

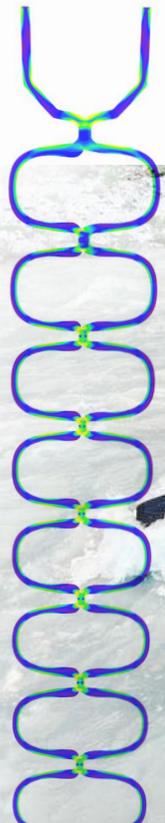
Newsletter



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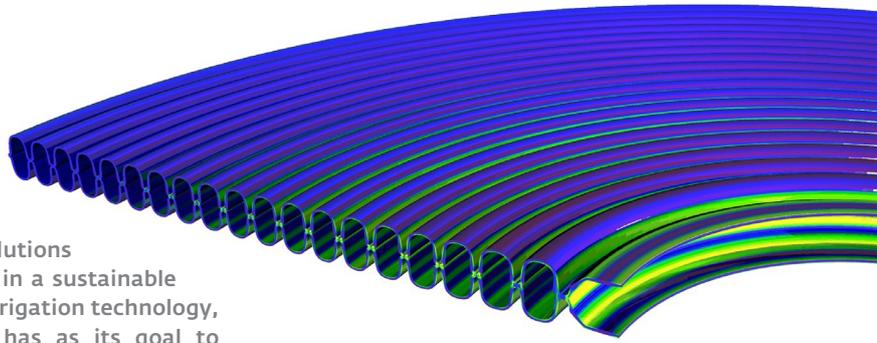
In this issue: A cost-effective solution for irrigation in developing countries - The development of a robust monoblock pallet for Smart Flow Europe - A new addition to the 3D services of BPO.

Barsha Pump: irrigation driven by water

Startup company aQysta strives for the development and implementation of technological and innovative solutions that bring economic advantages in a sustainable manner. The Barsha Pump is an irrigation technology, driven by waterpower. aQysta has as its goal to become market leader in "hydro powered irrigation technologies". The Barsha Pump is its first product. Compared to existing solutions the Barsha Pump is very cost effective and therefore a very good solution for small-scale farmers in, amongst other, developing countries.

The Barsha Pump (Barsha means "rain" in Nepalese) uses the energy of the flowing water of rivers and canals to pump water to farming land. The pump consists of an inward running spiral shaped duct in which air is compressed between water columns that are scooped up out of the water stream. The air pressure that is created is then used to pump the water away, without using any kind of fuel or electricity. The Barsha Pump is a sustainable and cost effective solution for the pumping of water for irrigation purposes in arid areas. At the moment more than 40 pumps have been installed in countries like Nepal, Indonesia, Spain, Turkey and Zambia.

The current pump has a diameter of 1.5 meters and can pump water up to 20 meters vertically or 2 kilometers horizontally. The maximum capacity is more than 40 000 liters per day, dependent on the flow of the river or canal. BPO has calculated if the spirals, made of HDPE, are strong enough to withstand the high



Material stresses as a result of internal pressure

internal pressures that occur. This has been done using finite element analyses. The spirals each consist of two symmetric halves that are merged together. The spirals are subjected to high and fluctuating pressures that also differ over the different windings of the spiral. BPO has executed axisymmetric analyses, amongst other types of analyses, in order to look at the occurring material stresses in each of the windings in detail. The parts have not only been simulated for short term high peak loads, also the fluctuating loads over a period of 10 years have been analysed, in order to guarantee a long lifetime of the product. Next to this, BPO analysed the influence of the forces on the central axis and the vanes that are fitted between the spirals on the construction, especially the connections between the different parts. Based on BPO's advice wall thicknesses in different areas of the product have been adjusted. Finally with a check simulation it was concluded that the spirals are able to withstand the high loads that occur when the pump is in use.

After several prototypes of the pumping system were tested in practical conditions, the commercial version of the Barsha Pump was introduced at the start of 2016 on the worldwide market. The goal now of aQysta is to increase their distribution network in Asia, Africa and Europe, so more farmers can improve their land irrigation in a simple and relatively cheap manner.

For more information see:

www.aqysta.com and www.bpo.nl

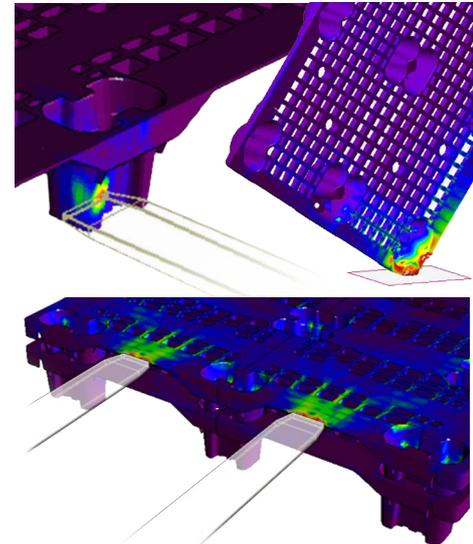


Innovative heavy duty pallet

Smart Flow Europe is a Belgian company, specialized in the development and production of material handling products for logistical applications. Commissioned by Smart Flow Europe, BPO developed an innovative, more-way heavy duty pallet without bottom skids. The SF800H is a nestable mono-block pallet (1200 x 800mm), made of virgin or recycled HDPE.

BPO developed the SF800H pallet based on the technical requirements as stated by Smart Flow Europe. These requirements were related to nesting height (maximum 50%), material (HDPE, possibly recycled), mass (between 10 and 12 kg) and several predefined load cases, like bending resistance on a forklift and racking, conveyor and impact performance.

Finite element simulations were used to quantify the performance and deformations under the predefined loads and conditions. Static and dynamic "worst case" simulations were executed for both reference and conceptual geometries. Evenly and unevenly distributed loads were taken into account, as well as extreme usage scenarios, like lifting from the short side, without extended forks, combined with a load on the free hanging side.



Top: Impact simulation long side on a foot and a drop test. Bottom: Impact simulation rim

BPO optimised the conceptual geometry of the pallet based on the results of the finite element simulations. The legs were designed to be rounded on the outside, which protects the legs from impacts by the forks. The openings in the deck were designed as small as possible, which explains the "kidney-shape" of the legs. The square rib pattern under the main surface is optimised based on strength and stiffness requirements, as well as requirements with regard to the production facilities of Smart Flow Europe. The ribs in the feet of the pallet function as crumple zones; because of their shape, these ribs absorb energy, whereby the leg itself is not structurally damaged and can still carry vertical loads.

In order to stabilize the load, a rim is designed on the top side

of the pallet. Smooth transportation over conveyor belts is guaranteed by functional rounds in the corners. Mounting geometry for rubber pads is added to the design, as well as functional drafts on the bottom side of the deck, which enlarge the forklift entry window. When empty, 40 pallets can be stacked on top of each other, which means that 1320 pallets fit in one container (40ft), taking into account outer dimensions and nesting height.

BPO prepared the 3D CAD files for production, and provided all technical documentation required for mould making. Smart Flow Europe recently added the SF800H to their product portfolio. For more information about the SF800H pallet, please visit: www.smart-flow.com and www.bpo.nl

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Stacking the pallet



New large 3D printer in-house

In the beginning of February BPO installed the **3ntr A2**, one of the **largest FDM printers** available at the moment. Our new 3D printer works with several different types of plastic. The printer manufactures products with a very high precision and up to a size of 620 x 355 x 500mm (l x w x h). Even larger products can be realised by dividing in smaller parts and then gluing those together.

This new printer is in use next to our existing Stratasys Dimension 1200es printer and SLS-3HD 3D scanner. These tools support BPO in fulfilling a wide range of services; Prototyping, reverse engineering, and verification of product development.



Stratasys 1200es :
254 x 254 x 305 mm



SLS-3 HD
3D scanner



The new 3ntrA2:
620 x 350 x 500 mm!