FAB IN A BOX

DT313 – PP3 – HU
Report on Fab in a Box

Version 2
06.2019

Content

A short overview of the Fab in a Box

The goal of mobile labs have been to extend the kind of high quality hands on learning in stationary FabLabs to a greater audience through programming and outreach efforts. The **Fab in a Box** of PP3 is not just a package of digital manufacturing tools but a complete mobile workshop itself on **wheels**. During the specification, we realized that overall the machines they need transportation, so why not convert a car to a mobile FabLab?

First, we did desk research on existing mobile Fablabs. The study indicated that the Fab Foundation had developed its own. https://www.fabfoundation.org/index.php/mobile-fab-lab/index.html

The Foundation estimates the following:

- The cost for a mobile Fab Lab is **264,000 EUR**
- The build of a mobile Fab Lab includes several phases (Design, Procurement, Construction, and Preparation & Training). These phases take approximately 6-18 months for completion

Our preliminary **specifications** were:

- To be environment-friendly, we should use a car which is **100% electric driven**
- The vehicle should be a **small van**, to be able to carry the machines and tools
- The mobile FabLab should be independent of mains power and should be capable of running from a separated battery system
- The following manufacturing tools and technologies are must have:
    - Fused Deposition Modelling (FDM) **3D printing**
    - Non-metallic **laser cutting**
    - CNC Milling
    - Vynil Cutting
    - 3D scanner
    - Basic woodworking cordless power tools
    - Basic electrical prototyping tools
    - Robotics and artificial intelligence
- Next, to the machines and tools, the mobile FabLab should have **open source sample projects**
- Every FabLab is a social space too, so a mobile one also needs chill services, therefore:
    - The Lab should be equipped with an espresso/coffee machine
    - Against lousy weather, a tent would be useful
    - Comfortable seats are a must

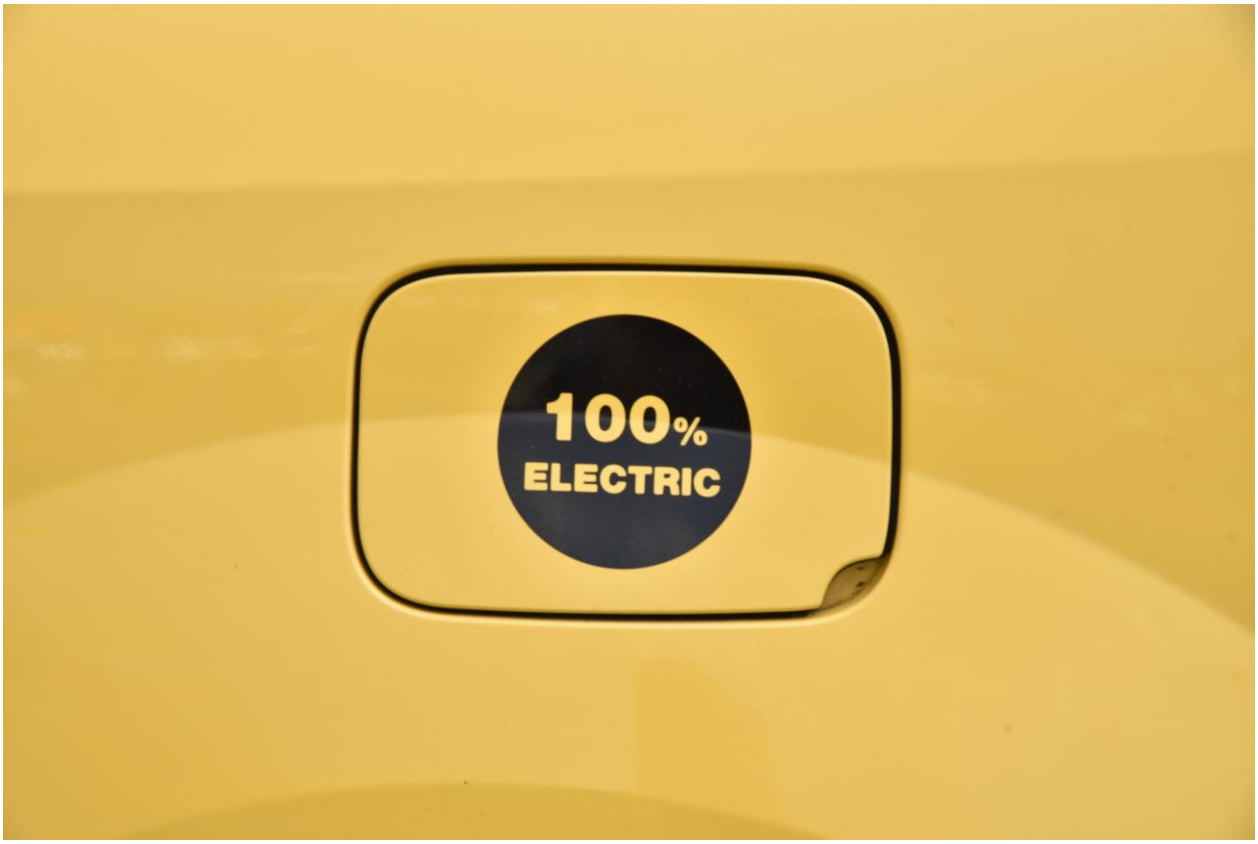
The vehicle

We choose a Renault Kangoo Z.E. for the platform. The Kangoo Z.E. is the world's top-selling all-electric light utility vehicle, with global sales of 38,527 units delivered since inception through December 2018. The van is powered by a **22 kWh lithium-ion battery pack** that offers a combined-cycle range of **170 km** (NEDC that varies depending on factors such as type of road, temperature, speed or driving style.[In November 2011, the Kangoo Z.E. was voted International Van of the Year for 2012. It was also elected Electric Vehicle of the Year in 2012 and 2013 by GreenFleet. We expect that if the project receives bigger visibility that other FabLab might use the same vehicle to start their mobile lab.

Perfect choice!


FabLab
Budapest
REW-709


FabLab
Budapest
Kangoo
REW-709

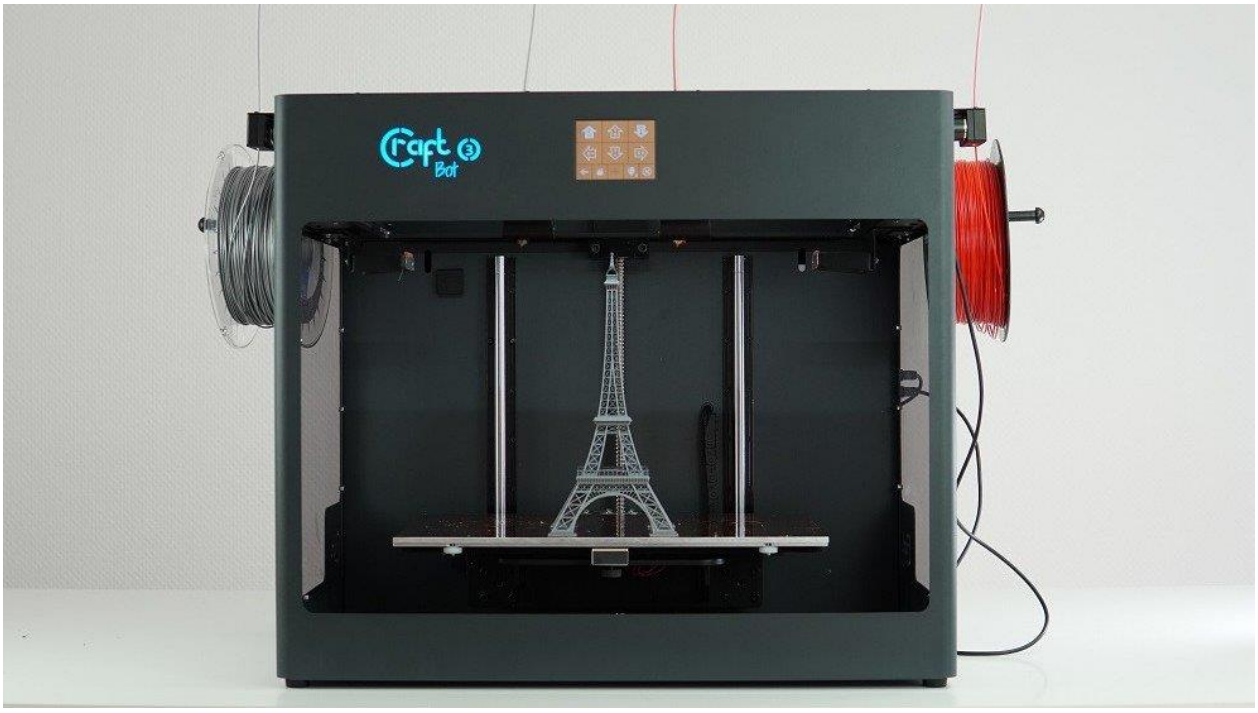

100%
ELECTRIC


REW-709

The machines

3D Printer

Brand: CraftBot
Model: CraftBot 3
PRINTER SPECS

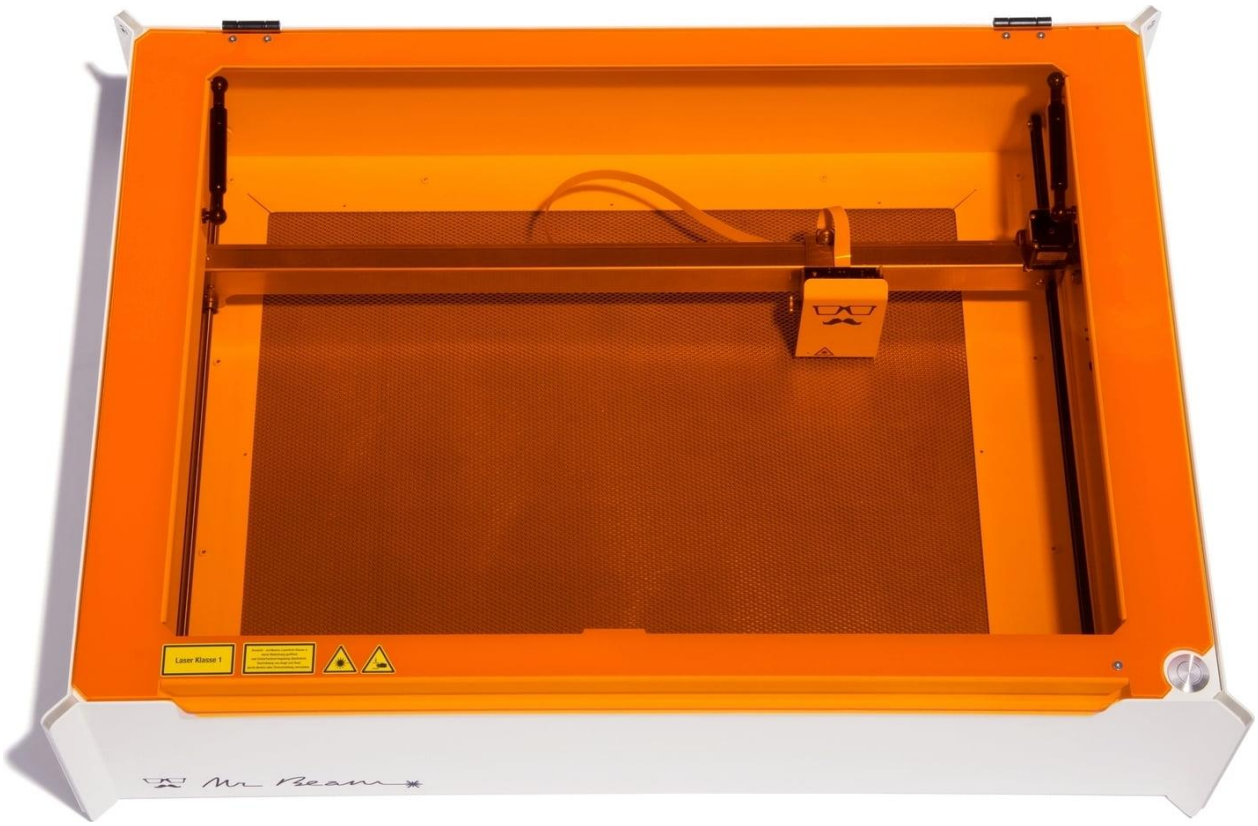


Printing technology: Fused Filament Fabrication (FFF)
Build volume: 374 x 250 x 250 mm
Layer resolution: 100 micron (ultra) / 200 micron (high) / 300 micron (medium)
Position precision: X,Y: 4 micron / Z: 2 micron
Filament diameter: 1.75 mm
Nozzle diameter: Includes nozzle kit with 0.25mm, 0.4 mm, 0.6mm, 0.8mm nozzles
Print speed: 50-200 mm/s
Connectivity: USB cable, USB pen drive, WiFi
SOFTWARE
Software package: CraftWare
File types: OBJ/STL/CWPRJ
Supports: Windows 7 and above
PHYSICAL DIMENSIONS
Frame dimensions: 57 x 44 x 48.8 cm
Shipping box: 70 x 58 x 66 cm
Weight: 32 kg
Shipping weight: 36 kg
Ambient temperature: 15-32 °C
Storage temperature: 0-32 °C
Operating nozzle temperature: 180-300 °C

Operating heated build plate temperature: 50-110°C

Laser Cutter

Brand: Mr. Beam
Model: Mr. Beam II
Technology: Diode Laser



- Laser class 1
- Working surface **500mm x 390mm**
- Strong and highly efficient 5W shortwave laser (450nm)
- Safety housing made of metal, transparent protective cover
- Optional: Smoke extraction with our Air Filter System
- CE Certification
- Integrated camera for an easy placement of your design templates
- Integrated WLAN
- Firmware Updates "Over The Air"
- Browser-based Plug & Play software for Mac, Windows, Linux and Tablets
- Shortwave 5W laser beam

Mr Beam II works with a semiconductor laser. Depending on the nature of a material, it is either vaporized, burned or molten when the laser light strikes. Thanks to a high precision, the thermal process is suitable for cutting complex shapes and engraving filigree, highly detailed designs.

Web-based Software

Mr Beam II does not require any software installation. Designs can be created in any program of your choice and uploaded via drag & drop in our web application where you can also easily update the necessary laser job settings.

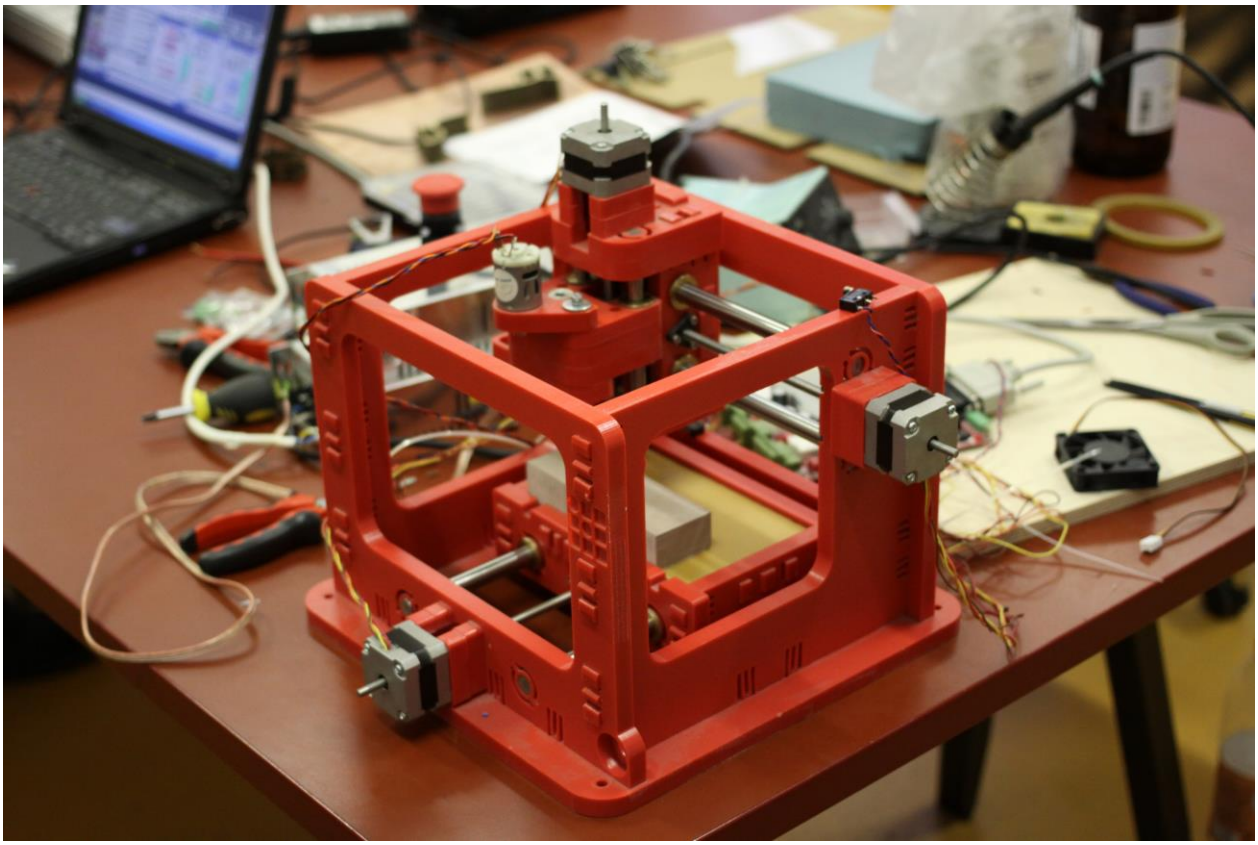
Integrated camera

Mr Beam II has a built-in camera in the safety cover. When the lid is open, a photo of the work surface is made every few seconds, ensuring precise arrangement of the materials. The designs can be aligned in our web application.

CNC Milling Machine

Brand: -

Model: MTM SNAP



Jonathan Ward from the MIT Center for Bits and Atoms has designed a snap-together, desktop-sized CNC milling machine. The MTM Snap (part of the Machines that Make project) is made from 12 mm high-density polyethylene (HDPE) – itself milled on a CNC– and can be assembled for about $200. This three-axis CNC machine can mill circuit boards, wax molds, and harder materials in a 127 x 76,2 x 44,5 mm working area. Perfect demonstration project!

Vynil Cutter

Brand: Silluethe

Model: CAMEO

The Silhouette Cameo is a personal electronic cutter. By plugging into your home computer with a USB cable it works much like a printer. However, rather than a print head, it uses a small blade to cut media such as adhesive vinyl, cardstock, paper, fabric and more. It can cut media up to 12" wide and ten feet in length. It features a quiet motor and also has an optical feature for the ability to register and cut printed media.

3D scanner

Brand: FARO

Model: FREESTYLE

The FARO Freestyle3D is a top-quality, high-precision, handheld scanner for professionals. It quickly and reliably documents rooms, structures, and objects in 3D and creates high-definition point clouds. With unbeatable precision and verifiable accuracy, it is suitable for all users in which installations or properties must be quickly measured from various perspectives. Best-in-class, large scan volume boosts productivity by reducing scan time. The FARO Freestyle3D is a durable, industrial-grade device. Thanks to its lightweight carbon fiber body, the handheld scanner is highly mobile. A tablet PC is available from FARO (or may be purchased elsewhere) and supports intuitive data acquisition. The 3D scan data can easily be imported into all commonly-used software solutions for architecture.

Features

- Handheld color laser scanner
- Effortlessly capture almost any surface type in a wide range of environments by merely pointing the FARO Freestyle3D to the surface of the object.
- Intuitive plug and play system
- The Freestyle3D provides high-productivity in the field with no warm-up time.
- Real-time point cloud visualization
- Point cloud viewing during scanning provides assurance of accurate data acquisition.
- Automatic flash
- Automatically activates and de-activates the built-in LED light depending on the existing light conditions.
- Optional on-site calibration
- The device can be easily calibrated on-site, ensuring consistent, high-quality data. A PDF report with key data permits maximum and verifiable confidence in the acquired data.
- Best point filter minimizes the noise and delivers optimum data quality.
- 3D documentation solution

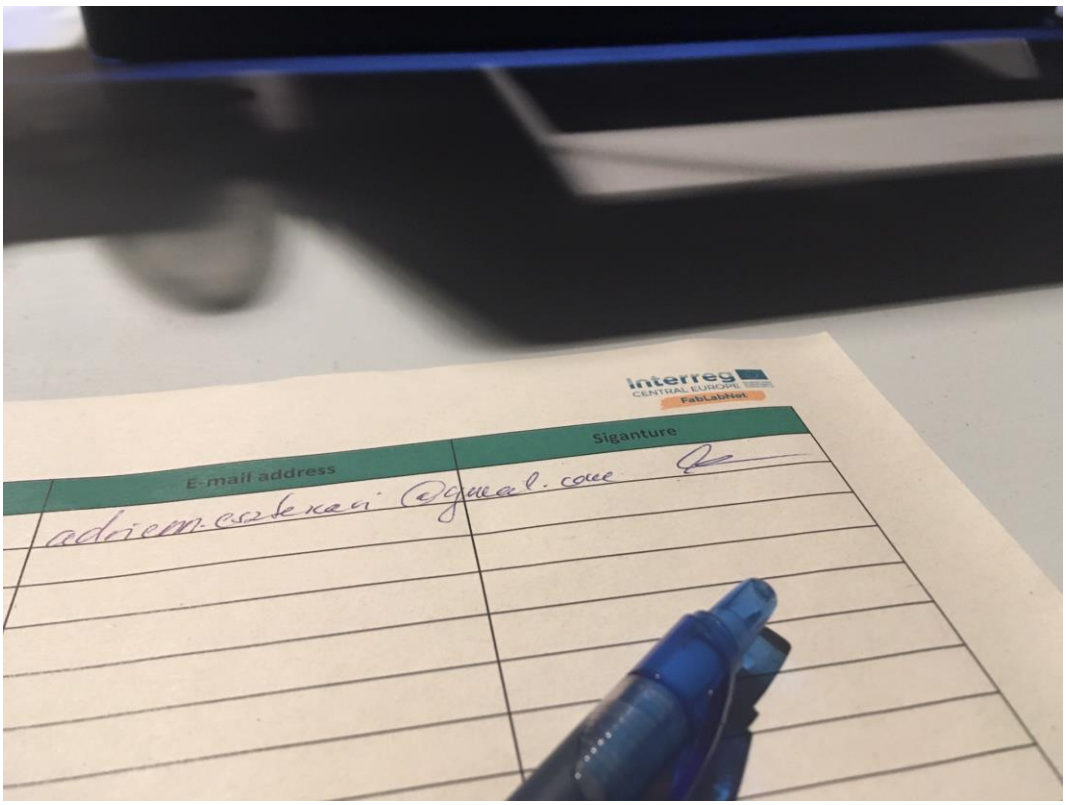
Approach and timeline

The Mobile FabLab was and will be used by FabLab Budapest as a disseminating tool enabling the most remote part of the country to get introduced to digital manufacturing technology and transdisciplinary approach of learning. It also acted as a great tool to match mentors with non-profit organizations and their local communities.

List of workshops and exhibitions performed for FabLabNet

- Trento (IT) BIGFEST. 18-19 May, 2019
- Tata (HU), Blue Hall, 22 May, 2019
- Budapest, Night of Museums, 22 June, 2019

Photos


interreg
CENTRAL EUROPE
FabLabNet
E-mail address
Siganture

Impact and benefits

Our mobile FabLab has proved that even a small footprint such a significant manufacturing capacity can have! It offers direct access to different focus groups. At this moment we are focused in the broader public, but also using them to local community engagement, to reach a more focussed audience who get a first idea about the possibilities of digital fabrication and digital design. We intend to offer various workshop topics for different groups.

Sustainability and transferability

Today, the products we buy usually travel thousands of kilometers before we can purchase them. They are made out of materials that often have to travel long distances before reaching the super-sized factories in which they are assembled. These factories turn out mass-produced, highly standardized products, which leaves no room for individual customer needs and the use of local resources. What if we could change this system? What if we could reduce the ecological footprint of products, democratize the access to quality design, and expand the market for designers, makers, and manufacturers? The designer's role is evolving and adapting to a new digitized world. Distributed Design is a new approach to design, which utilizes global connectivity to move data instead of the product. The approach rethinks how goods are produced and from what materials while enhancing the customers' relationship with products. Distributed Design is one outcome of the intersection of two global trends: the Maker Movement and the digitization of the discipline of design. This convergence has lead to the rise of a new market, in which creative individuals have access to digital tools that allow them to design, produce, and manufacture products themselves, or easily connect to a global network of collaborators to undertake aspects of this process. We call this process and the subsequent market, which is emerging from these trends, Distributed Design.

We want to use mobile FabLab to show how rural regions could be industrialized or reindustrialized.