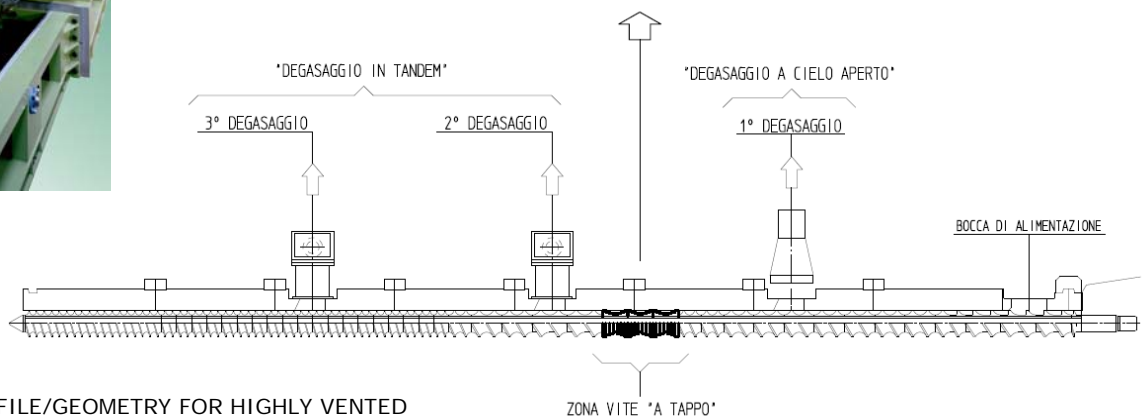
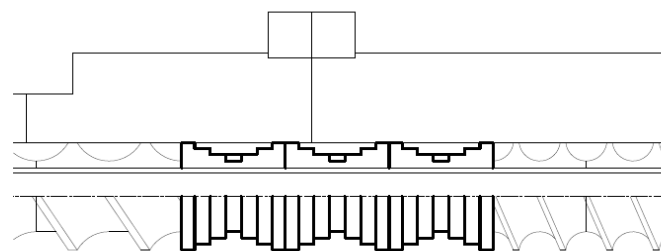
Raw material pre-treatments are very complex: raw materials are handled for many hours.

- ✓ **Easy management of feeding and dosing device**

Dosing systems designed by **Bandera**: reliable, user friendly, maintenance-free. The result is an easier management and configuration of raw material feeding and dosing auxiliary devices.



- ✓ **Co-rotating screws with a specially designed profile to obtain a very gentle working of PET polymer, avoiding thermic and hydrolytic degradation: excellent melt thermal control is assured.**

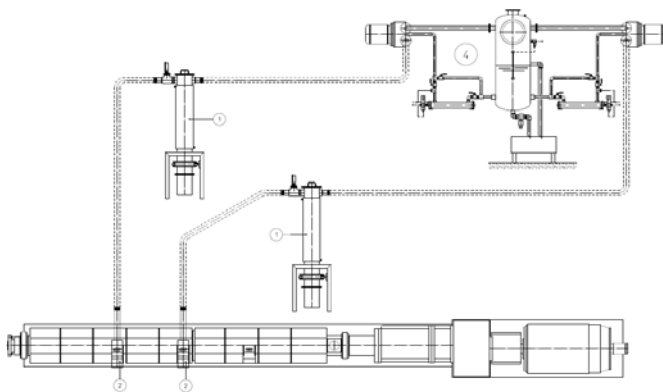


SCREWS PROFILE/GEOMETRY FOR HIGHLY VENTED CO-ROTATING TWIN SCREW EXTRUDER

TWIN SCREW TECHNOLOGY MAIN ADVANTAGES

✓ **New, reliable vacuum area and powered pumps device for maintenance-free and high purification effect**

Reliable venting and degassing unit with powered vacuum pumps - 10÷15mbar residual vacuum - with very low maintenance need and a very high melt purification effect (FDA approved contaminants evacuation trials executed on specific output – easy extraction of unwanted volatile materials, interstitial gas, residual moisture, oligomers, aldehydes and any carbonious materials). **Bandera** much more than any other machine supplier started such tests several years ago and achieved the FDA NOL since 2009.



SCHEME AND PHOTO OF THE NEW TWIN SCREW CO-ROTATING EXTRUDER VENTING DEGASSING SYSTEM

The combination obtained by screw profile, extruder length and vacuum system is the Key of **Bandera** research: very limited IV drop not absolutely interfering with mechanical properties of the sheet. The melt management at the extrusion die is much easier because of its stiffer characteristics and relevant enhanced features of the end-product.

Processing the same raw material (identical characteristics), the twin screw extruder demonstrates an I.V. drop sensibly lower than that of the single screw extruder: this is the reason for the “obliged” installation of dryers in case a single screw extruder is used.

TWIN SCREW TECHNOLOGY MAIN ADVANTAGES

- ✓ **Complete availability and flexibility to extrude other standard packaging thermoplastic materials (PLA – PS – PP).** No screw change operation needed and very interesting output compared to single screw extrusion technology and compared to other twin screw extruders.
- ✓ **Recipe & colour change with line running without interruption**
 The raw material recipes, formulations and melt colour switching procedure is largely facilitated by the **Bandera** extrusion process (with no interruption). The very low material residence time in the system and the self-cleaning properties of the twin screw corotating extruder typically allow the completion of the operation cycle in 5÷10 minutes. This system affords important savings in terms of line running time, material consumption and waste generation.
 Extrusion screws are composed by assembled mixing and conveying components mounted on broached shafts. The barrel is modular constructed, composed of nitrided steel sections.

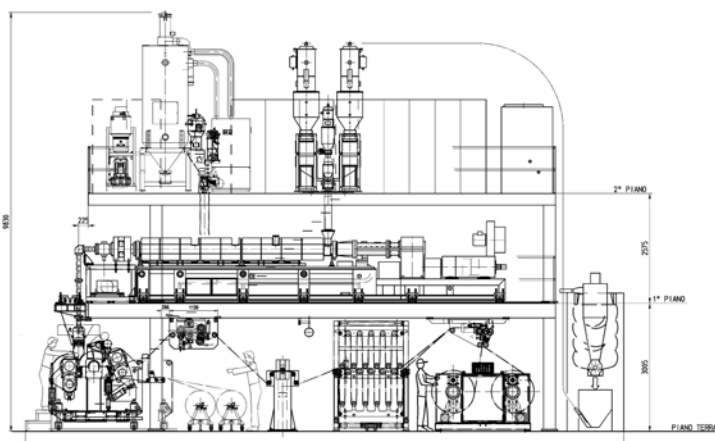


SCREW AND BARREL COMPONENTS OF TWIN SCREW CO-ROTATING EXTRUDER



DOSING SYSTEM FOR BOTH VIRGIN AND REGROUND RAW MATERIALS

- ✓ **Much more limited space requirement** for the whole equipment layout, which brings to save in logistic and plant infra-structures costs
- ✓ **Availability of much higher production output than the conventional extruder (up to 2500Kg/h with 2C135mm 52D extruder).** Minimum output available: 400Kg/h.
Bandera technical and engineering dept. is composed by very skilled engineers and project people: our extrusion lines are “tailor made” as per customer’s requirements.



PARTICULAR-DESIGNED “TAILOR MADE” MULTILAYER PET FOIL EXTRUSION LINE



MAIN CHARACTERISTICS OF BANDERA PET FOIL EXTR. LINES

Bandera extrusion lines are designed and manufactured to produce high quality products. Due to our deep Customer oriented attitude, we have **3 main PET foil extrusion line families**:

ECO PET

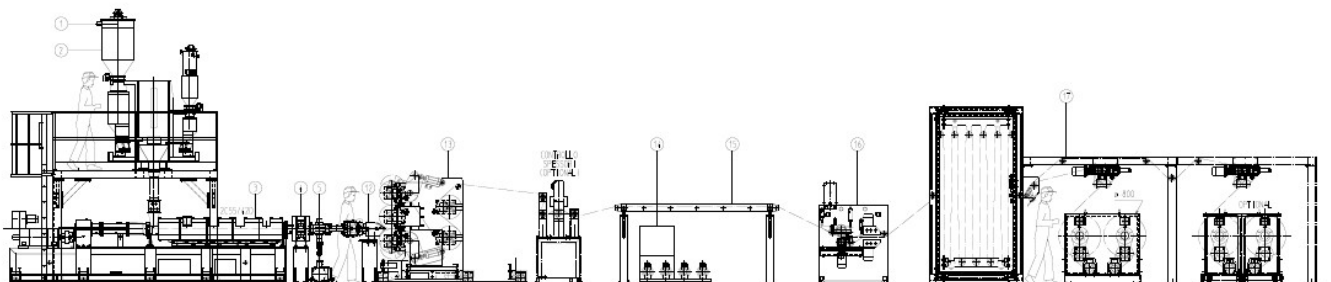
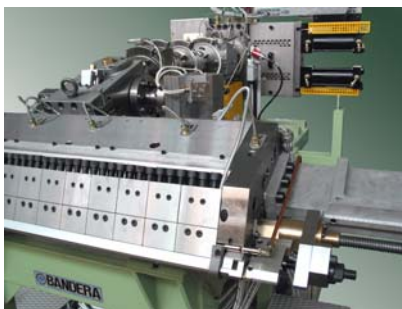
ALFA PET

BETA PET

Shown below are the main characteristics of this equipment.

ECO PET EXTRUSION LINE

- Raw materials: PET, C-PET, PET-G, PP, PS, PLA
- Production output range: 400Kg/h ÷ 750Kg/h
- Layer structure: ABA, AB, BA, BBB
- Thickness range of PET foil: 200µ ÷ 800µ
- Net width of the foil: 600mm ÷ 1050mm
- Flat extrusion die with external decking system
- Either 3 or 5-roll vertical calender roll stack configuration
- Line can be equipped with melt super-filtration systems
- Semi-automatic winding systems

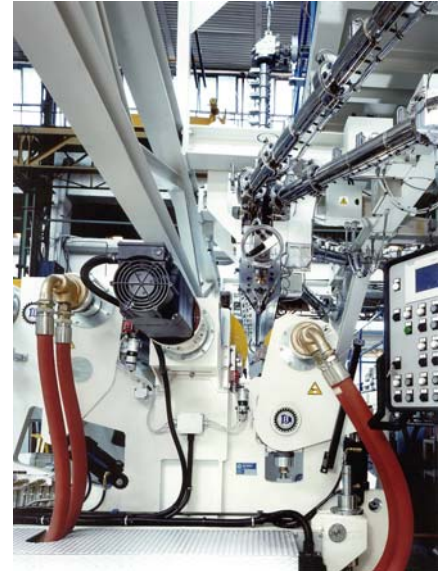


TYPICAL ECO PET LINE LAYOUT AND RELEVANT PICTURES OF THE EQUIPMENT

MAIN CHARACTERISTICS OF BANDERA PET FOIL EXTR. LINES

ALFA PET EXTRUSION LINE

- Raw materials: PET, C-PET, PET-G, PP, PS, PLA
- **Production output range: 700Kg/h ÷ 2500Kg/h**
- Layer structure: ABA, AB, BA, BBB
- **Thickness range of PET foil: 120 μ ÷ 1,80mm**
- Net width of the foil: 600mm ÷ 2200mm
- Flat extrusion die with internal deckling system
- **Automatic flat die through thermal bolts controlled by thickness gauge software**
- Cooling & polishing **horizontal calender roll stack** (either 3 or 5 rolls) equipped **with cross-axis** system for very thin foil production (**PET min. 120 μ** and **PP min. 250 μ**) and **motorized roll gap regulation**
- Possibility to produce foil for **F.F.S. market through lamination systems** (for both PET and PP with pressure roll or "hot melt" solution)
- For particular application, it's possible to complete the plant with **new coating technology**
- Line can be equipped with **melt super-filtration systems**
- **Fully automatic multi-reel winding system** for high precision rolls
- Line management by **computerized supervision system** (software by Bandera)



7 LAYERS ALFA PET/PP FOIL
EXTRUSION LINE

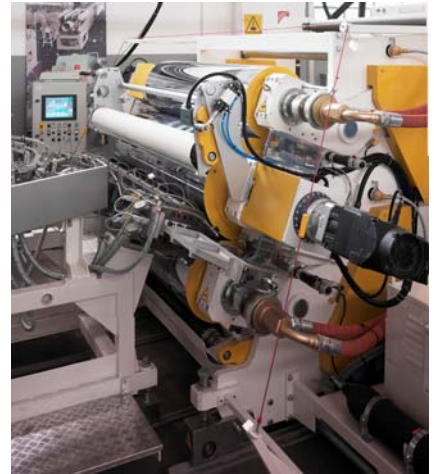


ALFA PET LINE: EXTRUSION SECTION AND ROLL STACK CALENDER GROUP

MAIN CHARACTERISTICS OF BANDERA PET FOIL EXTR. LINES

BETA PET EXTRUSION LINE

- Raw materials: PET, C-PET, PET-G, PP, PS, PLA
- **Production output range: 700Kg/h ÷ 2500Kg/h**
- Layer structure: ABA, AB, BA, BBB
- **Thickness range of PET foil: 180µ ÷ 900µ**
- Net width of the foil: 600mm ÷ 2200mm
- Flat extrusion die with internal deckling system
- **Automatic flat die through thermal bolts controlled by thickness gauge software**
- Cooling & polishing **sloping roll stack calender** (either 3 or 5 rolls) equipped with **motorized roll gap regulation**
- Possibility to produce foil for **F.F.S. market through lamination systems**
- For a particular application, it's possible to complete the plant with **new coating technology**
- Line can be equipped with **melt super-filtration systems**
- **Fully automatic multi-reel winding system** for high precision rolls
- Line management made by **computerized supervision system** (software by Bandera)



BETA PET FOIL EXTRUSION LINE



BETA PET LINE: EXTRUSION SECTION AND LINE PC SUPERVISOR (17" TOUCH SCREEN)

MAIN CHARACTERISTICS OF BANDERA PET FOIL EXTR. LINES

All **Bandera** PET extrusion lines can be supplied with the following equipment:



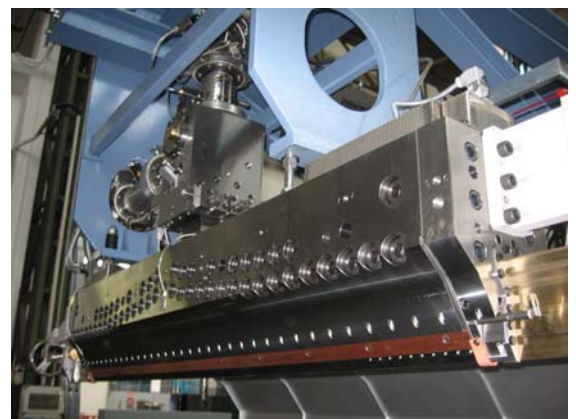
TWIN SCREW CO-ROTATING EXTRUDER
42:1 L/D OR 52:1 L/D BARREL



MELT SUPER-FILTRATION SYSTEM
FOR HIGH QUALITY PRODUCTION



SINGLE SCREW CO-EXTRUDER 35:1 L/D WITH NEW
VACUUM VENTING SYSTEM TO AVOID VIRGIN PET
DEHUMIDIFICATION FOR EXTERNAL SKIN LAYERS



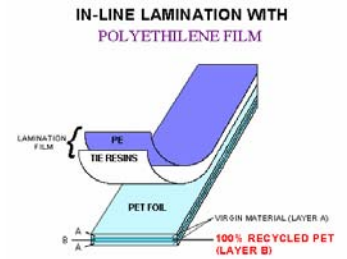
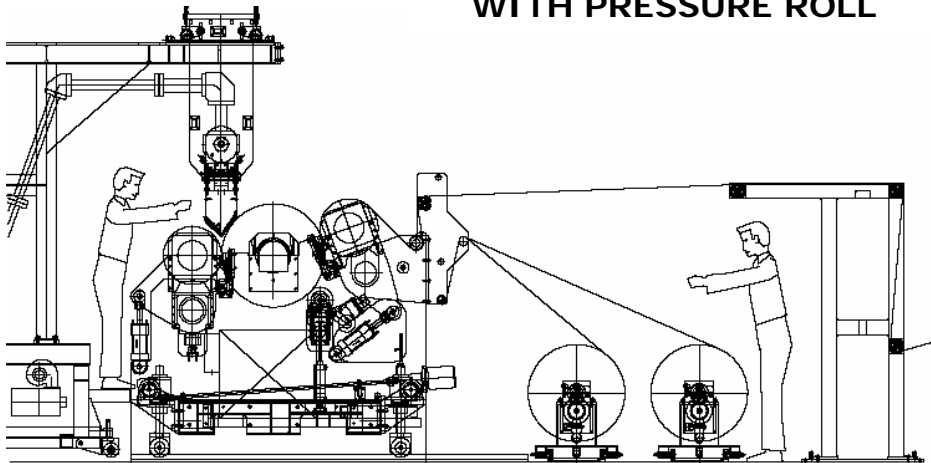
AUTOMATIC DIE WITH SPECIAL THERMAL BOLTS
CONTROLLED BY THICKNESS GAUGE SOFTWARE



FULLY AUTOMATIC WINDING SYSTEM FOR MULTI-REEL PRODUCTION: TURRET-REVOLVER, CANTILEVER OR TROLLEY

NEW PACKAGING SOLUTIONS

**PET IN-LINE LAMINATION SYSTEM
WITH PRESSURE ROLL**

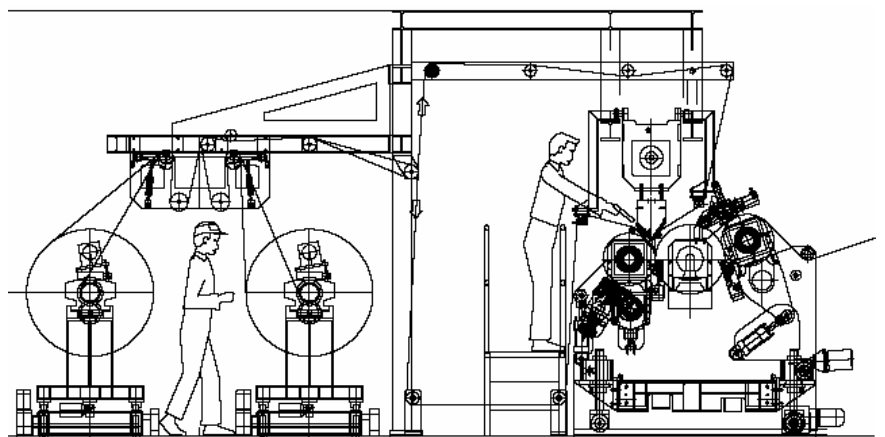
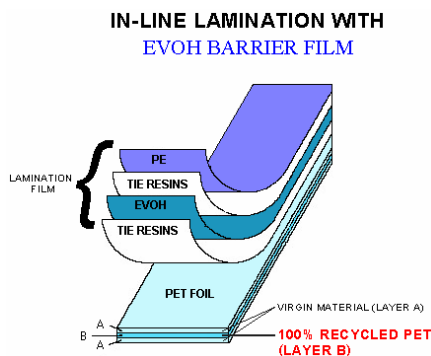


TYPICAL LAYOUT OF PRESSURE ROLL LAMINATION SYSTEM AND FINAL PRODUCT STRUCTURE



SOME EXAMPLE OF FINAL PRODUCTS / MAIN APPLICATIONS FOR PET + PE (... BARRIER) FOIL

PET/PP/PS IN-LINE "HOT MELT" LAMINATION



TYPICAL LAYOUT OF "HOT MELT" LAMINATION SYSTEM AND FINAL PRODUCT STRUCTURE

NEW PACKAGING SOLUTIONS

IN-LINE COATING TECHNOLOGY

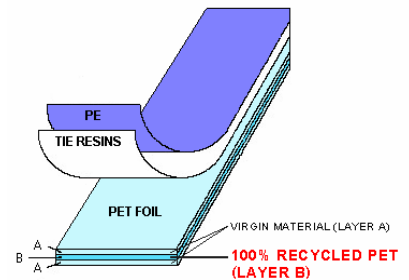
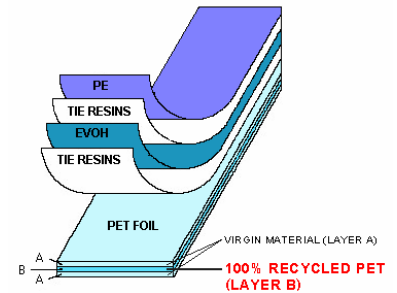
The **in-line coating** system allows the user to have full flexibility in terms of raw material choice and management: this means a strong potential reduction of production costs compared to the standard multi-layer foil technology

The typical PET foil produced – usually with A-B-A structure – is afterwards (slightly) pre-heated and coated with barrier layers (**EVOH** and **tie resin**) and/or PE layers.

All resins are processed through small single screw extruders placed on a dedicated support frame; the coating operation is made by an automatic multi-manifold die and a special designed chill roll equipment.

The adhesion between PET and PE barrier layers is extremely high, probably the most advanced. Bandera experience in this field is very wide thanks to the coating equipment recently supplied.

This technology can be applied to PP and PS sheets and can be retrofitted with existing extrusion lines.



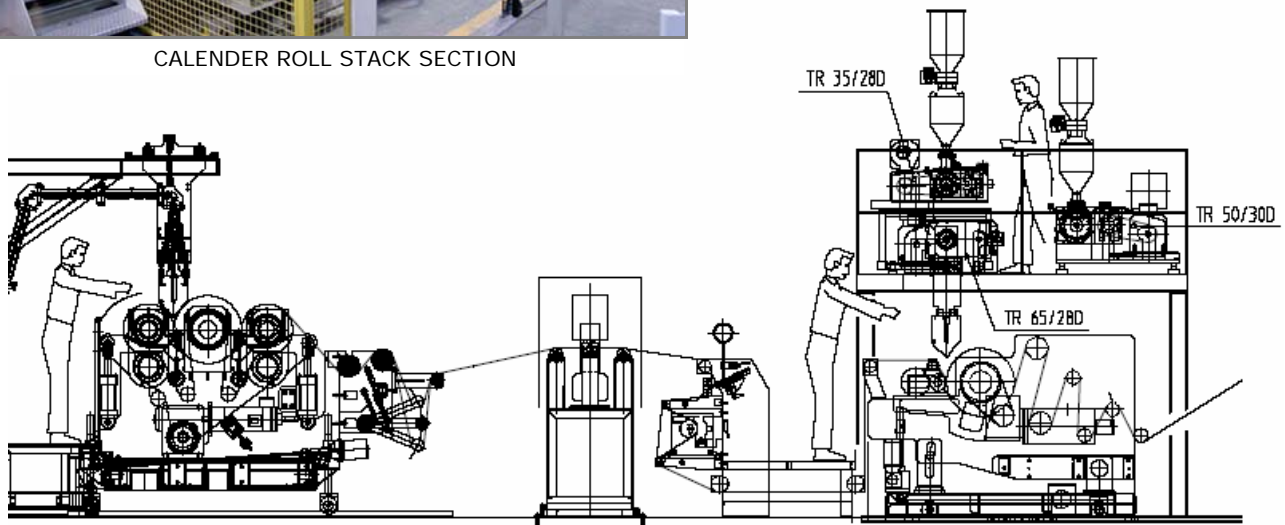
FINAL PRODUCT STRUCTURES



CALENDER ROLL STACK SECTION



COATING SECTION



TYPICAL COATING EQUIPMENT LAYOUT

NEW PACKAGING SOLUTIONS

PHYSICAL *FOAM PET* SHEETS

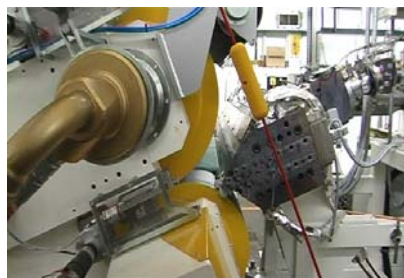
Bandera recently began its research into **foam PET** sheet production (**patent n°MI2008A00348**) using the new generation twin screw co-rotating extruder (52:1 L/D).

Current PET foam sheet production is obtained processing virgin PET with foaming agents (very expensive): production is high-priced and the final product is difficult to recycle.

Bandera has based its **new research on physical foaming** (injecting gas) **using recycled PET flakes** (from post consumer and industrial waste): this means a **sensible cost saving** on raw materials and a **total recyclability of the product**.

THE FLEXIBILITY SHOWN BY **BANDERA** TECHNOLOGY IS AMAZING

Just adding an appropriate gas injection system and a processing aid agent, a typical **Bandera** PET rigid sheet extrusion line can produce **foam PET** sheet (universal extrusion twin screws design for both rigid and foam PET production). To obtain a superior quality **foam PET** sheet, **Bandera** is able to supply dedicated extrusion equipment to optimize the whole process.



SOME PET FOAM EQUIPMENT IN WORKING CONDITION: EXTRUSION SECTION, DIE & CALENDER, PET FOAM MELT

The results obtained so far are both interesting and encouraging. Typical **A-PET rigid sheet density is around 1.33 ÷ 1.35 kg/dm³**; with an ABA or BBB structure (B layer being 100% Post Consumer Waste - mixed with industrial skeletal waste) **Bandera** experience on weight reduction is as follows:

- **total sheet thickness: 300μ ÷ 600μ**
 ✓ **density achieved: ~ 0.70 kg/dm³**
- **total sheet thickness: 600μ ÷ 1.3mm**
 ✓ **density achieved: ~ 0.40 kg/dm³**



SOME PET FOAM FINAL PRODUCTS / APPLICATIONS

The amount of weight reduction very much depends on the final application. Significant production cost savings have been achieved where rigid box liners have been replaced with foam liners.

Bandera is taking a sensible step ahead in terms of developing new products, with an eye on production costs savings and a further benefit of turning plastic materials into enhanced **“environment friendly”** lower weight packaging, demanded by both Food and Non-food markets.

REFERENCE LIST

PET FOIL & SHEET EXTRUSION / CO-EXTRUSION LINES

In the last months Bandera has been able to reinforce again its leading position in the worldwide packaging market thanks to the supply of several A-PET, C-PET, PET-G, PP, PS and PLA sheet extrusion lines. We like to underline that Bandera Customers are constantly supplying packaging products to the most important food industries worldwide, winning the competition through:

- ① great experience in running complete lines with minimum thickness of $120\mu\text{m}\pm 150\mu\text{m}$
- ① possibility to combine simple vented single screw extruders as external layers for A-B-A configuration (no need of dehumidification)
- ① great number of references worldwide (major converting companies in Europe, Asia and Mid-East)
- ① unique experience in PE and PE/tie/EVOH through film lamination process and extrusion coating
- ① usage of automatic dies with great results on sheet planarity performances
- ① great experience in providing multi-reel fully automatic winders (2, 3 or 4 reels on the same shaft)
- ① great experience in integration of auxiliary equipment (including complete supervising PC control up to raw material handling)
- ① electronic components special sub-supplier / vendor list with dedicated service
- ① experienced and prompt process, training and after sale service (fast reaction)

Thanks to its experience and engineering skills, Bandera is able to provide full technical support for revamping, upgrading and refurbishment projects, also supplying special equipment such as “drilled” designed calender rolls, extrusion screws, barrels and single components, flat dies and relevant accessories, various downstream auxiliary equipment of its own specific design and manufacture, either standard or highly customized as per individual requirements.





REFERENCE LIST
PET FOIL & SHEET EXTRUSION / CO-EXTRUSION LINES

N°	COUNTRY	CUSTOMER	YEAR OF SUPPLY	COEX	RESIN	DETAIL
	ITALY	ALIPLAST	2003	3	PET	FOIL COEX LINE
	ITALY	ALIPLAST	2004	3	PET	FOIL COEX LINE
	ITALY	ALIPLAST	2004	3-5	PET	FOIL COEX LINE WITH LAMINATION SYSTEM
	ITALY	ALIPLAST	2005	3-5	PET	FOIL COEX LINE WITH LAMINATION SYSTEM
	ITALY	ALIPLAST	2006	3-5	PET	FOIL COEX LINE WITH LAMINATION SYSTEM
	ITALY	AMB	2004	3-5	PET	FOIL COEX LINE WITH IN-LINE COATING
	ITALY	AMB	2007	3	PET	FOIL COEX LINE
	ITALY	AMB	2007	3	PET	FOIL COEX LINE
	ITALY	AMB	2010	3	PET	FOIL COEX LINE
	ITALY	ARCOPLASTICA	2003	5-7	PET-PP-PS	BARRIER FOIL COEX LINE
	ITALY	ARISTEA	2007	3	PET-PP	FOIL COEX LINE
	ITALY	CARTON PACK	2000	1	PET-PP	FOIL EXTRUSION LINE
	ITALY	CARTON PACK	2005	3	PET-PP	FOIL COEX LINE
	ITALY	CUKI COFRESCO	2003	3	PET-PP-PS	FOIL COEX LINE
	ITALY	ILPA	2002	3	PET	FOIL COEX LINE
	ITALY	ILPA	2006	3	PET	FOIL COEX LINE WITH LAMINATION SYSTEM
	ITALY	ILPA	2007	5-7	PET	FOIL COEX LINE WITH EXTRUSION COATING







REFERENCE LIST
PET FOIL & SHEET EXTRUSION / CO-EXTRUSION LINES

N°	COUNTRY	CUSTOMER	YEAR OF SUPPLY	COEX	RESIN	DETAIL
	ITALY	ILPA	2010	5-7	PET	EXTRUSION COATING EQUIPMENT
	ITALY	INFIA LIMPAC GROUP	2000	1	PET	FOIL EXTRUSION LINE
	ITALY	INFIA LIMPAC GROUP	2001	3	PET-PP-PS	FOIL COEX LINE
	ITALY	INFIA LIMPAC GROUP	2002	3	PET-PP-PS	FOIL COEX LINE
	ITALY	INFIA LIMPAC GROUP	2005	3	PET	FOIL COEX LINE
	ITALY	MOPLAST	1998	3	PET	LENTICULAR SHEET COEX LINE
	ITALY	PLAST VENETA	2009	3	PET-PP	FOIL COEX LINE
	ITALY	PLAST VENETA	2009	3	PET-PP	FOIL COEX LINE
	ITALY	PRAGMAGEST	2005	7	PP-PS-PET	BARRIER FOIL COEX LINE
	ITALY	PRAGMAGEST	2008	7	PP-PS-PET	BARRIER FOIL COEX LINE
	ITALY	ROBOPLAST	2007	3	PET	FOIL COEX LINE
	ITALY	ROBOPLAST	2009	3	PET	FOIL COEX LINE
	ITALY	RPC COBELPLAST	2010		PET	FOIL EXTRUSION EQUIPMENT
	ITALY	SIRAP GEMA	2003	3	PET	FOIL COEX LINE
	ITALY	TRADEX	2007	3	PET	FOIL COEX LINE
	ITALY	CONFIDENTIAL	2009	3	PET	FOIL COEX LINE





REFERENCE LIST
PET FOIL & SHEET EXTRUSION / CO-EXTRUSION LINES

N°	COUNTRY	CUSTOMER	YEAR OF SUPPLY	COEX	RESIN	DETAIL
						
	GERMANY	WIPAK	2004	5-7	PET	FOIL COEX LINE
	GERMANY	COEXPAN	2009	-	PET	FOIL COEX EQUIPMENT
	GERMANY	CONFIDENTIAL	2010	3	PET	FOIL COEX LINE WITH LAMINATION SYSTEM
	GERMANY	CONFIDENTIAL	2010	3	PET	FOIL COEX LINE WITH LAMINATION SYSTEM
	GERMANY	CONFIDENTIAL	2011	3	PET	FOIL COEX LINE WITH LAMINATION SYSTEM
						
	UK	ANSON PACKAGING	2006	3	PET	FOIL COEX LINE
	UK	ANSON PACKAGING	2009	3	PET	FOIL COEX LINE
	UK	FLIGHT PLASTICS	2009	1-3	PET	FOIL COEX EQUIPMENT
	UK	FLIGHT PLASTICS	2010	1-3	PET	FOIL COEX EQUIPMENT
	UK	KP FILMS	2009	3	PET	FOIL COEX LINE WITH LAMINATION SYSTEM
	UK	PPP UK LTD.	2003	2-3	PET-PP	FOIL COEX LINE
	UK	SHARP INTERPACK	2007	3	PET	FOIL COEX LINE
	UK	TDX	2010	1-3	PET	FOIL COEX LINE





REFERENCE LIST
PET FOIL & SHEET EXTRUSION / CO-EXTRUSION LINES

N°	COUNTRY	CUSTOMER	YEAR OF SUPPLY	COEX	RESIN	DETAIL
						
	SPAIN	BCN - POLIESTER EXTRUSIONADOS	2003	5-7	PET	FOIL COEX LINE WITH EXTRUSION COATING
	SPAIN	BCN - POLIESTER EXTRUSIONADOS	2006	5-7	PET	FOIL COEX LINE WITH LAMINATION SYSTEM
	SPAIN	COEXPAN	2010		PET	FOIL COEX EQUIPMENT
	SPAIN	DYNAPLAST COOPBOX EUROPE	2007	5-7	PET-PP PS-PLA	FOIL COEX LINE WITH LAMINATION SYSTEM
	SPAIN	INFIA SPAIN LINPAC GROUP	2005	3	PET	FOIL COEX LINE
	SPAIN	INQUITEX	2007	3	PET-PP	FOIL COEX LINE
	SPAIN	LINPAC PACKAGING	2005	3	PET	FOIL COEX LINE
	SPAIN	LINPAC PACKAGING	2006	3	PET	FOIL COEX LINE
	SPAIN	LINPAC PACKAGING	2010	3	PET	FOIL COEX LINE
						
	PORTUGAL	CONFIDENTIAL	2010	3	PET	FOIL COEX LINE
						
	FRANCE	COEXPAN	2007	3	PET	FOIL COEX EQUIPMENT
	FRANCE	COEXPAN	2010	3	PET	FOIL COEX EQUIPMENT





REFERENCE LIST
PET FOIL & SHEET EXTRUSION / CO-EXTRUSION LINES

N°	COUNTRY	CUSTOMER	YEAR OF SUPPLY	COEX	RESIN	DETAIL
	GREECE	NGP PLASTICS	2006	3	PET-PP	FOIL COEX LINE
	GREECE	NGP PLASTICS	2008	7	PET-PP	FOIL COEX LINE
	GREECE	NGP PLASTICS	2008	3	PET-PP	EXTRUSION EQUIPMENT FOR E-PET (FOAM)
	GREECE	SOULIS	2005	3	PET-PP	FOIL COEX LINE
	GREECE	SOULIS	2007	3	PET-PP	FOIL COEX LINE
	RUSSIA	ECOPET	2007	3	PET-PP	FOIL COEX LINE
	RUSSIA	ECOPET	2011	3	PET	FOIL COEX LINE
	RUSSIA	INTECO	2011	3	PET	FOIL COEX LINE
	BELARUS	CONFIDENTIAL	2011	3	PET-PP PS-PLA	FOIL COEX LINE
	BELARUS	CONFIDENTIAL	2011	3	PET-PP PS-PLA	FOIL COEX LINE
	POLAND	EUROCAST	2007	3	PET	FOIL COEX LINE WITH LAMINATION SYSTEM





REFERENCE LIST
PET FOIL & SHEET EXTRUSION / CO-EXTRUSION LINES




N°	COUNTRY	CUSTOMER	YEAR OF SUPPLY	COEX	RESIN	DETAIL
						
	THAILAND	EASTERN POLYMER	1999	2-3	PMMA-PS ABS-PET	SHEET COEX LINE
						
	SOUTH KOREA	KP TECH	2007	3	PET-PLA	FOIL COEX LINE
						
	ARGENTINA	BANDEX	2009	3	PET	FOIL COEX LINE
						
	MEXICO	PRODUCTOS DUNA	2006	3	PET	FOIL EXTRUSION LINE
						
	CHILE	PAN PACIFIC	2009	3	PET	FOIL EXTRUSION LINE
						
	ISRAEL	CONFIDENTIAL	2010	3	PET	FOIL COEX LINE





REFERENCE LIST

PET FOIL & SHEET EXTRUSION / CO-EXTRUSION LINES

N°	COUNTRY	CUSTOMER	YEAR OF SUPPLY	COEX	RESIN	DETAIL
						
	U.A.E.	AL BAYADER	2009	3	PET-PP-PS	FOIL COEX LINE
						
	LEBANON	SOMOPLAST	2009	3	PET-PP-PS	FOIL COEX LINE
						
	SIRYA	KANAWATI	2009	3	PET	FOIL COEX LINE





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OUR MAIN PAGE ON THE WEB

Political Map of the World, April 2007

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BACK TO BANDERA MAIN PAGE

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