

# PACO

## WORLD

Our International  
Wire & Mesh Magazine  
for Existing and  
Prospective Customers

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## Global Learning – With the Help of Our Customers

Dear Reader!

To learn from a continuously growing customer base is one of the most valuable chances that globalization can give us – at least, that's our view at PACO. The way that existing and potential customers in every corner of the globe come to us with all kinds of new ideas of about how to use our products is a first class source of innovation for us.

Fortunately, regardless of what the new challenge is, we can draw from an extremely solid technology base to provide competent and workable solutions: the mastery of metal wire and its subsequent processing to high precision mesh as well as finished parts is, however, just one side of the story. The other side is the extensive experience that we have gained from supplying an immense diversity of proven solutions to a broad spectrum of industries.

This combination of know-how and technology provides the ideal ground for nurturing innovation. When this is further enhanced through creativity and the desire to venture into new fields, you get an optimum working environment for the development of customer-specific solutions. Nevertheless, the real secret of success is close co-operation and an interchange of ideas between the specialists working at our customers as well as at PACO. This way we can continue to learn from present and future customers around the World – something that we are extremely grateful for. After all, we look forward to every new challenge – yours as well.

Best Regards

Peter Ruppel  
Managing Director



## Clean micro-filtration: PACO Promoting the Production of Clear “Green” Beer

Before beer drinkers can enjoy a refreshing drop amongst friends, breweries have to put in a lot of hard work. Particularly the filtering of freshly brewed beer to produce the clear, shiny amber fluid that is so much appreciated by beer connoisseurs around the World requires a high degree of effort. Traditionally, diatomaceous earth is used to filter the beer. This not only creates process technological challenges but also has a negative impact on the environment. PACO's research and development team is currently working on a revolutionary new filtration method that will completely eliminate additional filtering materials such as diatomaceous earth.

**Innovation that will redefine tradition**  
One of the oldest food laws in the World is the Reinheitsgebot, a purity law that has strictly regulated the ingredients of German beer for the past 500 years. This law finely illustrates the tradition that German brewers can look back upon and be justifiably proud of. Tradition, however, does not stop at the choice of ingredients: brewing techniques such as using diatomaceous earth for the deep filtration of the freshly brewed beer also have a very long history. Diatomaceous earth, incidentally, is a naturally occurring, soft, chalk-like, sedimentary rock mineral that is primarily made of silica and consists of the fossilized remains of diatoms, a type of hard-shelled algae.

Considerations about ways of optimizing filtration techniques as well as the current debate about how to “green” products and production processes have called into question the use of diatomaceous earth and prompted the search for alternative methods of filtration. That is why PACO has launched an intense research and development initiative that is being partly funded by the German Federal Trust Fund for the Environment. The aim is to develop a surface filtration process that can reliably filter turbid particles down to a size of <math>< 1 \mu\text{m}</math> (i.e. the largest particle is a thousandth part of a millimetre) out of the beer without



the need for any additional filtration materials. This would not only streamline the filtration process but also increase the quality of the finished product.

### Farewell diatomaceous earth: a material without a future

Something that has been an integral part of beer filtration for generations, now has large question mark surrounding its future. Firstly, diatomaceous earth is a natural product, the resources of which are limited – the known sources will only satisfy demand for, at most, the next 30 years. Secondly, the countries of origin are generally situated a long way away. For instance, the costs of transporting diatomaceous earth to Germany from countries such as USA, Mexico, Iceland, Chile and China are immense.

Nevertheless, the decisive factor in this debate are the broad environmental considerations regarding the use and disposal of diatomaceous earth. Since 2005, the 150,000 m<sup>3</sup> of diatomaceous earth filtration sludge that is annually produced in Germany alone has been classified as hazardous waste and, consequently, generates correspondingly high disposal costs. Of greater concern, however, is that since 2005 as well, the unused diatomaceous earth has also been classified as a “hazardous substance”. The reason for this is that it is presumed to be carcinogenic which – although there is no risk to the beer drinker – creates an unacceptable hazard for all persons that directly come into contact with the substance in powder form. This all means that there are plenty of reasons for looking for an alternative.

### Turning a new cloth into a perfect system

The central objective of the beer filtration research and development project was the realisation of an innovative filter medium that can hold back particles

Continued on page 2





### Perfect integration

The production process that has been jointly developed by PACO allows metal and plastic to form an almost natural unit. The advantages are improved quality and reduced costs – an interesting constellation for a number of other applications.

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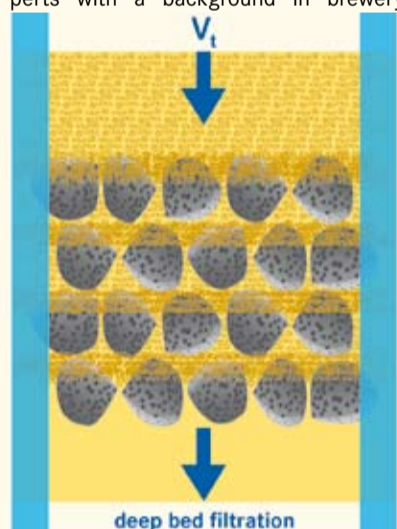
## PACO Promoting the Production of Rainwater Filter Media

smaller than 1 µm. Technologically speaking, this aim would represent a complete breakthrough. Even during the laboratory and planning stage, it became clear that this ambitious goal was technically obtainable. Working from here, implementation on an industrial scale requires the definition of an optimum filter geometry, extremely favourable flow characteristics and a self-cleaning capability of the filter medium combined with the necessary control and regulation technology, including an integral sensor system.

To ensure that these objectives could be attained within the given timeline, PACO strengthened their R&D resources through the appointment of experts with a background in brewery

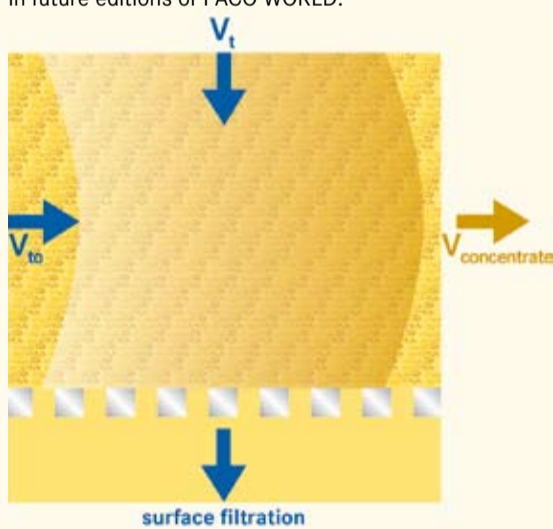
science and staff with experience from specialised university institutes.

The advantages of the successful completion of this project will significantly change the world of brewing in the years to come: a solution to the problem of filtration sludge disposal, improved quality of the final product (i.e. better beer) through streamlining the filtration process, environmental relief and a significant reductions in costs. However, it doesn't stop there: the advantages that benefit the beer filtration process can also be applied to other food processing industries, chemical production, pharmaceuticals and biotechnology. We will keep you posted about further developments in future editions of PACO WORLD.



### Principle of "deep bed filtration"

With deep bed filtration, the particles are trapped throughout the complete cross section of the ever increasing layer of diatomaceous earth. This causes the filter to gradually become clogged, thereby requiring considerable effort for cleaning.



### Principle of "surface filtration"

With surface filtration, the turbid particles are only trapped in one layer. Favourable flow conditions ensure that the filter cannot become clogged, thereby minimizing cleaning effort and, consequently, maximizing productivity.

## The Quadrature of the Rotation Process: PACO Screen Cloths – Even More Perfectly integrated in Plastic Part Production!

A new process that has been jointly perfected by FETO GmbH and PACO R&D offers considerable advantages for processing operations: fast volume production, reduced costs and reduced component weight. PACO is now planning to offer this process to other customers.

### Less brings more

Injection moulding is the most common way of producing plastic components in modern manufacturing operations. This also applies to a number of parts that PACO cloths are to be integrated into. However, injection moulding does have some disadvantages: the cost of the injection moulds is very high so that the expenditure only becomes cost-effective with larger batch sizes. This effect becomes more pronounced when large-sized parts are to be produced. Also, with injection moulding, a relatively high amount of polymers is needed which not only increases the price but also the weight of each individual injection moulded part.

Against this background, the new process that has been jointly developed by FETO and PACO considerably streamlines the production of plastic components containing screen components made of metal wire cloths.

### Rotational moulding: the Santa principle

The innovative production solution is based on rotational moulding. This is a method that is traditionally used to produce hollow parts of various shapes and sizes. For outsiders, it can best be explained using the example of a chocolate Santa Claus or chocolate Easter egg (depending on the time of the year!): molten chocolate is poured into a closed mould that continuously turns until the sweet brown substrate is evenly distributed. After allowing it to cool down, the seasonal chocolate statue can be removed. In principle, rotational moulding works in just the same way with polymer materials that melt to allow processing at correspondingly high temperatures.

### Ideal constellation

FETO, who are based at Bad Überkingen in south-western Germany are an important supplier for the rainwater filter specialists 3P Technik Filtersysteme GmbH. As a matter of coincidence, PACO is also a 3P supplier. We have been supplying screen cloths to them for a number of years. During a mutual interchange of

ideas it was decided that during their rotational moulding process, FETO could directly integrate the PACO filter cloth into the plastic component that they are producing for 3P. An ideal and, at the same time, exemplary constellation: all parties involved pooling their know-how and creativity to provide a significantly improved solution for the benefit of all.

### A rain water filter pioneers a new process

Rotational moulding is the key to the solution: a hollow mould that corresponds in size and shape with the finished part – for 3P parts this usually has to be quite large – not only takes the plastic granulate but also a metal screen cloth component that can be cut to requirements. The hollow mould is fixed to a tool holder that can be moved and turned along a number of axes. Together with other tools, the holder is then driven into a large-scale oven which can heat the constantly moving mould up to a temperature of 280°C. The plastic granulate melts and evenly flows around the inside of the tool. At the same time the edge of the metal screen component is seamlessly enveloped by the molten plastic mass to practically produce a component in a single casting.

### Convincing advantages – for other PACO customers as well

Compared to injection moulding, the advantages of rotational moulding are comparatively low tooling costs together with reduced material requirements for correspondingly lower-priced parts. These advantages become particularly cost-effective when producing smaller batches.

After an extremely successful pilot phase, the innovatively produced rainwater filter components went into production for 3P. The high quality and economic advantages of the project are so convincing that PACO has decided to make this process available to other interested customers.

If you would like to know more, please contact Matthias Faust at PACO on: +49 (0 66 63) 97 - 127

## All the Best for 2006!

It is always good to look forward. However, this doesn't stop us thanking our customers, partners and staff for a successful year 2005!

The year 2006 is now in front of us, which will surely contain a number of new challenges for us. We wholeheartedly wish you a year of progress, continued learning and a sense of achievement – together, of course, with good health for you and your families.

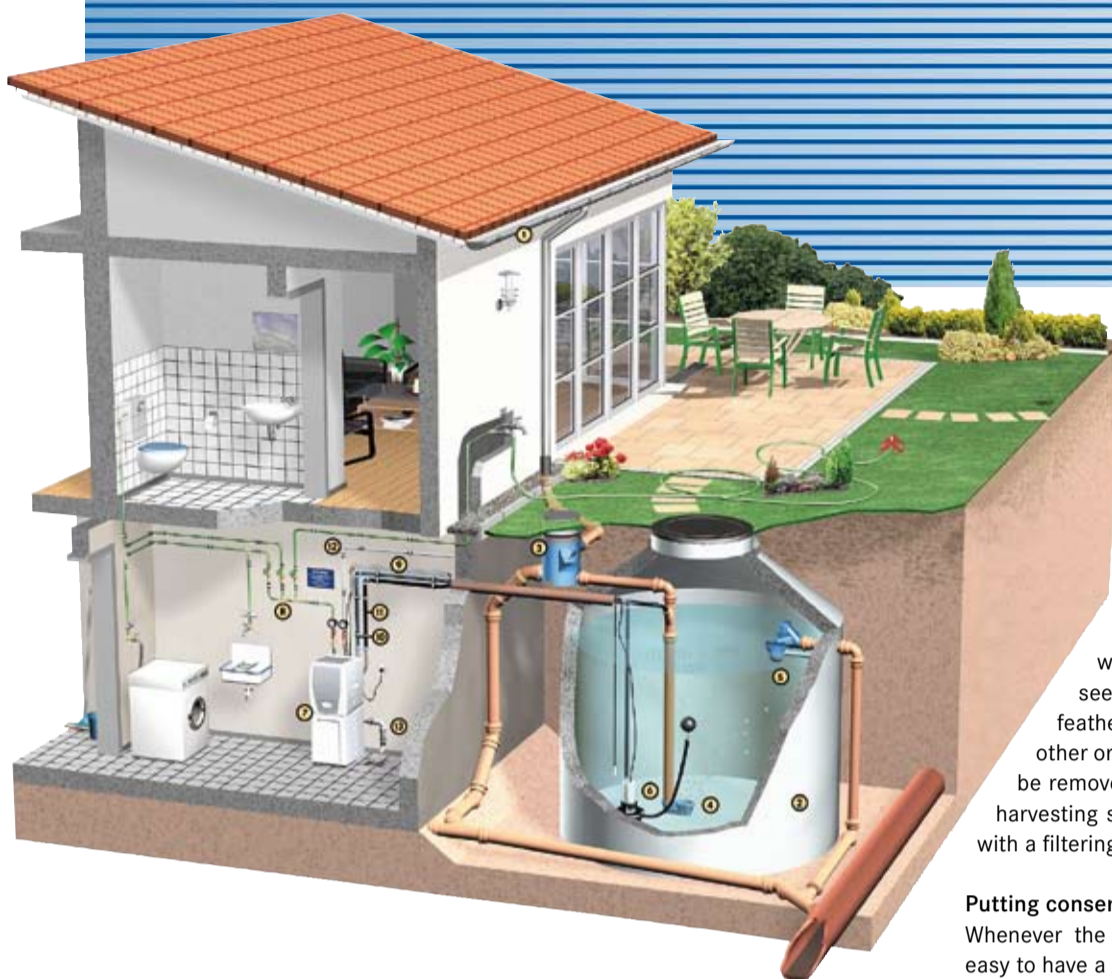
Best regards

Peter Ruppel

Wilhelm Ruppel



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www.paco-online.com



- |   |   |
|---|---|
| ① Roof guttering  | ⑧ Operating water line                    |
| ② Rainwater barrel  | ⑨ Cable channel for sensor and pump cable |
| ③ 3P volume filter with PACO stainless steel screen cloth | ⑩ Pressure line                           |
| ④ Calmed inlet  | ⑪ Feed line pump                          |
| ⑤ Overflow siphon   | ⑫ Drinking water line for feed            |
| ⑥ Floating pump intake                                    | ⑬ Overflow                                |
| ⑦ System controller                                       |   |

### Watering, washing, cleaning: 3P rainwater harvesting systems for private use

even the rainwater that is collected from roofs will need filtering: leaves, seeds, small twigs, birds feathers and insects as well as other organic residue will need to be removed. That is why rainwater harvesting systems are always fitted with a filtering system.

#### Putting conservation to the fore

Whenever the lavatory is flushed it is easy to have a bad conscience, knowing that a valuable commodity – high-quality drinking water – is being used to simply flush away waste. But looking even further from here, you don't really need drinking-quality water to water greens, clean windows, wash cars or even fill washing machines. Putting harvested and filtered water to such uses will not only conserve resources; qualitatively, it also provides an absolutely reliable alternative. The inherent softness of rainwater even makes it a better choice for washing machines, as it will not cause furring of the heating rods and can reduce the amount of detergent needed. And the fauna and flora in your garden is sure to prefer rainwater – regardless of whether it comes directly from the sky or out of a water conservation system.

#### In the interests of the community

Local communities can, in the long-term, minimize the cost of their water consumption – for everything from watering parks and gardens through to supplying fire hydrants – by planning a suitably sized rainwater harvesting system. Further to this, large quantities of rainwater that, for instance, suddenly appear due to a storm, can be safely buffered instead of overloading the drainage system. For such applications, large-scale retention systems are required that are adequately sized to absorb a large amount of precipitation and then release it, according to requirements, through a retention throttle. Usually, communal retention cisterns are combined with a rainwater harvesting systems to further increase their retention capacity.

#### Corporate and institutional rainwater harvesting

Rainwater harvesting has played an important part in industry for a long time. It is, for instance, used as a process coolant for machinery as well as for cleaning agricultural produce such as potatoes and sugar beet. The sanitary systems of schools and other public buildings are also fed with rainwater. In car washes, recycled precipitation makes sure that cars are properly cleaned. Rainwater is also valued in industrial laundries as

well as by textile manufacturers. High-rise architects now systematically plan rain water harvesting into their buildings to, for instance, sprinkle indoor and outdoor green areas or fill automatic window washing systems.

#### Clean water is needed

To correctly function, all systems that operate with natural rainwater need water that has been reliably freed of solid contaminants. Various filter systems that will ensure this are available. The most suitable system for each specific case will depend on factors such as the size of the roof area, method of installation, type of tank and waste water drain.

When the filtered-out waste can be drained off through the municipal sewage system, which is technically feasible, maintenance can be kept to a minimum. If the waste water has to be drained through a soakaway, filter baskets that require regular cleaning will be needed.

#### PACO stainless steel screen cloths: first choice

The filter system is of central importance for the purification of rainwater for re-use: whereby, the composition and quality of the filter medium plays a very important part. As rainwater has a comparatively low pH value, the screen

**The optimum interaction ...**  
... between material, form and function guarantees the quality of the complete component. Shown here is a 3P rainwater filter element with a PACO stainless steel screen cloth.



cloth has to be resistant to corrosion. That is why the materials of choice for 3P are PACO stainless steel screen cloths. They are not only available in a wide variety of specifications (type of weave, filter size, finish) but also offer a high level of quality: this means that they offer optimum filtering characteristics partnered with an almost unlimited lifetime.

3P Technik Filtersysteme GmbH supplies rainwater filters to customers around the world from their base in Germany. This means that PACO stainless steel screen cloths are also true global players – from EU countries such as France, the Netherlands, Belgium, Great Britain and Ireland to overseas localities such as Brazil, South Korea and Australia.

# Reclamation of rain water: Filter Technology to Conserve Resources and the Environment

Water is a natural resource that is becoming scarcer and scarcer and, consequently, more and more valuable. With the price of mains water continuously on the up, the reclamation of rainwater and its systematic use – regardless of whether commercially or privately – is definitely becoming well worth consideration. As a supplier of sieving cloths, PACO works closely together with the leading manufacturers of filters for rainwater harvesting systems that sell their products all around the world. This first example will be followed by others in future editions of PACO World.

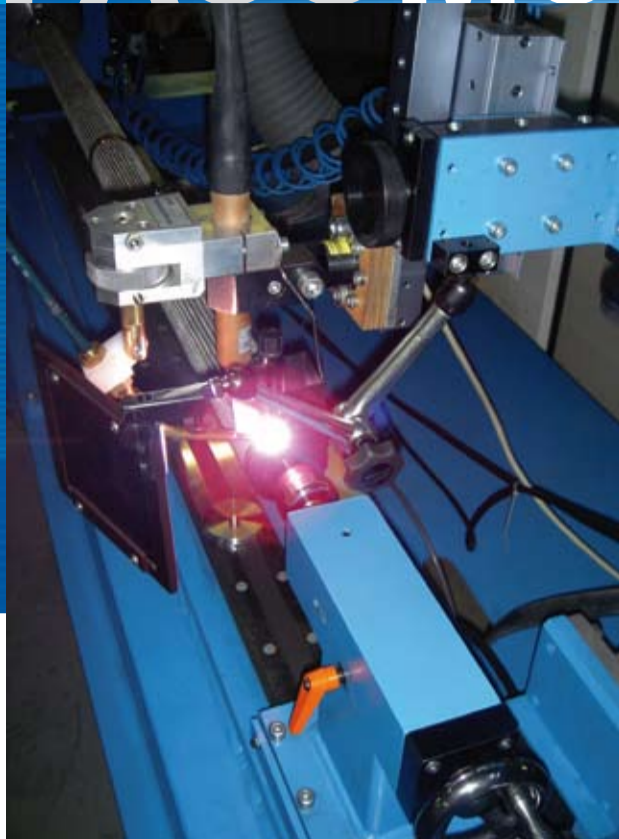
#### All good things come from above

The conservation of rainwater is an activity that is not just limited to dedicated environmentalists but is something that makes economic sense for an increasing number of companies, institutes, local authorities and private homes. Nowadays, whenever a building is being built or substantially renovated it is worth considering the installation of a rainwater harvesting system. This is because rain, which literally falls out of the sky, can truly be considered as a gift from heaven. As the rates for municipal water supplies and drainage skyrocket, the investment costs for a rainwater har-

vesting system can be amortised even quicker. PACO is actively engaged in this development, that promises to have a bright future, by supplying high-performance metal filter cloths.

#### Effective rainwater harvesting demands efficient filtering

In principle, a rainwater harvesting system consists of a more or less large barrel that collects the water that is guided into it. Of course, statutory building regulations only allow harvesting from roofs. For hygienic reasons, other areas that collect water, such as courtyards or pathways, are not permitted. But



**New standards ...**  
... are set by PACO with their newly commissioned production line for manufacturing filters that, for example, are required for pre-polymerisation, polymerisation and melt filtration in the production of textile fibres.

## Investment in Highest Tech: New Production Line for Pleated Filters

A big moment for PACO plant no. 1 and for PACO in general: In mid December 2005 the ultra-modern production line for pleated filters will be commissioned. It consists of pleating machine, a longitudinal seam welding machine and a circular welding machine which can process elements with a length of up to 1,400 mm. Incidentally, the total investment amounts to around 500,000 Euro.

**Optimum diversity – just as the market demands**

There is a clear trend among filter media customers away from catalogue parts towards more diversity and dedicated specifications. On the other hand, manufacturers need to be able to react quickly and efficiently to the demands of the market. The new PACO production line fully satisfies both sets of demands. This starts with the integral electronic control concept and continues through the innovative plasma system for circular seam welding to the automatic lathes for finishing operations.

The next edition of PACO WORLD will contain a complete report about the new production line for pleated filters in PACO's Steinau (Germany) factory.

## Bits and Pieces



Had,  
when,  
if ...

I'm sure I could have made something of myself in this world, if fate not maliciously got in my way.

I could have become a scholar, if I had learnt to read.  
Courting the favour of the muses, was also something that was far from me.  
Among the women, without doubt, I could have found my luck, if not everywhere that I went they had not barbarously laughed at me.  
To be born as a rich man is a stand that I would have selected, if among all things I had not suffered from a lack of cash.  
To rule over a state I would have been just the person, my gifts and talents give me this right.  
I should have been a king, where one can complain about princes, but my father was just a commoner, and that is enough said.

True, a lot of me could have been made in this world, If, maliciously, fate had not got in my way.

*This is a rendering of a German poem written about human ifs and buts by Adalbert von Chamisso (1781 – 1838). The German poet was also a naturalist and between 1815-18 took part in round-the-world sailing expedition. "Peter Schlemihls Wondrous Story," his romantic narrative about a man who sold his shadow was his most famous literary work.*

## Steinau an der Straße: The Devil's Cave – A Fairy-Tale Experience!

Situated just three kilometres away from Steinau town centre is devil's cave. This forbidding sounding name is in strict contrast to cave's natural beauty and accessibility. The fact that it is the only stalactite cave in the whole of the state of Hesse means that it is more than just a tourist attraction. Its 2.5 km length is something that keen geologists like to explore. And the "cathedral" with its height of eleven meters is sure to take away the breath of all those entering it. Before we forget, if you ever want to at long last learn which of the tapering deposits that hang from the ceiling or grow out of the floor are the stalactites and which are the stalagmites, you'll have plenty of chance to find out in Devil's Cave. It's also worth knowing that when the calcite formations from above and below meet, the resulting formation is known as a column or pillar. If you would like to have a look at the Devil's Cave, you can arrange a guided tour by calling the Steinau tourist office:  
Tel.: +49 (0 66 63) 96 31-0



**Heavenly devilish**  
The attractive lighting in the Devil's Cave underlines the fairy-tale beauty of this underground wonder of nature that is situated just outside Steinau an der Straße.

**Weaving in the space age**  
PACO weaves the finest metal wires to produce high quality cloths that are among the most precise in the world.



## PACOs

## PACOs Short Guide to Manufacturing

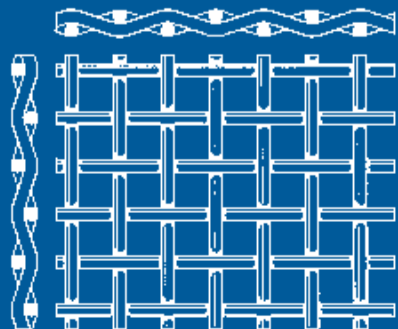
Work at PACO is characterised by a variety of different production techniques. We will be introducing the most important of these in a new series in the next few issues of PACO WORLD:

### 1. Weaving

Weaving – the interlacing of warp and weft threads – is one of the oldest production techniques in the history of mankind. Initially, it was used to turn textile material threads into cloth to

produce articles of clothing. The idea of weaving metal wire to make cloth came along time afterwards.

Since PACO was founded, the production of metal cloth is one of the company's fundamental production techniques. This goes as far as designing and producing our own looms to make sure that we have the machinery to exactly suit our requirements. Today more than 250 highly automated looms are in action – in our production plants in Germany as well as at our joint venture partners abroad.



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