

Newsletter

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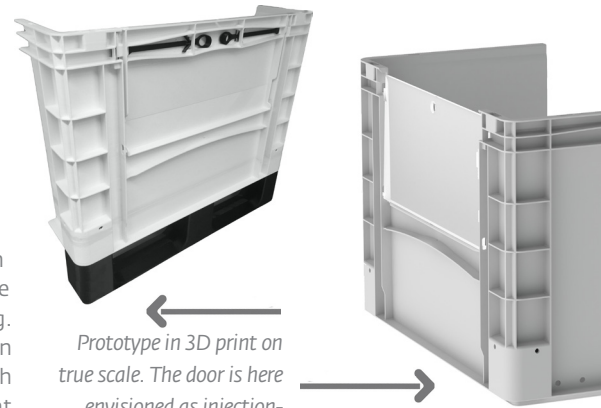
December

In this issue: BPO is celebrating its 30th anniversary - Development modular Basicline Plus (800 x 600mm) - Injection-mouldable pallet for an Intermediate Bulk Container (IBC) - Marlène, an elegant wind turbine - Robot Floor heating; "The future is Next" - BPO visits Thin Wall Packaging - Best wishes for 2019!

Basicline Plus (800x600mm)

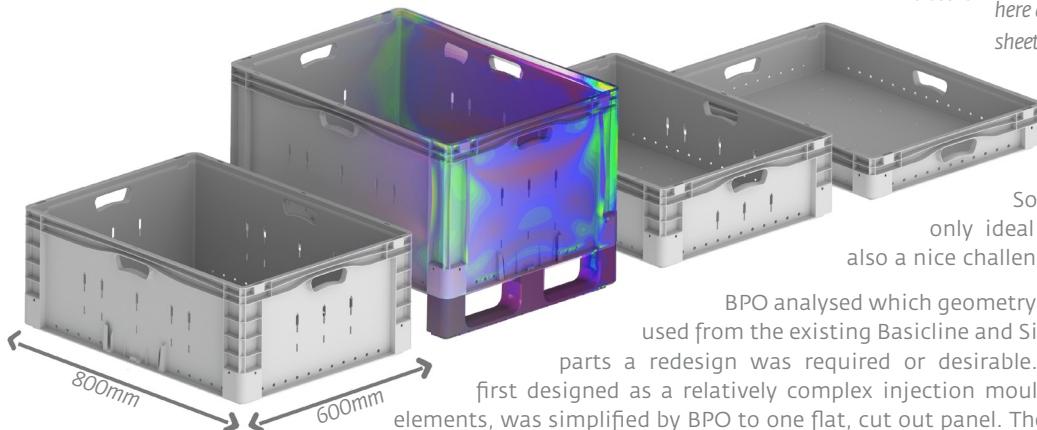
Bekuplast is one of Europe's leading manufacturers of plastic reusable transport packaging. By assignment of Bekuplast, BPO developed the modular Basicline Plus (800x600mm). The development was done based on existing elements of the crates of Bekuplast.

The complexity of the Basicline plus can be found mainly in the large number of variations and options. One can choose for an opening at the side, a hinged door or no opening. Also, there are versions with or without watering holes in the side walls. The bottom can be ordered either flat, with a sandwich construction or with a higher centre to prevent bulging. Grips and ticket holders can be placed at request. Finally, the Basicline Plus is available in several heights,



Prototype in 3D print on true scale. The door is here envisioned as injection-molded element with spring closure.

Rendering of the final product. The door is designed here as one simple punched sheet part with slide-closure.



and can be fitted with legs, wheels or pallet skids.

So many options are not only ideal for a customer, but also a nice challenge for the designer.

BPO analysed which geometry and features could be used from the existing Basicline and Silverline and for which parts a redesign was required or desirable. The opening panel, first designed as a relatively complex injection moulded part with spring elements, was simplified by BPO to one flat, cut out panel. The feet and pallet skids have been designed from scratch, because these were not part of the Bekuplast product portfolio before. The pallet skids can be mounted with click edges, if required with the aid of screws. Of course, the pallet skids fit on all variations of the Basicline plus.

During development BPO performed strength and stiffness analyses (FEM) as well as moldflow simulations. The functionalities of the design were verified using an in-house 3D printed model at full size.

In cooperation with AVK Plastics, BPO developed an injection moulded pallet for an Intermediate Bulk Container (IBC) of the Sotralentz brand. The starting point of the development was the current compression moulded pallet. BPO simulated the structure of the pallet and was able to realise an optimal relation between weight and strength.

An IBC consists of different parts: a metal frame, a 1000L tank and a pallet. The tank is used for the transport of, among other things, heavy chemical liquids. During transport these liquids may not leak in any given situation.

BPO's scope for the project was to optimise the pallet. But the required strength and stiffness of the pallet can only be adequately assessed if the tank and the metal frame are also considered in the simulation.

BPO has researched several loading situations, where the drop test from a height of almost 2 meters at a temperature of minus 20°C proved to be the most critical.

BPO used finite element analyses to determine the optimal structure of the pallet. The optimal relation between overall stiffness and a certain amount of flexibility was sought. The simulations of BPO proved to be an exact prediction of the way the product performs in the roughest of circumstances. The critical drop test has been met in an actual test and the IBC is currently available on the market.

Thirty years of BPO Jubilee edition

30 years

BPO

Marlène, an elegant wind turbine

Elegant Energy GmbH & Co KG, a company specialised in renewable energy, has developed Marlène, a vertical axis wind turbine (VAWT) that combines an efficient and flexible source of energy with a high aesthetic value.

The wind turbine is very well suited for use in an urban environment, because the functioning of its rotor is independent of the wind direction. Also, it has a much lower noise level than a conventional wind turbine. The generator is a bespoke development for Marlène and software keeps the turbine spinning at its most efficient speed in any geographical area and on any installation height.

From the start of the project, BPO has been involved in the development of the mast and rotor. Conventional, low-cost production methods were considered for the design, at the same time the total mass was kept as low as possible. This meant that a cost-performance ratio has been realised that has not been possible before for a VAWT. Steel cables have been used to withstand the high centrifugal forces in the rotor and using finite element analyses it was made sure that the rotor and the mast can withstand wind speeds up to hurricane level and beyond.

Another important requirement is that the wind turbine is self-starting at low wind speeds and that sufficient power is created at low wind speeds.

A range of computational fluid dynamics (CFD) analyses have been performed by BPO and development partners, in order to find the optimal wing profile and rotor geometry. An optimal combination of strength and stiffness together with a low mass has been realised by implementing a wing-box construction.

The first Marlène has been unveiled and put into operation with a small celebration in September this year and is currently running a pilot test phase near the northern German town of Crivitz. Series production is in preparation.

More information can be found on the website of Elegant Energy: www.elegant-energy.com

30 years of BPO: product design is and remains a great profession

At the end of 1988 I started Brocades Product Optimalisatie (Optimisation) as a one-man company. The resources I had available at that time: one computer, FEM software fit for analysing aircraft and bridges, a VW Jetta and one enthusiastic entrepreneur - me. The first computer for the company cost 12 thousand guilders (€9.800 in today's money, including inflation) and that large amount of money bought me a 386 with 387 coprocessor - according to the supplier the first one in the Netherlands - 4 MB internal memory and a 24 MB hard disk.

"Designing a product still starts with a creative phase: creating good ideas together with a team."

Quickly BPO welcomed its first employee Jan Eek, a very experienced and dedicated colleague, who is currently still working at the company. Through the years BPO has grown, slowly but surely getting more assignments and more employees. My father taught me to only buy something when you have the means to do so. This may be a bit boring, but a solid way of doing business.

Over the years the company moved to larger offices a few times, and the services were expanded: "Product Optimalisatie" (Optimisation) became "Product Ontwikkeling" (Development).

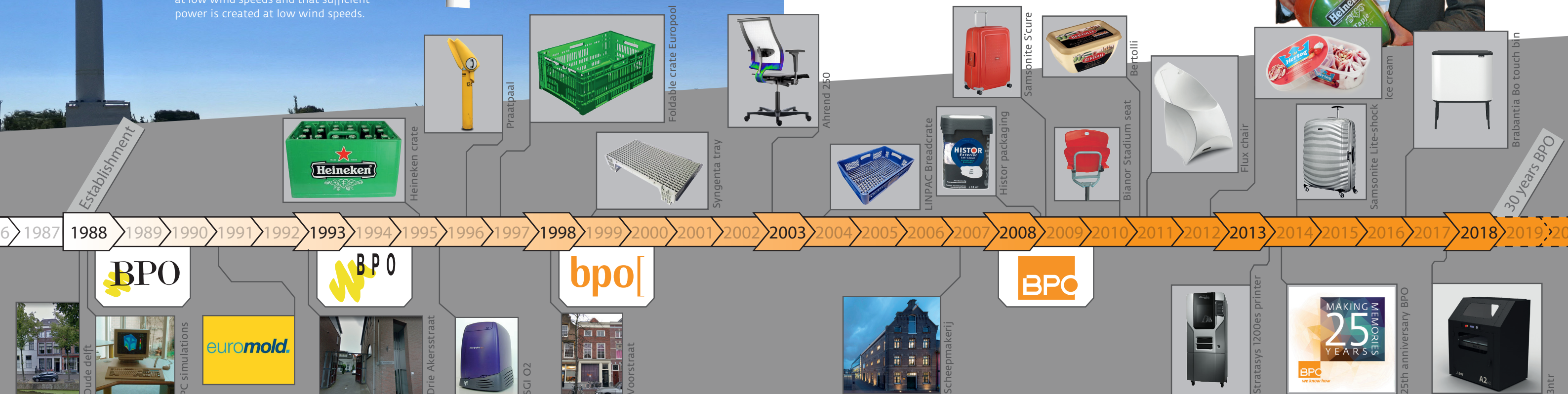
One can describe doing business as taking calculated risks and product design is the same. A good product

is fit for its purpose, with a healthy balance between requirements and costs. A designer must create something special within the set budget and the available time. BPO as a company as well as the Netherlands as a country have a very good reputation internationally regarding creative and innovative product development. BPO has executed many projects over the years for foreign firms, in Europe and further away, like Mexico, Russia, Australia and South-Africa.

Were there many changes over the last 30 years? Well, yes and no. Yes, quotations are now being emailed instead of being sent by fax machine and for prototypes 3D printing is now standard. No, because designing a product still starts with a creative phase: creating good ideas together with a team. This is how it was done in the past, this is how we do it now, and this is how it is going to be, at least for the foreseeable future. Product design is a balancing act between unit cost and risks, between time schedules and quality, between nice-to-haves and physical possibilities. The demands of the market are everchanging: the development of sustainable or even circular products is becoming an increasingly important aspect of our profession.

Product design is and remains a great profession that we will keep doing for you in the coming decades.

Oscar Brocades Zaalberg
Founder



Robot Underfloor Heating: "The future is Next".

The Dutch company Robot Climate Comfort Systems develops, produces and sells underfloor heating manifolds, including the successful type "standard manifold". This is a compact unit with a selection of 1 to 15 groups. The standard manifold is made of a steel beam profile.

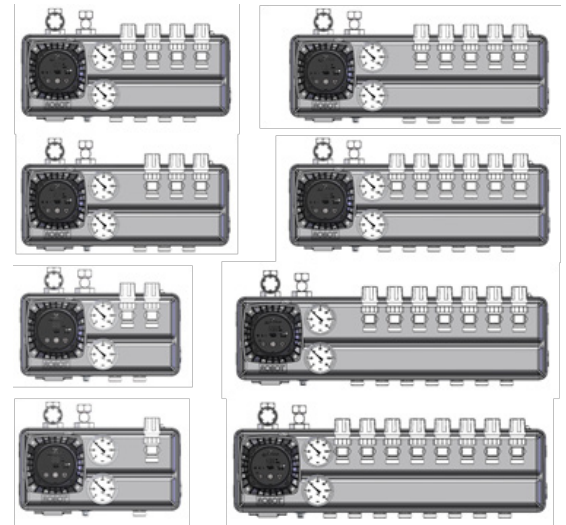
A plastic version of the "standard manifold" has potentially large advantages regarding the production efficiency. Manifolds consisting of multiple connected parts are already on the market, those types need a new connection part to be added to the system for each new group. This was not the direction Robot wanted to go. The main benefit of the current product is that it is made

of one piece with therefore a minimal chance of leakage.

BPO looked at different options to realise a plastic manifold out of one piece. Ideas were created for rotational moulding, extrusion and injection moulding. The technical feasibility of the different options was analysed using FEM simulations. Next to a diverse range of production methods, multiple material options were looked at. In

the end injection moulding was chosen, where different number of groups can be created using exchangeable parts in the mould.

Special attention was given during the designing to ascertain the leak tightness of all the holes that are required for the assembly of parts as the hose connections, the pump housing, temperature gauges, regulator valve and air vents. All connections must be able to withstand high pressures, specially developed inserts were used to make this possible.



A parting of the housing into two parts proved to be inevitable, because of the way the product is to be assembled. To make a secure connection between the front and back part of the housing, extensive research was done for welding and gluing, where in the end the decision was made for the parts to be glued together. A lot of further research was done to choose the appropriate type of glue, the optimal geometry around the glue connection and the optimal processing and curing conditions.

BPO also advised Robot during the selection of a producer. A producer with experience in gluing, moulding using inserts and modular moulds was preferred. The manifolds are currently being produced by Pekago and are glued together using a robot that was specifically developed for this project.

The innovative manifold has been tested thoroughly (including at TNO) and will be introduced shortly under the "Next" moniker.

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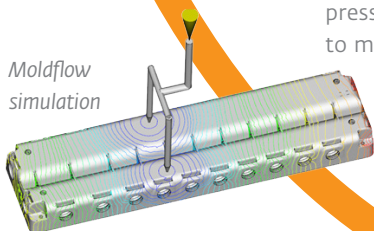
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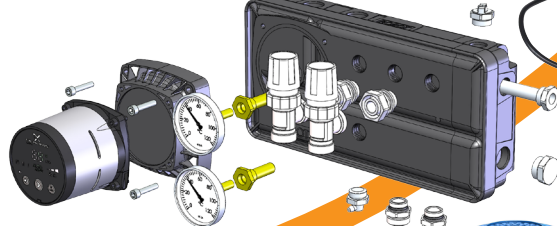
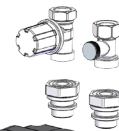
Standard plastic manifold



Moldflow simulation



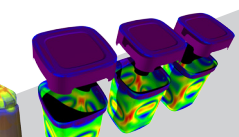
Simulation of stresses in back part, if loaded with internal pressure.



Redesign in 3D CAD



Standard manifold steel profiles



Thin Wall Packaging

This autumn BPO is again represented at the "Thin Wall Packaging" conference, an international conference on trends and developments in plastic packaging (11-13 December, Cologne, Germany).

*On behalf of the BPO team;
Happy Holidays and best wishes for 2019!*

