Newsletter

BPO
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In this issue: Top model waste bin from Brabantia – Spare parts using 3D printing – Titanium print for the Defence Helicopter Command

Brabantia's next top model

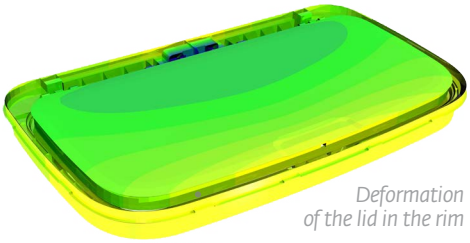
Brabantia's newest refuse bin Bo Touch Bin is one for design enthusiasts. Next to its sleek appearance and large opening, top-of-the-line Bo has a system for opening the lid with only the slightest of touch. Also, the model has 1, 2 or 3 different sized internal buckets made of 100% recycled material, that make it ideal to use for waste separation.

BPO has assisted Brabantia with the development of the lid and the inner buckets. Focal points here were the preservation of the clean look of the design over the long term, optimizing the design for more strength and stiffness and the mouldability of all parts.

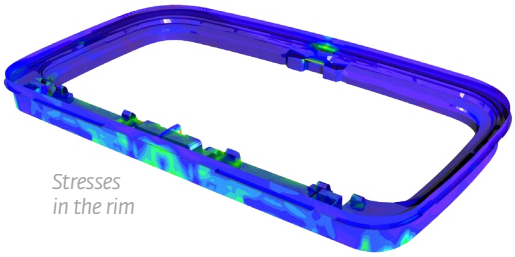
One of the major challenges in the design was keeping the lid's clean and sleek appearance during years in use. The system for opening of the lid acts with a permanent, albeit relatively low, force on the construction of the lid. This could have led to unwanted deformations of the lid.

The Brabantia Bo Touch Bin

The strength and stiffness of the design has been simulated by BPO using the finite element method (FEM). Especially a lifetime of use of at least 10 years was looked at, as well as the "behaviour" of the material for such a long time span. The geometry was optimized by eliminating local weak points by increasing the wall thickness in exactly the right areas and by improving the construction of the load bearing parts. This optimization guarantees the sleek appearance of the top of the waste bin, even after years of use.



Deformation of the lid in the rim



Stresses in the rim

Using moldflow analyses BPO has optimized the mouldability of the different parts, thereby guaranteeing that the strict requirements regarding the looks of the design were also met in the production of the injection moulded parts.

The analyses of BPO have contributed to the unique design of Brabantia's new top-of-the-line waste bin.

Less plastic waste using 3D printing

More and more products and packaging are made of plastic and at the end of their life they end up as waste in places they do not belong. A large fraction ends up in the oceans. The problem of a growing mountain of waste in the oceans asks for an integral approach.

At the moment, Oscar Brocades Zaalberg of BPO is writing an article that will be published shortly about designing, waste and solutions. Below we give an interesting preview of this article. Next to generating solutions for creating waste during the complete development process for instance by using less material, the prevention of waste can also be a solution. For quite a while BPO has been working on this from the viewpoint of a designer in multiple international collaborative projects. This is how the idea became apparent to design products and spare parts in such a way that they can be produced in mass series at the start of their lifetime, but later they can also be made as single pieces, manufactured using for instance 3D printing.

Left: The original, broken part
Right: The redesign, printed in ABS

An example of this is the famous Alessi/Philips juicer: the HD2003. Contained in this product is a smart hinged flap that stops the flow of juice if moved upwards. Next to the useful function of the part, it is also an indispensable part of the juicer. Without this flap, weighing only 8 grams, one has a non-functioning apparatus weighing 2,5 kilograms. The flap, made of ABS, has a construction that is (too) fragile and that can break too easily, especially if cleaned often in dishwashers using aggressive detergents. The hinged flap cannot be ordered (any more) for replacement and this renders the whole product useless.

As a solution to these kinds of problems, BPO initiated the (European project) "DirectSpare": developing the spare part parallel to the "normal" development process. This way, ordering and installing a part later is very easy and it prevents having to throw away a product that functions well in all other aspects. Of course, this is only an example, but if this is done on a much larger scale it could be a small start to work on the giant plastic waste problem.

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Titanium printed part for the NH90 helicopter

Last year the Dutch Defence Helicopter Command has flown for the very first time with a 3D printed part. It is a so called "ladder bracket" that is mounted at the tail plane of the NH90 Helicopter and which is used to mount a ladder for inspection and maintenance.

The ladder bracket development was commissioned by the CLSK (Dutch Air Forces Command). Using 3D printing, CLSK wants to have parts manufactured faster, to save on maintenance costs and in the end improve the deployability of its weapons systems. BPO, in cooperation with Fokker Aerostructures, NLR (Netherlands Aerospace Centre) and the Dutch Defence Materiel Organisation (DMO), has taken care of the development and optimization of the new design of the bracket. The redesign is made of titanium and is 40 percent lighter, while being stronger than the original design.

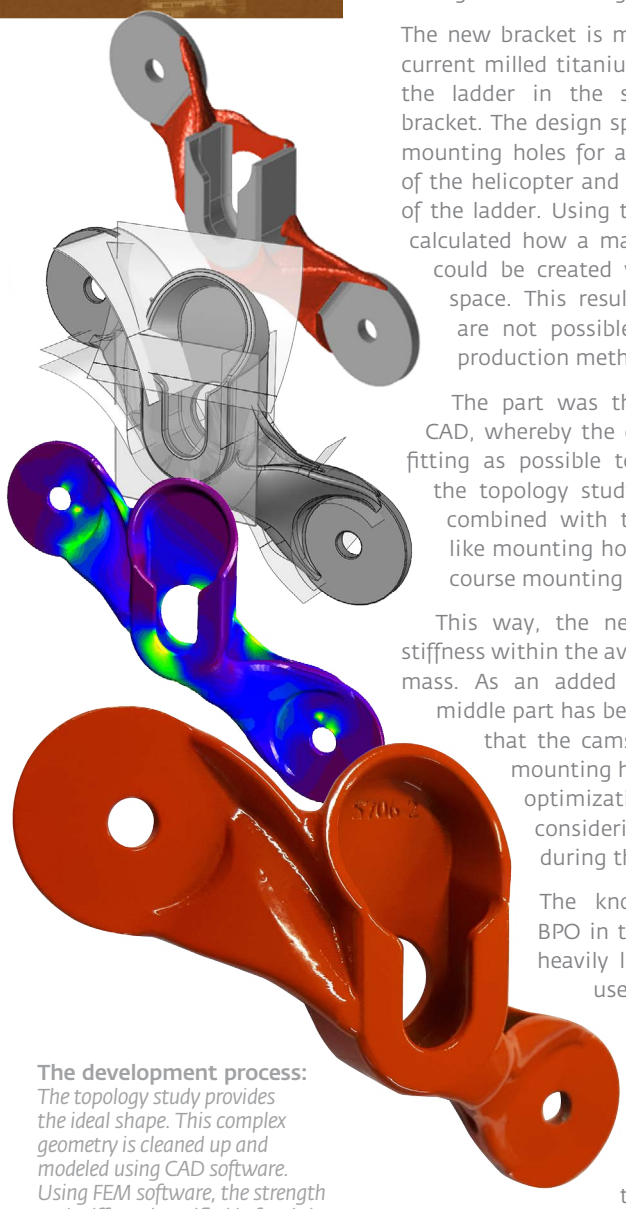
The new bracket is meant as replacement of the current milled titanium part and it must support the ladder in the same way as the original bracket. The design space was determined as two mounting holes for attachment to the tail plane of the helicopter and the interface with the cams of the ladder. Using topology simulations, it was calculated how a maximum amount of stiffness could be created within the available design space. This resulted in organic shapes that are not possible to make with traditional production methods.

The part was then surface modeled in 3D CAD, whereby the organic shape was made as fitting as possible to the original geometry of the topology study. This geometry was then combined with the required functionalities, like mounting holes, drainage features and of course mounting and using the ladder.

This way, the new bracket has a maximal stiffness within the available space with a minimal mass. As an added feature, the shape of the middle part has been engineered in such a way that the cams of the ladder fall into the mounting hole more easily. A functional optimization that is only possible by considering the production method during the development.

The knowhow and experience of BPO in the development of complex, heavily loaded parts were optimally used in the development of the new bracket. Knowhow like for instance the use of topology simulations, FEM analyses and CAD modeling of complex organic shapes. Also, the experience gained in earlier Additive Manufacturing projects like DirectSpare, Custom Fit and the solar panel satellite hinge for Airbus Defence and Space Netherlands was used. Designing for Additive Manufacturing requires a different process than is used when designing for more traditional production methods. Do you have any questions about the possibilities of using Additive Manufacturing for your products? Please do not hesitate to contact us!

Via bpo.nl/nh90 one can see a video that shows the complete project from design up to and including a test flight.



The development process:
The topology study provides the ideal shape. This complex geometry is cleaned up and modeled using CAD software. Using FEM software, the strength and stiffness is verified before it is printed and finished.

The titanium print, mounted to the rear of the NH90 Helicopter

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On **Wednesday March 7** BPO will be present at the yearly business fair of the faculty of Industrial Design Engineering at Delft University of Technology. For information visit: www.iobdelft.com

BPO Nederland b.v.
Scheepmakerij 11
2628 AA Delft
the Netherlands
+31 (0) 15 362 0000
info@bpo.nl
www.bpo.nl