

The Recycling Chain Is Linking Up

The Cycle Concept is Driving Integration and Networking

The new German law on materials and the emerging EU circular economy law are not the only things behind changes in the branch: the plastics industry is becoming increasingly involved in the reuse of its materials as raw material.

First it was PET, now it is polyolefins: recycling material is given consideration for more products and by more companies. Nevertheless, it is still not possible to ensure the stability and quality of production across the entire supply chain. Regarding the chances for progress, **Kunststoffe** spoke with Klaus Feichtinger and Manfred Hackl, the CEOs of Erema, the Austrian specialist for plastics recycling systems.

Kunststoffe: *Is the plastics recycling branch facing an upheaval?*

Klaus Feichtinger: In my opinion, your question stops too short. Strictly speaking, it isn't just the recycling branch, but the entire plastics industry that is facing an upheaval. It's in the air everywhere, that the goal is an integrated cycle. And for that, it isn't enough for the recycling branch to reinvent itself. Instead, that has to begin with the product design and development stage

and continue through the production phase. Inklings of this can already be felt. Everyone who makes molded parts, packaging, or whatever has to learn to think in different dimensions. If you want to apply an increased contingent of recycled material, you will have to make adjustments, changes, and optimization in order to achieve the same quality, performance, and economy.

Kunststoffe: *What is the reason for this development? Is the branch already reacting to the emerging circular economy package?*

Manfred Hackl: Not only do I see legislative requirements, but a change in awareness and commitments, such as the Ellen MacArthur Foundation. A new self-understanding is growing for working this way. Otherwise, plastics will have to face more social criticism than ever. It is gaining a firm hold in Europe now and among global manufacturers of brand name products. »





“The key is communication among everyone along both the recycling chain and the entire plastics chain.”

Personal Details

Klaus Feichtinger (born 1960) began 1993 as Executive Assistant to the management board and has played an important role in regards to technical developments. From 1999 to 2004, he was an authorized officer and has been CEO since December 2004.

That is why, for example, many glues, printing inks, and labels have disappeared, thereby considerably simplifying the recycling process and improving recycling quality.

Kunststoffe: Has “Design to Recycle” already reached people’s minds?

Hackl: Demand in plastics recycling has grown in general, but there is lots of homework to do within the branch. It does no good if there is recycling, and then the demand for regranulates is small. Regranulate has to be thought of as a secondary raw material.

Kunststoffe: Are test balloons and prototypes still dominant, or are processors and brand owners already finding economically attractive solutions?

Hackl: For PET, there is a large contingent of bottles with high recycling content. For polyolefins, too, there are many brand companies that meet all requirements with regranulates. Compared to the total amount, it is of course still minimal.

Feichtinger: As with all development projects, this one requires time and lighthouse projects. But more and more companies are repositioning themselves not only by taking over recycling companies, but specifically by demanding materials and components made from recycling material. There has been cooperation across the entire value chain – from preparation to production – to learn the necessary adjustments. For the last two years, an enormous trend has come in motion that everyone in the plastics industry will profit from.

Kunststoffe: In terms of costs or image? What are you referring to?

Feichtinger: Both. For materials like metals or paper, the circular economy is, no doubt, an absolute necessity. People don’t ask how much old metal is in their cars, or how much recycled gold is in their smartphones. The image of plastics will improve considerably once the circular economy works smoothly here, too.

Kunststoffe: What are some examples of the successful cycling of polyolefins?

Hackl: That has been state of the art for years, e. g., with films for agriculture and building construction, or for garbage bags, even if not much has been said about it. Film recycling began with agricultural film, since it is very easy to recycle, despite impurities from use. As demand for this regranulate grew in film production, technological developments were quick to follow. Five years ago, no one would have imagined that a 20 µm film could be manufactured from a mixed household waste fraction that has excellent mechanical properties at 100 % recycling material.

Kunststoffe: What was the key to such improvements?

Feichtinger: The key is communication among everyone along the recycling chain, on the one hand, and along the entire plastics chain, on the other. Recycling is not just an extrusion process like our core business, but also involves sorting or washing. All these technologies have to be tuned to each other. The results produced by a washing facility can have significance for extrusion. That is why the information stream is important for coordinating the components.

Kunststoffe: How is your company reacting to such necessary coordination in the recycling chain?

Hackl: When we receive consumer orders, we take coordination with up- and downstream processes into consideration right from the start. We integrate our systems as well as possible into the existing processes. Since the K 2016, we have also been offering our re360 MES software solution, in which the entire processing chain can be imaged transparently – keyword smart factory. Besides this, in the future we will use our experience to advise our customers in every way, we will find overall solutions as a

system integrator. A dedicated team will advise customers who desire tailored recycling solutions from the first idea up to system commissioning.

Kunststoffe: *Due to their increasing contingent, multi-layer films are presenting a growing challenge to recycling. What kind of technological solutions do you see there?*

Feichtinger: The most important approach is to avoid multi-layer film wherever there is an alternative. Of course, if the packaging's functionality requires multi-layer films, there are enough proven technological ways of compounding and compatibilizing that produce materials whose quality is sufficient for certain components. However, they aren't used on a large technological scale – for any number of reasons, e.g., because the next processing step is not ready, receives too-small amounts, or the process runs less problematically or more economically with new material. We have already had projects with compound material where everything from the technology to cost fitted, except that the required quantities could not be made available constantly. In that case, the injection mold was to be in use for two years. Over such a long period of time, however, the supply of material could not be guaranteed. We are often closer to technical than to logistic feasibility.

“That is what we mean by industrializing: Spreading out higher quality.”

Hackl: That's the classic case! Something that is a matter of course for new material manufacturers and gives the processor the required assurance, cannot be assured by collectors, sorters, and recyclers at this time: for example, that the material will be available in constant quality over two years at a specified price. As long as this assurance does not exist in the supply chain, large brand owners will not base a product design on regranulate. I consider it a task for the industry as a whole to drive development in this direction.

Kunststoffe: *How can the industry network better to guarantee this supply chain?*

Hackl: We are seeing signs and steps there, too, e.g., waste disposers developing towards recycling, that is, assuming all the tasks from disposal to sorting and all the way to recycling, or participate in company consortia that cover these links in the supply chain. Such projects are often driven via brand owners, since they require a reliable supply of 10,000, 50,000, or 100,000 tonnes per year.

Kunststoffe: *How important for networking are initiatives like the recently initiated Ceflex where Erema is already a member?*

Feichtinger: We have been participating for some time in PCEP (Polyolefin Circular Economy Platform) that was called to life by EuPC, PRE, and PlasticsEurope, and we now have been invited to join Ceflex where the entire plastics materials chain for flexible packaging is represented. It is comfortable, but not sustainable, to concentrate on one's own thinking. It is necessary to under-



Personal Details

Manfred Hackl (born 1968) came to Erema in 1995 as quality manager. Beginning 1998, he was the product manager responsible for product development and sales for PET-recycling. From 2004 to 2006 he was Vice President and has filled the position of CEO since April 2006.

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stand the up- and downstream processes in order to coordinate the processes with each other. The packaging industry has to know what can be done, and we need to know what they need. That's the only way to find a common denominator. From our side, we can bring in our knowledge from more than 400 recycling tests per year going back more than 30 years. We have already processed an enormous variety of materials and developed a certain feeling and understanding of how to generate precisely the outputs that a particular processor requires from varying inputs.

Kunststoffe: *Let's talk now about technological progress. What kind of developments are you planning?*

Hackl: To start with, I would like to emphasize that, for the first time, we were able to introduce so many new products at last year's K that we couldn't present them individually any longer, but bundled them as our Careformance package. Now our job is to put these novelties on the market one after another, for »

instance, the Refresher for smell-optimized regranulate, or the re360 Manufacturing Execution System, where we are entering the market for the first time as a software supplier. As an afterthought, we presented two online analysis products and a laser filter for PET – a variety that hasn't been perceived in its entirety by the market.

Feichtinger: Even so, we naturally have our strategic next steps in the back of our heads. More and more, this will involve industrialization and professionalization: verifiability, automation, optimizing. That means processes that run optimally, whether in terms of quality, machine or cost performance.

Kunststoffe: *What potentials exist there?*

Feichtinger: Self-optimizing systems, for example, determine whether a machine is already running at the right level. By contrast with most other industries, we have a very wide spectrum of inputs. That's why it isn't always easy for the individual operator to recognize how he can run his machine optimally. How, for example, should he react to whatever variations in pollution that suddenly appear when he gets a new charge of input material?

Kunststoffe: *What conditions does that need to work?*

Feichtinger: It requires systems whose processing technology is sufficiently stable. Otherwise they are very hard to control, even using regulation technology. It is state of the art in the raw materials industry for materials to be processed reliably and repeatedly. We have to transfer that to the recycling industry as well, even though we have to deal every year with materials that are more and more polluted. The materials that are easiest to recycle have always been recycled. The new materials combinations are a challenge resulting from the increased use of plastic. At the same time, demand is rising for regranulate that can be used as replacement raw material. That increasingly leads to a balancing act. Consequently, the processes have to become more and more robust in order to squeeze the wider range of inputs into tighter tolerance ranges. That can't be done just by sorting, washing, or extruding, but only by everyone involved. If everybody pursues only his own goal, the total solution will not be economical.

Kunststoffe: *Technically speaking, that means more networking toward Industry 4.0.*

Feichtinger: Precisely. That's why we introduced our re360 Manufacturing Execution System at the K. Here it is not a matter of making individual facilities smarter, but of imaging the entire processing chain with just one software. That makes the entire process more transparent and also offers the opportunity to use this data to learn and optimize.

Hackl: Data like those managed by a MES can, at any point in time, be used to derive quality data or materials information. It is then possible to make model calculations and establish connections that used to be inaccessible due to the lack of a data base. By proceeding systematically, optimization can succeed in the broad mass. That is what we mean by industrializing: Spreading out higher quality.

Feichtinger: This networking is, to be sure, not yet determinable to all customers. Even so, we are convinced that the trend toward digitalization will continue and develop in precisely this direction.

Kunststoffe: *How will the move to stronger industrialization proceed in fact?*

Feichtinger: That depends on each individual case. For example, a process model for particular parameter ranges can be developed from a data base integrated in a control system. There it supports conventional regulation by improving precision. The customer doesn't notice anything – except that the machine works better. In the coming years, we will successively develop models from such mass data statistics for various machines.

Kunststoffe: *Will your customers be able to develop such processing models themselves?*

Feichtinger: Probably only large companies will be able to do that, the ones that to some extent evaluate and control their injection molding machines systematically. That has not been widespread in the recycling industry. Many companies will learn this know-how. The data from installation to evaluation will be made available to others as a service.

Kunststoffe: *Does Erema intend to offer such a service?*

Hackl: I would say we're on the best way there and are currently building a basis for new business models.

Feichtinger: Digitization is already being lived very strongly in other branches, where it is often the basis for entirely new ideas. Instead of welding machines, welding points can now be invoiced – if you have the sensors to ensure that the points were set in the proper quality. Data quality is of course decisive for its meaningful evaluation and further processing. We always start by testing our developments on our machine park in the Erema Customer Center so that we can ensure their use by the customer. The re360 Manufacturing Execution System, for example, has been successfully used in our facilities for more than a year.

Kunststoffe: *In summary, you take recycling to be a kind of lever for implementing the concept of circular economy in the plastics field, following the example of the glass or paper industry. That means positive growth prospects for Erema.*

Hackl: Of course, for mechanical engineers like us, but also for recyclers and producers, these developments represent new opportunities. But we can't sit back and wait for new orders and fail to adapt our technology to current challenges. The increased and, above all, stable quality of recycle will be decisive for exploiting the potential of recycling as well as possible in the sense of circular economy. And exactly that is our incentive: on the one hand, to present our already available recycling technologies and their use potential for the entire plastics industry. And on the other hand, to push digitalization in plastics recycling in order to increase and thus to strengthen the use of recycle as a secondary raw material. ■

Interview: Dr. Karlhorst Klotz, Editor

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