

2015/2016

RECYCLINGNEWS



STEP UP!

EREMA opens new UpCentre®

IN ACTION

International users report

SMOOTH FINISH

Gentle processing. Perfect result. Re grindPro®.

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“The only substitute for quality is quality”

Fabian Kasten’s quotation perfectly sums up the trend in plastics recycling: the way forward is with quality recycled pellets. The growing quality requirements span all product categories. They apply both to straightforward, existing applications and just as much to new, higher quality products in which virgin material is replaced entirely with recyclate. As a result, recycling companies are able to not only develop existing markets, they can in fact also open up new, future markets for themselves. As the market and innovation leader we have been setting the quality standard in the industry from the beginning in order to meet this trend and support our customers with the best recycling technologies.

In the articles on pages 4/5 and 6/7 we take a look at the quality requirements facing recyclers in the In-house and Post Consumer sectors together with the concrete answers and solutions which EREMA already has available for you.

The highlight of this new issue, however, is of course our latest new development which will allow us to systematically continue the course for even more quality in plastics recycling: the new INTAREMA® Re grind Pro® which enables you to process an extremely wide variety of thick-walled regrind material types to make application-optimised recycled pellets. This means you can make even better use of regrind as an alternative to virgin as this enables end products which are made from up to 100% recyclate and, moreover, stand out through top functional properties. You will find the technical details of this innovation on pages 10 to 17.

The fact that EREMA sees itself not only as a “pure mechanical engineer” but also as a partner for its customers can be seen in our latest service: the EREMA UpCentre®, which offers you a whole new form of upcycling service. Starting immediately you can use COREMA® technology for the sampling of recycling compounds. Turn to pages 20 to 22 for more information on this subject.

As you can see, with our EREMA technologies you will be perfectly equipped for current developments and key (technological) challenges in plastics recycling. Our customers also underline this once again in this issue of Recycling News with interesting user reports on pages 23 to 38.

So don’t settle for anything less, make sure you (continue to) count on top quality!

Klaus Feichtinger, EREMA CEO

Manfred Hackl, EREMA CEO



THE EREMA CONCEPT

- 1 PRE-CONDITIONING UNIT
- 2 GENTLE MELTING
- 3 FILTRATION
- 4 HOMOGENISATION
- 5 DEGASSING
- 6 COMPOUNDING
- 7 QUALITY CONTROL



Clemens Kitzberger, EREMA Business Development Manager Post Consumer Recycling at the EREMA "Discovery Day" 2015. Guests took full advantage of information about trends, challenges, opportunities and efficient solutions in the field of post-consumer recycling.

Post Consumer Recycling continues to thrive

The figures and trends in the field of post-consumer waste recycling speak for themselves and the market has huge growth potential: currently, of the around 46 tonnes of plastic consumed in Europe every year, only 2.3 million tonnes – i.e. 5% – are processed into recyclate. Experts expect, however, that this figure will increase to 10 to 15% in the short- to medium-term. One reason for this is the stricter legislation, such as landfill bans, for example, which are currently effective in only nine European countries and due to be implemented step by step also in other countries. However, parallel to this drastic increase in quantities, the quality of the input material from post-consumer waste will become much poorer. Quality requirements, on the other hand, which recycled pellets have to fulfil are increasing – as in the case of blown films which are becoming thinner all the time. This is why there is a demand for recycling systems which are able to turn poor input quality into high output quality. Another benefit of such solutions is that they act as a door opener for new markets. Because recyclers can place their recycled pellets this way also in higher quality end products which in turn can achieve more attractive prices.

What are the current trends and challenges in post-consumer recycling? And what can recycling companies do in the future to make use of attractive opportunities in the marketplace for themselves? More than 200 existing and potential international customers and guests heard the answers to these questions at the "EREMA Discovery

Day: Post Consumer Recycling" held at the company's headquarters in Ansfelden in March 2015. EREMA has now put into operation 2,050 post-consumer & post-industrial recycling systems throughout the world in a period spanning more than 30 years. Highly efficient recycling technologies are in demand due to the

high degrees of residual moisture and contamination in the input material. The current trend which can be observed in the direction of "poorer" input material will continue. Clemens Kitzberger, EREMA Business Development Manager Post Consumer Recycling, explains: "Packaging materials are becoming

thinner and thinner so the relative portion of impurities such as paper labels, for example, which have to be removed at some point during the process is growing as a result." There is an additional aspect for countries planning to implement landfill bans in the future and thus increase recycling rates: "In such countries it will probably take some time until the quality of the collection systems – i.e. clean-sorted separation – reaches the level of those countries which have already been handling this successfully for a while," adds Kitzberger. EREMA systems have the advantage that they can also achieve top results in terms of output quality even with these very challenging materials.

The success concept

Besides efficiency it is above all the flexibility of the EREMA systems which, Kitzberger says, makes for a recipe for success: "Our recycling customers have to be able to remain flexible enough to

meet the ever changing demands in the marketplace. This is possible with the EREMA concept." The modular concept of the systems (the full effect of which can be seen with the INTAREMA® TVEplus®) consists of the following: preconditioning unit, gentle processing, filtration, homogenisation, degassing and quality control – plus compounding can be added if required.

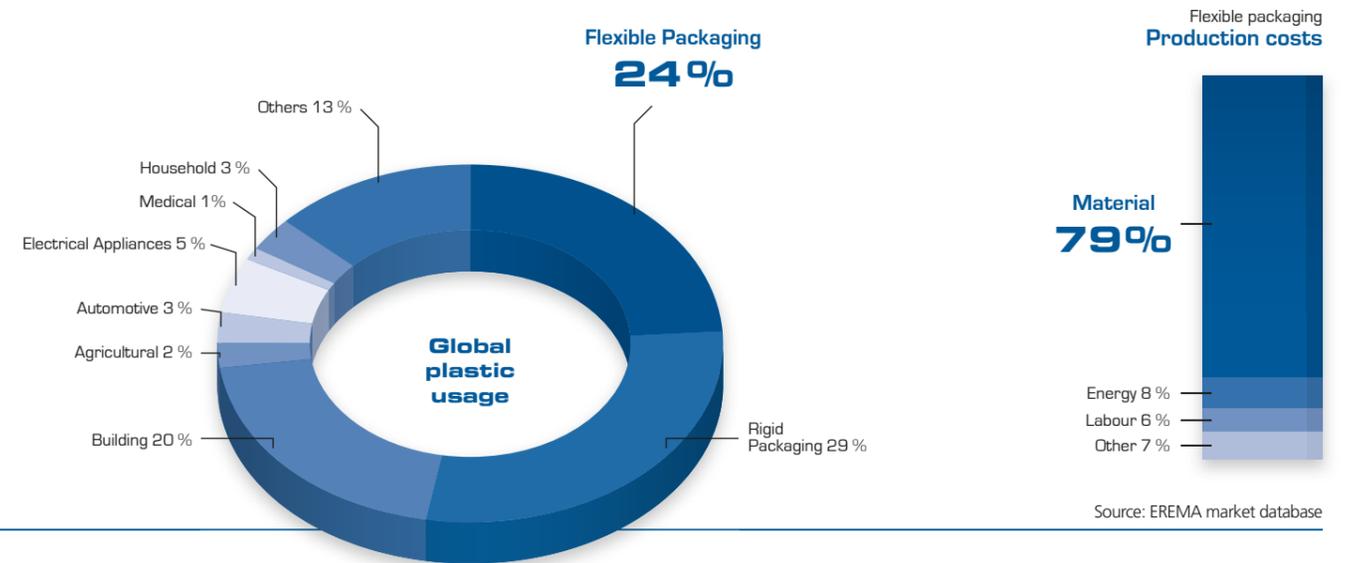
Recycling is gaining presence

The increasing amounts of post-consumer recycled pellets pose two key questions for recycling companies. Firstly, what can you do with these additional quantities? Put them in existing plastics products with a high amount of recyclate and/or in new, creative products which consumers who have a growing awareness of sustainability are looking for? And secondly, will the prices for recycled pellets which are used "only" in standard applications be put under pressure due to the increasing quantities? There is a

lot to be said in both cases that the accent will be increasingly on quality recycled pellets. After all, plastics processors expect that the increased amount of recycled pellets in the product will not have a negative impact on the functional characteristics in terms of mechanical properties, surface quality, smell, etc. And the people who buy an innovative recycling product tend to place higher requirements on it – for example in terms of the haptics and design of articles in the lifestyle and electronics sector. Such new products can often be made only with higher quality recycled pellets. This can be a new future market for recyclers, one that also enables greater flexibility with regard to pricing. EREMA supports recycling companies who want to take this step towards more quality. On the one hand with concrete products such as the two plant types INTAREMA® TVEplus® and RegrindPro®, plus the upcycling solution COREMA®. And, on the other hand, with innovative services such as the recently founded EREMA UpCentre® (see page 20).

Reduced production costs thanks to efficient In-house Recycling

Some 2,000 of the 4,500 EREMA plants in operation throughout the world are in-house recycling systems.



Flexible packaging accounts for a quarter of the world's plastic applications. Special polyethylene (PE) film applications such as shrink and stretch films and biaxially oriented PP (BOPP) dominate the field here with annual growth rates of 3-5% in the market. As material costs account for the majority (over three quarters) of the production costs, less production "waste" also means lower costs for raw material and disposal. And this is why efficient in-house recycling saves packaging manufacturers immense costs.

Recycling is not the core business of packaging manufacturers. For many of them, it is uncharted territory. This article will tell you more about the benefits processors have when they handle this processing stage in-house, how it can be easily integrated in the existing logistics and how you can keep product quality stable and personnel requirements low.

Intelligent in-house recycling solutions

In-house recycling solutions, especially for flexible plastic packaging, are a core competency at EREMA – some 2,000 of the over 4,500 systems sold around the world operate in this application field. Film and packaging manufacturers who would like to integrate recycling in their production operations benefit from this wealth of experience. With EREMA's in-house systems you can return up to 100% of the plastic "waste" to the production process and save production costs as a result.

Thanks to the reduced use of primary raw materials and the savings in energy costs, the amortisation period for the investment in the recycling systems is very short.

Quality counts

However, packaging manufacturers are not just interested in cutting costs when it comes to the reutilisation of their production waste. They are more interested in the quality of their end products remaining at the same, high level they have without the addition of recycled pellets. EREMA systems meet this quality requirement on a number of levels. First of all through the combination of the preconditioning unit and recycling extruder, plus Counter Current technology which has been available since the INTAREMA® generation was launched. This technology package ensures the preconditioning of the plastic material prior to extrusion which is crucial for the quality of the recycle. Moreover,

and especially together with the high degree of automation of the INTAREMA® plant, it ensures that the recycling process remains stable – despite varying input material properties and conditions. Thanks to the Smart Start system, however, the labour required for the recycling process is kept to a minimum, and this is important as in-house recycling systems often only run "on the side" compared to the actual film production plant. Depending on the customer's logistics requirements, EREMA systems can be integrated both directly in the production lines and also installed as an offline system. "Crocodile", a special conveyor belt with fully automatic feed control for endless tapes and edge trim which becomes extremely tangled through storage, has also been available from EREMA since 2014. This makes it possible to process these materials directly in the INTAREMA® system – without prior size reduction.



Turnover up 21%

EREMA ends 2014/15 fiscal year with sensational result

EREMA GesmbH achieved a record turnover figure of EUR 115 million for the 2014/15 fiscal year. This corresponds to a 21 per cent and EUR 20 million plus in turnover compared to the previous year. The turnover of the EREMA Group as a whole with 480 employees in total (EREMA GesmbH, PURE LOOP GesmbH and 3S GesmbH) rose to EUR 130 million.

This result shows that EREMA is continuing its positive course of previous years. EREMA GesmbH was able to generate a turnover of EUR 115 million at its location in Ansfelden alone from April 2014 to March 2015. "This growth is due primarily to the new INTAREMA® plant generation and confirms that this innovation is an attractive technology for customers," explains EREMA CEO Manfred Hackl.

Together with 3S GmbH in Roitham near Gmunden and subsidiary EREMA North America Inc. in Ipswich, MA, EREMA has been pursuing a consistent and sustainable growth strategy for a number of years. This also has an impact on group turnover, with consolidated sales at around EUR 130 million in the last financial year.

Technology innovation INTAREMA®

This success is supported above all by the new INTAREMA® plant generation with

260 recycling systems sold already at the location in Ansfelden since the system was launched two years ago. "Thanks to Counter Current technology, INTAREMA® is exceptionally flexible and productive," explains Hackl, "the system adapts in an optimum way to the broad spectrum of recycling applications which means that demand is constantly high."

Further plans for growth

EREMA announced its continuing expansion at the beginning of 2015 with the foundation of the new sister company PURE LOOP GesmbH. In terms of strategy, PURE LOOP as the sister company of EREMA pursues the clear positioning in the market and further development of the shredder-extruder technology while EREMA as a group intensifies its range of services in the field of in-house recycling. The next expansion is now in full swing:

EREMA North America, Inc., a subsidiary of EREMA GesmbH, is more than doubling the size of its trial centre due to high demand – especially in the post-consumer recycling sector. The trial centre at the company's head office in Ipswich, Massachusetts, will be extended to 2,400 m² in total featuring four recycling systems for test runs. Sister company 3S also expanded in the 2014/15 financial year. The new premises in Wartberg im Mürztal in Styria were extended by 4,000 m² to a total of 7,000 m² production space and the number of employees rose from 60 to 68 compared to the previous financial year.

PRODUCT WORLD

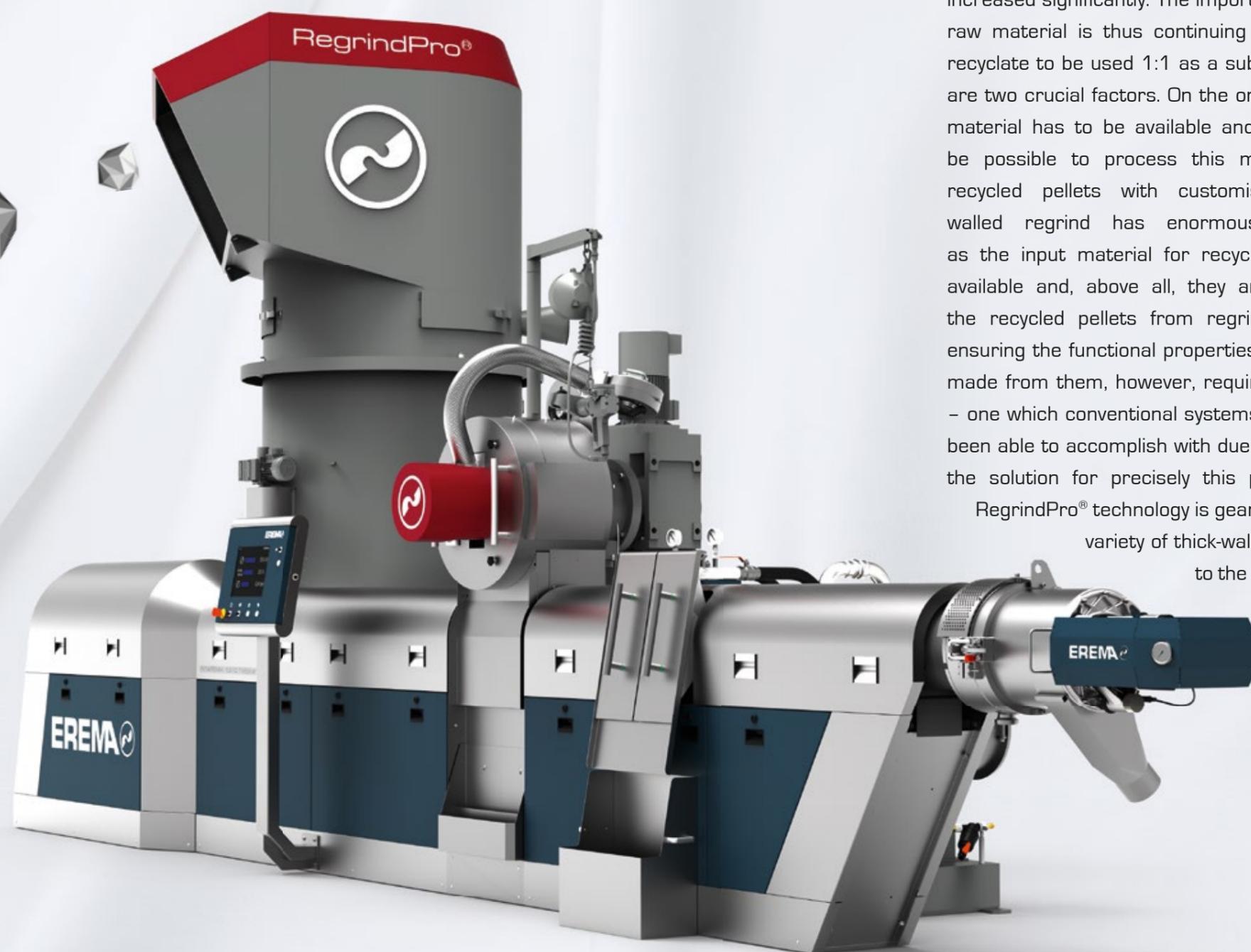


RegrindPro®

A giant leap forward in the recycling of plastic regrind

In order to secure the plastic loop streams also for future generations, the amount of recycled material in products has to be increased significantly. The importance of plastics as a secondary raw material is thus continuing to increase rapidly. To enable recycle to be used 1:1 as a substitute for virgin material there are two crucial factors. On the one hand, sufficient raw recycling material has to be available and, on the other hand, it has to be possible to process this material economically to make recycled pellets with customised property profiles. Thick-walled regrind has enormous potential in this respect as the input material for recycling – sufficient quantities are available and, above all, they are clean sorted. Reprocessing the recycled pellets from regrind without any problems and ensuring the functional properties of the end products which are made from them, however, requires a specific recycling process – one which conventional systems on the market have so far not been able to accomplish with due thoroughness. EREMA now has the solution for precisely this purpose: the new INTAREMA®

RegrindPro® technology is geared exactly to the extremely wide variety of thick-walled regrind material and, thanks to the exceptionally gentle process and highly efficient filtration, can make high-grade recycled pellets from regrind.



RegrindPro® Flexible universal machine: gentle processing and efficient filtration

Recycled pellets based on regrind material are an excellent alternative to virgin material for plastics processors. Most of all because of the fact that regrind is easy to sort and separate and is thus available as a clean-sorted input stream for the upstream recycling process. Raw material sources include thick-walled packaging such as HDPE blow-moulded bottles from the hygiene and cosmetic sectors and also thermoformed and injection-moulded articles made of polypropylene and polystyrene such as closure caps, cups, fruit containers and butter tubs. Plastics from waste electrical and electronic equipment (WEEE) and products from the automotive sector such as bumpers, battery packs, engine piping, etc. also have great potential in terms of reutilisation. EU Directive 2012/19/EU on WEEE foresees 85% reutilisation as of 2019. This corresponds to approx. 12 million tonnes of WEEE per year including approx. 2 million tonnes of plastic (largely ABS, PS). Furthermore, the Directive ELV

(2000/53/EC) has stipulated since January 2015 that the recycling rate for end-of-life vehicles shall be at least 85% of the weight, and these currently consist of 12 to 15% plastic. Clemens Kitberger, EREMA Business Development Manager Post Consumer, underlines the potential of polyolefin regrind with an example from the USA (see Fig. 1): "In the USA the post-consumer recycling rate for the various bottle types is only in the region of 30%. The bottles are, however, easy to sort - both for the consumers and for machines - and compared to film, regrind has a higher bulk density of 200-600 kg/m³ and is free-flowing. Both properties contribute to the washing and sorting processes working better and the material thus being available in a more clean-sorted form. This has huge potential in terms of the recycled pellets produced coming very close to virgin material - similar to PET bottle recycling." The material streams are, therefore, available in sufficient quantities for the

use of recycled regrind as a substitute for virgin material and, compared to film, they are also available in a more clean-sorted form. Processors are, however, also interested in the rheological properties of these recyclates allowing trouble-free subsequent processing and the assurance of the functional characteristics of their end products. Besides the mechanical aspects, above all surface quality, dyeability and smell are decisive quality factors. This places particularly high requirements on the recycling process which commercially available systems have not always been able to meet so far.

Challenge: regrind recycling

Due to its high bulk density (200-600 kg/m³) and the fact that it is free-flowing, regrind is, as a rule, easy to dose in an extrusion system and requires no additional compacting and size reduction. The challenge, however, lies particularly in melting the thick-walled regrind

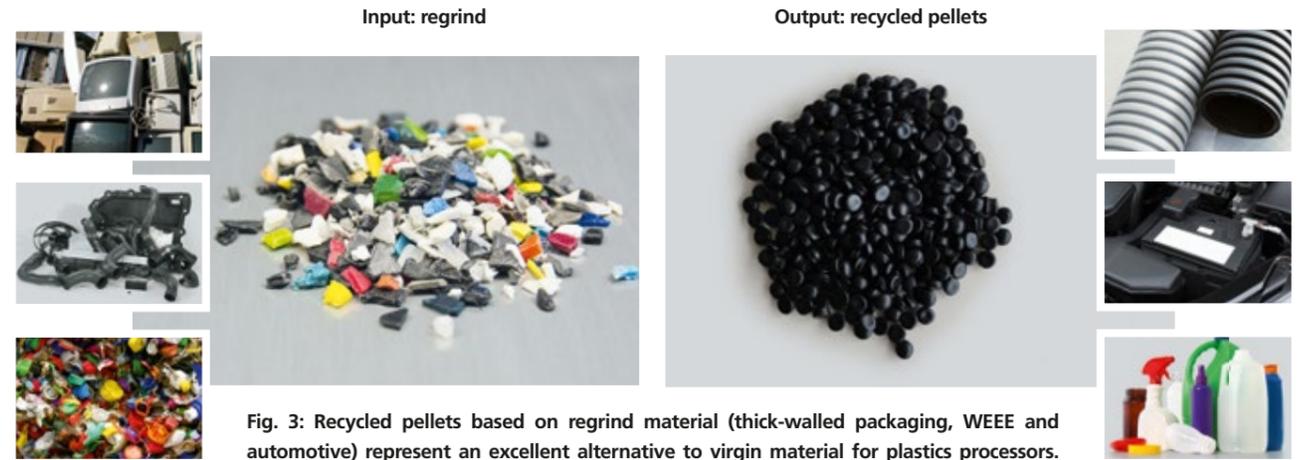


Fig. 3: Recycled pellets based on regrind material (thick-walled packaging, WEEE and automotive) represent an excellent alternative to virgin material for plastics processors.

particles in a gentle way, as they require more time to heat through and melt compared to thin films. With conventional treatment systems the regrind is dosed into the single or twin-screw extruder via a hopper system. A longer processing unit is thus required to melt the cold regrind particles. This increases the residence time in the extruder and the melting process takes place under high shear stress. The polymer structure is destroyed in parts because of this, which has a negative impact on the mechanical properties of the end products. Additionally, the impurities appearing in the regrind material are also reduced in size through the impacting shear forces and filtration efficiency is decreased drastically as a result. Compared to the single screw systems, this effect is increased with the co-rotating twin-screw extruder through up to three times poorer filtration fineness

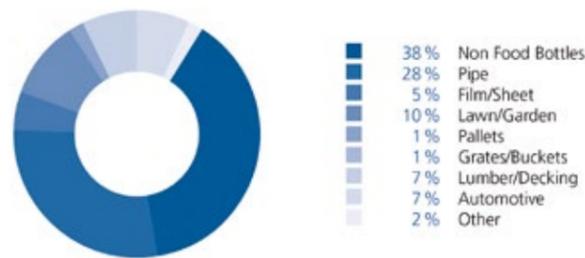
due to the low pressure build-up. The cold-fed single screw systems lack the flexibility to handle the various regrind types such as HDPE and PP with the same quality requirements economically on one system. Additionally, moisture contents of up to 8% mean that energy-consuming pre-drying is necessary on both systems. The specific treatment process in the recycling of thick-walled input material thus has to be designed to be able to work with different types of regrind (PP, PE, PS, ABS, etc.), with a wide variety of bulk densities and moisture contents, plus strongly varying contaminants such as impurities like rubber, silicone and soft contaminants like wood and paper, plus foreign polymers like PET and PA. These contaminants have to be removed effectively because more and more material is being saved in wall thick-

nesses also in the production of e.g. bottles and pipes, and the end products are thus more sensitive to defects through contaminants. The statistics from the USA in Fig. 2 show the end products which are made from HDPE bottle regrind. Non-food bottles account for the largest part with 38%, followed by 28% in the piping sector and 5-7% in automotive applications and films. In these end applications it is not only the mechanical properties, smell and dyeability but also and in particular the surface quality which is an essential criterion. This, however, can be achieved only if the recycled pellets used for this purpose have been filtered extremely efficiently in the upstream recycling process. The value added increases additionally, as the recycled pellet amount in the finished product can also be raised up to 100% as a result.

Plastic Bottle Type	Plastic Recycled	Resin Sales	Recycling Rate
PET	1798.0	5764	31.2%
HDPE Natural	440.4	1571	28.0%
HDPE Pigmented	605.0	1733	34.9%
PVC	0.4	76	0.5%
LDPE	0.3	78	0.4%
PP	62.0	195	31.8%
Other	3.8		
TOTAL BOTTLES	2906	9417	30.9%

Source: American Chemistry Council and Association of Postconsumer Plastic Recyclers, 2014

Fig. 1: Bottle market and recycling in the USA 2013



Source: American Chemistry Council and Association of Postconsumer Plastic Recyclers, 2014

Fig. 2: End products from recycled HDPE bottles; post consumer market in the USA

Clemens Kitberger sums up:

"Processors who use recycled pellets from regrind have to be able to rely on their end products having premium surface quality and that their mechanical properties likewise stay top class. In order to be able to recycle in line with these criteria the recycling extruder has to be filled with thoroughly warmed regrind particles to ensure first of all exceptionally gentle processing and, secondly, high-performance filtration. And these are precisely the two key functions of our innovative RegrindPro® technology."

Die RegrindPro® technology

What makes RegrindPro® so special is that unlike other systems the regrind material is heated through already prior to extrusion which increases both flexibility in material selection and filtration efficiency as a result. This is handled by the preconditioning unit which is optimised for the regrind and in which the material is processed in an extremely gentle way by means of a rotor disc with a special tool setup (see Fig. 4). Thanks to the slow turning of this rotor disc the thick-walled, moist particles are efficiently dried and degassed with a high filling level and thus longer residence time. Long residence times in the preconditioning unit are important so the regrind is not only dried but also so it has enough time to be warmed thoroughly and homogeneously. An additional benefit of the longer residence time is that powder additives such as CaCO₃ can be admixed in amounts up to 20% and, above all, be distributed well.

After the preconditioning unit the dried, degassed and thoroughly warmed material is dosed into the directly connected extruder and melted in the short universal screw with minimum shear stress. EREMA's Counter Current technology offers a further benefit here, which is crucial especially in terms of free-flowing materials such as regrind. This is made possible by the screw being filled virtually pressure-free and the fact that it only takes as much as is required at any one time. Furthermore, the melting process with minimum shear stress increases the cleaning efficiency of the melt filter as the size of organic or mineral solid matter is not reduced. This means that even contaminants such as wood and paper can be optimally filtered because, thanks to the

gentle process, the fibres do not separate and they remain large enough to be discharged at the filter.

Through the combination of the optimised preconditioning unit with a new, particularly gentle universal screw, RegrindPro® additionally offers you a remarkably high degree of flexibility in the choice of materials, which enables multipurpose regrind processing. This allows you, for example, to process regrind despite varying melting points and energy contents, as in the case of HDPE and PP, using the same system with full output and in a gentle way.

Once the material has been melted the melt passes through the recently enhanced EREMA Laserfilter. Thanks to the redesign of the scraper geometry and discharge system, contaminants are removed even more quickly which reduces fine particles and results in even better filtration performance. Clemens Kitzberger recommends the RegrindPro® package with EREMA Laserfilter especially in the

post-consumer sector: "Thanks to the optimised scraper geometry in the Laserfilter, rubber-like, non-melting contaminants such as silicones and linked polymers are removed quickly and continuously from the screen and thus filtered even more effectively." Clemens Kitzberger explains further: "Additionally, the principle of EREMA's patented TVEplus® technology also comes into effect: melt filtration pri-

or to homogenising and degassing. This removes any impurities from the system before they can outgas and prevents the formation of undesired smells."

The RegrindPro® configuration can also be combined with EREMA's recycling and compounding technology COREMA®. A way of producing customised compounds directly in a single step on the basis of regrind.



EREMA preconditioning unit optimised for regrind



The thick-walled regrind particles are heated through homogeneously in the EREMA preconditioning unit and prepared for extrusion

Gentle melting process

The combination of the preconditioning unit with a particularly gentle universal screw makes for high flexibility in the choice of materials and a gentle melting process with minimum shear stress

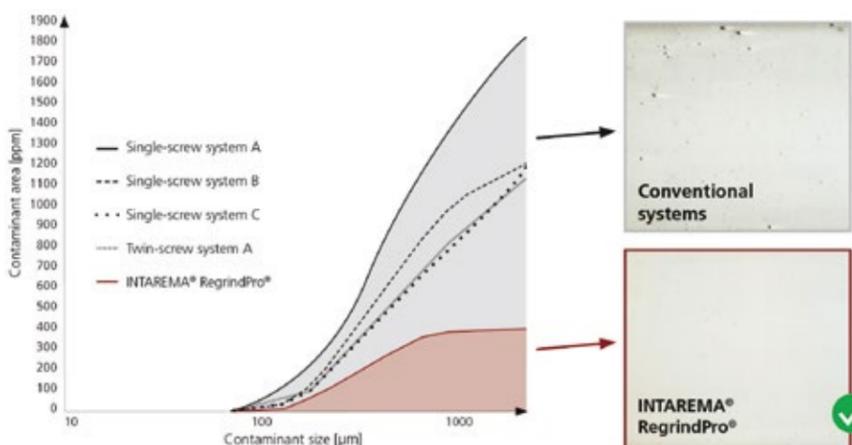
High-performance filtration

Thanks to the gentle processing and redesign of the scraper geometry and discharge system of the EREMA Laserfilter, impurities are filtered out extremely efficiently with continuously high output

Fig. 4: The new RegrindPro® for highly efficient regrind recycling

Comparison test confirms efficiency lead of RegrindPro®

Fig. 5 compares the filtration efficiency of conventional single and twin screw systems with the new RegrindPro® system. Natural PP regrind from the same batch was used as input material on all systems and the respective recycled pellets were then processed to make sample films on an OCS film plant in the analysis laboratory at EREMA. The defects in the films are detected automatically in the process and then categorised according to size and the area of nonconformity is shown in cumulative form. With this sensitive testing method any impurities remaining in the recycled pellets are made visible and can thus be evaluated in terms of both quality and quantity. A large number of nonconformities caused by impurities in the test film also has a negative impact on the subsequent processing of these recycled pellets and leads to mechanical and optical defects in the end products.



Recycled pellet quality test: film test with contaminant analysis on an OCS measuring extruder ME25/25D-V3. Test material: recycled pellets made from PP regrind on various regrind recycling systems (filtration: 140–180 µm)

Fig. 5: Comparison of regrind recycling systems

The comparison in Fig. 5 documents the respective defect analysis for the test films produced from the different recycled pellets and shows the cumulative defect area share as a function of the defect size. In contrast to the other technologies the curve for RegrindPro® already begins to even out at nonconforming sizes of 400-450 µm and stays at a constant nonconforming area share of approx. 300 ppm. With the cold-input single and twin-screw systems tested, however, the curve rises and with it the nonconforming area of the film increases throughout the entire area measured significantly to over 1000 ppm. The comparison shows that the recycled pellets produced with RegrindPro® are filtered much better and contain significantly fewer and, above all, fewer large impurities. This difference in quality is already visible to the naked eye when you see the film sample. And it is precisely this difference in quality which has an effect on surface quality in subsequent processing of the recycled pellets to make piping, for example.

Concrete customer application: optimum pipe surface despite silicone impurities

The efficiency of RegrindPro® has been confirmed by EREMA in collaboration with a pipe producer. This customer has its own recycling department where it uses post-consumer bale material consisting of HDPE shampoo bottles to make washed regrind which it then processes to produce recycled pellets for use in the pipe production process. EREMA has now been able to set completely new standards for this application with RegrindPro® in combination with the Laserfilter: The silicones and linked polymers of the seals of the screw tops and spray nozzles of the bottles are a key issue in the processing of this regrind. These cannot be removed completely when washing, do not melt and thus have to be filtered out during extrusion otherwise they cause holes in the pipe surface when the pellets are reprocessed. Silicones, for example,

are difficult to filtrate as they behave like rubber, become long and thin at the filter and pass through the filter holes. This is the reason why it is necessary to keep these impurities as large as possible up to filtration so they can be filtered. This is ensured by RegrindPro® through the gentle melting of the regrind which has already been preheated. Thanks to the minimum of shear forces the silicone particles stay large enough inside the extruder and can thus be removed even more efficiently by the EREMA Laserfilter. Any particles which may be left in the melt are homogenised intensively downstream of the Laserfilter in accordance with the TVEplus® principle. This is because the smaller the remaining silicone is and the finer it is distributed, the lower the impact on the reprocessing of the recycled pellets.

In order to be able to compare the material quality of the recycled pellets which are produced with the customer's existing twin screw extrusion system and with RegrindPro®, EREMA carried out a control test. Both recycled pellet batches were processed on the OCS film unit into 60 µm test films in the EREMA analysis laboratory which were then analysed with regard to their respective particle size. Fig. 6 shows that the test films made from the recycled pellets produced with RegrindPro® have significantly fewer and above all considerably smaller residual impurities. Analogous to the film control test the surface qualities of the pipes produced using the respective recycled pellets were also compared. Here too it can be seen as on Fig. 6 that the surface quality of the pipes made from recycled pellets produced with RegrindPro® is considerably better. The second key issue is the flexibility in the choice of material. Previously the customer had been able to process only very thick-walled regrind with up to max. 1%

moisture with the twin-screw extruder used. As, therefore, the twin-screw extrusion system used in the past was only able to handle input material with a high bulk density from 200 kg/m³ the light fractions present in the bales – such as the thin-walled plastic residues from the bottle labels – had to be separated in the washing plant. With the RegrindPro® system you can now process materials with a bulk density range from 30 to 800 kg/m³. With this remarkably high degree of flexibility in the choice of material the customer can also process these thin film scraps – i.e. the entire bale material now – in-house with the new RegrindPro®.



Clemens Kitzberger, EREMA Business Development Manager for Post Consumer Recycling

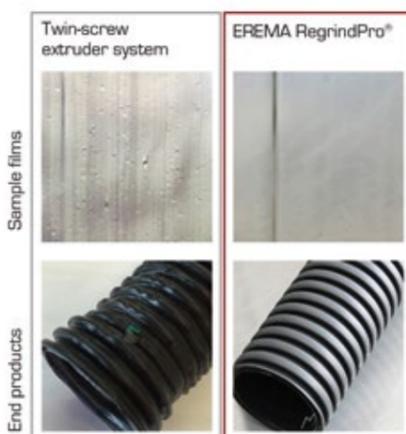


Fig. 6: Comparison of recycled pellet material quality, as produced with the customer's previously used twin screw extrusion system (left) and with RegrindPro® (right). The respective nonconforming share in the test films produced also reflects the surface quality of the pipes shown at the bottom.

SUMMARY

To take full advantage of the potential of recycled regrind as an alternative to virgin material a specific treatment process is required. With the new product INTAREMA® RegrindPro® EREMA has succeeded in developing a plant system which is designed exactly for these thick-walled materials. In short, RegrindPro® offers a number of benefits which enable you to process regrind to make application-optimised recycled pellets and make end products with a recycling rate of up to 100%.

- The **thick-walled regrind particles are heated through homogeneously** in the EREMA preconditioning unit **and prepared for extrusion**.
- The **melting procedure** for the thoroughly warmed regrind particles in the extruder is gentle and takes place with **minimum shear impact**. This prevents any size reduction of the contaminants prior to filtration and **enhances filtration efficiency**.
- The thorough warming of the regrind also enables the **processing of polymers with different melting points and energy contents – without screw change** but with high throughput at the same time.
- The EREMA preconditioning unit enables the **processing of materials** with a **broad bulk density spectrum of 30 to 800 g/l and an input moisture of up to 8%**. Furthermore it is possible to admix additives in pellet form and up to 20% in powder form.
- The RegrindPro® package can be used on all INTAREMA® systems (T, TE, TVEplus®) and COREMA®.

1.1 million tonnes
overall annual capacity

Global market leader
rPET direct food contact

VACUREMA®

167
SYSTEMS
WORLDWIDE

50%
market share in the USA

0.29 kWh/kg
specific energy
consumption
with inline sheet
systems*

30%
market share in Europe

VACUREMA® the clear no. 1 in direct food contact

Around the world there are 167 VACUREMA® systems processing over 1 million tonnes of post-consumer material every year to make rPET for direct food contact. Christoph Wöss is responsible for Business Development Management Application Bottle at EREMA and, thanks to 15 years of experience in recycling for direct food contact, can offer customers a vast amount of expertise especially in the PET sector and also concerning polyolefins such as HDPE milk bottles. In this interview he explains why VACUREMA® technology is the most successful on the market.

What are the main reasons for the success of VACUREMA®?

On the one hand our decontamination process fulfils the criteria of both the FDA and EFSA and many major branded companies, and this applies to all VACUREMA® systems. The parameters for direct food contact compliance are monitored and saved continuously throughout the recycling process. Any material which goes beyond the defined limits is removed from the production line. Secondly, VACUREMA® offers enormous

cost-efficiency. No additional predrying is necessary as amorphous flakes in the vacuum reactor are not only decontaminated before extrusion, they are also dried and crystallised. Additionally, we use core components for our recycling systems which save costs on a day-to-day basis in continuous operation. One example of this is the utility-free vacuum pump which requires no water to create the vacuum. Compared to other pump systems, this means considerable operating and maintenance cost savings after just

one year. The ecological benefit of VACUREMA® is another success factor. Through the pretreatment in the vacuum reactor and our ecoSAVE® technology we can offer considerably lower energy consumption than conventional technologies in the marketplace. Just one example: the specific energy consumption of our inline sheet system is only 0.29 kWh/kg*. This has also been clearly confirmed by an independent research institute.

* incl. sheet downstream



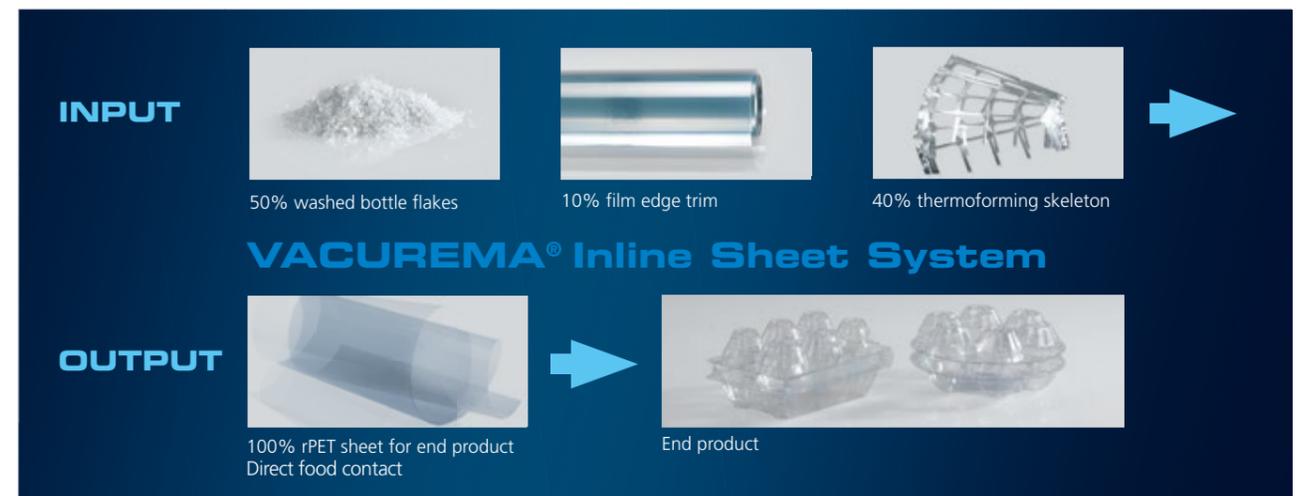
Christoph Wöss, EREMA Business Development Manager Application Bottle, in front of the new VACUREMA® Prime system which is available for customer trials at the EREMA headquarters

Where is currently the biggest potential in recycling for direct food contact?

I think it has to be in PET sheet production. The share of rPET compared to virgin material has increased considerably in recent years. With the VACUREMA® inline sheet system it is even possible to produce 100% rPET sheet for direct food contact

– with full throughput capacity and the best filtration. One particular benefit for plant operators is the high degree of flexibility in the choice of input materials. This enables you to mix washed bottle flakes quite easily with production waste such as skeleton waste and edge trim to make 100% rPET sheet directly from the melt. The VACUREMA® system is also very efficient in terms of plant

configuration. This is because it can be easily combined with the customer's preferred downstream sheet unit. In addition to this the VACUREMA® technology can be retrofitted on existing PET extrusion facilities. In this case the existing extrusion system is fed with dry, crystallised and decontaminated flakes.





Step up!

EREMA opens new UpCentre®

With its COREMA® product line EREMA combined all the benefits of recycling and compounding in a single processing step for the first time in 2012. EREMA is now taking the next step by offering a completely new upcycling service. COREMA® technology for the sampling of recycling compounds has been available to customers at the newly installed UpCentre® not far from the EREMA headquarters in Ansfelden since November 2015. "With 'use instead of buy' as the motto, this service helps our customers to open up new markets for their recyclates. We give them the flexibility and speed they require in this phase," explains COREMA® product manager Robert Obermayr.

Use COREMA® technology instead of buying

To enable recyclates to be used 1:1 as a substitute for virgin material they have to have exactly specified, customised property profiles. Processors are interested above all in the recycled pellets allowing trouble-free further processing and the assurance of the functional characteristics of the end products produced from them. COREMA®

technology, which customers are able to use in the new EREMA UpCentre®, offers precisely this upgrade of recyclates, right up to customised recycling compounds. "On the way to these 'made-to-measure' products you need a lot of fine tuning in practice and processors demand varying quantities of samples – as often and as long as necessary until the recycling compound meets the exact requirements of their concrete application, such as film or injection moulding parts," explains

Robert Obermayr. And this is the point where EREMA comes in: the new UpCentre® makes COREMA® technology available for use by EREMA customers so they are able to produce sample quantities quickly and flexibly also by the tonne and without having to buy a system of their own. Customers will additionally benefit from EREMA's recycling know-how and Coperion's compounding know-how – the two global market leaders in their fields.

Opening in November 2015

The UpCentre® was opened on 20 November 2015 in a producer's building around 20 km from EREMA's company headquarters. As a result, customers can now take advantage of the existing infrastructure, which is required in shift work,

in order to produce larger sampling quantities in a short time, too. The new UpCentre® features a COREMA® 1108 T which will compound quantities from 2 to 200 tonnes on a monthly basis.

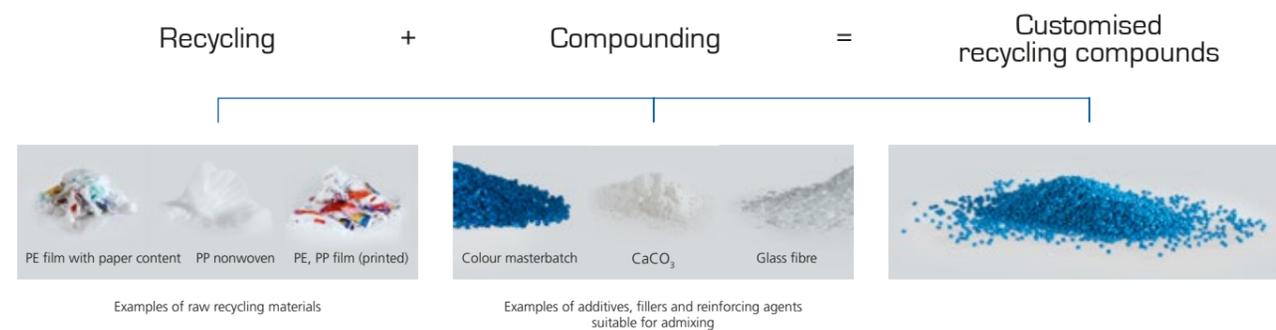


Your EREMA UpCentre® contact:
Robert Obermayr,
COREMA® Product Manager
r.obermayr@erema.at

COREMA® TECHNOLOGY - CUSTOMISED RECYCLING COMPOUNDS IN A SINGLE STEP

The innovative COREMA® system unites recycling compounds with exactly specified characteristics are and compounding in a single process step, saving considerable time and costs. This is how recycling products made from them.

BEST PRACTICE





Reinhard Händel, Polifilm Project Manager:
 "If you work properly with recycling instead of virgin materials you can save around 30% for every tonne of material processed and that corresponds to roughly 300 to 500 euros."



POLIFILM Germany: Professional recycling of PE films

Business with bin liners, construction and agricultural films in the highly competitive environment is only effective and worthwhile if recycling materials are used for their production – up to 100% in some cases. The use of recyclate, however, is also recommended for other, primarily multilayer films for all applications from hygiene to packaging, not only for reasons of economy. The in-house recycling of film edge trim has long been a standard while a reverse integration from film to recycled pellet manufacturer has not. This can, however, make sense, as Reinhard Händel, Project Manager at Polifilm Extrusion GmbH in Weissandt-Gölsau is aware.

As one of the biggest producers of polyethylene film in Europe with a production capacity of 220,000 t/year which is achieved with more than 70 extrusion plants, recycling is extremely important at Polifilm. Reinhard Händel: "If you work properly with recycling materials instead of virgin you can save around 30% for every tonne of

material processed and that corresponds to roughly 300 to 500 euros." But recycling is also a statement. More and more consumers demand products which are more sustainable than what they are used to and we all know the extent of legal requirements. This is why Polifilm operates six central recycling lines in total – besides edge trim refeeding on

every plant – working in four shifts and producing 25,000 tonnes of recycled pellets every year. "Our recycling facilities work 24/7, just like the film plants," explains Reinhard Händel. The film and recycling plants have something else in common: they all have to cope with regular changes as the film producer's product portfolio is extremely wide-

Text: Karin Regel; photos: EREMA/Polifilm

Top left: Each of the 70 extrusion machines at Polifilm is reconfigured several times a day, the scrap material is collected and sorted according to type and colour before it goes to a recycling machine; Top right: 100% recycled pellets from the company's own recycling lines are used for the production of bin liners; Bottom left: With a production capacity of 220,000 tonnes of film per year, reconfiguration and start-up scrap is inevitable – and using your own recycling lines pays off; Bottom right: Reinhard Händel: "With our recycling machines we not only realise the waste-free factory, we also work very economically."

ranging. Besides technical films, packaging films, construction and agricultural films and stretch films which are produced in cast or blown film extrusion processes, Polifilm alone produces 80 different types of recycled pellets. Precise planning is crucial here.

Cutter/compactor guarantees constant material flow

Polifilm decided in favour of EREMA for its central recycling systems, "because they work without stuffing units and guarantee a very stable process," as Reinhard Händel explains. The systems are also ideal for even very thin films. EREMA has made sure

of this thanks to continuous optimisations in recent years. And this is one reason why Polifilm will soon be putting a sixth EREMA system into operation. The systems installed here are "T" systems for non-printed and "TVE plus" systems for printed film scrap. Unlike stuffing units, which are often used in the recycling plants of other manufacturers, the cutter/compactor has specific benefits: above all, the perfect preconditioning of the remaining material prior to extrusion is crucial for the quality of the recyclate. EREMA fulfils this requirement with its systems by combining a preconditioning unit with the recycling extruder. This means that films of varying thicknesses can be

cut, heated and compacted to a uniform bulk density of around 350 kg/m³. The material which is compacted this way can be added continuously and pulsation and process fluctuations are ruled out. Another positive aspect of the cutter/compactor is the preheating of the materials so that less energy intake for plastification inside the extruder is required and thermomechanical stress on the polymer is minimised. Finally, the cutter/compactor carries out the degassing process. This is because moisture deposits on the film scrap can occur from time to time due to fluctuations in temperature and air humidity when in-house waste is kept in storage.

OKUV BLAIMSCHEIN GMBH

Austria: TVEplus® gives you maximum flexibility

Family-run OKUV Blaimschein GmbH located in St. Marien near Linz, Austria, is a very successful recycling company based on toll recycling services. Owner Karl Blaimschein has placed his trust in the EREMA brand for over 25 years. Currently using three EREMA recycling systems, OKUV processes various plastics to make recycled pellets again for around 40 companies in Austria.



Karl Blaimschein, owner of OKUV, was delighted about the installation of his new EREMA system in 2015 – an INTAREMA® 1309 TVEplus®, featuring a personal touch added by EREMA to mark the occasion of his 60th birthday

The recycler's customers deliver their properly sorted and clean post-industrial materials, specify their requirements for the recycled pellets to be made from them and OKUV takes care of the entire recycling process. Thanks to the high quality of the recycled pellets produced, the customers can return up to 100% of them to the production process. The spectrum of input materials ranges from PE, PP, PS, PA and PC to ABS – either in the form of films or regrind. If pipes, crates, runners or other injection-moulded parts are supplied whole by the customers they are

turned into regrind at OKUV using a shredder and/or a grinder prior to the recycling process.

INTAREMA® increases flexibility once again

The youngest of what are currently three systems from EREMA was delivered in 2015. It is a brand new INTAREMA® 1309 TVEplus® with SW filter. "We made a conscious decision in favour of the TVEplus® system again because this technology has proven its merits at our

company – it covers a very broad scope of use. This is precisely what gives us the flexibility we need on a daily basis," explains Karl Blaimschein, owner of OKUV, "and with the new INTAREMA® we are now even more flexible than before." The combination of the pre-conditioning unit and extruder means another benefit for him: "This enables us to admix additives and colour pigments without any additional technical measures and thus prepare plastics exactly according to customer specifications – which we see as a growing trend."

COPO PLAST Germany: High-quality recycled PP pellets with INTAREMA®

The first INTAREMA® system in Germany was installed in spring 2014 at Heinrich e.K. of Traunreut. Copo Plast uses its TVEplus® 1310 with Laserfilter LF 2/350 to process 10,000 tonnes of heavily printed multilayer materials, mainly in PP and with contaminants such as paper, wood and foreign materials, every year to make recycled thermoplastic pellets. After what is now roughly one and a half years, Managing Director Heinrich Winkler reports about the complete satisfaction with the latest technology from EREMA.



According to Heinrich Winkler the challenge of recycling is primarily to produce a good quality. The recycled pellets, which go to processors, injection moulding and film producers working in the automotive, gardening and construction sectors throughout Europe, have to be adapted according to the respective application when produced. They have to ensure a smear-free surface on the finished part and fulfil a wide variety of modifications for impact resistance, colour and filler material. It is, however, becoming increasingly difficult to obtain good, clean-sorted production scraps. Numerous manufacturers now produce a multitude of mixed films

which also have considerable amounts of contaminants with PVC or PET. The availability of the input material decreases as a result, while the requirements of the customers in terms of the recycled pellets are rising continuously. In order to be able to produce high-grade recycled pellets nevertheless from this input material with continuously sinking quality, however, Copo Plast decided in favour of an INTAREMA® TVEplus® system.

Best technology on the market

Heinrich Winkler explains why the

decision fell in favour of EREMA: "Because it's the best technology on the market and the technical contact is on an extremely high level. We have never experienced this with any other producer," He goes on to add: "We are particularly pleased with the magnificent degassing performance and the consistently high throughput of our INTAREMA® system. Plus the Laserfilter is of course brilliant when it comes to removing contaminants such as paper." Heinrich Winkler also very much appreciates the service and friendly approach of EREMA.

EXXEL POLYMERS Inc.

Canada: Top flexibility with TVEplus®

The recycler EXXEL POLYMERS processes a very wide variety of input materials from a multitude of post-industrial supply streams in Quebec, Canada, to make high-quality recycled pellets. The company is growing continuously and, based on years of positive experience with the flexible TVEplus® technology, has now invested in a further EREMA system – an INTAREMA® 1309 TVEplus® with Laserfilter.



From left: Martin Schedlberger (EREMA), Julie Beaumier (Administrator Director EXXEL), Charles Bourdeau (Vice President EXXEL), Éric Fradette (President EXXEL), Robert Pauli (EREMA) und Luke Horrocks (ENA)

EXXEL processes more than 11,000 tonnes of post-industrial plastic scraps in HDPE, PS and PP in the form of regrind, film/sheet and nonwovens on a yearly basis. The company analyses the input material from the various supply streams in its own laboratory so that material flows can be grouped together to be in a position to provide the best quality of specified recycled pellets to clients in Canada and the USA for extrusion, injection molding and industrial parts. “We process all types of material. And to do so we need a flexible recycling technology which enables us to switch for example from regrind to film/sheet or materials with MFI values ranging from low to

high,” explains Éric Fradette, President at EXXEL POLYMERS, “plus the system has to be able to remove any dust and moisture inside the input material.” The company has had an EREMA 1109 TVEplus® in operation for some years for this purpose. This system can process the many different materials ideally with stable quality while at the same time coping with even the big challenges in terms of moisture and dust, too.

INTAREMA® increases flexibility

EXXEL’s strategy is to be flexible at all times in order to be able to process all



Photos: EXXEL

materials. Éric Fradette adds: “There are so many different types of plastic on the market – and this is precisely the challenge!” To remain flexible enough in the future as well and thus be able to fulfil market requirements the company has now installed another system, based on its excellent experience with EREMA; this time it is a new INTAREMA® 1309 TVEplus® with Laserfilter.

Charles Bourdeau, Vice President at EXXEL, is fully satisfied with the new system: “The plant stands out through even greater flexibility of the input material and in respect of degassing and the high degree of efficiency of the Laserfilter.”

TIVACO Belgium:

Ultramodern equipment for high-end products

The Belgian company TIVACO recycles post-industrial scraps in polypropylene, polyethylene, polystyrene and flexible PVC to make recycled pellets for the production of high-end products such as visible automotive parts or household articles. The ultramodern recycling technologies which TIVACO uses, such as an INTAREMA® 1714 TVEplus® with Laserfilter, are an integral part of the success.



Photos: TIVACO



Since it was founded in 2001 by Thibaut and Wauthier Debode, TIVACO has recorded exponential growth in the recycling sector and has become a long-established partner to both the petrochemical and plastics processing industry. The successful company now has four production lines in operation, processing around 20,000 tonnes of polypropylene, polyethylene, polystyrene, elastomers, flexible PVC and soft plastics every year to make recycled pellets. This capacity will increase once again as of 2016 by approx. 8,000 tonnes per year through further expansion. Thibaut Debode, owner and General Manager at TIVACO, explains that the success comes from the fact that the company is always open to new products and also different types of plastic and that TIVACO has always

made every effort, together with its customers and suppliers, to find new ways of maximising the added value for everyone involved. “In my opinion it is important for the plastics processing industry to see the recycling industry as a partner rather than just a supplier or a client. We will only have a win-win situation if both sides are open-minded and share experiences and opinions,” says a convinced Thibaut Debode.

State-of-the-art equipment

TIVACO’s clients come from the fields of automotive, compounding, household, building/construction and agriculture. The company uses state-of-the-art equipment to be able to supply the recycled pellets and compounds in the quality the customers require for their high-end pro-

ducts. This is why one of the production lines consists of an INTAREMA® 1714 TVEplus® with Laserfilter from EREMA and an upstream shredder from LINDNER reSource which are used mainly for the processing of polypropylene and elastomers. The LINDNER reSource shredder enables the optimum and user-friendly inline processing of these various input materials at a throughput of approx. 1,700 kg/h and additionally ensures stable and reliable production with the multiple metal separation unit.

According to Thibaut Debode the main benefits of the new INTAREMA® lie in the high capacity of the plant and the exceptionally efficient filter system. Furthermore, the filtration is automated and thus also saves labour costs.

PLASTIREC Belgium: Extending the value added chain

The tradition-rich company Plastirec, located near Antwerp in Rijkevorsel, Belgium, began to invest systematically in extending the value added chain in 2014. Clearly with huge success: the commissioning of an integrated INTAREMA® type cutter/compactor-extruder-repelletising system from EREMA, which was virtually at full capacity from the beginning, meant the company had a new, attractive money earner.

With its roots in paper recycling, Plastirec quickly became a successful plastics shredder in the 1990s. Several large shredding facilities from different manufacturers and around ten grinders produced an exceptionally wide range of types and qualities on a floor space of around 4,000 square metres up until the middle of 2014. Only clean-sorted production scrap, including specialities such as soft plastics and elastomers, plus large amounts of LDPE are processed. The company collaborated with partners when required in order to produce the appropriate recycled partners. "It proved to be increasingly difficult, however, to achieve further company growth," says General Manager and co-owner Nicky Jaspers, outlining the situation. "The quantities supplied began to decrease already in the crisis in 2008 and 2009, we had problems getting sufficient material. And in recent years a multitude of processors have begun to grind production scrap themselves and reuse it directly." Plus, such processors have also been buying up more and more material from other companies in recent years so the grinders can work to capacity. This likewise narrowed the scope of business for pure grinding. Following appropriate market analyses and meetings with customers, Nicky Jaspers and his father and company

founder Rudi Jaspers, defined the strategy: the installation of an additional production stage – a pelletising system. After extensive market evaluation and sample processing of a variety of complex production scrap types, the decision was taken in favour of the INTAREMA® 1714 TVEplus® which was presented in October 2013 and launched at the beginning of 2014. "We had the impression that the company philosophies go well together here," explains Nicky Jaspers. "The focus is on quality, service and flexibility in processing at all times, just like with our products and the grinders. We knew quite a lot about plastics but not much about extrusion. We did have some trial runs beforehand with typical materials at EREMA's test centre but we still needed support from the manufacturer and reliability in the operating process already during the start-up phase."

New customers – attractive orders

Most of the processing is with PE, PP and TPEs. Depending on the material type and shape, 800 to 1,400 kg pass through the system with prior size reduction, the extruder and pelletiser every hour. The system is operated by just one person, who is also responsible for material feed. To

begin with the plan was to operate with just one shift, based on the expected capacity for the machine. Due to the unexpectedly high demand from existing regrind customers, however, who then also enquired about recycled pellets, and thanks to the first new customers, operation was increased to two shifts after a good month. Staff gained valuable experience concerning optimum plant operation at the same time. "We are already in the process of introducing the third shift now, too, after roughly just six months of the EREMA system being in real operation. We are currently looking for new employees for this," reports Nicky Jaspers. Any concerns beforehand about not being able to work to capacity have clearly disappeared. For the first time in quite a while customers are now calling on their own initiative to find out more about the system and the possible products. There has even been one company which operates its own repelletising facility with a more basic set-up which has enquired about processing LDPE to make high-quality pellets. Initial experience has also shown that processors still continue to buy production scrap themselves in the marketplace but they then pass it on to Plastirec for it to be processed on the INTAREMA® to achieve better quality and/or a better



Text/photos: Meinolf Droege

Left: Plastirec processes an extremely broad spectrum of materials. Right: General Manager Nicky Jaspers: "... something like this is only possible with EREMA systems."

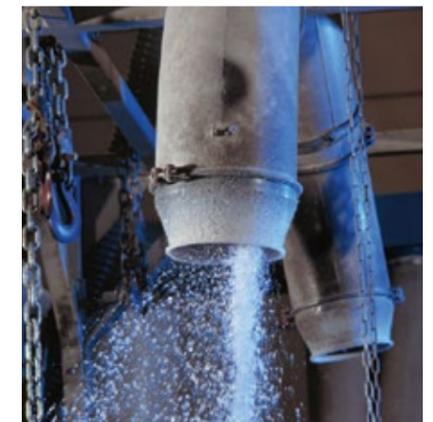
price-performance ratio. "We gained five new customers in five months," reports Nicky Jaspers. Some of these applications are quite straightforward, such as the repelletising of plant pots and trays, but most of the materials are more complex and come from automotive engineering, packaging technology and difficult products from the construction industry such as inliner sheeting used in sewer engineering. Such materials can be used only in lower-grade applications again after just grinding. After repelletising in an EREMA system, however, they can be used in far more demanding applications.

Materials for direct food contact

Plastirec now even produces recycled

pellets for direct food contact. In this case the customer delivers the food-grade production scrap as regrind, Plastirec repelletises it using the EREMA system and the customer then produces thermoformed cups and trays for the packaging of meat. Quality control facilities have also been upgraded and the company's own laboratory can now carry out a wide range of chemical and physical tests. The entire process is documented and certified in accordance with ISO 9001, with ISO 14001 certification pending. Being able to handle and offer this level of recycling is exceptionally lucrative. However, you also have to train your staff so they are higher qualified. Nicky Jaspers brings it to the point: "Most grinders have four or five operating buttons and a

defined material spectrum. With the INTAREMA® we can have a much greater influence on the end product, and this is precisely what we want, of course. Having said that, the very easy to use PLC control system supports the operators in every step."



JADCORE USA: Mastering the material mix - even more flexible than before with INTAREMA®

American recycler Jadcore LLC of Terre Haute, Indiana, has had an EREMA 1514 TVEplus® system for the recycling of a wide range of post-industrial materials in operation since 2012 and is extremely satisfied, above all because of the flexibility of the technology. This is the reason why Jadcore decided to invest in another system - a new INTAREMA® 1714 TVEplus® - in 2015.

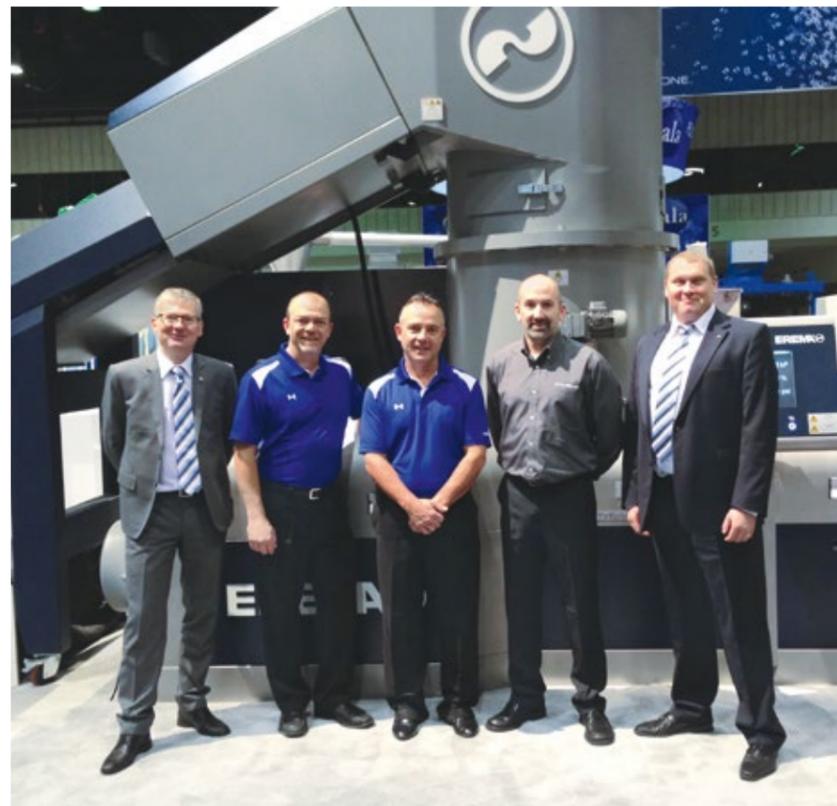
Jadcore processes 27,000 tonnes of non-printed to heavily printed post-industrial plastic scrap in LDPE, LLDPE, HDPE, PP and PS every year. The recycling technology they use has to be extremely flexible because of this broad range. Grant Bradley, Jadcore Plant Manager, was already so impressed by the flexibility of the first EREMA system that he was strongly in favour of purchasing a new INTAREMA® 1714 TVEplus®: "The EREMA's ability to process a variety of materials has streamlined our production scheduling efforts and improved our plant efficiencies." Rob Doti, Jadcore Vice President of Manufacturing, is clearly satisfied with the efficiency of the EREMA technology: "With the first EREMA TVEplus® system we wanted to step up the growth in business with materials that are difficult to process. And we succeeded. EREMA is simply very aware of the challenges recyclers face today. Their technology and innovation address these better than anyone I've worked with in my 30 years."

Consistently high quality

Further to this high degree of satisfaction, Jadcore will therefore be recycling with an additional EREMA

system - a new INTAREMA® 1714 TVEplus® - in the future. The core Counter Current technology will ensure even greater flexibility than before, with consistently high and also quality output at the same time. "This is exactly what

we need. A consistent, high-quality pellet is what customers are looking for from their repro supplier - and EREMA delivers this," says a convinced Dean Doti, Jadcore Vice President of Sales.



From left: Manfred Hackl (CEO EREMA), Robert Doti (Vice President Manufacturing Jadcore), Dean Doti (Vice President Sales Jadcore), John Capece (Sales Manager EREMA North America) and Hannes Haslinger (Area Sales Manager EREMA)

RODEPA PLASTICS Netherlands: RegrindPro® & co.: success through state-of- the-art equipment from EREMA

Rodepa Plastics BV of Hengelo processes 25,000 tonnes of post-industrial and post-consumer LDPE, PP and PS every year to make recycled pellets. The company relies entirely on recycling technology from EREMA. The material all-rounder RegrindPro® has proven to be particularly efficient in the processing of thick-walled regrind.

Photos: RODEPA



Left: Mark Langenhof is delighted with the efficiency of the new INTAREMA® RegrindPro® system for regrind recycling. Right: the modern company premises of Rodepa Hengelo in the Netherlands where three EREMA systems are now in operation.

The Dutch recycling company has an EREMA system from 2011, a new INTAREMA® 1714 TVEplus® from 2014 (both for post-industrial) and a brand new INTAREMA® 1714 TVEplus® RegrindPro® (for post-consumer) which was shipped in 2015. These machines will be joined by another at the end of 2015: an INTAREMA® 1714 TVEplus® with double filter system. Managing Director Mark Langenhof lists the reasons why Rodepa is committed to EREMA: "The systems have a very high quality. They are stable, offer good capacity and can process films and nonwovens

directly. This is exactly what we need to meet the requirements of our customers. Plus EREMA is a reliable recycling partner who you can develop with."

Individual applications

According to Mark Langenhof the challenge of recycling is to produce good recycled pellets consistently. The recycled pellets produced by Rodepa are supplied to extrusion and injection moulding companies and film producers throughout Europe and for the production of panels, pipes, films, battery

casings, plant pots, plant trays and for compounding. This shows that every customer has individual requirements, for example in terms of mechanical properties, impact strength, viscosity and density. With the help of EREMA's technology Rodepa is able to adapt flexibly to these specific requirements. A highlight here in the recycling of regrind is the new RegrindPro® system which processes a particularly broad range of input materials to make such specific recycled pellets.

WINGSPAN PLASTICS South Africa: Enormous production stability with INTAREMA®

Wingspan Plastics, who have been successful in the market for ten years now and are the Western Cape's second largest recycler of plastics, process 7,200 tonnes of post-consumer and post-industrial scrap a year to make recycled pellets for the film and injection moulding industry and are fully committed to EREMA technologies in doing so. The company appreciates above all the stable performance of its new INTAREMA® system.



Left: Johan van der Merwe, General Manager, and Hermann Pieterse, owner, and their new INTAREMA® system
Right: motivated Wingspan employees sorting post-industrial materials



The post-consumer input material mainly consists of PE films and HDPE regrind material from cosmetic bottles, screw tops and poison cans used in farming activities. The company also processes clean, sorted scrap plastic such as e.g. LDPE films with paper labels from pallet packaging from the post-industrial sector. Wingspan collects all these different plastics, sorts them, cleans them thoroughly in the washing lines which are specially configured for the respective material streams and then processes them to make high-quality black (from post-consumer scrap), smokey (from clean-sorted material) and clear (from very

clean industrial scrap) recycled PE pellets.

Best recycling technology

When it comes to recycling technology, Wingspan has relied on EREMA for years and now has three successful systems in operation: an EREMA RGA, an EREMA 1310 TVEplus® and since 2014 the latest INTAREMA® 1310 TVEplus® with a capacity of approx. 600-700 kg/h. Johan van der Merwe, Wingspan General Manager, explains the main reason for his complete satisfaction as follows: "EREMA produces the most efficient, most reliable and most productive systems on the market. The new INTAREMA®

is also extremely stable in production – even better than the previous systems."

Plastics recycling as part of modern life

Johan van der Merwe explains: "Discarded milk or fabric softener bottles, ice cream tubs, plastic bags and even cling wrap can all be recycled and converted into something useful like a garbage bag, a comb, a rope, a car bumper, or even a kid's toy. Recycling is becoming an important part of modern-day life and we are excited about playing a pivotal role together with EREMA in a greener future."

PLASKAPER Brazil: INTAREMA® offers even more productivity than before

As part of the Kapersul Group, which works in the fields of industrial waste management and paper distribution, Plaskaper Termoplásticos S/A is the plastics recycling company of the group. Plaskaper produces around 12,000 tonnes of recycled pellets from LDPE, HDPE and PP every year at its facility in Brazil's Fazenda Rio Grande for film manufacturers in Brazil. Three high-capacity EREMA systems are used for this purpose and since the end of 2014 productivity has soared once again through the addition of a brand new INTAREMA® TVEplus®.



Plaskaper processes mainly post-consumer scrap LDPE amounting to 9,600 tonnes every year. The company also processes 1,200 tonnes of LDPE and the same amount of PP from post-industrial waste. Lauro Furuta, Plaskaper President, explains what the key issue is in the main application: "The main challenge is to have efficient cleaning and decontamination of the washed LDPE films, and the four EREMA systems we now have at our disposal offer the best recycling solution for this. We do have upstream washing plants but they have their ups and downs which mean residual moisture and residual contaminants at times. The preconditioning unit and Laserfilter in particular are successful in combatting these factors."

Photo: PLASKAPER

3 EREMAS + 1 INTAREMA®

All in all Plaskaper has four EREMA systems in operation: an EREMA T, two EREMA TVEplus® systems and a new INTAREMA® 1716 TVEplus® with double Laserfilter 2/350-TWIN joined them at the end of 2014. "Unlike other extruder systems, Erema recycling technologies come with the special benefit that they are able to process washed flakes with much higher moisture levels with no trouble at all. Thanks to the new INTAREMA® we can even handle material with 8 to 10% residual moisture and peaks of up to 15% from time to time," says a delighted Lauro Furuta, talking about the new system. The company

is also enthusiastic about the fact that energy consumption is even lower although output is higher than with the previous EREMA systems. Process stability, above all through the PLC, is a further key benefit for Plaskaper. The values for filtration and degassing are likewise very stable and the system produces in general more homogeneous material of even higher quality. Lauro Furuta considers this process stability to be extremely important, especially for the future: "The amount of co-extruded material with several layers and additives that you cannot separate is growing continuously. PE, PET, EVOH and PA often pose major challenges."

Growing market

The company ranks among the leading LDPE post-consumer recyclers in Brazil, where the recycling market is still small but growing steadily and has high growth potential. Plaskaper sells the recycled LDPE pellets to plastics processors who use them to make blown film for e.g. shopping bags and agricultural and construction use. The recycled PP pellets are used for injection moulding applications.

CRONOPET Argentina: Recycled pellets for leading plastics processors in South America

Cronopet S.A. has been placing its trust in EREMA for 18 years. The plastics recycler from Argentina has an RGA 80 TE and a new EREMA 1108 TE in operation for the processing of polyester resin, fibre scraps and PET production scraps to make high-grade recycled pellets from them for use in the textile industry.



From left: Clemens Zittmayr (EREMA), Luis Matas (owner of Cronopet), Fernando Gomez Veiga (FGV, EREMA Representative Argentina)



Cronopet decided to invest in another system in 2014, an EREMA 1108 TE for PET fibre recycling

The challenge posed by Cronopet's application lies above all in the high and fluctuating moisture (emulsion) of the PET input materials. In addition to the hygroscopic characteristic of polyester, the processing additives, spinning oils, etc. contained in the fibre materials are a hurdle for every recycling process. The EREMA 1108 TE system which used to be in the EREMA Customer Centre and was sold with the launch of the INTAREMA® generation at the beginning of 2014 is ideal for this particular customer application. PET fibres, agglomerates and bottle flakes rank among the "difficult ones" in plastics recycling due to their extreme differences in density and their bridging tendency. Luis Matas, owner of Cronopet, is not perturbed by this, thanks to the EREMA technology: "The EREMA cutter/compactor system handles all of this perfectly. When we

launched this application back in 1996 we were able to achieve the necessary results only with EREMA." The EREMA cutter/compactor-extruder combination handles moisture levels of up to 12 per cent – depending on the modular configuration – in continuous operation. There is perfect homogenisation in the same working step and the necessary compacting of the bulk weight is ensured. The dry PET mixture is optimally preconditioned at a polymer temperature over 100°C upstream of the extruder intake so that subsequent processing is very gentle on the material.

Two plants, one operator

When investing in the second plant – the EREMA 1108 TE – Cronopet had one prime objective: to save labour in the production process. Ideally it should be possible to

use the two systems, which stand parallel next to each other in the building, with just a single operator. EREMA's project engineering team was able to fulfil the customer's wish flexibly and at short notice: the operator's touch screen on the existing 1108 TE demonstration facility was relocated to the rear of the machine and the configuration of the SW RTF melt filter was changed from right to left. "EREMA's flexibility helps us on a daily basis to save labour and therefore production costs," says a delighted Luis Matas.

Satisfied customers

With a capacity of 600 kg/h and 24/7 operation Cronopet produces high-quality recycled pellets for large plastics processors such as Mafissa and Poliresinas San Luis.

TEXPLAST Germany: High-quality recycling technology - excellent product quality

In the storage area of Texplast GmbH in Bitterfeld-Wolfen, compacted bales of PET bottles await their rebirth as recycled pellets, suitable for direct food contact. Making new bottles out of old ones is a line of business of this medium-sized recycler who relies on VACUREMA® for its technology. Thanks to the upgradability of the system it can be adapted quite easily to new requirements even after more than 10 years in operation.

Text: Gabriele Rzepka / Photos: Rzepka/K-ZEITUNG



From left: Production Manager Torsten Kreisler, Managing Director Rico Seiler and Purchase & Logistic Manager Matthias Schäfer



The company processes 50,000 t of baled material every year, producing 12,000 t of recycled pellets. It leaves the rest as washed PET flakes, a third of which are reused in the company group's own production of strapping. Texplast started out in the market in 2002 with the first VACUREMA® 1512 T. A second VACUREMA® 1716 T went into operation at the company in 2005. Together they produce 1,800 kg of recycled pellets every hour.

High pellet quality

To begin with, the PET bottles are carefully sorted, reduced in size, washed and dried. The clean flakes, with around 1% residual moisture, then enter the first processing stage of the VACUREMA® Advanced - the crystallisation dryer – where they are dried, crystallised and warmed. They then move on to the

heart of the VACUREMA®, the vacuum reactor. In this section the flakes are brought to reaction temperature through friction in a vacuum. Residual moisture and migration materials are removed from the material and intrinsic viscosity increases at the same time. The residence time inside the reactor is 1.5 hours, which enables Texplast to achieve a stable IV value and ensures food contact compliance for up to 100% reuse in beverage bottles or thermoforming products. Production Manager Torsten Kreisler explains with satisfaction: "Energy consumption is negligible because we do not have to provide any additional heat." The material then goes inline to the extruder and from here via the melt filter to the strand pelletiser. The company examines both the pellets and the washed flakes from every batch meticulously and according to certain

specifications. The ready-for-sale recycled pellets satisfy all FDA and EFSA requirements for direct food contact which is certified by both institutions.

An eye for plant engineering

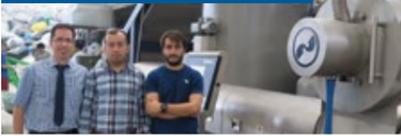
Although Texplast has had the two VACUREMA® systems in use for over ten years now, the contact to EREMA has remained close over the years. Torsten Kreisler is more than satisfied: "When we wanted to expand our reactor we received competent support from EREMA immediately. Our contact, Christoph Wöss, had numerous beneficial suggestions and ideas. Everything is straight to the point and we always have direct contact. Managing Director Rico Seiler adds with praise: "EREMA has an eye for plant engineering."

Business in Turkey going from strength to strength

SATISFIED CUSTOMERS

The plastics industry in Turkey is growing rapidly. This also means huge potential for the recycling industry and INTAREMA® systems are in high demand. A number of systems are already operating successfully there and customer feedback is extremely positive – as initial customer reports confirm.

First Laserfilter in Turkey



Gabor Ferencz (EREMA Sales Manager Turkey), Veli Göksu (Göksu Sales Manager) and Fatih Göksu (Assistant General Manager)

Göksu Plastik Ltd.

Location: Istanbul

INTAREMA® 1310 TVEplus®

with Laserfilter

Input material/application:

LDPE, HDPE, production scrap and supermarket film with paper labels

Veli Göksu, Sales Manager: “We chose the number one in order to meet our core requirements of best quality and maximum output.”



Gabor Ferencz (EREMA Sales Manager Turkey), Tekin Bututaki (Derya Factory Manager) and Anastas Rizo (Riplateks, EREMA Agent Turkey)

Derya Büro Malzemeleri

Location: Erenler/Sakarya

INTAREMA® 1007 T

Input material/application:

PP production scrap

Tekin Bututaki, Factory Manager: “Thanks to EREMA, Derya Büro Malzemeleri can recycle 95% of the in-house waste. This enables us to make a major contribution to the conservation of resources in our world.”



Gabor Ferencz (EREMA Sales Manager Turkey), Engin Hano (Polibak Production Manager) and Anastas Rizo (Riplateks, EREMA Agent Turkey)

Polibak A.Ş

Location: Izmir

INTAREMA® 1310 T

Input material/application:

BOPP

Engin Hano, Production Manager: “We are satisfied with the quality of the recycled pellets and the fast service. We particularly appreciate the technical support we get from EREMA in this partnership.”



Anastas Rizo (Riplateks, EREMA Agent Turkey), Cafer Ayranci (Production Manager) and Gabor Ferencz (EREMA Sales Manager Turkey)

Bareks Plastik Film Ekstruzyon San.Tic. AŞ

Location: Izmir

INTAREMA® 1007 T

Input material/application:

LDPE, LLDPE, HDPE, blown film, production scrap

Cafer Ayranci (Production Manager): “We are very satisfied with the product quality and output of this very easy to operate machine.”

NEWS ROOM

Strong recyclate designs

Many products in daily life are already made of recycled plastic, some of them even 100%. These innovative applications from different manufacturers show that they are not only in the interest of the environment but are also practical and offer attractive designs. The products are a prime example of how plastics can be recycled and help people to see used plastics as a valuable resource instead of waste.



Scandinavian Business Seating: HÅG Capisco office chairs

A Norwegian HÅG Capisco office chair consists of 50% recycled materials – steel, aluminium and plastics. The plastic parts are made of 100% recycled PP (68% from post-consumer and 32% from industrial waste). The modular design makes it possible to replace just the worn parts and makes it easier to separate the various materials for recycling.

- Awarded first prize in EPRO's "Best Recycled Plastic Product 2015"
- First office chair which is authorised to carry the Nordic Swan ecolabel



AEG: PowerForce/UltraOne/Ultra Silencer ÖKO vacuum cleaners

Three vacuum cleaner models of the German electrical equipment company AEG are particularly environment-friendly. The PowerForce ÖKO APF6140 is made of 60%, the UltraOne ÖKO 70% and the UltraSilencer ÖKO of 55% recycled plastic. All models are up to 92% recyclable. The two models UltraOne ÖKO and Ultra Silencer ÖKO are the very first vacuum cleaners to bear the renowned Blue Angel ecolabel.

- Awarded the "Blue Angel" (UltraOne ÖKO and UltraSilencer ÖKO)



Nestlé Waters North America (NWNNA): resource® Natural Spring Water and Arrowhead® Mountain Spring Water

In July 2015 Nestlé Waters North America (NWNNA) announced the debut of its remodelled bottle made from 100% rPET (excluding cap and label) for its product resource® Natural Spring Water. resource® is one of the first premium natural spring water brands to offer a 100% rPET bottle in the USA. In October NWNNA announced that it will expand its use of 50% rPET to further bottle sizes of Arrowhead® Mountain Spring Water by the end of 2016. NWNNA sources the food contact compliant rPET from the EREMA customer CarbonLITE Industries of California.

Photos: EPRO, PAV, Stabilo, Nestlé Waters North America, AEG/Electrolux, Trodat, BUREO



STABILO: Green Range writing products

With its Green Range, STABILO, one of the leading producers of writing products in Europe, offers sustainable products for writing, colouring and highlighting text. The STABILO® pointball® including refill made from 79% recycled plastic and the GREEN BOSS® highlighter made from 83% recycled plastic with environment-friendly refill have particularly high recycling rates.

- Awarded the Austrian ecolabel



BUREO: Karün X Bureo designer sunglasses

BUREO, an innovative company from the USA, developed a concept to produce trendy skateboards using recycled fishnets (as featured in the 2014/15 issue of Recycling News). In 2015 BUREO has now launched sunglasses with a Yuco frame that is made from 100% recycled and recyclable nylon fishing net material. The design comes from the Chilean sunglasses design studio Karün and the glasses have premium Carl Zeiss Polarized lenses.



Trodat: Printy 4.0 stamp

Trodat, the world's leading manufacturer of self-inking stamps, has been committed to the environment and sustainability for many years. In the course of the introduction of the 4th Printy generation in 2011 the Austrian company launched the world's first climate-neutral stamp which is produced from up to 65% post-consumer recycled plastic.



PAV Gmbh & Co KG: RPT® railway sleepers

The German company PAV Gmbh & Co KG has developed new and sustainable railway sleepers – RPT® Railway Plastic Ties. These are made from 65 to 85% HDPE and 15 to 35% glass fibre.

- Awarded second prize in EPRO's "Best Recycled Plastic Product 2015"



CURVER: Eco Life Neo® storage box

CURVER, the market leader for plastic household product design, has been successful with its Eco Life Essentials product line in the marketplace for some years. The Luxembourg-based company's range includes the high-quality design product Eco Life Neo®, a storage box made from 100% recycled waste post-consumer plastic. Procylen®, the raw material for this product, is supplied by Interseroh, a customer of EREMA.

Procter & Gamble: increasing amount of recyclate

P&G Fabric Care announced in July 2015 that it will be increasing the amount of recyclate in packaging around the world. This will see 230 million Fabric Care bottles of brands such as Ariel, Lenor and Dash being made out of up to 50% recycled packaging material. P&G Fabric Care will at the same time encourage its global suppliers to use considerably more recyclate from secondary raw materials in their own production processes in the future.

ecophoenixx

All systems go for environment-friendly recycled polyethylene pellets

FVH Folienveredelung Hamburg GmbH und Co. KG is currently establishing the most modern and environment-friendly facility for the processing of valuable polyethylene from film scraps to make extremely pure recycled pellets. The installation of this facility means not only a new generation in plastics recycling but also the dawn of a new recycling era in the German city of Schwerin with 100 new jobs.

FVH uses an innovative and patented process at the new plant which offers closed, environment-friendly loops and ensures maximum and high-quality raw material recovery at the same time. The FVH plant uses what are currently the most ecologically-friendly standards in film recycling worldwide. Compared to conventional recycling, energy consumption is reduced considerably and water consumption is minimised. Almost all materials which are separated from each other in the cleaning process are suitable for reuse and no costly waste management is necessary, meaning that there are effectively hardly any residues and emissions. The objective is to process film scraps from agricultural applications, trade and industry and household collection to make pure, recycled polyethylene pellets – with the claim of producing a considerably larger amount of recycled pellets than was previously possible in the market and, at the same time, in a sustainably constant quality for the film manufacturing industry. Plus: with the degree of purity which is required by the industry. INTAREMA® technology from EREMA will be making a major contribution as an INTAREMA® 2021 TVEplus® with Laserfilter will go into operation at the



Minister for Economic Affairs Harry Glawe, EREMA Head of Marketing & Business Development Gerold Breuer and Michael Hofmann, MD at FVH

FVH facility in autumn 2015. The recycled polyethylene pellets will then be introduced on the market with the brand name ecophoenixx starting in 2016 and are suitable for the production of packaging and agricultural films and bin liners. With the ecophoenixx product standard, FVH's long-term aim is to offer a quality which could previously not be generated using heavily contaminated films.

All systems go

It was all systems go for the FVH plant on 22 June 2015 with the topping-out ceremony for the new company building. Gerold Breuer, Head of Marketing &

Business Development at EREMA, was also there to offer his congratulations and presented FVH Managing Director Michael Hofmann with a 3D model of an INTAREMA® system as a symbol of his wishes. The first construction phase was completed in October 2015. As of November the company will be processing some 20,000 tonnes of scrap plastic every year to make high-grade industrial raw materials at the facility in Schwerin with around 40 employees. A second construction phase with a capacity of an additional 20,000 tonnes is planned to go into operation in 2017. Around 100 highly qualified specialists in total will be working at this location in the medium term.



Left: Gerold Breuer (EREMA Head of Marketing & Business Development) speaking at the event. Rechts: Annabé Pretorius (SAPRO General Manager) receiving an honour from Jaco Breytenbach (Transpaco) in recognition of her services to the promotion of recycling in South Africa.

SAPRO AWARD South Africa: Best recycling products of the year

The South African Plastics Recyclers' Organisation (SAPRO) presented the 5th "Best Recycled Plastics Product Award of the Year" on 18th September 2015 at a gala evening held in Stellenbosch, Western Cape. EREMA was present at SAPRO's awards ceremony this year as main sponsor and guest speaker.

Already in its fifth year, this prestigious event has proven to provide products made from recycled plastics widespread exposure in both the local and international media, increasing the market acceptance and demand for recycled plastic material. Annabé Pretorius, SAPRO General Manager, was delighted about the number of entries from the entire country for the Best Recycled Plastics Product Award of the Year. "Recycling is not regarded as a very glamorous industry and although conditions are tough and the work hard, it is an industry that is fuelled by passion and creativity," explains the convinced recycling campaigner from South Africa. She continues: "The entries give us a good overview of the current portfolio of recycled plastics products which reflect in particular the power of

innovation and increasing quality standards of the South African plastics and recycling industry. These are important impulses to raise the profile of products made from recycled materials for new markets." The competition offers an ideal platform to honour recyclers and all the parties involved in the value chain for their commitment to diverting waste away from the country's landfills and reprocessing it.

Exemplary initiative

Products ranging from anti-termite membranes, technical automotive parts and women's shoes made from old PVC tarpaulin were judged according to criteria including innovation, quantities already sold/produced or just simply the Wow! factor.

In the category "100% Recycled Content" the Silver Award went to USABCO (Pty) Ltd for their Addis storage box. The jury was impressed by the neat, well-finished appearance of the boxes, some 11,000 units of which are sold every month, which kept 240 tons of PE-HD from landfill in 2014 alone.





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