PROFESSIONAL COURSE

DIGITAL CARPENTRY

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Professional course digital carpentry

1. Onl'fait
2. The Fab Labs
3. Digital carpentry
4. Main objectives
5. Trade skills
6. Target audience
7. Méthodology
8. Time table

ONL'FAIT

In October 2017, the association Onl'fait opened the first Fab Lab in Geneva thanks to the G'innove programme, managed by the Agenda 21 department.

Onl'fait is a space open to all around digital craftsmanship, which provides its community with community with technical, technological and human resources. The aim is to offer a varied community of professionals and enthusiasts the tools to repair, develop, design a prototype or even a product.

Onl'fait is also an intergenerational and multicultural meeting place to reflect on an ecological, citizen and sustainable approach to technology and innovation,
and sustainable approach to technology and consumption. A Fab Lab is also a global sharing network where members are in turn beneficiaries and contributors, with experiences being pooled to optimise global innovation.

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THE FAB LAB

The first vocation of Onl'fait is in the field of education and development. Fab Labs are seen as an innovation in technological education, to train skilled labour and enhance learning through practice in STEM (science, technology, engineering and mathematics) disciplines. In terms of economic development, Fab Labs are the perfect embodiment of technological innovation with a social purpose, enabling the application of local designs on an international scale without compromising their content. These two ingredients suggest that the integration of Fab Labs into local economies will create new jobs and income in a growing collaborative economy. In general, Fab Labs are gaining more and more interest as tools for revitalising the economy of a city or even a country.

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DIGITAL CARPENTRY

The professional training courses that Onl'fait offers consists of textiles, carpentry and the Internet of Things and includes training in the use of specific machines, techniques, participation in the life of Onl'fait and the development of a personal project.

Currently, there are no workshops in the French-speaking part of Switzerland corresponding with the OpenDesk initiative: a platform where you can exchange free designs of furniture creations or for projects requiring a large digital milling machine (CNC) for wood. The platform allows you to send, download and manufacture unique designs that have already become iconic, such as the Valoví chair, which is part of the permanent collection of the Vitra Design Museum in Bern. Open Desk provides the files drawn by international designers free of charge to Fab Labs and all workshops equipped with a CNC and connects Fab Labs with potential customers under request

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MAIN OBJECTIVES

The training course aims to renew the participants' knowledge of craft, transitioning to a more digital and sustainable approach.

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TRADE SKILLS

- Draw in 2D and model in 3D parts from a plan.
- Model parts in 3D from an object.
- Master CAD software (Autodesk Fusion 360 or Rhino 7).
- Set up numerically controlled (CNC) machine tools (laser cutting and 3-axis milling machine).
- Program CNC machine tools.
- Know how to choose the right technique for the situation.
- Know how to maintain, diagnose and repair machine breakdowns.
- Know how to create an invoice and estimate the cost of materials and work
- Manage and order the materials needed for the activity.
- Monitor machining and detect and prevent malfunctions.
- Check the quality of the finished pieces
- Check the safety equipment on all the machines and prevent any risks

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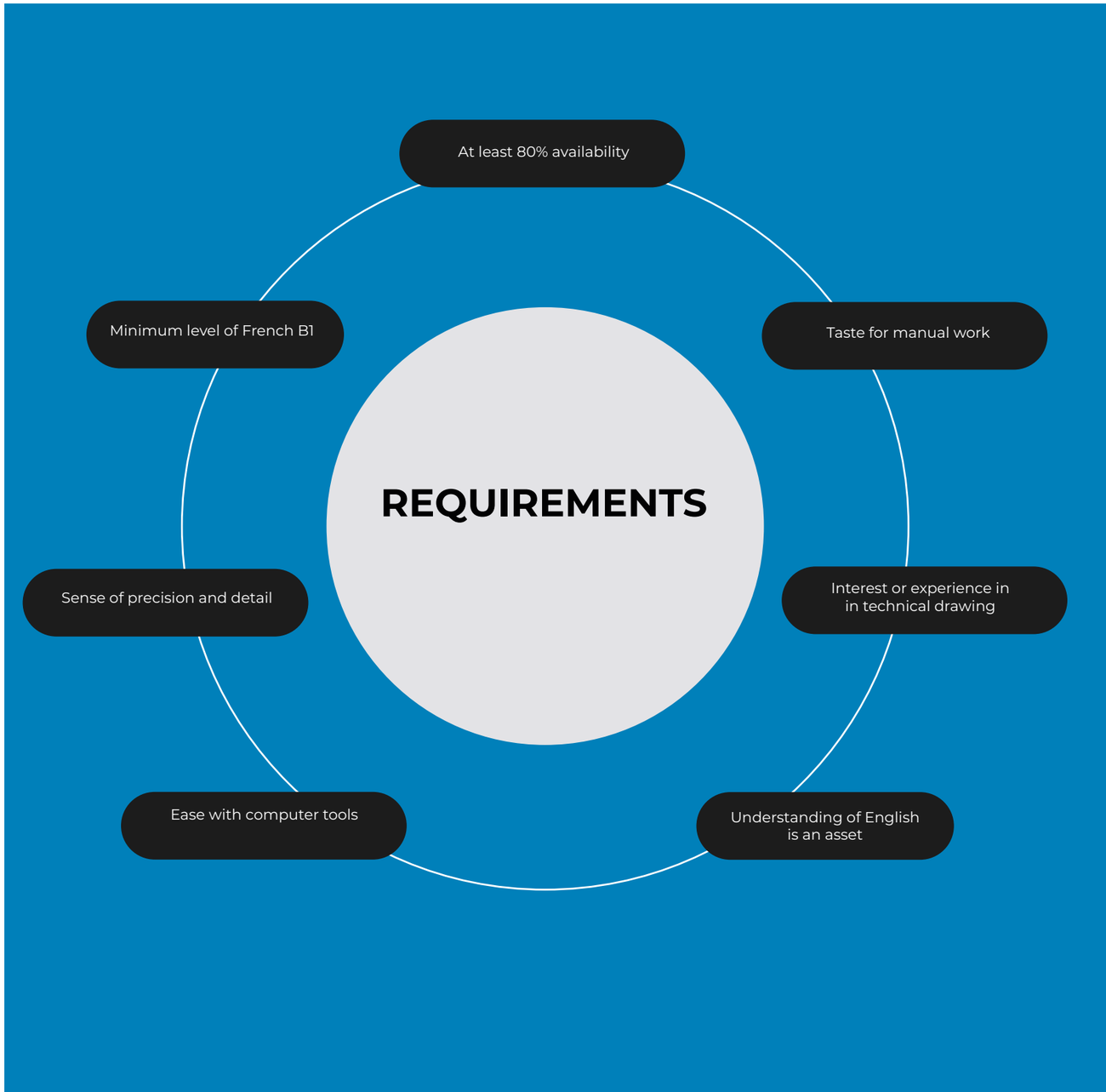
REQUIREMENTS

Candidates (assistant) carpenters, cabinetmakers, technical draughtsmen.



METHODOLOGY

Participants divide their time between :

7.1. Learning sessions

- Operating and programming of the ShopBot CNC milling machine for wood and soft metal work.
- Using and programming of a CO2 and fibre laser cutters
- Use of a CNC router for specific work.
- 2D drawing and 3D modelling.

7.2. Work on Onl'fait commissions for an active learning pedagogy

- Applying the acquired skills in concrete contexts.
- Learn to work in a team.
- Manage deadlines, make an estimate, respond to clients, etc.

7.3. Development of a personal project chosen

- In agreement with the supervisory staff
- Stimulate autonomy and work time management and present the personal project at the end of the training course.

7.4. Teaching method

- Active approach according to Mucchielli.
- Alternating theory and practice.
- Individualised follow-up by professionals in the field.
- Personalised training according to needs.
- Distribution of working time (training/work/personal project development) varies from week to week.
- Each week ends with the updating of a Wiki journal (documentation of acquired skills, mandates to which the candidate has contributed, progress of the personal project).
- Bimonthly and final assessments (job skills + soft skills).

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CALENDAR

The training course lasts between 4 and 6 months at 80%.

WEEK 1

TOPICS

- Presentation of Onl'fait, its objectives, operations, introduction to the team and safety rules
- Visit of the Onl'fait Fab Lab and presentation of the machines.
- Introduction to the Wiki, documentation and communication tools of Onl'fait.
- Visit of the MACO and its associations.

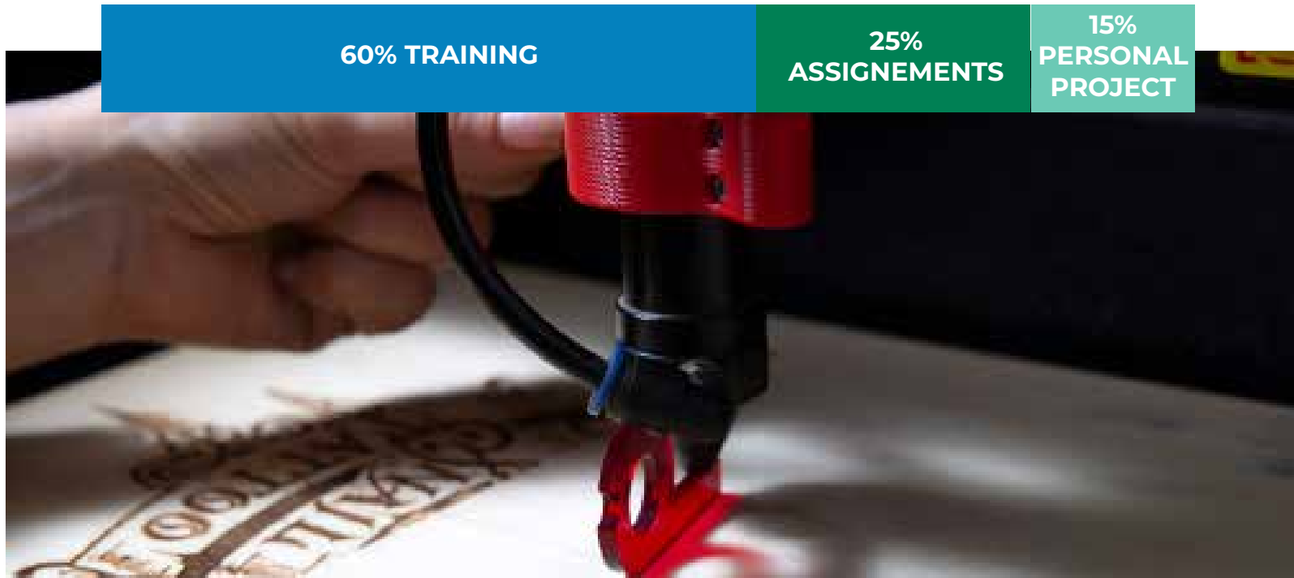
OBJECTIVES

- Integrate into the life of Onl'fait, respect schedules and safety instructions.
- Have access to internal communication tools.
- Create an Onl'fait wiki account and prepare the home page.

EXTERNAL RESOURCES

- Wiki Onl'fait

TIME ALLOCATION WEEK 1



WEEK 2

TOPICS

- Introduction to digital fabrication and the world of Fab Labs.

OBJECTIVES

- Integrate into the life of Onl'fait, respect schedules and safety instructions.
- Have access to internal communication tools.
- Update your personal training diary on the Onl'fait wiki.
- Discover and learn about the machines and the functioning of a fablab.

EXTERNAL RESOURCES

- Plateforme MOOC France Université Numérique
- coursera.org
- Wiki Onl'fait

WEEK 3

TOPICS

- Introduction to 2D drawing and 3D modeling with Rhino 7 or Fusion 360.
- Basic induction in laser cutting and Lightburn software.

OBJECTIVES

- Know how to model simple shapes.
- Complete the basic laser cutter induction provided by Onl'Fait.
- Update your personal training log on the Onl'Fait wiki.

EXTERNAL RESOURCES

Wiki Onl'fait
Autodesk Fusion 360
Rhino 7
Tuto Crea_Din3D: https://www.youtube.com/playlist?list=PLrXIm0lfnhExsqLQtPY92qYGdbFXlW4SG

TIME ALLOCATION WEEKS 2 AND 3

60% TRAINING	25% ASSIGNEMENTS	15% PERSONAL PROJECT

WEEK 4

TOPICS

3D modeling and practice of CO2 laser cutting (customised photophore project).

OBJECTIVES

- Know how to use the laser cutter independently.
- Produce a candle jar with a personalised design using the laser cutter.
- Update your personal training log on the Onl'fait wiki.
- How to optimise options of the laser cutter

TIME ALLOCATION WEEK 4

60% TRAINING	25% ASSIGNEMENTS	15% PERSONAL PROJECT

WEEK 5

TOPICS

- Introduction to 3-axis CNC training.
- vCarve Pro training

OBJECTIVES

- Know how to use the ShopBot CNC.
- Basic knowledge of the control software.
- Update your personal training log on the Onl'fait wiki.

TIME ALLOCATION WEEK 5

40% TRAINING	30% ASSIGNEMENTS	30% PERSONAL PROJECT

WEEK 6

TOPICS

- Advanced 3-axis CNC.

OBJECTIVES

- Know how to make vector drawings in vCarve Pro software.
- Master the placement of pins.
- Know how to adapt the machine settings according to the materials used.
- Know the advanced settings offered by the control software.
- Update your personal training log on the Onl'fait wiki.

WEEK 7

TOPICS

- Induction in 3d printing.
- Software induction: Cura.

OBJECTIVES

- Know how to use a slicer (Cura)
- Know the main parameters used for 3D printing.
- To know the operation and settings of a 3D printer.
- Update your personal training log on the Onl'fait wiki.

WEEK 8

TOPICS

- Induction on the maintenance and troubleshooting of the CO2 laser cutter.

OBJECTIVES

- Know the weekly and monthly controlled checkpoints of the laser cutter.
- Know how to maintain the tube, the cooling system, the optical system of the laser.
- Know how to prevent and diagnose problems on the mechanical system of the laser cutter.
- Know the causes of the most common breakdowns.
- Update the personal training log on the Onl'fait wiki.
- Present a first physical draft of the personal project.

TIME ALLOCATION WEEKS 6, 7 AND 8

40% TRAINING	30% ASSIGNEMENTS	30% PERSONAL PROJECT

WEEK 9

TOPICS

- Induction on the maintenance of the ShopBot CNC.

OBJECTIVES

- Know the weekly and monthly controlled checkpoints for the ShopBot CNC.
- Know how to maintain the ShopBot CNC.
- Update your personal training log on the Onl'fait wiki.

WEEK 10

TOPICS

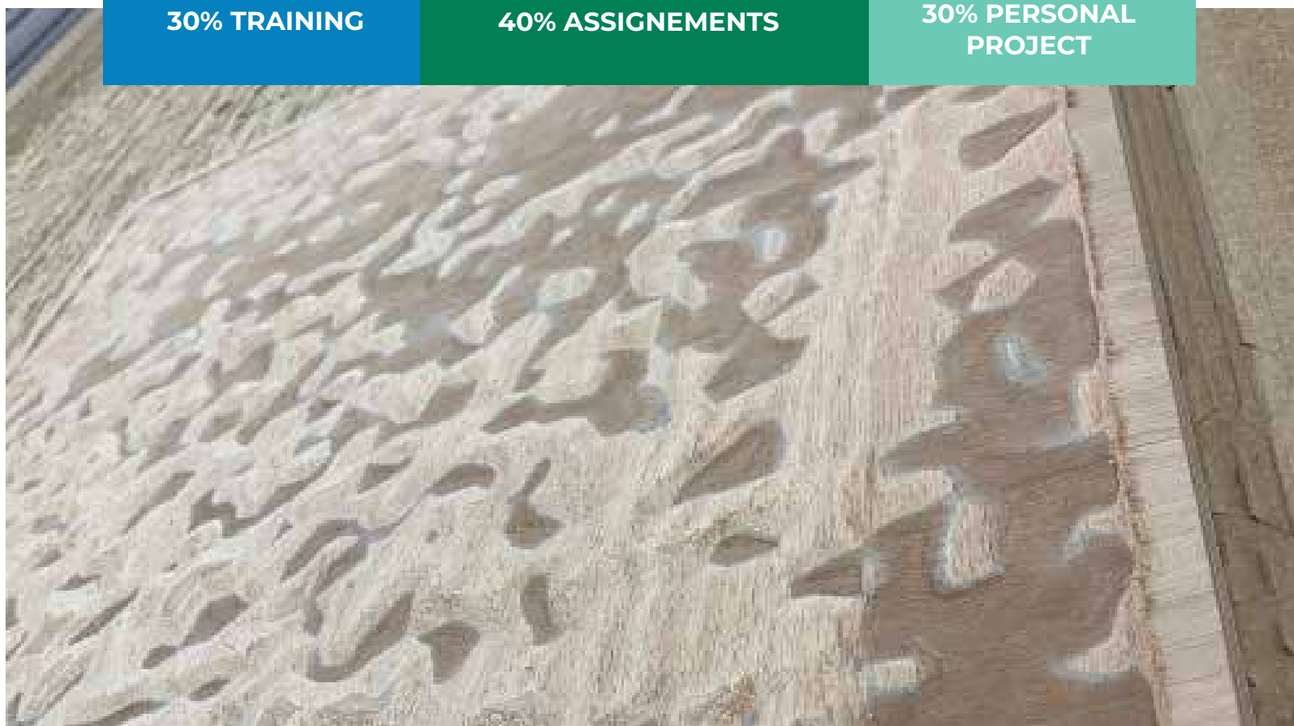
- Training on troubleshooting the ShopBot CNC.

OBJECTIVES

- Know the cause of the most common breakdowns.
- Prevent breakdowns.
- Update your personal training log on the Onl'fait wiki.

TIME ALLOCATION WEEKS 9 AND 10

30% TRAINING	40% ASSIGNEMENTS	30% PERSONAL PROJECT



WEEK 11

TOPICS

- 3D milling induction

OBJECTIVES

- Know how to use and set up the PartWorks 3D software.
- Produce an example of a 3D machined piece.
- Update your personal training log on the Onl'fait wiki.

WEEK 12

TOPICS

- Training in Aspire software (the most common software used in wood milling).

OBJECTIVES

- Be able to reproduce projects made with vCarve Pro in Aspire.
- Know how to take advantage of the optimization features offered by Aspire.
- Update your personal training log on the Onl'fait wiki.

WEEK 13

TOPICS

- Training on the Shaper Origin digital router.
- Follow the Shaper Origin induction given by Onl'Fait.
- Carry out a free project with the Shaper Origin.
- Update your personal training log on the Onl'fait wiki.

TIME ALLOCATION WEEKS 11, 12 AND 13

30% TRAINING	40% ASSIGNEMENTS	30% PERSONAL PROJECT

WEEK 14

TOPICS

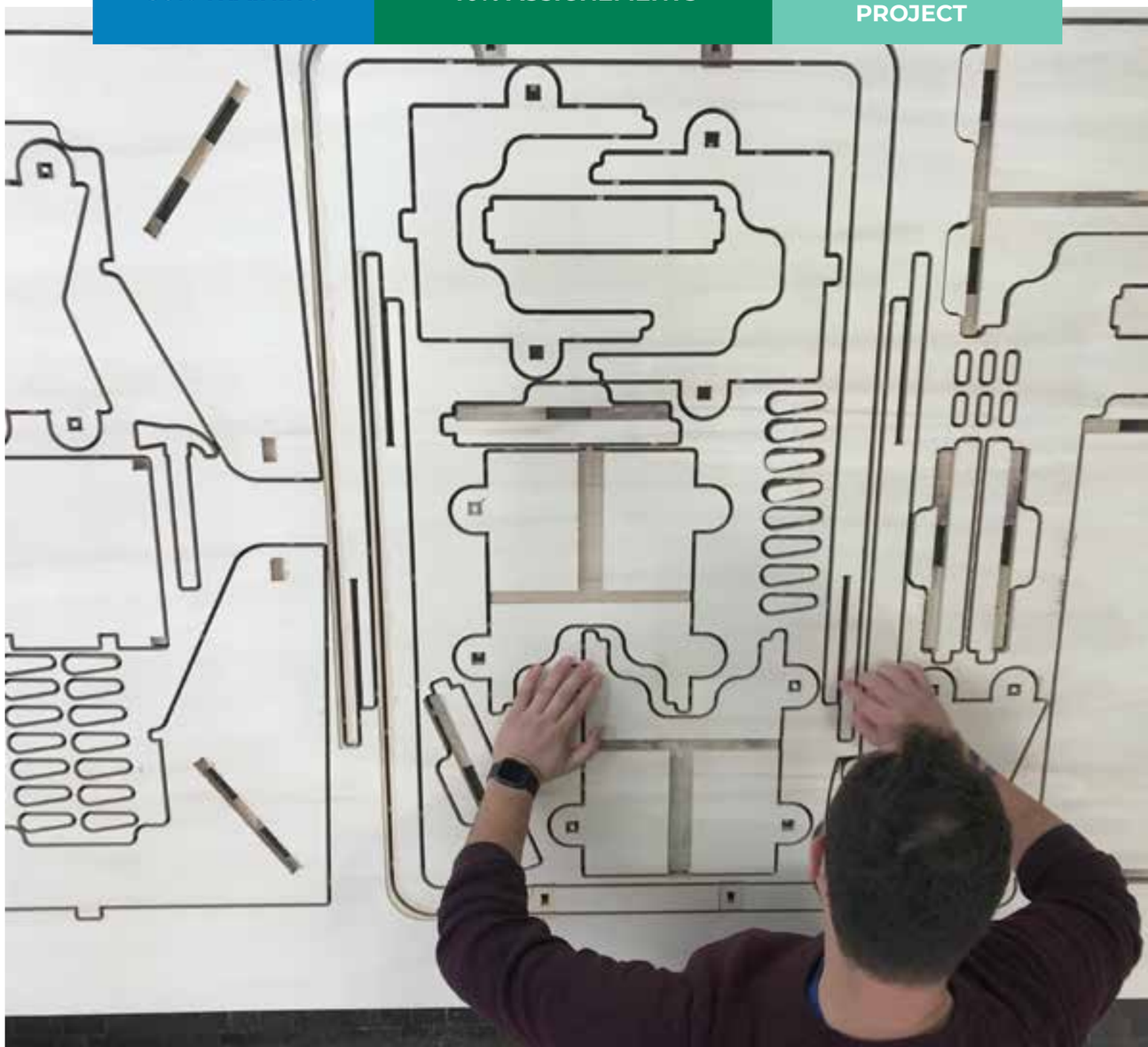
- Presentation of the last prototype of the personal project.
- 3D machining induction with Aspire.

OBJECTIVES

- Improve the week 11 project and produce it with Aspire.
- Document the process in the wiki.

TIME ALLOCATION WEEK 14

30% TRAINING	40% ASSIGNEMENTS	30% PERSONAL PROJECT



WEEK 15

TOPICS

- Stereolithography 3D printing induction.

OBJECTIVES

- Follow the induction provided by Onl'Fait.
- Produce an object by stereolithography.
- Finalise the personal project.
- Update your personal training diary on the Onl'fait wiki.

WEEK 16

TOPICS

- Further development according to the needs and wishes of the candidate.
- Finalise the personal project.

OBJECTIVES

- Complete the personal project.
- Complete your personal diary of the training on the Onl'fait wiki.

TIME ALLOCATION WEEKS 15 AND 16

30% TRAINING	40% ASSIGNEMENTS	30% PERSONAL PROJECT

EXTRAS

- 3d modelling software (OpenSCAD, FreeCAD)
- Free vector drawing software (Inkscape)
- Vinyl cutting