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2019 - 2020

Objective & Context
Techniques & mistakes
Tips & ideas

THE MOCK-UP MOMENT

THE SPHERE

LIGNUM.

INTRODUCTION

THE PROJECT

As part of my **reception project**, I chose to create a model of the **Seguin Moreau** sphere. This choice is meaningful: Seguin Moreau was the company where I completed my apprenticeship, and where I discovered the foundations of the trade. By reproducing this sphere as a model, I **pay tribute to my training journey while showcasing the craftsmanship I acquired during my Tour de France**.

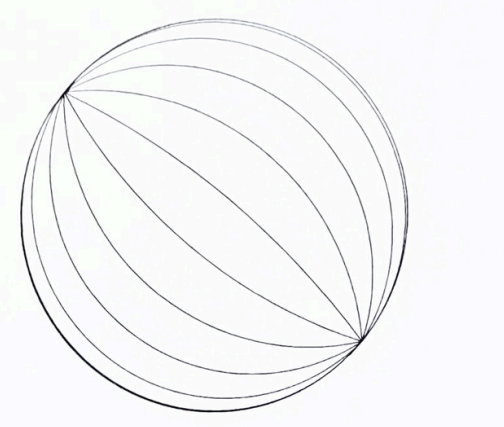
UNKNOWNS

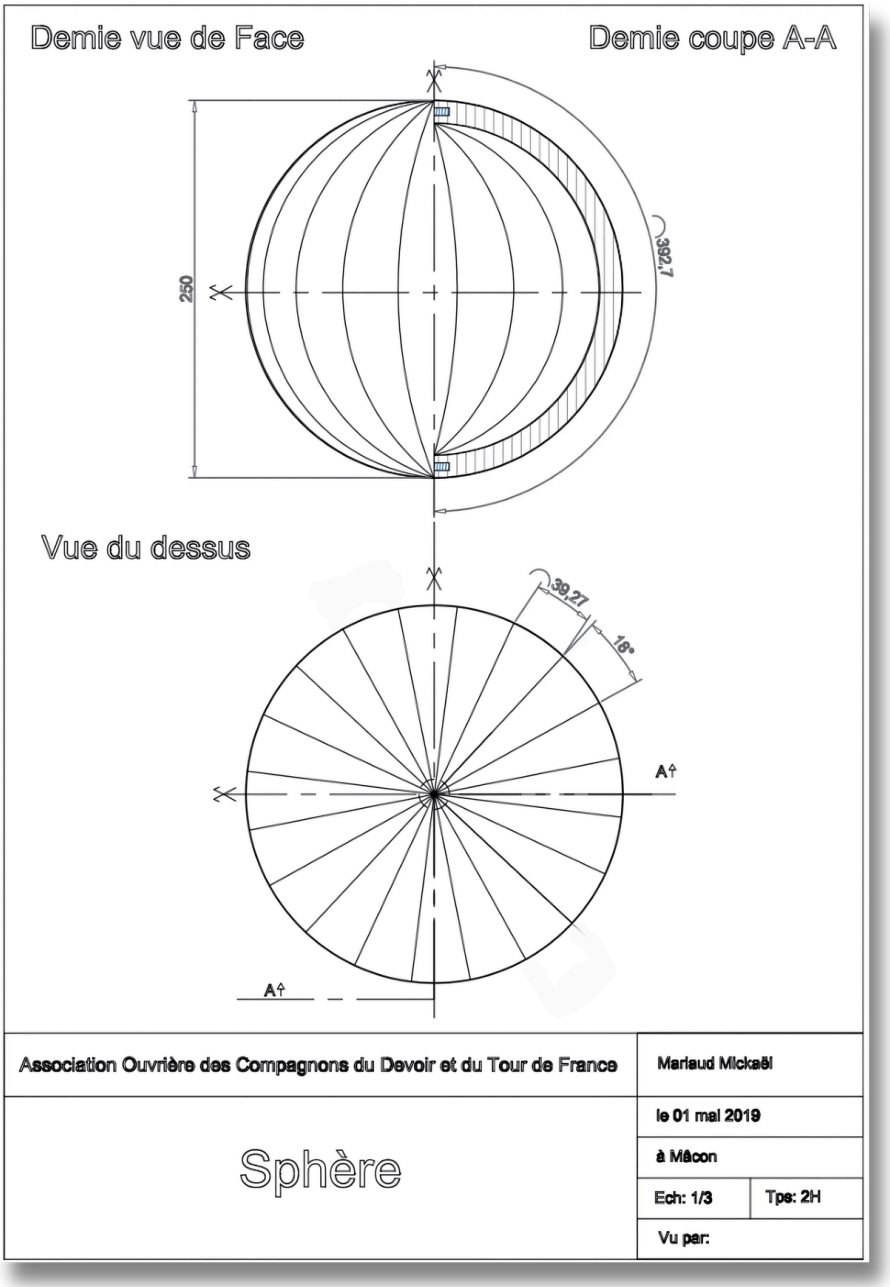
- **Individual compression bending:** adapting each stave separately to achieve a regular curvature.
- **Manufacturing the jointing template:** designing a specific tool to ensure assembly precision.

THE SPHERE

THE STUDY

INFORMATION | PLAN





ESSENTIAL DATA

Sphere diameter
250 mm

Number of staves
20

Stave width
39, 27 mm

Jointing angle
9°

BENDING

- **Preparation**: 4 hours in water at approximately 90°C (objective: soften and saturate the fibers).
- **Assembly**: tightly tensioned steel strap/compression band, with end stops to prevent elongation; anti-slip wedge on the template.
- **Bending**: shape on the template with slight over-bending (to compensate for springback, see below).
- **Stabilization**: keep on the template until cooled, then leave for 24 hours in the sun (or under gentle ventilation) to dry and set the curvature.
- **Piece dimensions**: 600 L × 50 W × 15 T (one stave at a time).

THE SPHERE

BENDING

I noticed this issue:

During drying and stabilization, some staves closed beyond the intended over-bend.

To avoid this, I recommend:

Collect data

- Measure moisture content at each stage: before soaking, after soaking, after bending, and after 24 h.
- Record wood moisture content and ambient temperature.

Precise soaking time

- Record immersion duration and water temperature.
- Record the delay between soaking and placing on the template (target: < 90 s).

Avoid changing tools

- Use the same steel strap / same tensioner for the entire series.
- Avoid changing tools in order to limit compression variations.
- Standardize the applied tension.

Dimensional stability during drying

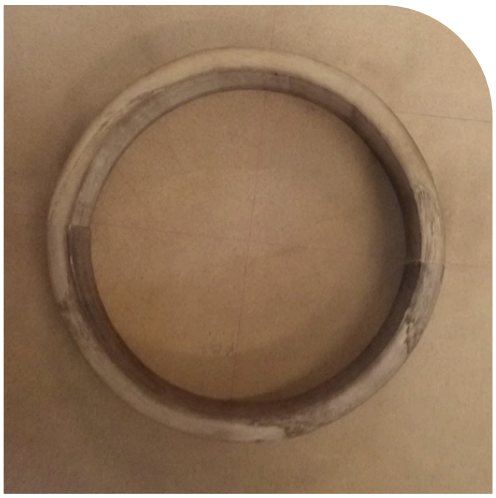
- Develop a holding system.
- Objective: maintain exactly the same dimensions for each stave during drying, with turning halfway through the process.

THE SPHERE

CUTTING TO LENGTH

What I did:

For cutting to length, I constrained each stave inside a mold/counter-mold template.
The objective was to immobilize the stave in its final curvature and cut perpendicular to the axis.
This method allowed me to maintain both length and squareness despite the curvature differences from one stave to another.



Simple procedure

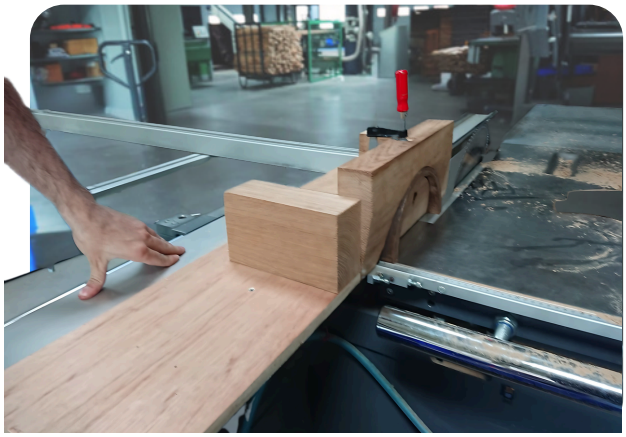
1. **Shaping:** place the stave inside the mold/counter-mold and clamp along the axis.
2. **Length stop:** adjust the stop (repeatable setting) to the target dimension. I personally used a panel saw.
3. **Perpendicular cut:** the saw is guided by the template, which encloses the piece and acts as an anti-splinter support.
4. **Holding**: do not release the clamping during the cut; release progressively afterwards.
5. **Checks:**
   - Length
   - Squareness of the ends
   - Deflection after release

Key points

- Same template for the entire series (consistency).
- Progressive clamping to avoid deformation.
- Anti-slip material (cork/sandpaper) inside the mold to hold the piece in place.
- “Axis” reference marking on the template + interchangeable stops for repeatability.
- Always make a test piece first.

THE SPHERE

JOINTING



What I did:

For the jointing process, **I constrained each** stave in its final shape (mold / counter-mold).
I used a **vertical template** on the panel saw to machine the angle on both sides.
Before starting the series, **I carried out tests on wood offcuts** (same width as the staves) to verify that the theoretical angle matched the real angle once assembled.
For jointing, I use **template A** for the first side.
For the second side, I use a mirrored **template B**, because the reference surface is no longer the same (the already machined face changes the support surface).
I then carried out a light finishing pass using a sanding block.

Simple procedure

1. **Template A** (1st side): adjust angle α, set the length stop, clamp the mold/counter-mold assembly, then cut.
2. **Template B** (2nd side): mirrored support referencing the already machined face.
   - Integrate a thickness **compensation shim equal to the material removed on side A** in order to maintain the target width.
   - Cradle support to follow the curvature without tilting.
3. **Side B cu**t: same feed rate, same blade, symmetrical clamping.

Key points

- Same template for the entire series (consistency).
- Progressive clamping to avoid deformation.
- Anti-slip material (cork/sandpaper) inside the mold to secure the piece.
- “Axis” reference marking on the template + interchangeable stops for repeatability.
- Always make a test piece first.

THE SPHERE

GLUING

What I did:

For the gluing process, I assembled the staves in pairs**, then in a 2-1-2 sequence**, which resulted in **4 quarter-spheres.**
I checked the squareness of each quarter and corrected it with a sanding block when necessary.
I then glued the quarters together in pairs to obtain **two half-spheres**; I checked the flatness of the edges, corrected them if needed, and then glued the two halves together.
The most delicate point was the alignment of the tips: I made **shape templates for the quarters** and wooden blocks to clamp the first two staves together.

FINISHING

What I did:

I carried out the finishing on a lathe at a carpenter's workshop in order to make **the sphere as round as possible.**

I started with a **coarse grit** to remove the misalignments, then progressively moved to a very **fine grit.**

I finished with a light **scraper pass, always following the grain direction.**

FINISHING

What I did:

I made my **own wood polish using beeswax**, olive oil, and turpentine for the finishing of the sphere.

Typical recipe (soft paste, easy to polish)

- 100 g beeswax
- 100 ml olive oil
- 50–80 ml turpentine (adjust for the desired softness)

Procedure

- Double boiler: melt the wax at approximately 65°C (no direct flame).
- Add the olive oil and mix well.
- Remove from heat, and once the mixture is below 50°C, add the turpentine and mix.
- Pour into a jar and allow to cool for 12–24 h (place the lid on loosely at first, then close it fully).

Application with a cloth: 3 coats with polishing between each coat.

- Use a **lint-free cloth** and very little product.
- Apply a very thin layer (circular motions first, then following the grain).
- Wait 15–30 min (until a light haze appears), then polish until dry to the touch.
- Repeat 3 times. Leave 2–4 h between coats depending on temperature and humidity.
- After the 3rd coat, perform a final polish and leave to rest for 24 h before handling.

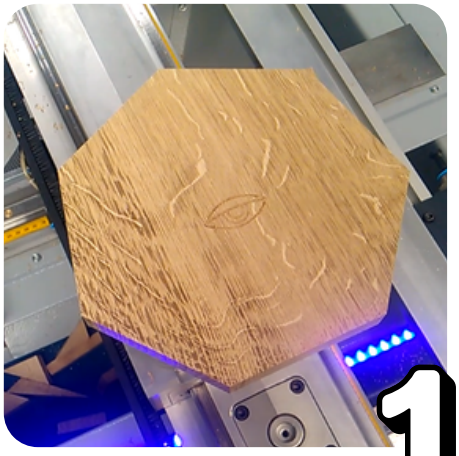
Tip: if the surface remains greasy or sticky, you applied too much product. Wipe it clean and polish again.

THE STAND

What I did:

I created a stand with a **heptagonal base** (7 sides) and **three bent laminated wooden legs.**

This base allowed me to machine and **engrave using CNC**, fill the engraving with **epoxy resin**, and master **laminated bending** techniques for the legs.



1

Heptagonal base

2

Fill the engraving with epoxy resin

3

3 bent laminated wooden legs

4

Stand assembly

THE SPHERE

Total time: ~400 h
Number of staves: 20
Diameter: 250 mm