

ONE CO-ROTATING HEART
IS BEATING IN OUR SYSTEMS



CO-ROTATING TWIN
SCREW EXTRUDERS

COMPOUNDING

ADVANCED
RECYCLING

NATURAL FIBERS

DIRECT EXTRUSION

LAB SYSTEM

OUR PEOPLE MAKE THE DIFFERENCE >

www.icmasg.it





INDEX

- p. 1 MILESTONE
- p. 2 CUSTOMER SUPPORT
- p. 3-4 CO-ROTATING TWIN SCREW EXTRUDER MCM
- p. 5-6 CO-ROTATING TWIN SCREW EXTRUDER NEW SERIES
- p. 7-8 COMPOUNDING SYSTEM
- p. 9-10 RECYCLING SYSTEMS
- p. 11-12 PET DIRECT RECYCLING/EXTRUSION
- p. 13-14 WPC WORLD
- p. 15-16 IN-LINE EXTRUSION COMPOUNDING
- p. 16 TURN KEY PLANT



OUR PEOPLE MAKE THE DIFFERENCE >



Advanced Compounding and Extrusion Systems

MORE THAN 100 YEARS OF HISTORY IN INDUSTRIAL ACTIVITY



www.icmasg.it

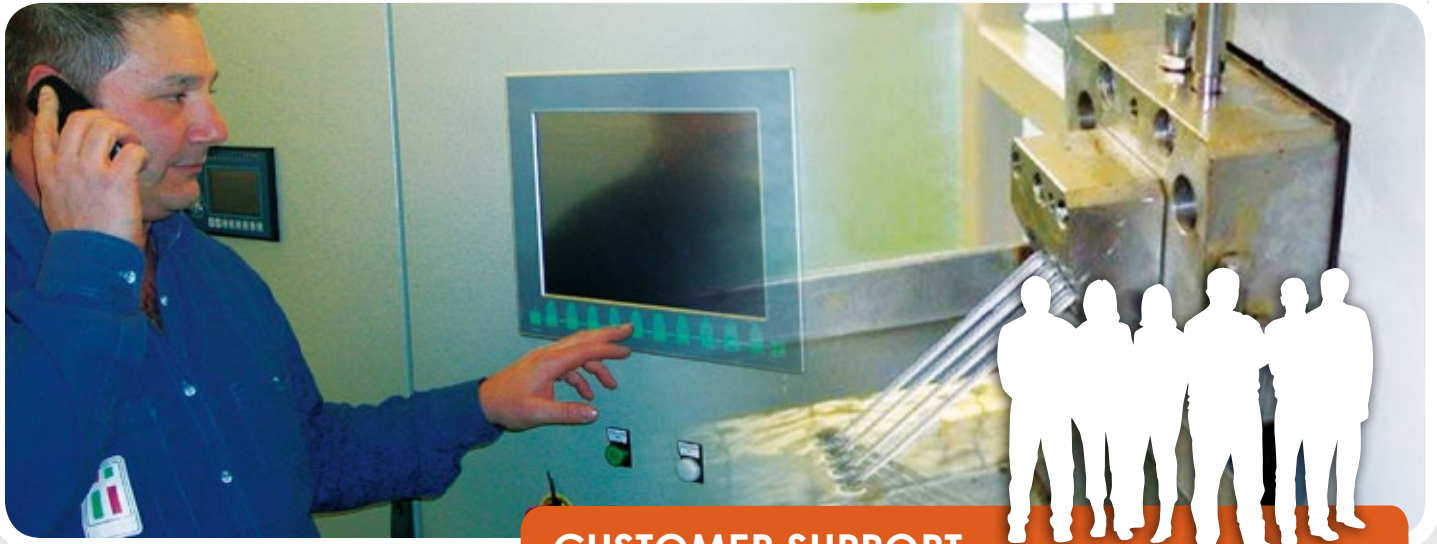


**WE WORK FOR A
SUSTAINABLE DEVELOPMENT**

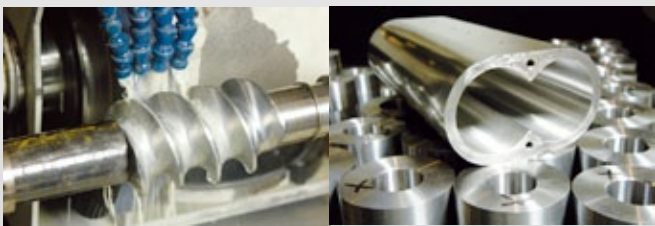
- **1907.** The entrepreneurial Colombo family starts a foundry specializing in casting iron and special alloys.
- **1945.** ICMA SAN GIORGIO, established to support the foundry, initially manufacturing machines for wood processing, and later specializing in high-precision machine tools.
- **1965.** ICMA focuses on the budding plastics industry designing its first patented twin-screw extruders, creating the foundation for the company's core business.
- **1974.** ICMA develops a revolutionary technology to produce a composite sheet made of polypropylene and wood flour. Marketed under the trade name, Wood-Stock™, the technology was adopted worldwide by automakers including General Motors, Ford, Fiat, Nissan and others for moulding interior components.
- **1980.** ICMA builds on its ability with twin-screw co-rotating extruders designed for technical compounds, thermoplastic rubber, masterbatch, etc., and quickly becomes a world leader in compounding technology.
- **1995.** ICMA introduces a patented system for the extrusion/compounding of a multi-layer sheet (using a polymer with natural fillers called Naturecore™). This application was developed for the agro industrial sector for producing disposable crates, fully recoverable.
- **2000.** ICMA develops an advanced mathematical mod to simulate the extrusion process of co-rotating extruders.
- **2005.** ICMA's accumulated experience is successfully employed in developing an extrusion/compounding solution suitable for composite sheet, PET foil production, WPC pipes and profiles.
- **2006.** ICMA, with third-generation management, begins a strong international expansion.

ICMA TODAY

Through more than 40 years of R&D, manufacturing and process experience, ICMA possesses a deep knowledge of extrusion / compounding solutions. Customers depend on ICMA for high-quality, state-of-the art solutions backed by training, technical support and a high level of customer service.



CUSTOMER SUPPORT



HELP DESK

Our goal is to keep customers operating at peak efficiency. Our service team operates our HELP DESK 16 hours/day.

TRAINING SERVICE

Over our forty years experience in the compounding industry and a continuous R&D activity, we have developed a unique technical & process knowledge.

We condensed such knowledge in training seminars on co-rotating technology.

Our seminars extend beyond basic operations to processing knowledge that can make a difference in a competitive marketplace.



SPARE PARTS SERVICE

We offer a deep inventory of the most important extruder parts for rapid, "off the shelf" delivery. We provide in-house support and manufacturing capability for screws elements, barrels sections and other important mechanical components to help guarantee quality control.

R&D /LAB SUPPORT

Our experienced laboratory personnel and versatile equipment help customers solve a variety of research and development challenges, including both pilot- and pre-production testing.

Our lab facility includes a pilot line with a twin-screw co-rotating extruder (MCM/25HT) for running preliminary suitability and processing tests on a variety of materials and compounds.

Second-phase pre-production testing is performed on our industrial extrusion line. The line is equipped with a full-sized twin-screw co-rotating extruder (MCM/60HT) suitable for verification of specific production parameters on extruded flat sheets or pellets, or laminated in-line sheets with a combination of different materials.



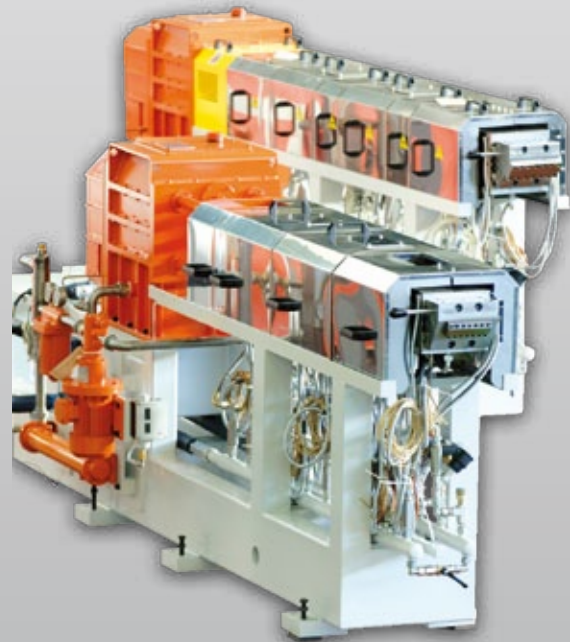


CO-ROTATING TWIN-SCREW EXTRUDER MCM



FEATURES

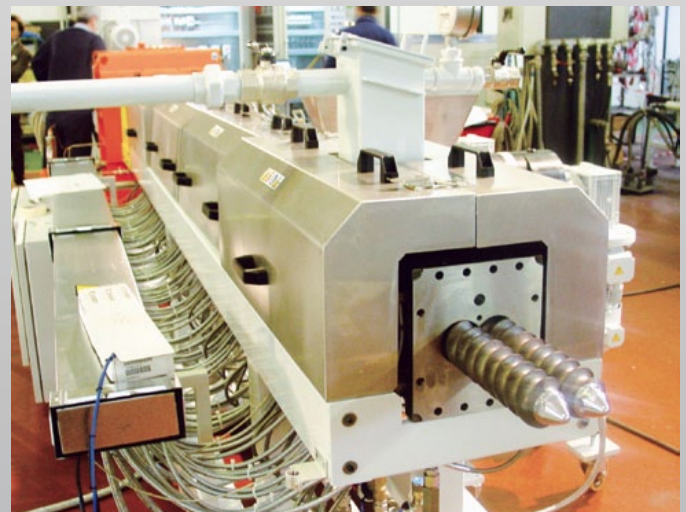
- Modular design for screw and barrel
- Built-in water circuit for barrel cooling
- Intermeshing screw geometry
- Energy-saving heating system
- Updated electronic control device





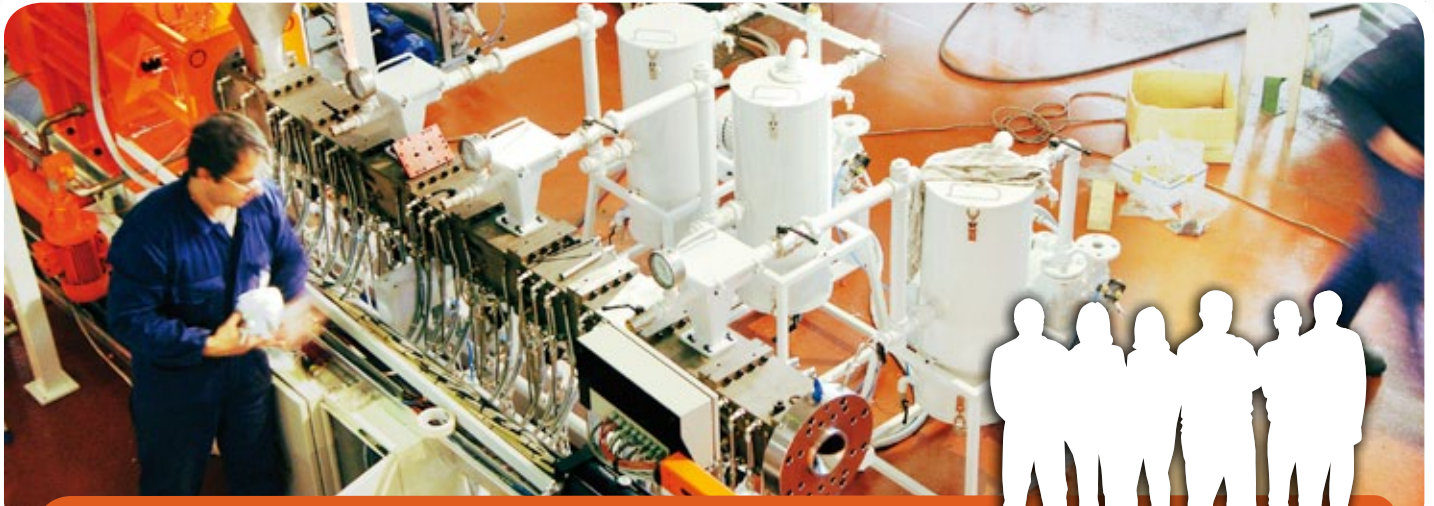
PERFORMANCE

- Highly flexible modular system
- Energy saving, low specific-energy consumption
- High intake capacity of feed screws
- Fast recipe or colour change due to self-wiping geometry
- High plasticisation capacity
- Calibrated control of melt temperature
- High homogenising/distributive mixing capacity
- High dispersive mixing capacity
- Fine-tuning of residence time-shear/elongation stresses parameters balance
- High venting efficiency due to the large surfaces and to the system's modularity



ICMA QUALITY STEMS FROM A SYNTHESIS OF THESE FIVE POINTS:

1. Technology and market EXPERIENCE and KNOWLEDGE
2. Constant DEVELOPMENT of applied technology and KNOW-HOW
3. Strategic CHOICE of materials and components
4. Internal MANUFACTURING of the main components
5. Systematic CONTROL of the materials and components quality

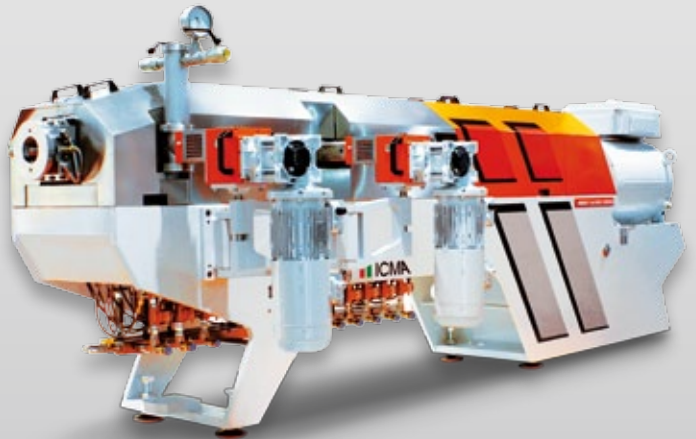


CO-ROTATING TWIN-SCREW EXTRUDER NEW CLASS

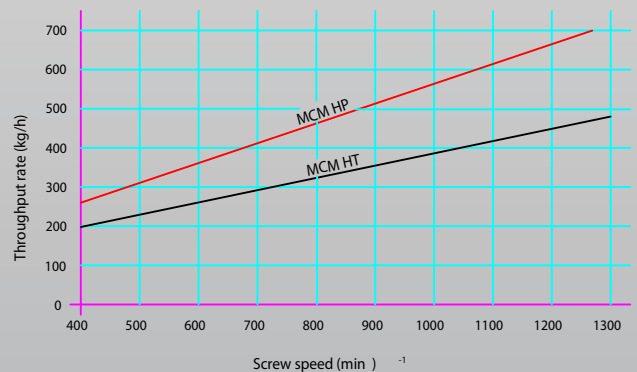
HP-High Performance Class

HIGH TORQUE not high enough?
Need High Capacity too?

In our continued commitment to co-rotating technology, ICMA has developed a powerful new class of extruders, the HP (High-Performance) family, that combines a boosted torque (16 Nm/cm³) with a higher free-volume of the screw channel with a D/d Nominal ratio of 1.65. In addition to boosting torque and volume, we enhanced this new extruder family with a series of technology solutions to improve energy efficiency. That includes a high-efficiency water-cooled AC motor and an innovative insulation system that reduces heat losses at the barrel. The HP family is designed for the most demanding compounding applications, and capable of processing materials that require high specific energy, with higher yields, while reducing energy consumption. A clam-shell barrel execution is also available on request.



MCM42 : Comparison MCM HP vs. MCM HT
Pa 6 + 30% Glass Fiber (Md 85%)



BENEFITS FOR R&D

The best solution for your laboratory to improve R&D capability. Compact melting-chamber design allows trials to be conducted with minimal batch size for considerable cost savings.



HV Class

More VOLUME reduces production costs

Designed and engineered to satisfy a specific market demand the newest HV class is based on high free volumes in the melting chamber. This concept allows for the highest production performance for compounds requiring a low specific energy, such as:

- Highly-filled compounds
- Wood-Stock, Wood plastic compounds (WPC)
- PVC compounds
- Flame-retardant compound HFFR



The geometry of extrusion barrels and screws has been carefully designed to help guarantee the perfect scale up of trial results to industrial production for faster R&D payback.

Downstream Equipment is also available, from traditional strand pelletizers to dedicated units to produce sheet, foils, profiles and pipe.





COMPOUNDING SYSTEMS



COMPLETE COMPOUNDING PLANT

Since the very beginning, ICMA has been specializing in providing turnkey plants from raw material feeding to downstream equipment. These engineering capabilities are supported by many successful customers who have chosen ICMA as a turn-key solution provider. All phases -- from design, construction, assembling, test and final production -- can be customized according to customer's needs.

ICMA offers the advantage of a skilled and agile company for fast and reliable delivery.

ICMA turnkey solutions incorporate other major brands for equipment not manufactured by ICMA itself, such as dosing and cutting units. So our engineers can choose the best solution for each project according to the specific needs of in customer. ICMA can also offer personnel training before delivery to decrease operational risks.

Each line is tested and debugged at ICMA before delivery to allow customers immediate production after assembly at the factory site.

THERMOPLASTIC RUBBER

COMPOUNDING SYSTEMS FOR THE WHOLE RANGE OF THERMOPLASTIC RUBBERS

- TPO polyolefin matrix modified with EPDM
- TPV polyolefin matrix modified with vulcanisable EPDM
- TPE styrene co-polymer SBS modified with styrene polymers or polyolefins
- TPE styrene co-polymer SEBS modified with styrene polymers or polyolefins
- TPU thermoplastic polyurethane
- Soft PVC





WE SERVE THE COMPOUNDING INDUSTRY WITH STATE-OF-THE-ART TECHNOLOGY SOLUTIONS TO COVER THE WIDEST RANGE OF FORMULATION/ APPLICATIONS REQUIREMENTS, INCLUDING COMPOUNDING LINES FOR:

- Mineral, organic and fibres fillers
- Masterbatches and additives
- Polymeric alloy
- Techno-polymers
- Flame-retardant resins and HFFR
- Cross-linked PE
- Thermoplastic rubber TPE
- TPU's
- WPC's
- Natural fibres
- Soft, rigid, and medical-grade PVC without pre-blending operation.

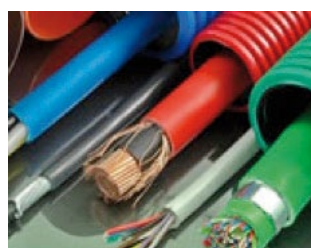


REACTIVE COMPOUNDING SYSTEMS FOR REACTIVE COMPOUNDS

- Cross-linkable Polyethylene - XPE
- Compound for adhesive resins - Hot melt
- Polymerisation/extrusion of thermoplastic polyurethane

IN ADDITION TO THE STANDARD BARREL DESIGN, SPECIALTY BARRELS ARE ALSO AVAILABLE:

- CLAM-SHELL OPENABLE BARREL DESIGN
- SLIDING BARREL DESIGN



SPECIAL SYSTEMS FOR HIGHLY THERMALLY-SENSITIVE COMPOUNDS:

- Special HFFR flame retardant compounds
- Cross linkable PE (peroxide-based) for low/medium tension cable coating with CASCADE COMPOUNDING SYSTEM



WE WORK FOR A
SUSTAINABLE DEVELOPMENT

GIVE A HIGHER
ADDED-VALUE
TO RECYCLED
POLYMER!

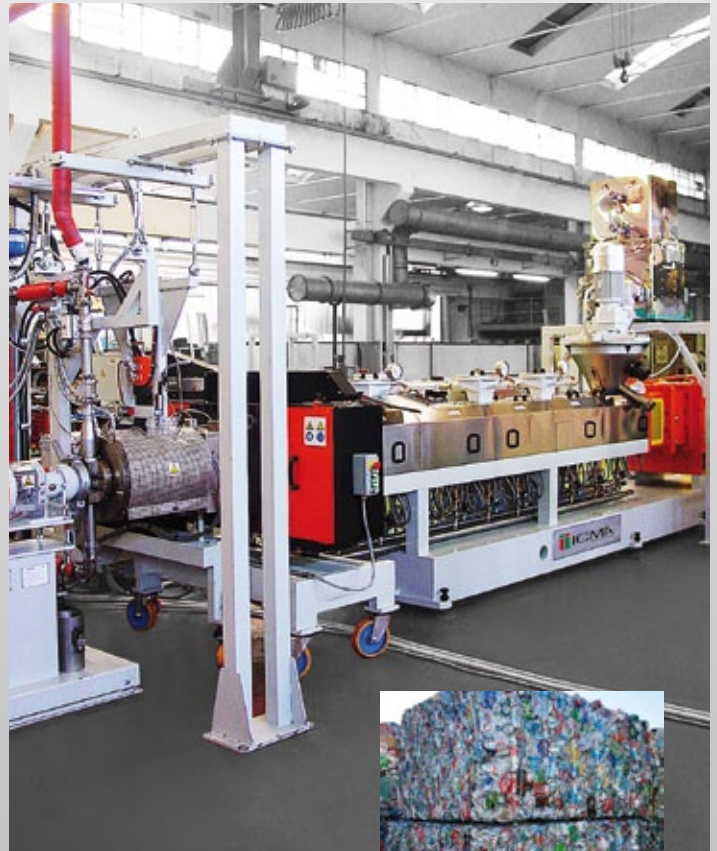
RECYCLING SYSTEMS

LET US HELP YOU ACHIEVE
SUCCESS IN THE "SPECIAL" WORLD
OF RECYCLING.

To turn the business from commodity to specialty and escape from this micro-business world, you need new ideas and world-class equipment:

- USE THE CHEAPEST POST-CONSUMER WASTE
- REDUCE ENERGY CONSUMPTION
- REDUCE MAINTENANCE COSTS
- FILL/REINFORCE RECYCLED RESINS

4 POINTS TO CONSIDER FOR A SINGLE SOLUTION:
Twin-screw Co-rotating Extruders by:

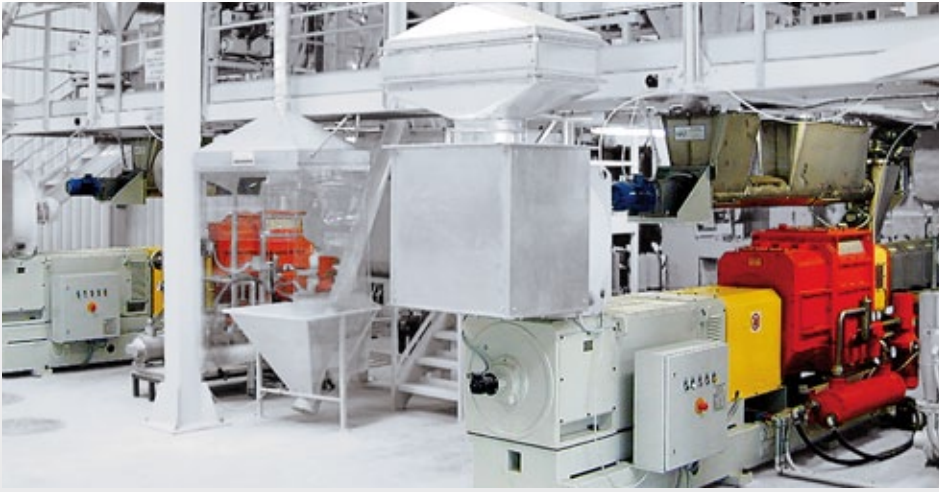


RECYCLING/COMPOUNDING SYSTEMS

one step process: recycling, degassing, reinforcing or filling

- Recycling/compounding systems of Polyolefin waste with a wide broad of viscosity/density, reinforced or filled
- Recycling/compounding systems of plastic textile yarn waste rein forced or filled
- Direct recycling systems of PET bottle flakes without predrying and crystallization





THE MOST REMARKABLE ADVANTAGES OF A SYSTEM EQUIPPED WITH AN **ICMA** TWIN-SCREW CO-ROTATING EXTRUDER, COMPARED TO A TRADITIONAL SYSTEM WITH SINGLE-SCREW EXTRUDER, ARE:

- **HIGHER ENERGY SAVING** due to reduced energy consumption (kWh/Kg)
- **REDUCED** maintenance costs thanks to the MODULAR design of screws and barrel
- **TIGHTER** melt temperature control thanks to a high-efficiency cooling system for the barrel
- **HIGH-EFFICIENCY** degassing system minimizes volatiles
- **EXCLUSIVE** filling or reinforcing of the recycled polymer can produce higher-value final products
- **BETTER** self-cleaning characteristic of the extruder
- Extremely **QUICK** colour/material change
- **BETTER** homogenisation when mixing materials with dissimilar densities/viscosities and/or compatibilities

RECYCLING/ESTRUSION SYSTEMS

- Direct extrusion/recycling system for converting un-separated plastic waste in to sheets, foil, pipe, and profile shapes
- Direct extrusion/recycling system for converting HDPE bottle/butt scrap in to thick or reinforced sheet



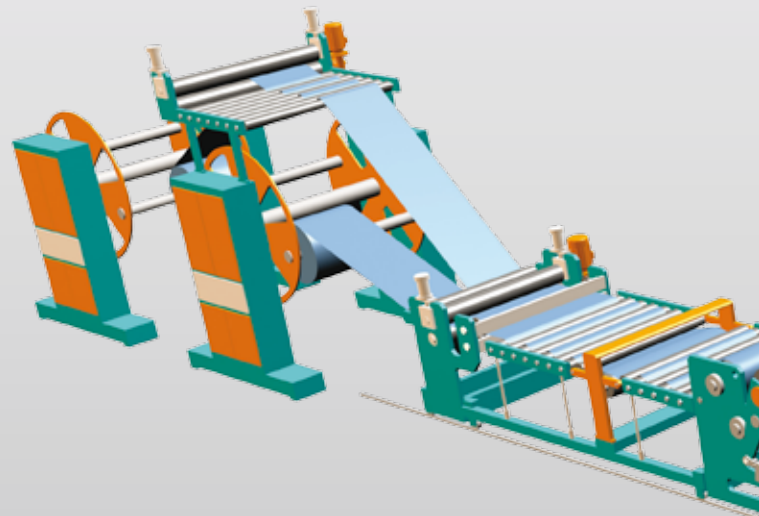
EVERY DAY AROUND THE WORLD BILLIONS OF PET BOTTLES ARE FILLED UP WITH WATER, SOFT DRINK, OIL, MILK...LIQUIDS.

EVERY DAY BILLIONS OF PET BOTTLES ARE WASTED.



PET DIRECT RECYCLING/EXTRUSION

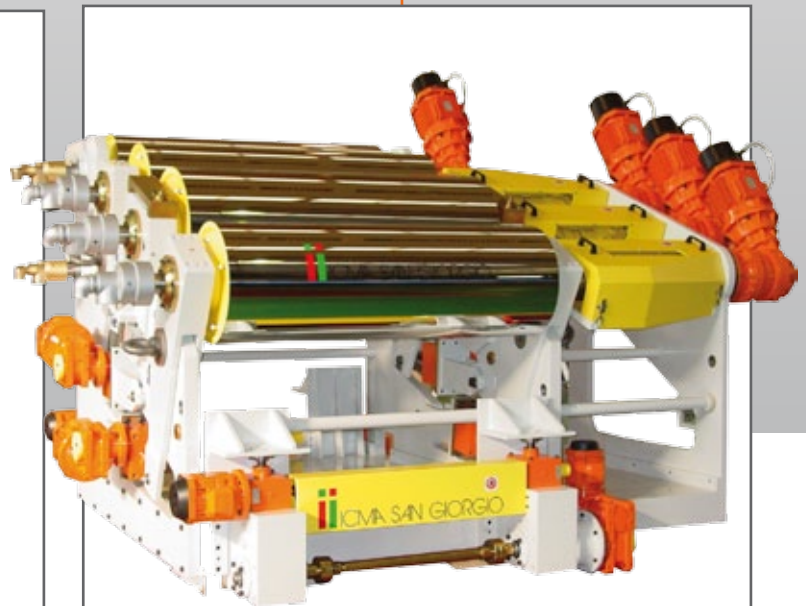
Selective garbage collection this is the **GREEN SOLUTION!** In Europe the process started in 1990, and today in countries like Switzerland, 70% of PET bottles are collected and recycled.



Thanks to the innovation of automated separation systems and high efficiency washing lines, a huge quantity of PET flakes of good quality are available on the market.

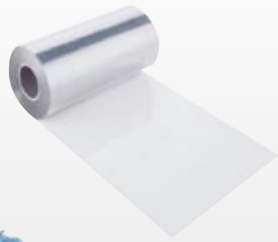


THE GOAL IS TO TURN RECYCLED MATERIAL INTO HIGH-VALUE PRODUCTS



5 ROLL CALENDER

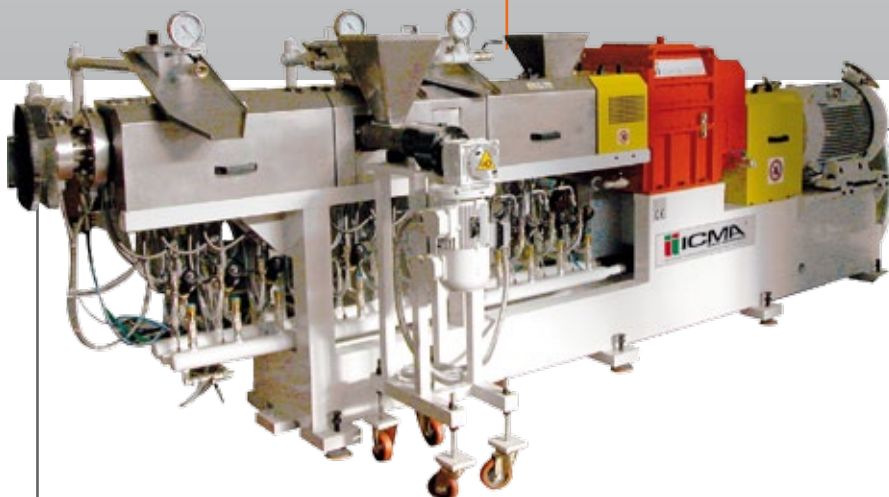
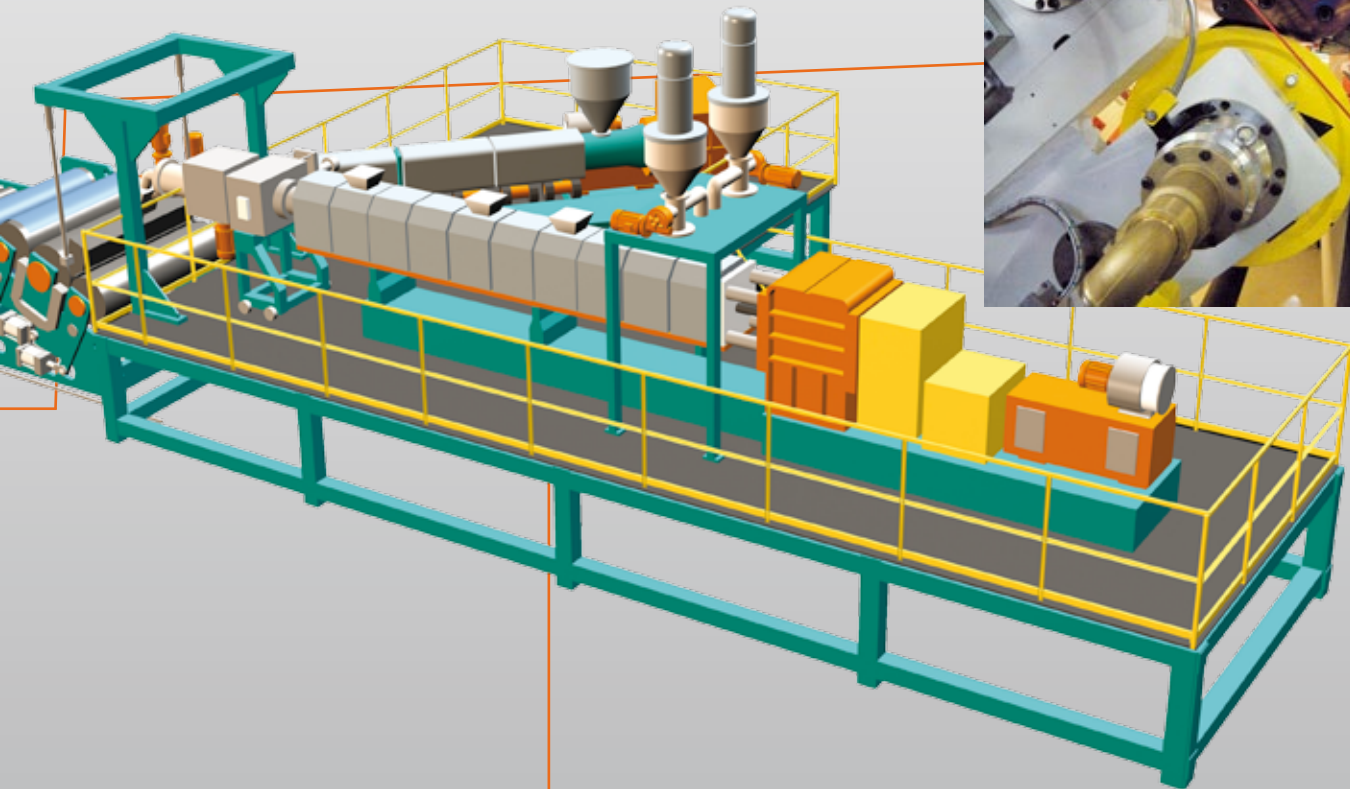
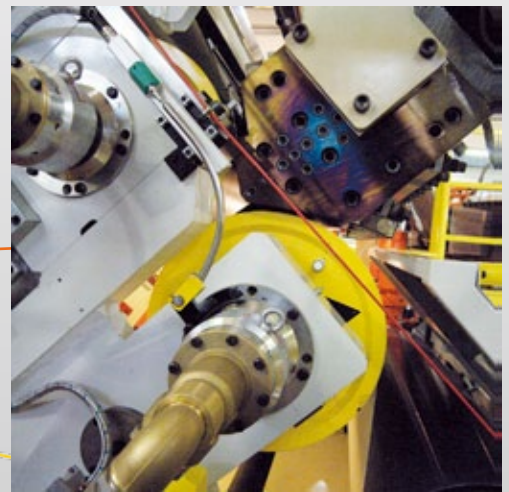
- Large roll diameter
- High thermal exchange performances
- Speeds up to 60 m/min.



WE WORK FOR A
SUSTAINABLE DEVELOPMENT

TURN KEY SYSTEMS

PRODUCTION CAPACITY	From 200 to 2000 Kg/h
FOIL NET WIDTH	From 650 to 2250 mm
FOIL THICKNESS	From 150 to 1500 μ
PRODUCTION WITH R-PET (Bottle flakes)	Up to 100%
PRODUCTION COST SAVING	Up to 50 %
SPACE SAVING	Up to 20%



TWINSCREW EXTRUDER HIGHTORQUE, CO-ROTATING, INTERMESHING, SELF-CLEANING.

- Ultra wide degassing surface
- Low shear stress
- Low energy consumption
- Modular screws and barrel design = low maintenance cost



WPC WORLD

Our knowledge in mixing natural fibres and a polyolefin roots back to the early 70's when ICMA successfully pioneered, first in the World, the process technology for producing a thermoformable sheet for automotive interior trims made of polypropylene and wood flour. This patented technology became a world wide success in the automotive industry with more than 50 plants worldwide, delivered during the last decades to the major car component manufacturers. This technology came to be known as WOOD-STOCK™.



THIS STRONG KNOW-HOW LED **ICMA** TO SUCCESSFULLY DEVELOP A FULL RANGE OF WPC APPLICATIONS IN COMPOUNDING, SHEET EXTRUSION AND PROFILES



ICMA's **co-rotating technology** provides superior results compared to alternative technologies like counter-rotating in terms of:

- HIGHER PRODUCTIVITY
- BEST QUALITY PRODUCTS due to: Superior Melt temperature control - Side feeding of Wood - Superior mixing - Superior degassing
- UNMATCHED FLEXIBILITY either in process production and maintenance

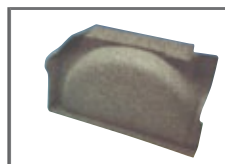
Co-rotating extruder + Calender = Patented Process Technology



Production output up to Max 2500 Kg/H

WPC SHEETS WOODSTOCK™

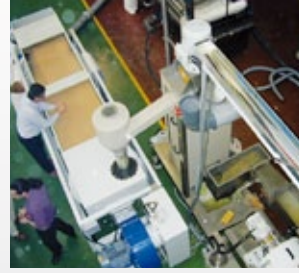
- Direct extrusion systems for WPC sheets (Wood Plastic Compound)
- Direct extrusion systems for sheets filled with natural fibres—rice husk, coconut shell, hemp..



WPC COMPOUNDING

- **ICMA's** WPC systems are designed to produce compounds either for extrusion or injection moulding
- By **ICMA's** co-rotating extruders you can produce the highest output rates in industry (up to 5.000 Kg/h)

TURN-KEY Compounding plant

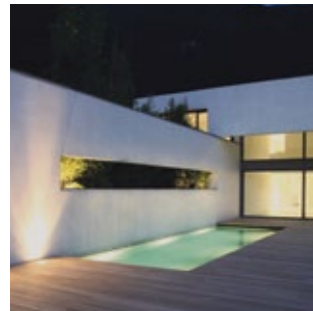
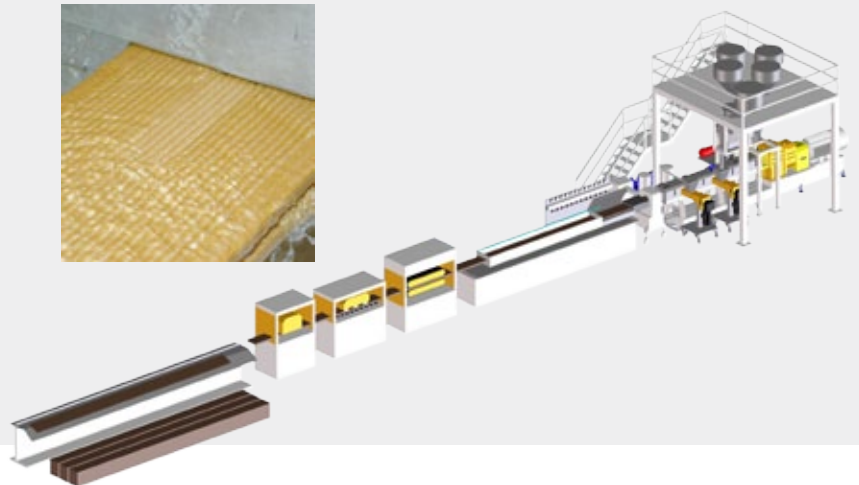
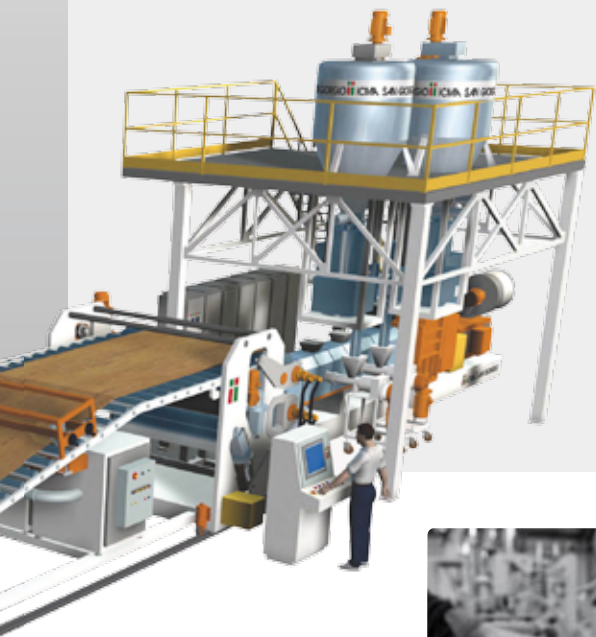


WPC PROFILES

ICMA is a specialist in offering turn-key solutions for the entire process plant.

ICMA Direct extrusion system produces in one step the extruded profile with unique advantages of:

1. Energy savings
2. Less space needed
3. Simple logistic management
4. Substantial cost savings (investment, management....)
5. Formulations adjustable in-line
6. Maintain a proprietary in-house manufacturing process
7. Only one heat/shear history

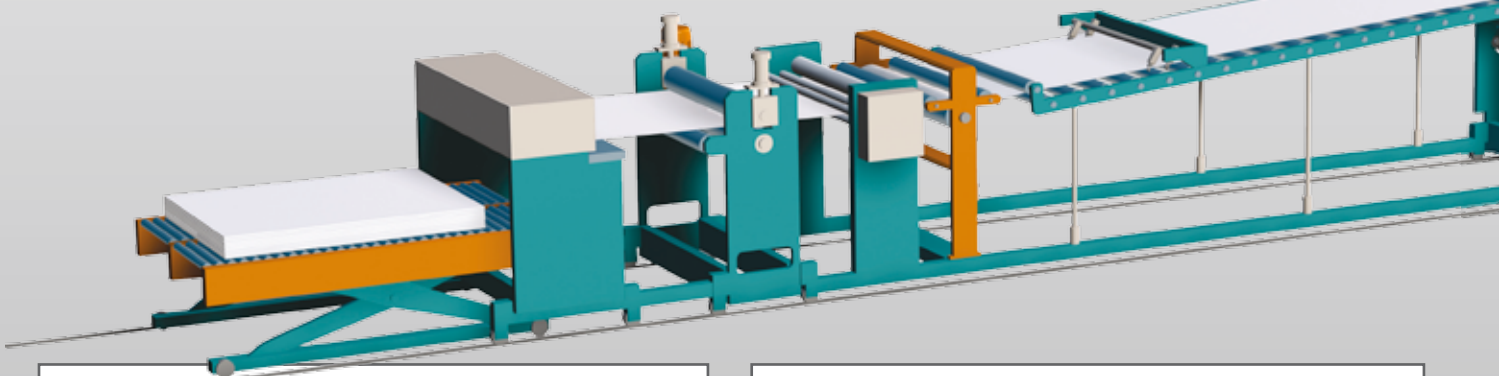
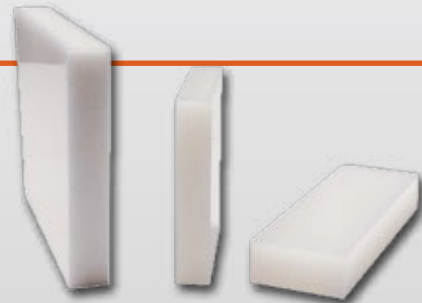




IN LINE EXTRUSION COMPOUNDING

REINFORCED SHEETS

DIRECT EXTRUSION of reinforced/filled sheets is the new frontier in this highly competitive market. It can achieve major **energy/cost savings** due to the single-heat cycle and reduced maintenance costs. Plus the **flexibility** of immediate in-line formulation adjustments saves time and **reduces** manpower.



DIRECT EXTRUSION/RECYCLING SYSTEM FOR DIMPLED MEMBRANE



DIRECT EXTRUSION/SYSTEM FOR REINFORCED LAYER OF PIPE

- Central layer of PP reinforced with glass fibres for heating system
- Central layer of PP with high mineral filler content for sound dampening on water discharge piping.
- Monolayer of filled PP for cost saving in general-purpose piping.

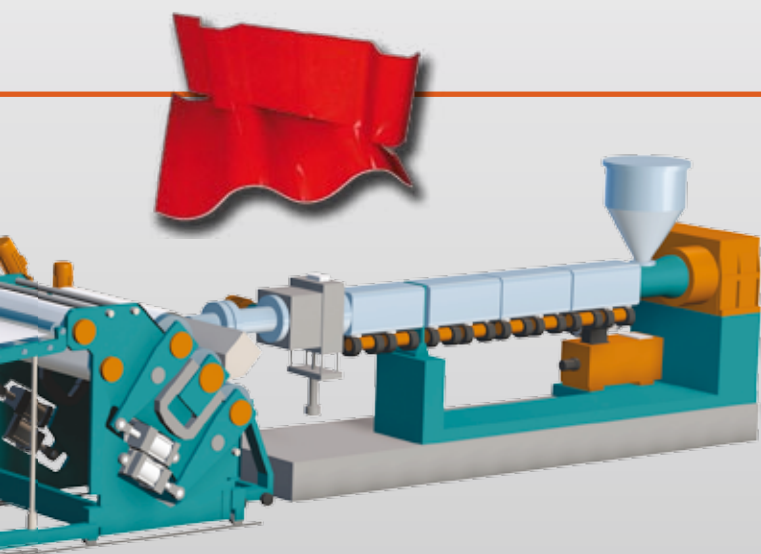


IN LINE LAMINATED SHEET/FOIL APPLICATION

- Substrate for general purpose moquettes
- Substrate for car carpet with sound insulation characteristics
- Water proofing membrane reinforced with plastic net and laminated with non-woven
- PET/EVA foil laminated fabrics with non-woven for the shoe industry
- TPE laminated with textile net for conveying flat belt production



- Moquette
- Virgin PE + bonding agent
- Recycled PE + min. fillers
- Non woven



TYPICAL APPLICATIONS

- High thickness sheets made of PP/HDPE filled with CaCO₃ or Talc
- Sheets made of recycled PE/PP with mineral filler
- Sheets made of PA reinforced with glass fibres
- Sound insulation sheets made of EVA with high filling content of barium sulphate
- Electromagnetic absorber sheets made of PE with high ferrite content
- Sheet made of PP filled with any kind of pulverised industrial waste

TURN KEY PLANT

COMPLETE SYSTEM FOR PRODUCING FOLDABLE PRODUCE CRATES

from co-extruded pe/pp sheets filled with natural fibres or mineral fillers
FOR THE TRANSPORT AND PACKING OF FRUIT AND VEGETABLES



COMPLETE SYSTEM FOR PRODUCING PALLETS FOR THE LOGISTIC INDUSTRIES

- WPC pallets produced by injection moulding process
- Pallets made of recycled PE by thermoforming process





OUR PEOPLE MAKE THE DIFFERENCE

