Information service offered to plastics & rubber technological companies by Maris SpA

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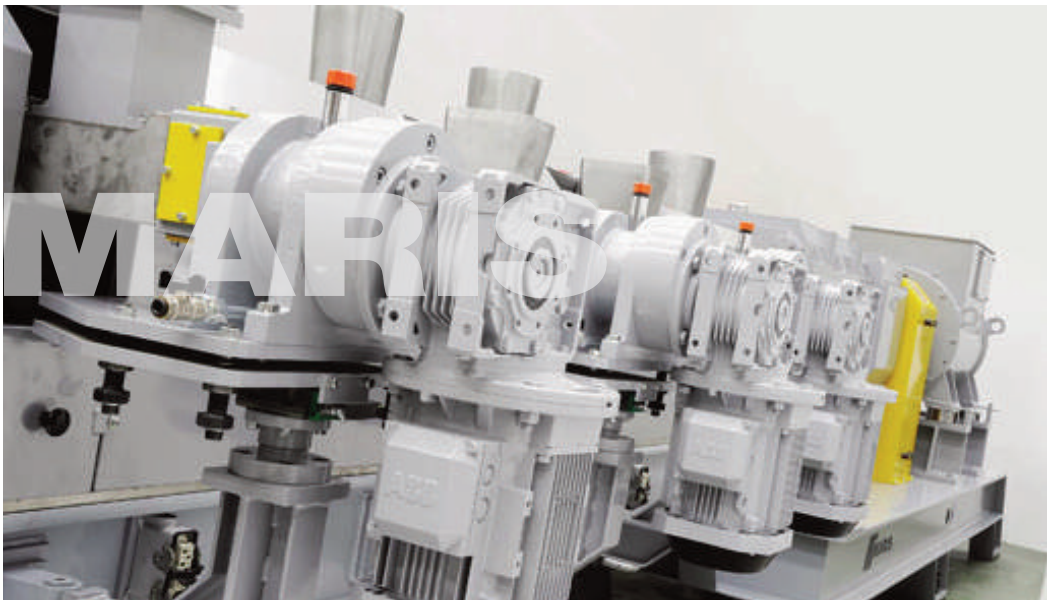
JOURNAL MARIS

NEWS FROM THE COMPOUNDING WORLD

DO NOT THROW WASTE AWAY, IT CAN BE USED IN ANOTHER WAY!



Regranulation is the easiest way to recycle a polymeric material and, for that purpose, single-screw extruders are employed. However, when the aim is to provide an added value to the material or to preserve its fragile stability, the use of a co-rotating twin-screw extruder is mandatory. Thanks to this type of extruder - which is a continuous dynamic mixer - fillers, reinforcing materials, colors and other components can be added to a less noble product thus enabling it to acquire further value.

Through a careful selection of materials and an accurate analysis of their composition, the co-rotating twin-screw extruder guarantees products of constant quality, even when using recycling materials.

In order to reprocess the materials we intend to recycle, they firstly need to be ground. If for the single-screw extruder, which works 'full-mouthed' (the screw is always covered in material), accurate feeding is not essential, the twin-screw extruder, which works 'hungry-mouthed' (the screw is never covered in material), a constant and meticulous

feeding is strictly required, especially if other ingredients are added to the polymers in the recipe. Obtaining a free-flowing material from the grinding process is therefore necessary and, whereas this is not possible, tape- or vibrating-channel feeders can be used so as to guarantee a smoother feeding process. Moreover, installing a forced feeder on the main feeding may be useful as well. This system will accordingly facilitate the introduction of the material into the extruder.

Recyclable polymeric materials may derive from two different sources: industrial wastes or part of the huge amount of Municipal Solid Waste (MSW). The former is of known origin and composition and – once sorted – they can be more easily reprocessed, while the latter must be separated first – using appropriate machinery – to be then treated and finally processed. If the former is unlikely contaminated by dirt or foreign materials, the latter require to be washed and are often subject to various types of contamination.

It is precisely during the sorting and the washing phases that some problems, which could affect the processing of materials from MSW, may arise. For instance, this may happen when the following elements are present:

- water, which must absolutely be reduced, since high quantities can limit compounding and granulation processes, as well as decrease the productivity;
- other polymers, metals or pollutants such as wood or paper.

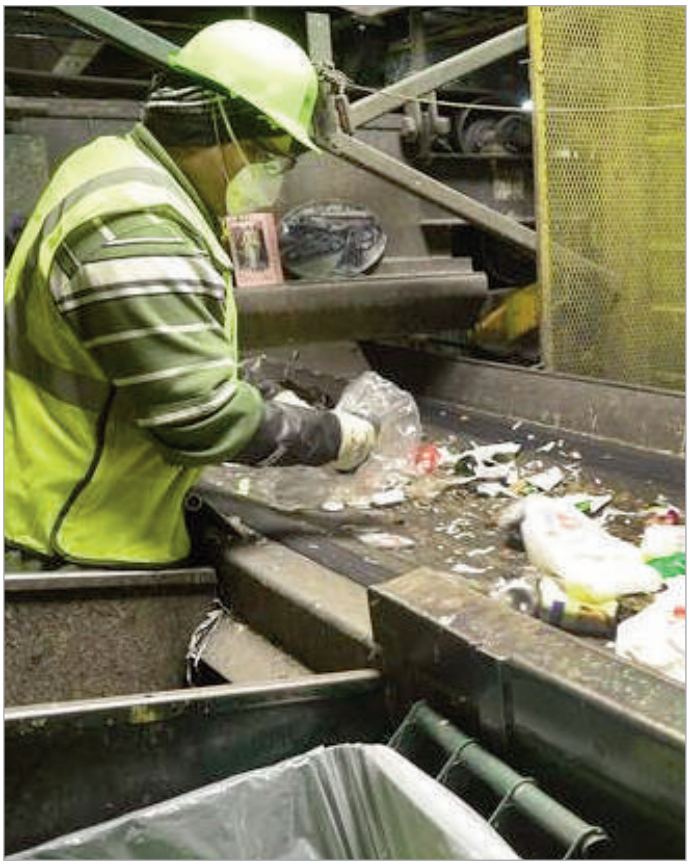
In this last case, the filtration system - with the help of a special device positioned in the final part of the extruder, can be a valid solution to these inconveniences, thus guaranteeing the quality of the material.

Wastes are washed with special soaps whose residues may release smells through the processing phase. If it were to occur, a potential addition of anti-odor additives has to be considered depending on the final application of the product.

A recycling process is advantageous only when the material is clearly identifiable, volumes are substantial and the market proves to be receptive concerning its reuse.

Polymers as polyethylene (PE) and polypropylene (PP) can be recycled showing satisfactory results. Polyethylene terephthalate (PET) from bottles, which is an example of MSW polymers, has a rather clear composition, it can be easily selected and its reuse for the production of bottles in the food sector has recently been authorized.

When recovering the PET, it is mandatory to reduce water traces so as to minimize the loss of intrinsic viscosity; for that reason, the process requires the use of high vacuum pumps enabling the removal of the residual moisture from the material and avoid any decrease in performances.



Other sources of post-consumer material derive from the agricultural sector (e.g. the mulching film) and from the automotive sector, especially materials coming from wreckers. In the first case, the resulting and remarkable quantity of reusable high-density polyethylene (HDPE) can be employed for the same application (even if rather polluted by rubble and dirt); as for the second case, we have large volumes of different materials with a discreet traceability.

In the past, MARIS has carried out some tests reprocessing hygiene-related items (namely diapers) with a PE polymer base. Materials of this nature can be found in big amounts and have shown some cleaning and sanitation-related difficulties, as well as concerning their feeding into the extruder.

Furthermore, even 'printed polyolefins' from food packages can be discolored thanks to the stripping technique, which is typically carried with water.

Industrial scraps - if appropriately selected - provide an excellent secondary raw material (SRM).

In the rubber sector, for example, thanks to the devulcanization process patented by Maris, which makes it possible to recycle production wastes through a continuous system, producers can re-use part of their wastes re-introducing recycled rubber into the same production cycle in a proportion that does not compromise the material performances. In fact, the devulcanization process enables the reintroduction of recycled material into the basic formulations from 15% to 50% minimizing the impact on the mechanical properties of the final product.

It should be underlined that - after a careful selection and the identification of materials - the above-mentioned devulcanization process can be applied to post-consumer materials as well. In this case, recycled rubber can be employed in completely different areas when compared to those of origin.

Back to industrial wastes, thermoplastic materials offer a wide range of possibilities. Processing wastes and non-compliant parts – once ground and converted into free-flowing material – are likely to be mixed with solid and/or liquid additives to be then reused.

This type of process can be applied to all types of polymers (such as polyolefins and PVCs) and techno-polymers (including TPUs and PCs).

INDUSTRY 4.0: FUTURE GETTING CLOSER

The term 'Industry 4.0' has now become an expression of common knowledge, even though a widely shared definition or a specific relevant legislation still does not exist. The word was born in Germany in 2013 to be then interpreted in several and rather different ways according to the most diverse realities and specificities of the countries where it has been adopted. Industry 4.0 is a 'paradigm' or – rather - a 'concept' able to turn the production reality into a leaner, dynamic, flexible, efficient and sustainable system thanks to specific principles (e.g. interconnection and/or virtualization). In other words, it is the process that will lead users to a fully automated and interconnected industrial production.

Criteria for its application vary according to the country of reference. Common standards are particularly difficult to identify. As for the Italian legislation, the 'general guidelines' applied to the extrusion lines are the following:

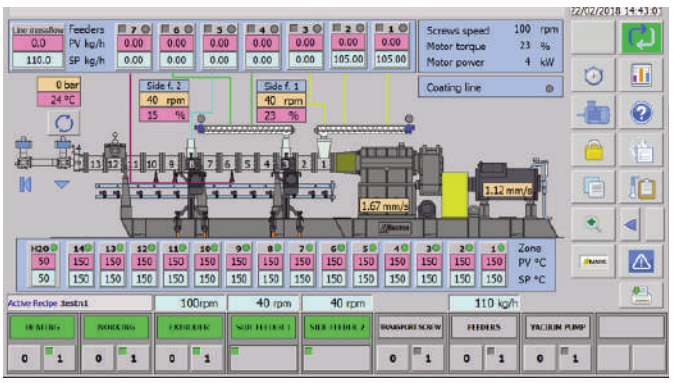
- control by means of PLC (Programmable Logic Controllers);
- interconnectivity with factory information systems and remote loading of instructions (recipes);
- automated integration with factory logistics systems, supply network or other machinery of the production cycle;
- simple and intuitive human-machine interface;
- remote maintenance, remote diagnostics or remote control systems;
- continuous monitoring of working conditions and process parameters through appropriate sets of sensors and the adaptability to process deviations.

HOW DO MARIS LINES MEET THESE CRITERIA?

Maris has already provided lines enabling customers to benefit from a specific fiscal advantage. However, which solutions have been chosen?

Control by means of CNC (Computer Numerical Control) or PLC (Programmable Logic Controllers)

Maris extruders are equipped with constantly evolving hardware and software PLCs. This allows the communication within different fieldbuses and to meet the interconnectivity requirement as well. Although all our software is in-house developed and is part of our know-how, no custom product and/or protocol is used for communication purposes.



Simple and intuitive human-machine interface

The human-machine interface (HMI) – achieved by using color touch-screen panels – has been studied and thought to be easily understood and employed by means of intuitive icons always placed in the same position on the various video pages, function buttons to start and stop several devices ordered and represented in logical sequence, soft colors to avoid eyestrain.

Moreover, diagnostic pages have been inserted as well in the perspective of remote diagnostics purposes. Thus, the whole system status can be checked without opening the electrical panel or, better still remotely.

Remote maintenance and remote diagnostics

The machine manufacturers market has been using modem to modem connections to remotely access devices and systems for years. Nowadays, thanks to the Internet and the broadband – through industrial VPN routers that easily guarantee excellent levels of connectivity and reliability – opportunities to connect any type of system or device in plants and installation sites worldwide are constantly increasing.

An available remote connection for our systems allows us to meet both the requirements of remote maintenance and of remote diagnostics.

Interconnectivity with factory information systems and remote loading of instructions/ Automated integration with factory logistics system, the supply network or other machinery of the production cycle

'Industry 4.0' means the possibility to intensively use, assess and analyze production data within the IT (Information Technology) systems of a company's corporate level.

Nowadays, PLC programs are already collecting large amounts of data on production and process levels (pressure values, temperatures, totalizers).

Thanks to Industry 4.0, the exchange of data between production and corporate levels of a company, or with other systems of the line, must be guaranteed and made available to IT systems in order to – for instance – improve product quality.

Taking into account the fact that historicizing data and handling the communication with the logistics department are a customer's task (or of a company on its behalf), one of the essential requirements for the success of Industry 4.0 is therefore the existence of a uniform standard to exchange data.

As for Maris lines, the use of worldwide recognized and employed protocols such as Profinet or open protocols as the OPC Unified Architecture (UA) makes reading and writing data available and easier to manage with no need to resort to a more specific purpose-oriented add-on software.

Continuous monitoring of working conditions and process parameters through appropriate sets of sensors and the adaptability to process deviations

This requirement is naturally fulfilled by Maris lines as it is vital to meet the basic process and safety needs of our customers.

EXTRUSION LINES: MACHINERY OR PARTLY COMPLETED MACHINERY?

In our previous articles, we have been underlining what an End user should be aware of when deciding to buy partly completed machinery and to assemble them in a machinery where the CE marking is affixed. This article deals with one of the most critical issues to be considered: maintenance of the final machinery and its documentation.

As stated in the Machinery Directive, the documentation accompanying the final machinery plays a significant role in ensuring the safety of the workers. The End user assembling partly completed machinery should record in a Technical File the risk assessment as well as any other information useful to ensure that the machinery is safe. This Technical File should include all the information for a safe maintenance of the final machinery.

Maintenance is part of the life of machinery, as well as one of the Essential Health and Safety Requirements, and failing to properly design the final machine could generate risks for maintenance workers, which is to be avoided at all costs.

The first step to correctly assess the risks arising during the maintenance operations is to read and understand the instruction manuals and the Instructions for incorporation transmitted by the manufacturers of the partly completed machinery. This information is the basis for the manual of the final machine the End user shall prepare.

This manual is not just a "copy-and-paste" summary of the information taken from the manuals of partly completed machinery; in fact, the End user should consider the final machinery as a new item, because the interaction between the different machines could make the access for maintenance difficult. Hoppers, gantries and other equipment added to a partly completed machinery without previous agreement with the manufacturer could require additional access platforms to be added. Furthermore, consideration must be given to how to

get tools, spare parts and components to the areas where they are needed. If access is by a ladder then it is difficult to get tools and equipment safely, so maybe better access needs to be provided so that they can be lifted by forklift truck or overhead crane. In certain cases, a re-design of some machines is the only way - which is very expensive - to allow a safe maintenance of the line.
A better result can be achieved if the maintenance requirements are taken into consideration since the beginning of the project, letting the manufacturers of the partly completed machineries have a view of the part of the project involving their machines.
In conclusion, CE marking is an issue that should be considered from the very beginning of the project. The Essential Health and Safety Requirements are a key part to CE marking so, if they are not addressed properly, it is likely things will be missed. Contracts need to specify where responsibility lies: the person who is expected to take care of the final machinery preparing all the documentation required by the Machinery Directive should also co-ordinate the manufacturers of the partly completed machineries composing the final machinery.
The role of assemblers is crucial to guarantee the safety of the final machinery throughout its life. The End user should be aware that the final machinery is not "a set of different machinery assembled together", but a new item which could generate additional risks that should be assessed, providing the correct documentation.
Thanks to a long-standing experience, Maris Company is your right partner, either if you decide to buy machinery or partly completed machinery, helping you to fulfil the Directive and to guarantee the safety of your employees.

(4 - the end)

The Machinery Directive 2006/42/EC can be downloaded from:
http://ec.europa.eu/enterprise/sectors/mechanical/documents/legislation/machinery/index_en.htm

The Guide to application of Directive 2006/42/EC can be downloaded from:
http://ec.europa.eu/enterprise/sectors/mechanical/documents/guidance/machinery/index_en.html

EXHIBITIONS, CONGRESSES AND CONFERENCES IN 2018

PLAST ALGER 2018
ALGIERS / ALGERIA
on March 11 th to 13th, 2018

25TH ETRA CONFERENCE
BRUSSELS / BELGIUM
on March 14th to 16th, 2018

CHINAPLAS 2018
SHANGHAI / CHINA
on April 24th to 27th, 2018

NPE 2018
ORLANDO / USA
on May 7th to 11th, 2018

ELMIA POLYMER 2018
JÖNKÖPING / SWEDEN
on May 15th to 18th, 2018

ACI'S EUROPEAN ADHESIVES & SEALANT SUMMIT 2018
WARSAW / POLAND
on May 23rd to 24th, 2018

PLAST 2018
MILAN / ITALY
on May 29th to June 1st, 2018

COMPOUNDING WORLD EXPO 2018
ESSEN / GERMANY
on June 27th to 28th, 2018

MASTERBATCH 2018
MADRID / SPAIN
on September 3rd to 5th, 2018

... to the next!

plast 2018

PLAST 2018 EXHIBITION PREVIEW

The next edition of PLAST - the international exhibition for the plastics and rubber industries - will take place in Milan from May 29th to June 1st. It represents a very important event for all the operators of this sector.
With its almost 1.600 exhibitors on an area of about 55.000 sq., Plast 2018 will be again the biggest event in Italy in the innovative plastics and/or rubber industry.
The event is expected to attract around 50,000 visitors from over 100 different countries.
For this exhibition, Maris has been assigned a booth of 220 sq. in the Hall 13, with stand number C/D 21/22.

HOPE TO MEET YOU THERE IN ORDER TO DISCUSS NEW PROJECTS TOGETHER!

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