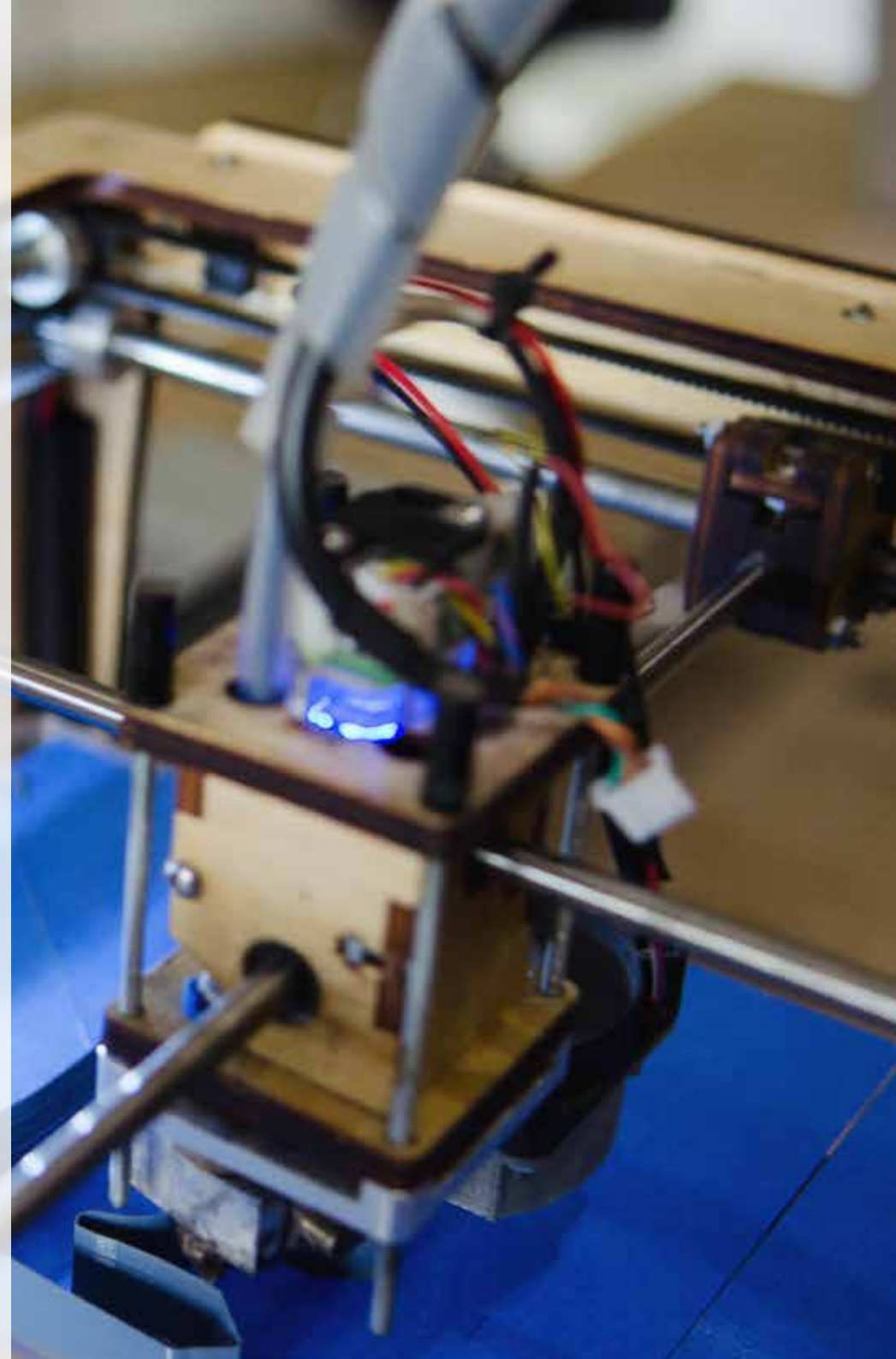
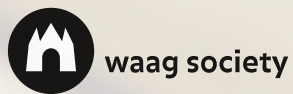


Fairphone Accessory Challenge

open design contest and
masterclass for a
3D printed phone accessory





Introduction

The open design Fairphone Accessory contest challenged designers to submit their 3D designs for a Fairphone accessory. It could be more than just a case: think of a mobile phone stand, or something for a bike, or an accessory that helps people carry a phone around at a festival or any other innovative use. Out of the entries, three finalists were chosen to whom we offered a masterclass in 3D design on 14 and 15 November 2014 at the Waag in Amsterdam. In two days they learned how to optimize their design for production on a low-cost 3D printer from expert Joris van Tubergen.

The optimized designs are available under the Creative Commons BY-NC-SA license via the Fairphone website.

The winners received an invitation to join a masterclass on 3D printing. Why organize a masterclass for people who already know how to 3D print? Because we see that many designers know how to make a 3D drawing, but not many know how to make a file that is 3D printable. This is exactly what we wanted to teach in the masterclass.

With this booklet we are happy to share some insights from the masterclass. There is a lot to learn on 3D printing and we hope this will give you some ideas for further exploration. Enjoy the read; we hope it will make you a better 3D craftsman!

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Organizers

The Fairphone Accessory Challenge was organized by Waag Society, Fairphone, Schrijf-Schrijf and 3D Hubs with the support of Stichting DOEN. The contest was held between September 22nd and November 15th, 2014.
fairphone.opendesigncontest.org

About Waag Society

Waag Society, institute for art, science and technology, develops creative technology for social innovation. The foundation researches, develops concepts, pilots and prototypes and acts as an intermediate between the arts, science and the media. Waag Society cooperates with cultural, public and private parties.
waag.org

About Fairphone

Fairphone uncovers complex systems to change how things are made. By creating a smartphone, we're opening up the supply chain, building new relationships between people and their products and starting conversations about what is truly fair. Fairphone is leading by example to expand the market for products that put ethical values first. It's not just a phone, it's a movement.
fairphone.com

About Schrijf-Schrijf

Schrijf-Schrijf is a Dutch bureau specialized in text and communication, whether it be printed media or digital means of communication. Besides that, they create campaigns and give writing workshops.
schrijf-schrijf.nl

About 3D Hubs

3D Hubs is a collaborator in the Fairphone Accessory challenge. 3D Hubs provides a platform that connects people to over 8000 local 3D printers. You can upload your design, select a print Hub and get your products made around the corner within days.
3dhubs.com

The 3D printer is a tool - not a magic box

According to Joris van Tubergen, you can see your 3D printer as a tool. Just like any other tool you need to master it to make it work well for you.

The 3D printer helps you to do something that you could also do by hand: placing layers of plastic on top of each other. The 3D printer is a helpful tool because it works a lot faster and with more precision.

Just like any tool, such as a hammer or a drill, to get the best results out of your 3D printer you need to gain some experience with it. You have to bear in mind what it can do for you – and what not. And then practice and experiment a lot to enhance your skills!

If you want to estimate whether an object is printable, a good rule of thumb is to imagine if you could do it by hand. Is it impossible? Then you will probably not be able to 3D print it.

The 3D printer is probably one of the few tools that get better over time. If you get to know your machine, you can tweak it to your personal preference. And thanks to its open nature and the lively developer community you will always be able to upgrade its software and mechanical parts yourself.

The next thing to remember is that plastic is a material which has its own material properties. Just like wood or metal you need to understand how you can process it. You can easily carve and sand a block of wood, but you would never use the same techniques to shape a block of steel. It's the same with plastic; you have to learn a bit about its behavior in order to understand how to process it.

masterclass



The craft of 3D printing – some tips from the master

So we have learned that the 3D printer is a tool to place layers of plastic nicely on top of each other, and that plastic is a material that has its own unique qualities. If you take this knowledge into account when printing an object, it will enable you to optimize the design, the orientation of the object in the printer, and the printer settings. On these pages you will find the favourite tips and takeaways according to the masterclass winners.

A. The design

You don't need to be an expert to press the print button, but you'll need some design skills to create well-constructed and good-looking objects. Learning how to design objects can take years. Luckily there are many open source .stl files available for download via websites such as Thingiverse, 3D Hubs and many others. It's a lot easier to download an object and start from there. As for the design, it really helps to keep a few 'rules' in mind regarding geometry and shape:

Overhanging walls

Walls cannot be steeper than 45 degrees. A hollow dome for example is really hard to print without flaws. You'd better redesign or reposition your object so the printer can do what it's good at.

Single walls

Walls consisting of only one string of plastic often give good, smooth results. You can design a solid object, and change this later in the printer settings.

Pretty sides

Vertical walls are easy to print horizontal planes are difficult. Straight planes are easier to print than (double) curved surfaces.

Gaps

Holes in walls are a bit tricky, but if not too big you can adjust the retraction speed in the printer software to make it possible.

3D printing



3D printing

A woman with blonde hair tied back, wearing a pink shirt, is looking intently at a 3D printer in a workshop. The background shows other people and workshop equipment.

B. The orientation in the printer

Smart positioning

Vertical walls, the sides of your object, are easy to print. As said, horizontal planes like the bottom and top parts are more risky. Choose an orientation on the printer bed that avoids horizontal planes.

Supports

When you have a complex shape, you might need to include supports for overhanging shapes. Remember that a printer always needs to put a layer of plastic on top of another layer; it is hard to print 'in the air'. Many designers choose to rotate the object so they can leave the support out, because a support often does not look good. But you can also try to make it look nice, as if it were an intended part of your design. Or position it in a way so you don't need the support.

C. The printer settings

You can improve the quality of your print by playing around with the printer settings. In the masterclass we used the software Cura, and went through all the settings in detail. You can find a good manual online via ultimaker.com.

A smooth print has a proper balance between material flow (how much material is being extruded), print speed (mm the nozzle moves per second) and temperature of the plastic. How material flow and speed or temperatures correlate to each other is something you just need to try out and do a lot. Like with any other tool, you get a feeling for it. Here some hints to start playing:

Speed

Increasing flow means pressing more material through the nozzle at once. Increasing the speed means that you get less material per mm per second, so you'll have to find a nice balance between flow and speed. For good results it is wise start on a relatively low speed, let it print a few layers and if all goes well you can increase the speed - and adjust the flow if needed.

3D printing

A close-up photograph of a 3D printer's extruder assembly. The printer is constructed from a combination of metal and wood. A filament spool is visible, feeding into the extruder. The extruder is mounted on a metal frame. The printer is printing a part on a blue build plate. The background is slightly blurred, showing the printer's bed and other components.

Temperature

You want the material to melt well to get a nice flow, check the material properties of your filament for the optimal temperature. Sometimes you want it to be a bit lower, for example if it is important that the material cools down before the next layer is placed on top. And if you are printing fast it is better to print with a high temperature.

Spindle

Once you are printing you can turn the machine spindle up and down. This will not kill the motors. Putting the bed up makes the space between the plastic layer and the nozzle smaller, so the lines of plastic of each layer will be wider and lower.

DO try this at home...

Experiment

Do play around and dare to put the settings to extremes, the outcome might be very surprising and inspire you even further. If a problem occurs, never stop the machine until you solved the problem. As long as the machine is running you can analyze what happens and learn from that. It's hard to kill the machine, so take your time to solve the issue.

Drill the print nozzle

There is a huge variety of filament available, from biodegradable plastic to plastic filaments with wood fibres. A common issue is that the filament gets stuck in the nozzle of the printer. An easy trick is to use a drill to enlarge the diameter of the nozzle from 0.4 to 0.8 mm. You will encounter less troubles with all materials.

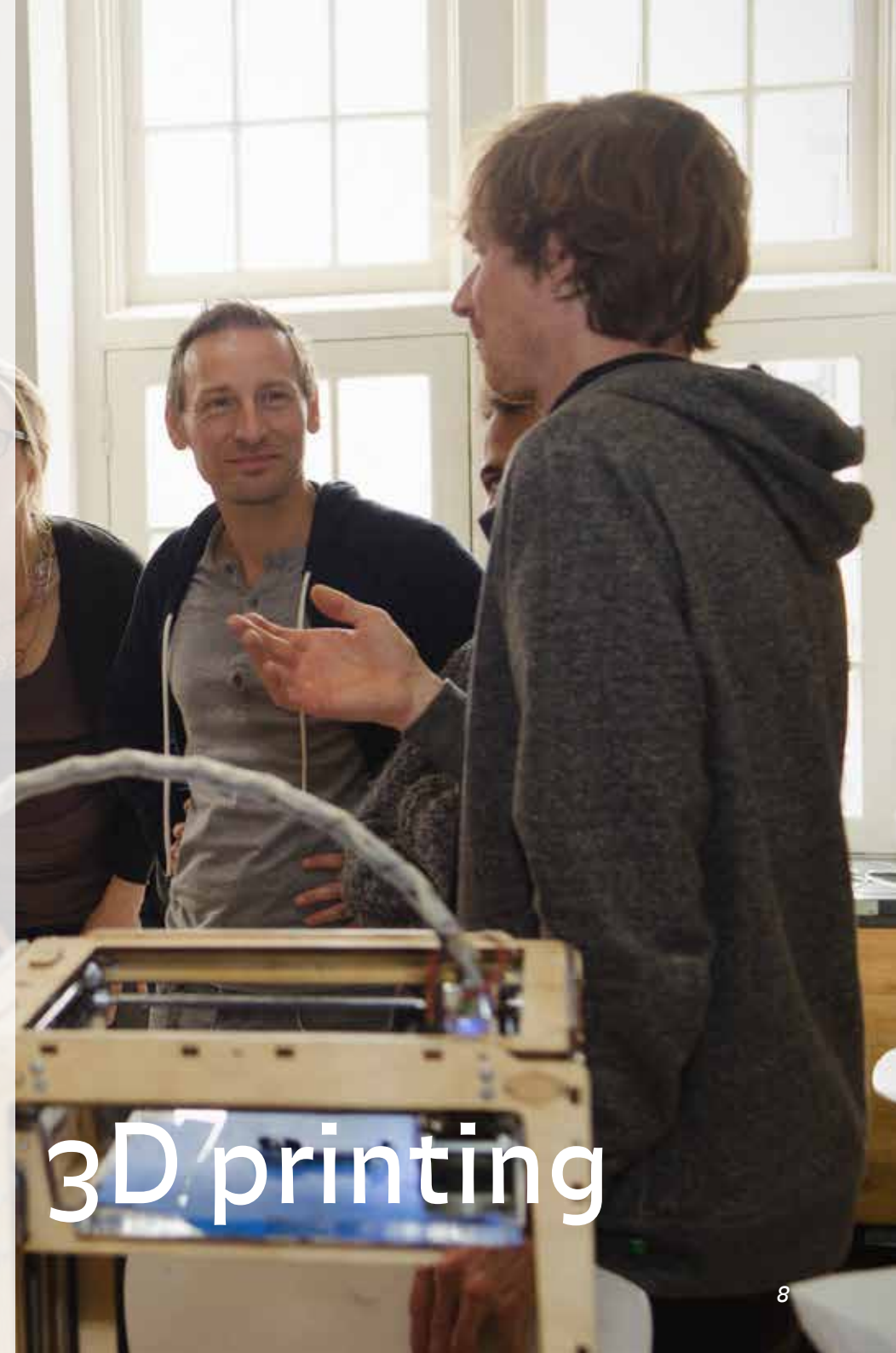
Weird textures

Some effects you can not design, but only tweak at the machine. If you turn the flow down and speed up, you can get a lace-like structure. When you are printing with a rich flow and relatively low speed, try turning the bed down a bit. You will see that little drops fall down and make a bead-like structure.



Play with the GCode

The printer listens to commands in GCode. The GCode might look scary for non-programmers, but try to have a look at the snippets you DO understand. If you have a look at the code for a basic object you'll see it is basically a list of how each layer of the object should be printed. Sometimes it is easier to directly change the GCode of your design. For example if you want to make a cup, you can design a solid cylinder. Then you tell the printer it is hollow. The last thing you'll do is to cut the last lines (for the cap of the cup) out of the GCode and your cup can be printed.



3D printing

participants



Upper row (left to right): Peter van der Mark (Schrijf-Schrijf),
Astrid van Roij-Lubsen (Waag Society), Miquel Ballester (Fairphone),
Carolina Poelk (winner, Germany)
Lower row (left to right): Joris van Tubergen (workshop leader),
Vítor Marinho (winner, Portugal) and Floris Elteren
(winner, The Netherlands)

Floris Elteren, winner (Netherlands): “This goes well with Fairphone’s philosophy”

“This is a method to hang your Fairphone on a string when you’re in a tent. To watch a movie for example. That way you do not have to take your hands out of your sleeping bag to hold the phone. You can also attach your mobile phone to a tripod. For instance, to film or play music at parties. That’s the idea behind my Fairphone Flip Stage.

I looked for a function for the case that I need myself. And out of all the entries, I thought that I had come up with one of the most useful ideas. So I certainly had good hopes to be among the winners.

I came into contact with the design challenge through Facebook. I started brainstorming about my design the same evening. I thought about putting a cage around the phone, to protect it if you would like to charge it somewhere. Or create a design with feathers, to protect the Fairphone when it would fall. But eventually it became a frame around the phone, to attach a string or tripod.

During the masterclass, I learned a lot. That you need to think differently about a product, among other things. My idea turned out to be too complicated. Some parts are hard to print. That is why I developed the concept further. The idea of the string eventually worked best. I had to get used to my design turning out differently than I had thought at first. But now I’m actually quite proud of it. In the coming months, I would like to continue to work at it - because the concept could be improved I think.

My idea is applicable for all smartphones. But the approach fits well with the philosophy of Fairphone. Being able to repair products yourself is important. I find it strange that we, as consumers, discard products because a small part is broken. The point is that as the owner of a product you can find solutions for improvement yourself. And, in my opinion, the fact that you can download my case from the Internet and 3D print applies perfectly.”

participants



Carolina Poelk, winner (Germany): “Nice finish and less use of materials”

“My Fairphone Desk Speaker has two properties. In it, the Fairphone can stay upright, for instance on your desk. And a speaker is integrated, allowing you to amplify the sound of the mobile phone - without using any extra energy.

My first smartphone was a Fairphone. During my Industrial design studies I was working on a project to reuse phone parts. It was called the Share Phone! Before that, I did a lot of research, and at one point it seemed useful to me to buy myself a smartphone. When you look at fair alternatives for smartphones, you'll naturally end up at Fairphone. I would very much like to support this. Through the Facebook page of Fairphone I saw information about the design contest.

In my work at the Interactive Institute in Gothenburg, Sweden, I use 3D printers among others. So I have some experience with these and printed my design before I attended the masterclass. At the Waag in Amsterdam, I further modified my design. Making it easier and mostly faster to print. Since the masterclass I focus more on a nice finish of my case. Furthermore, I experimented with the removal of the bottom part. In this way, the printing requires less material, and of course that fits well with the idea behind Fairphone. I'm a perfectionist, so the coming time I will keep developing the design.

Even with my knowledge and experience in the field of 3D printing, I learned a lot during the masterclass. Such as the importance to be able to quickly print a product. You should already take this into account in the design. I was looking for the highest quality, so my prototype from Sweden took a night to print. Which is impossible for a case that people want fast. Also, you should think about the possibility of printing on different types of 3D printers.”

participants



Vítor Marinho, winner (Portugal): “The idea of open design appeals to me”

“I was looking for a system to attach my phone to the handlebars of my bike. I then combined this with the design contest. My design is a kind of Lego system, where users can click several different color backgrounds on the Fairphone, in addition to the bike mount.

I studied art and multimedia. Designing a product for me is quite tricky. Still, I tried it. Therefore, I am very proud that I am one of the three winners of the design contest. But when I started working on the finer detail of my idea during the masterclass, it turned out that it is a bit out of my league.

During the masterclass I especially learned that 3D printing is quite difficult. There’s more to it than just design and push the “print” button. For example, it demands quite a lot of the way you design and you look at products. For me that’s very difficult. So it turned out that my original design is difficult to execute with the 3D printer. I also discovered that the grip of the case was not working very well. I’m going to continue to improve in the coming period. But whether my design can ever really be admired on my bike, I do not know. My design simply proved not to be perfect.

The masterclass was very instructive for me on all fronts. Not in the least because I, besides the techniques of 3D printing, learned more about Fairphone. I read about Fairphone for the first time in the Portuguese magazine Deco Proteste six months ago. It was an article about the background of the raw materials in smartphones and the alternative Fairphone offers to consumers. I looked for more information on the internet right away. Pretty soon after I ordered a Fairphone. The idea of “open design” really appeals to me, too. Is not it strange that you buy a smartphone for a lot of money, but that it is not really yours. If the phone is broken, you cannot fix it yourself. That is the reason I took part in the design contest by the way. People can just take our designs from the Internet and print them themselves. Isn’t that fantastic?”

participants



interviews

Miquel Ballester, Fairphone

Product Strategy at Fairphone. Miquel takes care of Fairphone's products and helps out with the strategy for all action areas.

How do the contest & masterclass fit within the Fairphone activities?

"The activities from the masterclass are very important for the impact of Fairphone. On the one hand it allows us to do something together with the community, which is great. It is strengthening the bond among us and helps us learn from each other. On the other hand it helps us make an important statement, 3D printing is here to stay and as it develops, we encourage the expansion of the maker movement. If you can make your own stuff, you take more responsibility and better care of it."

What do you think of the results of the masterclass?

"I think it shows the potential of giving new tools to great minds. The ideas were there, now distributive production of these products across the world is possible, thanks to networks like 3D Hubs. I think it is brilliant that designers learned the tools to make their designs available worldwide, both during the masterclass, and for those that will read this booklet."

How do you plan to proceed with community-driven design and local production activities?

"In our Design a Day project (designaday.fairphone-open.com) we experimented with a low threshold challenge in which the community could deliver ideas that would be turned into a theme for a pre-designed case. Every theme came up on the website in cycles of 24 hours (barely 4 hours from idea to real product). With the challenge organized by Waag Society we wanted to contribute to bringing that to designers as well. We keep on innovating in ways that encourage the community to design stuff themselves."

Joris van Tubergen

“I preach the gospel of digital manufacturing”

The three winners of the Design Contest received a two-day master class in 3D printing by Joris van Tubergen. “For me it’s a challenge to see how you can print a design in a cheap and fast way.”

Vases. Cups. Jewelry. And a meter-high orange elephant, too. Joris van Tubergen has already created it all with the 3D printer, layer by layer. For him, it is not about endlessly improving the final product. “I find it interesting to discover what you can do with a 3D printer. And especially how to find a solution to any potential design problem. If I succeed in this, the project is successful as far as I am concerned. I am a conceptual thinker. For me it is a challenge to see how you can print a design in a cheap and fast way.”

Seeing where something comes from

As creative director of ProtoSpace in Utrecht and through the masterclass ‘Build a RepRap’, Joris is at the very heart of the Ultimaker, an open source 3D printer. The Ultimaker has been voted the most popular and best 3D printer for consumers for several years. It is the machine that participants use during the masterclass. “The beauty of 3D printing is that you can see for yourself where something comes from and how it is made,” says Joris. “In that respect, it also fits very well with the ideology of Fairphone. In addition to knowledge about the origin, saves a lot of lugging with products and commodities, as you can make a product yourself. And like for Fairphone, the open source philosophy matters in 3D printing, too. Digital files are by definition impossible to protected by copyright. Just look at the experience of the music and film industries.



interviews

So why bother doing that? It means that you have to develop different business models for many products. This different way of looking at designs and products really appeals to me.”

Making mistakes is ok

“The more precisely you want to print something, the more complicated you make it for yourself,” Joris tells the three winners during the masterclass. “The design determines a lot. You can make sure that beautiful side of the product is visible, for instance, and the less attractive features are on the bottom or on the inside of your design. Furthermore, I share with the participants that the printing of a flat part is difficult and takes a relatively long time. Vertical surfaces are easier to print. The orientation of a product in the printer is extremely important. I also teach the participants that they can make mistakes. Do not turn the unit off when it is likely to go wrong, but change the settings during the printing process and try again later if necessary. ”

3D printer is just a tool

It is certainly feasible to transfer the essence of 3D printing within a day and a half, says Joris. “It’s not magic. 3D printing is actually building up layers. And you also see that the participants made great progress in a short time. Floris’ design works even better in practice than I had imagined beforehand. For this we needed to simplify the design somewhat. We made a nicer finishing for Carolina’s speakers. When it comes to Vitor, I noticed that he is more a graphic designer than a product designer. 3D printing is really something new for many people. For example, they do not know the construction characteristics of the material yet. That’s something to get used to, but also something everyone can learn eventually .” As much as he loves to work with it, eventually the 3D printer is only a tool, emphasizes Joris. “For me it is about a different perspective on design and handling of production technology. I actually preach the gospel of digital fabrication. ”

www.rooiejoris.nl



interviews

interviews



Brian Garret, 3D Hubs

“On paper, we were convinced that distributed manufacturing could work one day, but to see it gain so much traction is amazing. Fairphone’s cases have been our most printed product to date. We’ve been overwhelmed by the passion our Hubs put into perfecting each and every product they make.”

3D Hubs is a collaborative production platform for 3D printer owners and 3D makers. We are on a mission to make 3D printing accessible to everyone by unlocking the world’s idle 3D printers, facilitating transactions between 3D printer owners and people that want to make 3D prints.

The majority of 3D printer owners use their device less than 10 hours a week, and 3D Hubs harnesses the remaining 95 percent idle time. Printer owners earn money when their 3D printer is not in use, and simultaneously establish social connections within their local maker community. 3D printer owners simply join the Hubs listing in their city to offer 3D printing services in their neighbourhood.

The results of the masterclass

In 2014 Waag Society, Fairphone and Schrijf-Schrijf launched a design challenge for a 3D printed phone accessory that enhances the use of your Fairphone in your daily activities, aimed at designers and students with 3D design skills.

Every contestant was a winner! If you uploaded a complete design, you received a 10€ voucher from 3D Hubs to print your design at a 3D printer nearby. Three designers won a masterclass in Fablab Amsterdam to create their object with 3D print expert Joris van Tubergen and our designers. The three finalists had all the insider tips, tricks and secrets on optimizing a file for 'home' 3D printers during a two day workshop in Amsterdam.

The submitted designs of the contestants have been shared under a Creative Commons BY-NC-SA license at:
fairphone.opendesigncontest.org

Organizing at Waag Society: Astrid van Roij-Lubsen
From Fairphone: Miquel Ballester
Texts and interviews: Schrijf-Schrijf, Peter van der Mark
Photography: Arne Kuilman
Layout & editing: Ron Boonstra, Eva James

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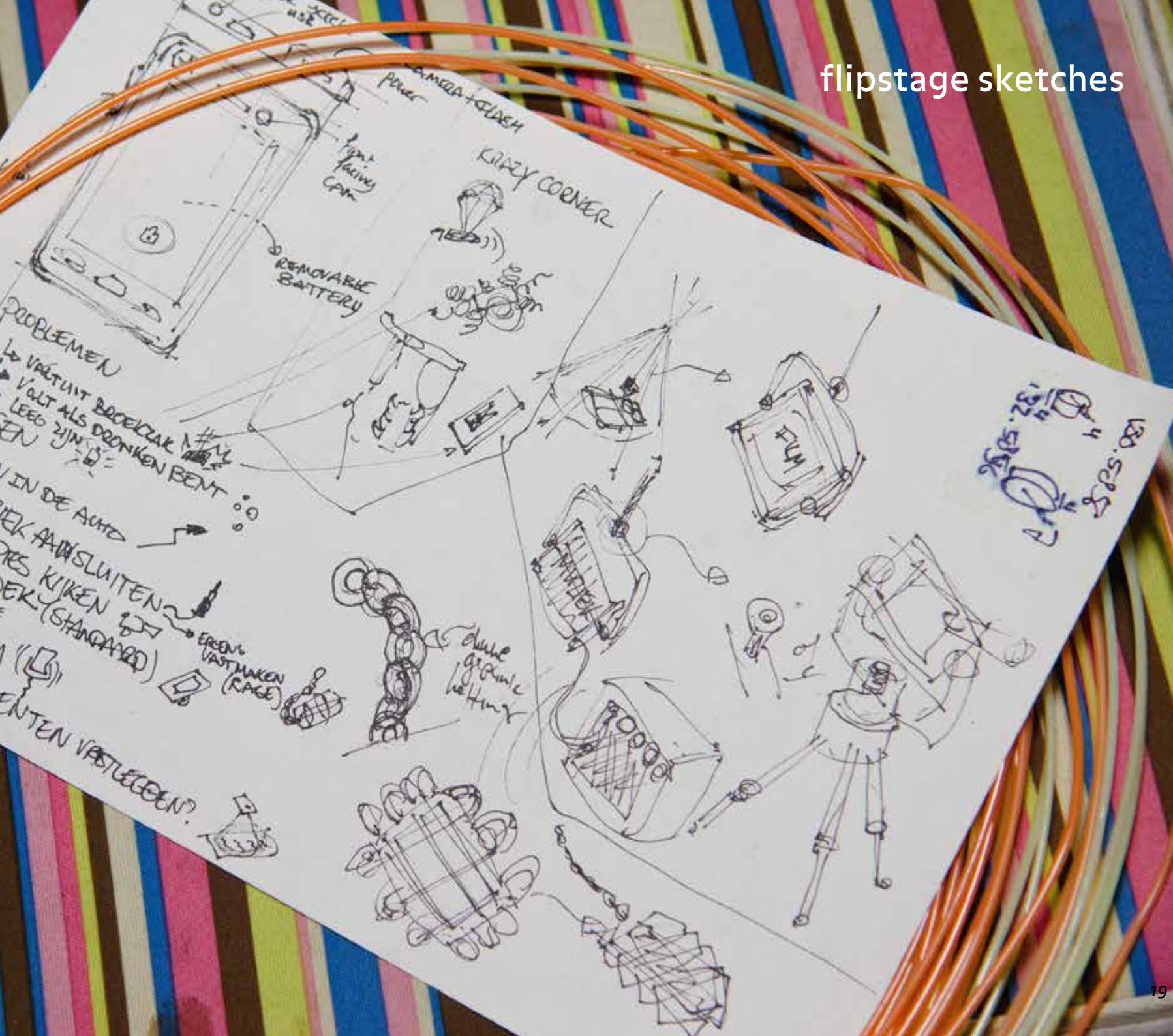


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results

flipstage prototype





PROBLEMEN

- ↳ VALT UIT BROECELAK
- ↳ VALT ALS DROONKEN BENT
- ↳ LEEG ZIJN

KANSEN

- ↳ NAV IN DE ACHT
- ↳ MUZIEK AANSLUITEN
- ↳ FILMPRES KIJKEN
- ↳ KOOKBOEK (STANDAARD)
- ↳ STEADYCAM
- ↳ EREN DOCUMENTEN VASTLEGGEN?
- ↳ OPHANGEN



desktop speaker prototype

prototyping

