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Objective & Context
Techniques & mistakes
Tips & ideas

2021

THE MOCK-UP MOMENT

INVERTED EGG SHAPE



LIGNUM.

INTRODUCTION

THE PROJECT

This inverted egg-shaped mock-up was created while I was a trainer at the wine industry training center in Beaune, following a technical reflection on the **understanding** and **execution** of this layout exercise. It served as a teaching support to show apprentices that cooperage remains a true technical laboratory, where mastering geometry and layout techniques makes it possible to **explore complex shapes and assemblies**.



UNKNOWNNS

- **Geometric layout:** determining the construction method that makes it possible to understand and materialize the geometry of the inverted egg shape.
- **Reversal of forms:** adapting the logic of development and assembly in order to obtain an inverted volume while maintaining the consistency of the staves and joints.

THE STUDY

INFORMATION

PLAN

ESSENTIAL DATA

Major axis of the egg shape

260 mm

Minor axis of the egg shape

200 mm

Major axis of the oval (bilge)

300 mm

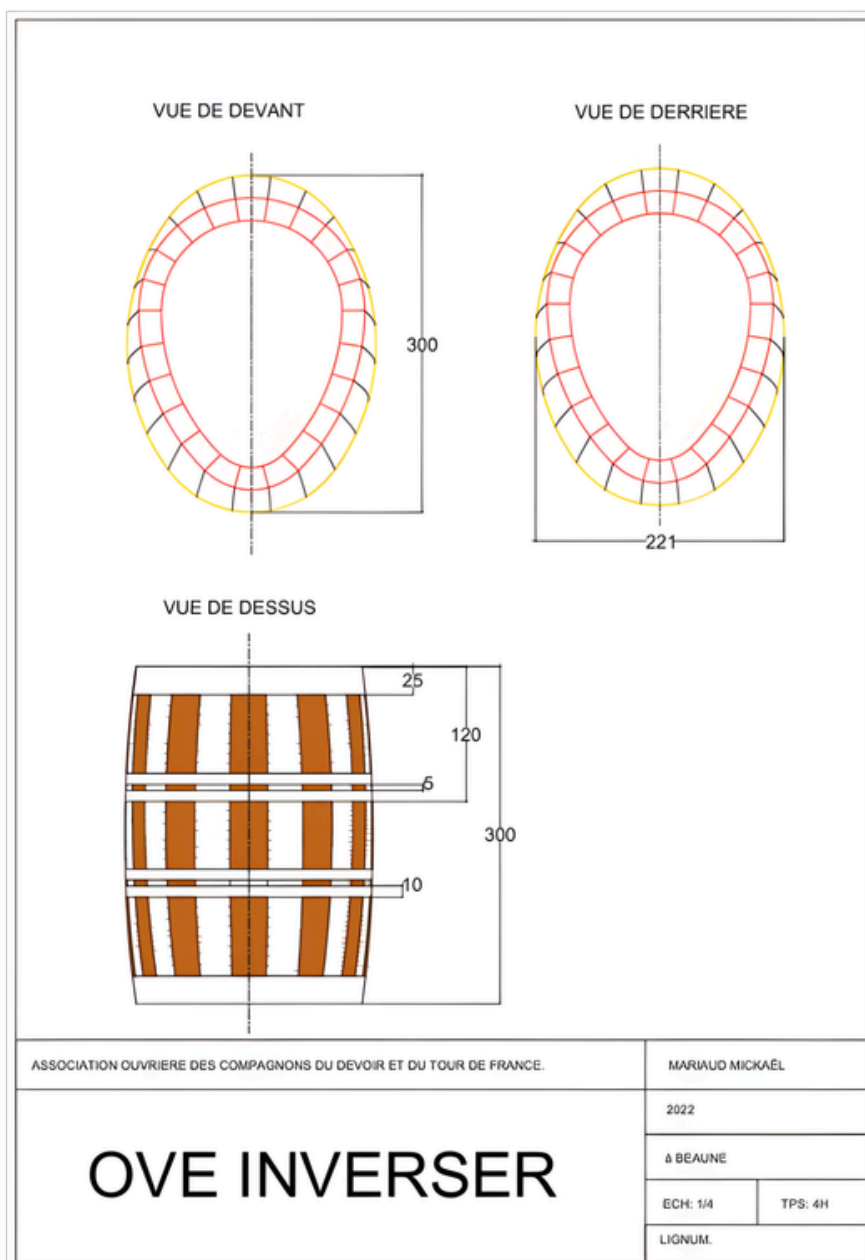
Minor axis of the oval (bilge)

221 mm

Stave length

300 mm

COPPER HOOPING



THE METHOD



- **Layout:** creation of the two faces of the inverted EGG shape at full scale. Complete numbering of the staves on both drawings in order to identify the correspondence of each piece.
- **Cutting:** transferring the layout onto the wood and cutting all the staves according to the established numbering.
- **Jointing:** producing the joints with a jointer plane, respecting the angles defined by the layout to guarantee the geometric continuity of the assembly.
- **Dry assembly:** assembling the barrel from both ends in order to check the quality of the joints and the consistency of the shapes before bending.
- **Bending:** traditional bending with boiling water, initial tightening with a cabestan knot, followed by final shaping with the hoop.
- **Shape stabilization:** use of deliberately thick hoops in order to stabilize the geometry and preserve the obtained shapes during cooling.



AMMONIA

What I did:

- **Piece identification:** all the staves are numbered in order to reassemble the barrel in its original configuration.
- **Disassembly:** the barrel is then dismantled to isolate the staves.
- **Ammonia treatment:** every other staff is placed inside an airtight box containing a bowl of ammonia in order to create an atmosphere saturated with vapors.
- **Observation:** the staves exposed to ammonia vapors darken, while the others retain their original color.



Explanation of the phenomenon

- **Réaction chimique avec les tanins :** le chêne est une essence riche en tanins. Les vapeurs d'ammoniac réagissent chimiquement avec ces composés.
- **Modification de la couleur du bois :** cette réaction entraîne un assombrissement naturel du bois, qui peut aller du brun foncé au noir selon la concentration de tanins.
- **Coloration non superficielle :** contrairement à une teinte appliquée en surface, la coloration est issue d'une réaction interne au bois, ce qui la rend plus naturelle et plus stable.



CROZING

What I did:

- **Reassembly of the barrel:** after treatment of the staves, the barrel is reassembled in its original configuration while respecting the numbering, then tightened in order to recover its final shape.
- **Crozing:** the crozing operation is carried out using a crozing knife, a croze cutter, and an adze.



Simple procedure

1. **Axis marking:** identify and measure the two axes inside the croze in order to structure the head layout.
2. **Perimeter measurement:** using a fixed compass, go all the way around the croze by successively transferring the compass opening. The count gives the perimeter length (example: 10 compass openings + 2 cm).
3. **Layout construction:** on a sheet, draw the head shape while respecting the two identified axes.
4. **Perimeter transfer:** transfer the compass opening all around the drawing in order to recover exactly the value measured inside the croze (example: 10 compass openings + 2 cm).
5. **Shape adjustment:** progressively correct the drawing until the correct geometry is obtained while respecting the measured perimeter.



Once the shape was validated, I transferred it onto a plywood sheet matching the thickness of the croze in order to create a template. This template was then tested on the barrel to check the fit. After validation, the shape was transferred onto the final heads, which were then cut and fitted into the barrel croze.

INVERTED EGG SHAPE

FINISHING

What I did:

The heads were made from wood offcuts as part of a material optimization approach.

The hooping was also produced from leftover copper hoops, which explains the chosen configuration:

- one wide head hoop
- and two small Bordeaux-style bilge hoops.

All the hoops will be fixed using brass nails in order to ensure both structural stability and the finishing quality of the piece.



INVERTED EGG SHAPE

Total time: ~180 h
Number of staves: 24

