

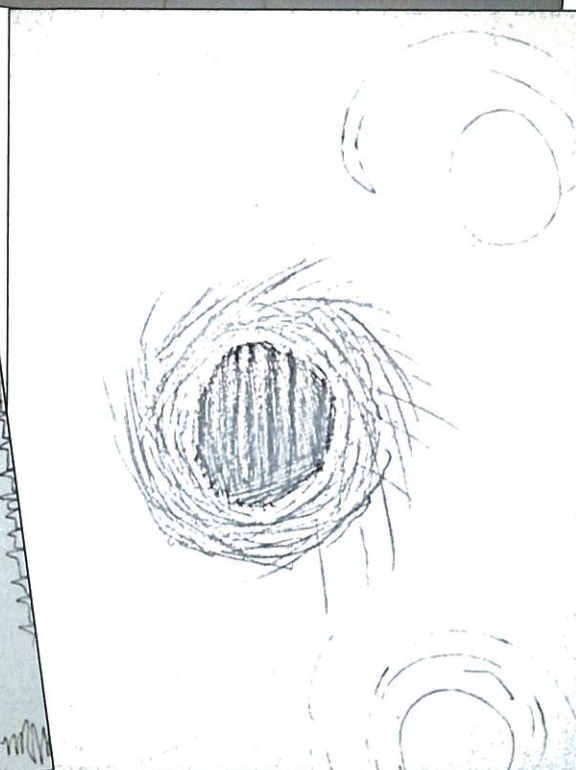
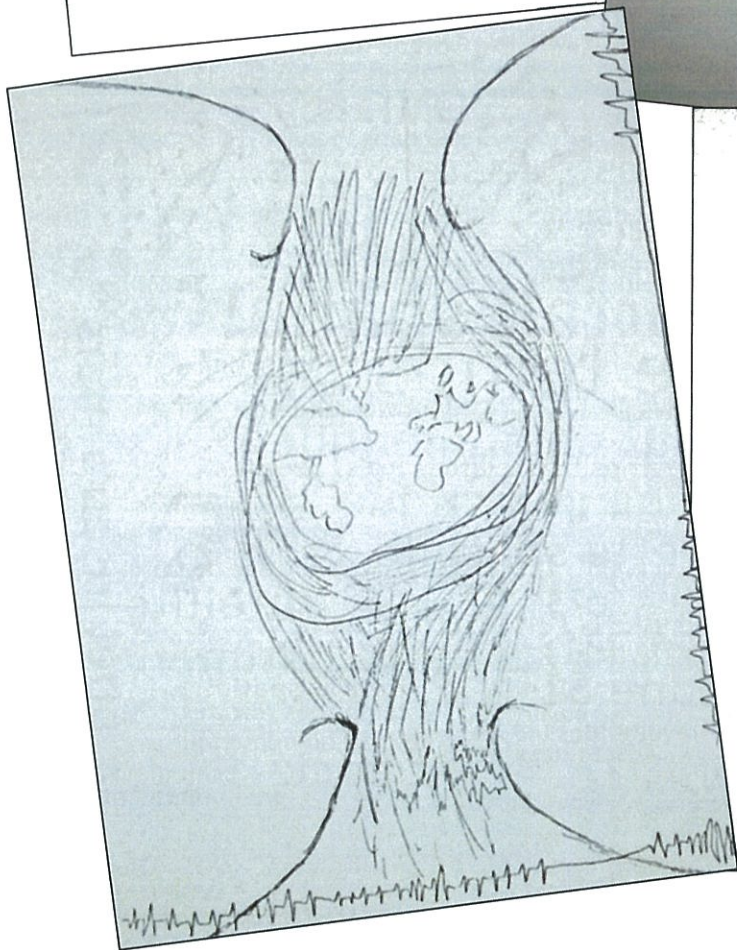
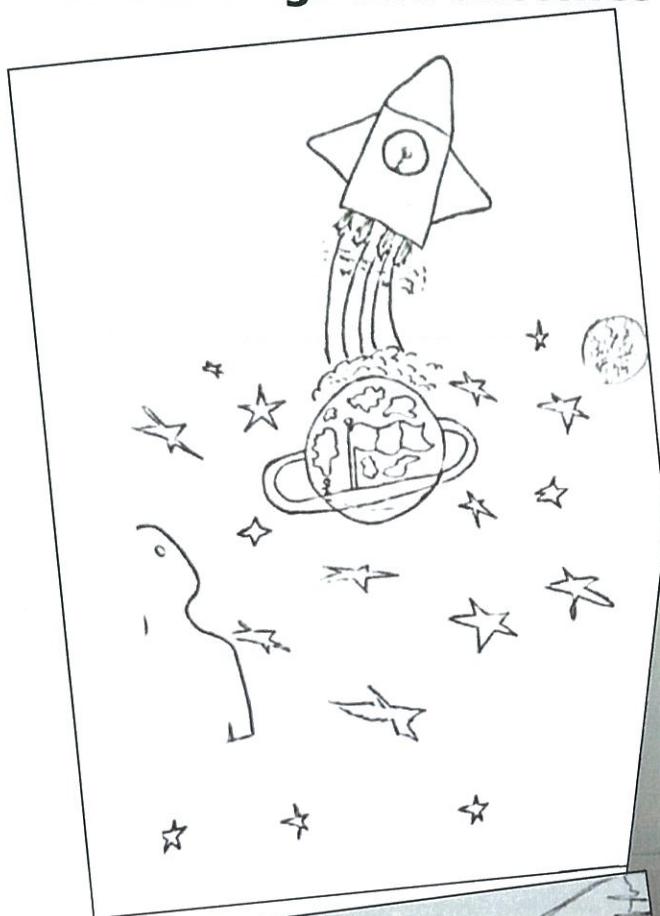
## Brainstorming and word clouds

The resulting word cloud is as follows:





## Free drawings and sketches



## PRELIMINARY PROJECTS –

### First concepts

Interested in the notion of black holes and space-time travel, and based in the city of Besançon, known as the capital of time, it seemed appropriate to tackle the theme imposed by this angle, with the aim of anchoring ourselves in our region and thereby setting ourselves apart from the other competitors, with the risk of finding ourselves off topic.

The initial idea, inspired by Christopher NOLAN's film Interstellar, is that when you approach a black hole, there is a strong attraction and time slows down, so if you place a planet between two black holes, time stops.



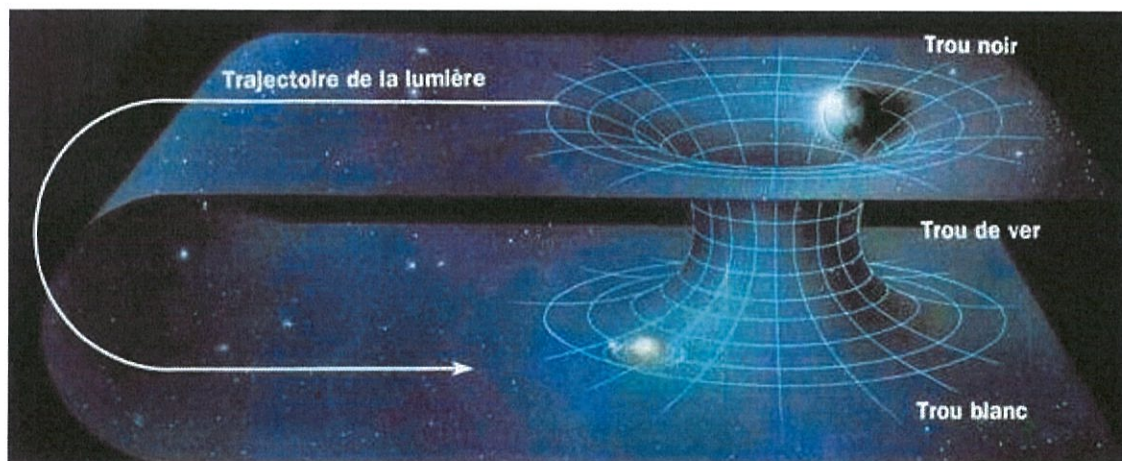
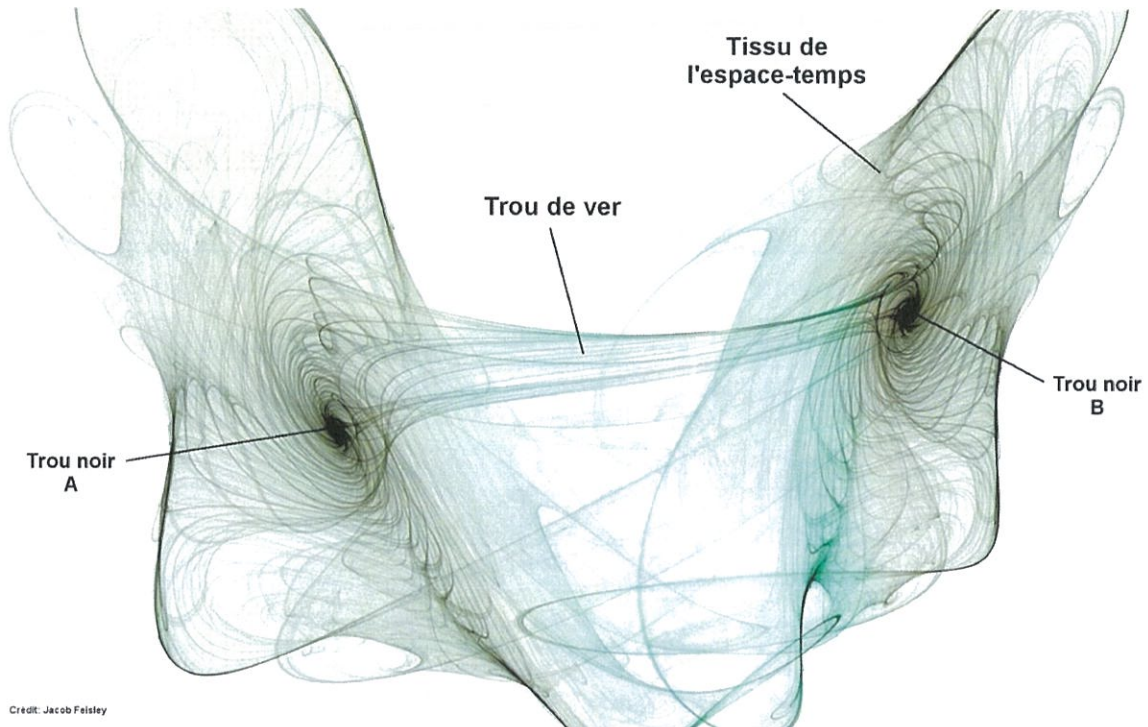
The model to be produced had to be feasible, within the reach of a metalwork CAP class (second and final year combined), and have a strong visual style, so the initial project underwent a few changes.



## Visual chosen

What was in the original drawings, two opposing black holes, has been transformed into a wormhole, a hypothetical object in astronomy, used to link two regions of space-time, on one side by a black hole, on the other by a white hole, or by two black holes, depending on the hypothesis.

The planet at the centre of the tunnel created by the wormhole.



## NAME OF WORK –

To name the work, a new brainstorming session combining the titles of films about time travel and references to our planet gave us "Gaia through time".

In reference to :

- Adam à travers le temps, the French title of the film Adam Project, in which the hero travels through time using a spaceship.
- Gaia, primordial Greek goddess, mother of the titans, whose name means Earth.

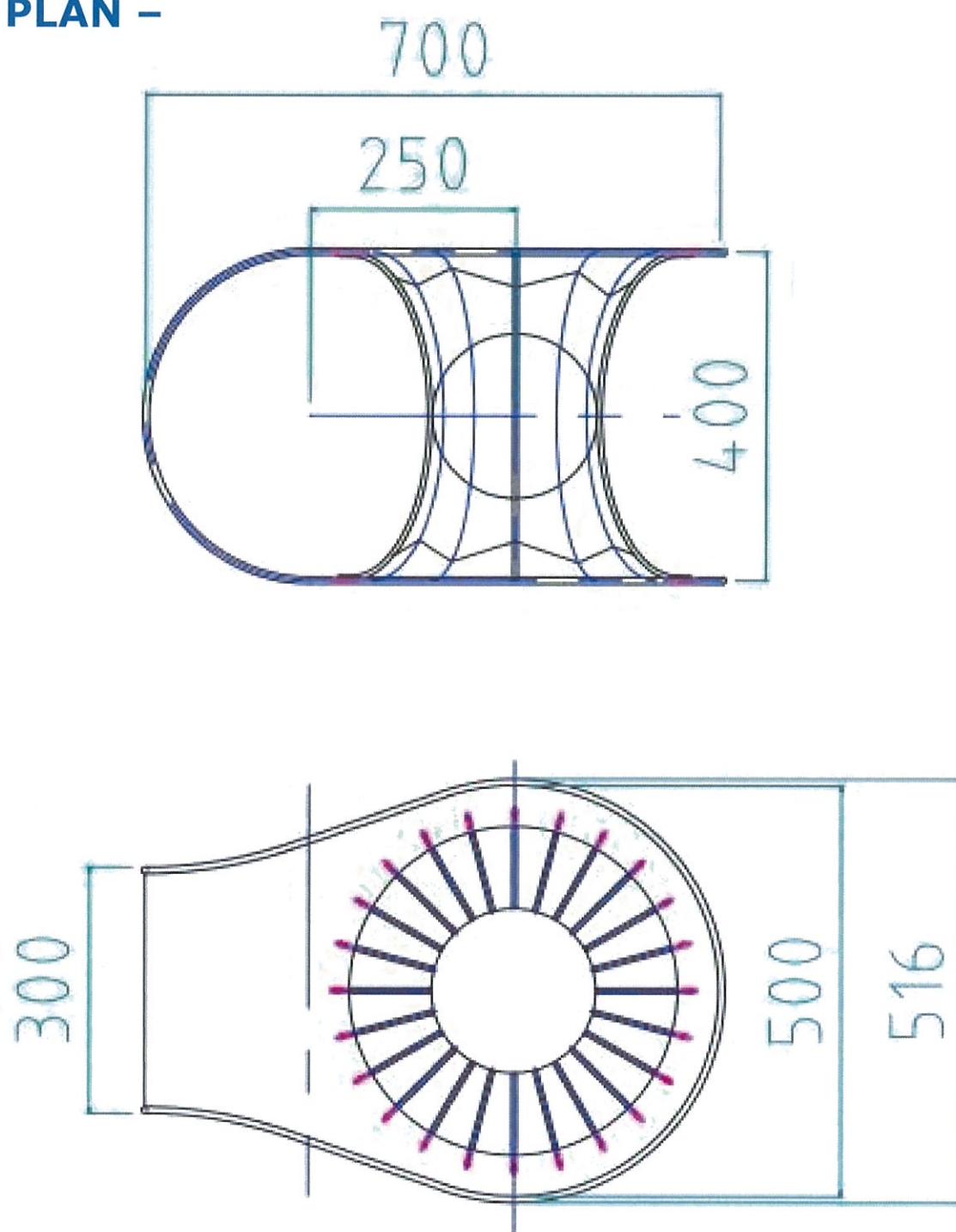
## VISUAL TESTS –



In order to determine the various dimensions and ensure an attractive visual appearance, a mock-up was made using the maximum overall dimensions given in the competition specifications.

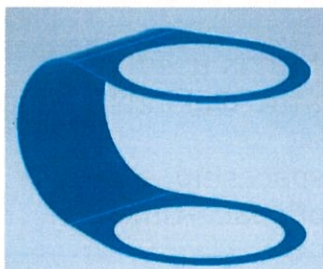


## PLAN –



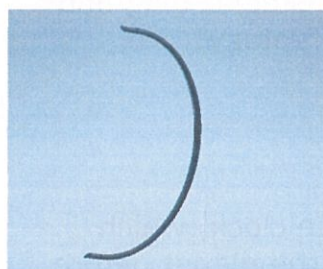
## CHOICE OF MATERIALS AND TECHNIQUES –

For reasons of budget and ease of installation, most of the elements will be made of steel. A few elements will be in brass to bring a little colour and contrast to the whole.

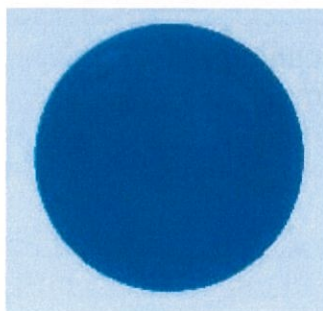


The plane joining the black holes will be made of 1mm-thick steel sheet, in order to limit the weight and cost of the assembly.

The sheet metal will be cut on our plasma bench, the inside will be cut using a manual plasma cutter to give a "tear-off" appearance

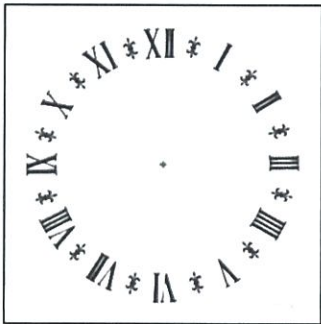


To symbolise the wormhole, hold the sphere and the sheet metal assembly, 8mm square bars are used, twisted and bent into the shape of half ellipses. This will enable you to learn how to twist, hot and cold form and calibrate on a template.



The planet will be made of S235 steel.

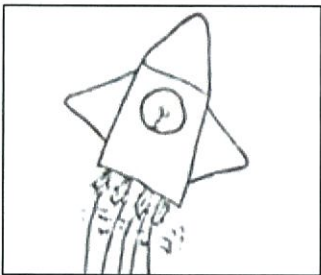
We would have liked to be able to shape the sphere by hydroforming, but were unable to find a partner to help us with this technique. So we decided to make it differently, in several parts, 24 to be precise, to represent the time zones. These were rolled, calibrated and then assembled by punching.



After a visit to the Besançon Time Museum, where the class learned that it was by observing the stars that mankind was able to determine the correct time, as well as the specifics of how time is divided up. It was therefore decided to add the numerals of a dial on top of the black hole.

These will be made of brass, laser-cut with the help of the Manton company, which hosts the EREA students on their work experience placements.

Note that the 4 is marked IIII, which is used in watchmaking to visually separate the dial into 3 equal parts.



We wanted to add a rocket or a spaceship, a tardis, a deloréan, or any other means of space-time transport.

The question of dimensional consistency and feasibility led us to add a forged and welded rocket made from round steel, stainless steel tubing and copper to add a little colour and fantasy.



After learning that the apocalypse clock, which estimates the time remaining on the planet before a nuclear disaster, has gone from minus 2 minutes to minus 90 seconds, according to scientists specialising in the subject.

We decided to add our rocket escaping from the planet at this precise time.

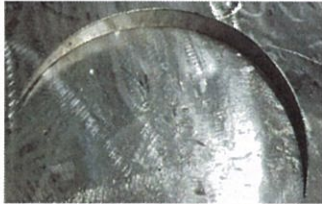
## Notes on the choice of materials

We thought about working with materials used in the aerospace industry, such as titanium or certain inconels, but this would take us too far away from the reality of metalwork and would require specific supplies or partnerships.

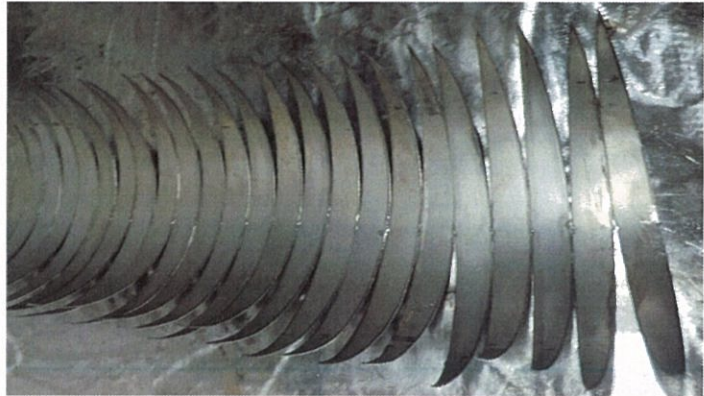


## TESTING AND PROJECT START-UP –

### Making the sphere

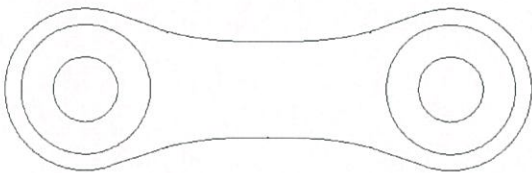


24-piece construction



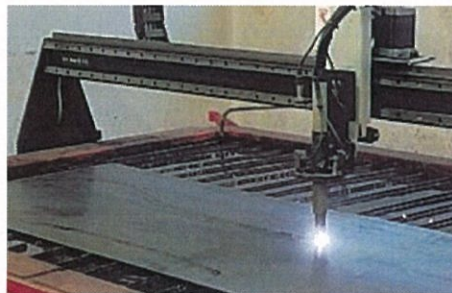
Pointed 6 by 6 from  
then the 4 shells from the outside

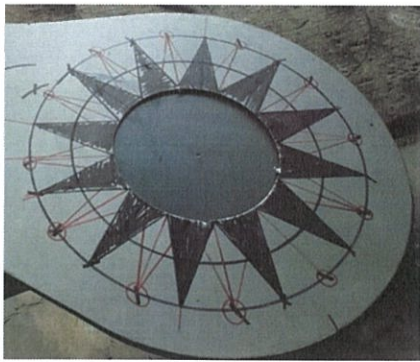
### Production of the junction plane sheet



Production of the junction plan sheet

Plasma cutting





Marking out the areas to be cut manually (in black) and the areas where the bars are to be welded (in red)

Manual plasma cutting



Shaping areas with a torn effect

## AFTER THE COMPETITION –

So as not to be used solely for the competition, but with a view to what it might become over time, the work is intended to be recycled as a coffee table, with the addition of a glass top, for use within the school.

However, following a discussion that started as a joke during the visit, we thought it would be interesting if the work could be exhibited at the Musée du Temps in Besançon.



## L'EQUIPE

CAP 1 and 2 students with their metal structures teacher



Yacine - Ibrahim - Adama - M. Mougin - Siaka  
-CAP2- -CAP1- -CAP1- Enseignant -CAP1-

Kamel - Deniz  
-CAP2- -CAP2-