



LZ 45 "L 13"

1:144

- Thorsten Brand -

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This is an accurate scale **paper model** of the airship **LZ 45** (flown as "L 13" for the German Navy in World War I) in scale **1:144**.

The model is free, it can be downloaded, printed and built by anyone as often as requested. It may not be sold, either in digital or in printed form. Please notify thorstenbrand@gmx.net of violators.

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The LZ 45

LZ 45 was a 'p'-class Zeppelin airship. It was built by the Luftschiffbau Zeppelin in hall 1 at Friedrichshafen and entered service in the German Navy as "L 13" on July, 24, 1915,¹. Its commander was Kapitänleutnant Heinrich Mathy, one of the most famous airship commanders of the First World War.

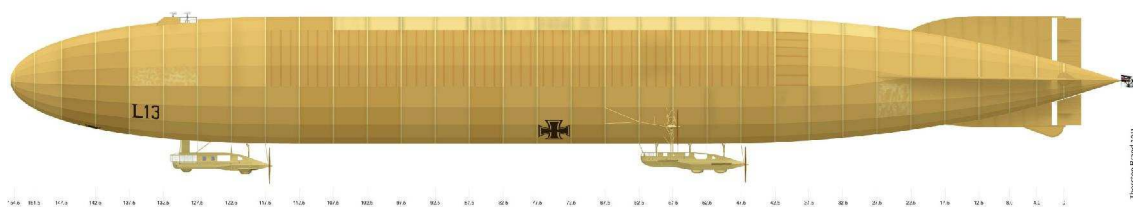
"L 13" took part in several bombing raids over England. It was one of the ships which attacked London on September 8th and October 13th, 1915².

As newer and better ships were available, LZ 45 received a new role as a training ship, identified by a white stripe around the ship's bow (see profiles below).

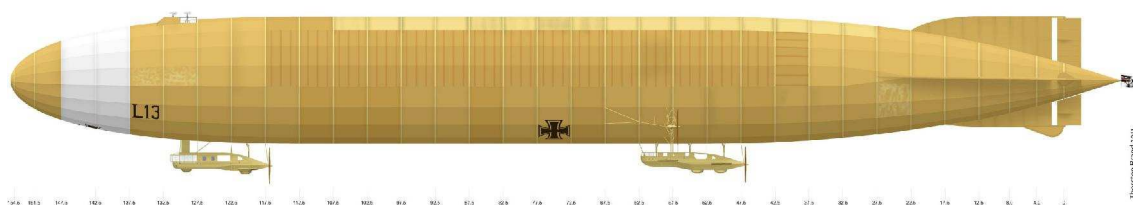
"L 13" was decommissioned in late April 1917 and scrapped in December of that year. During its operational career, "L 13" logged a total of 159 flights, which included 17 attack and 45 reconnaissance missions.

Technical data³:

| | | | |
|---------|---|---|----------------|
| Length | : | 163.5 | m |
| Height | : | 21.962 | m |
| Width | : | 25.789 | m |
| Volume | : | 32000 | m ³ |
| Engines | : | 4 x Maybach C.X, 210 hp, 1200 rpm | |
| Mass | : | 21470 | kg |
| Crew | : | 18 | |



LZ 45 "L 13" as seen during front line operations.



LZ 45 "L 13" as seen during its career as a training ship.

1 Schiffskunde LZ 45

2 Robinson, D. H., Deutsche Marineluftschiffe 1912-1918

3 Schiffskunde LZ 45

The model

This model represents LZ 45 as seen during its combat career. In 1:144 scale, the model measures approximately 1.14 meters (44.8'') overall.

Construction sections:

The model is broken down into five construction sections:

- 1) **Skeleton**
- 2) **Hull**
- 3) **Front gondola**
- 4) **Rear gondola**
- 5) **Final assembly and details**

Printing:

The part sheets have to be printed on white **DIN-A4** paper⁴ of different weights as listed below. In the U.S. Use legal size paper which will leave approximately 2 ½ inches unused at the bottom of the page. Before printing, deactivate the "fit to page"- function. Every page has cm-scale bars to control the print settings.

- The **parts for the skeleton** have to be printed on **250 g/m²** paper (U.S.: use .055" mat board , .050"/1.3mm illustration board or 1mm cardboard).
- The **parts for the hull** have to be printed on **120 g/m²** paper (U.S.: use 90 lb cardstock).
- The **hull join strips** have to be printed on **80 g/m²** paper (U.S. use 65 lb cardstock).
- The **parts for the fin skins** should be printed on **80 g/m²** paper, 120 g/m² paper won't show the translucent appearance like on the real subject.
- The **parts for the gondolas** should be printed on **120 g/m²** paper.

There are three pages which need to be printed on **both sides**.

The kit also includes a **stand** onto which the model can be clamped to ease skinning, gondola assembly and transportation. The sheets for the stand should also be printed on **250 g/m²** paper.

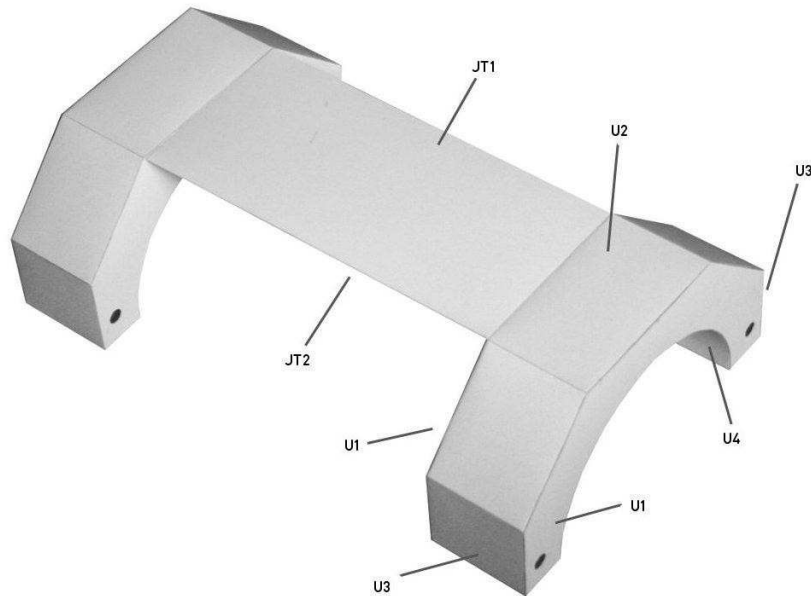
Additionally, **0.5 mm (.020'')** plastic rod and **0.4 mm (.016'')** wire is required for struts.

Templates for **crew figures** in 1:144 are available separately.

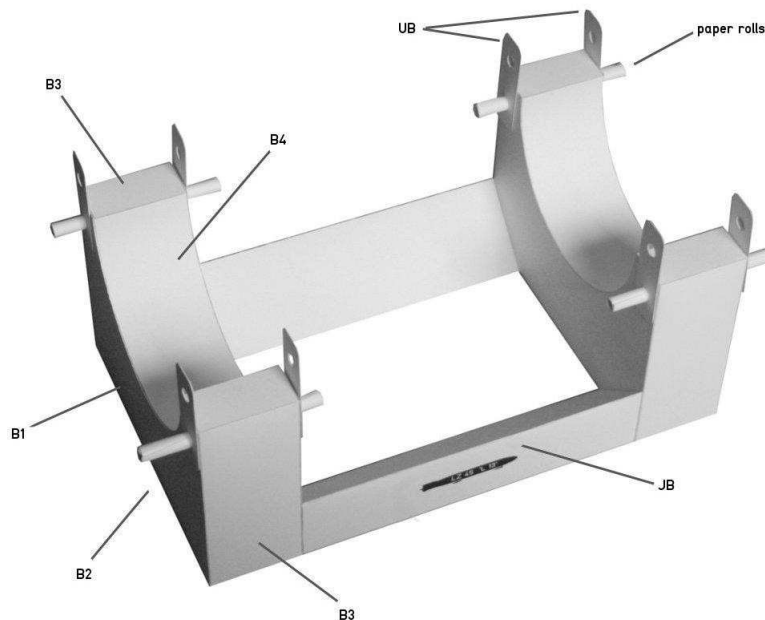
⁴ Letter format should work as well

Stand

The stand consists of two parts which can be connected so that the body of the Zeppelin rests above the table, providing enough height for the gondolas and the propellers.



The upper part of the stand is built up from the parts **U1-U4** and **JT1** and **JT2**.

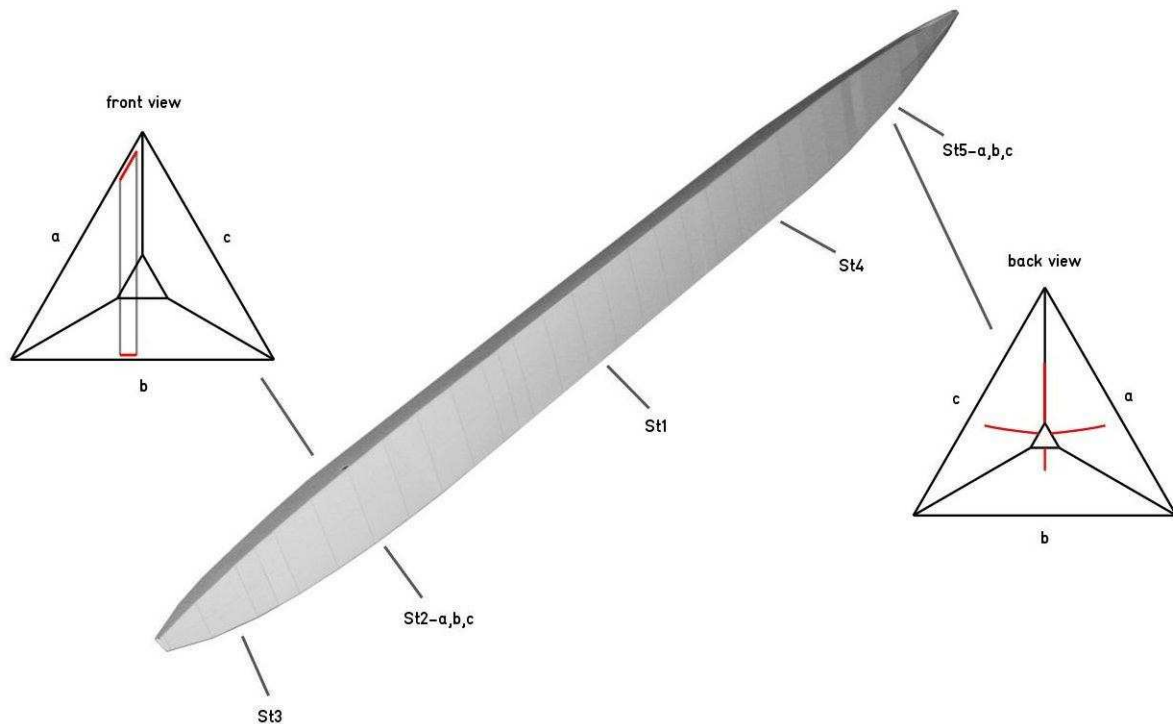


The lower part is similar (parts **B1-B4** and **JB**). Insert a piece of rolled paper through the holes of **B1** and **U1**. Onto this, laminated parts **UB** can be plugged. Another set of paper rolls can fix the upper part of the stand to the lower.

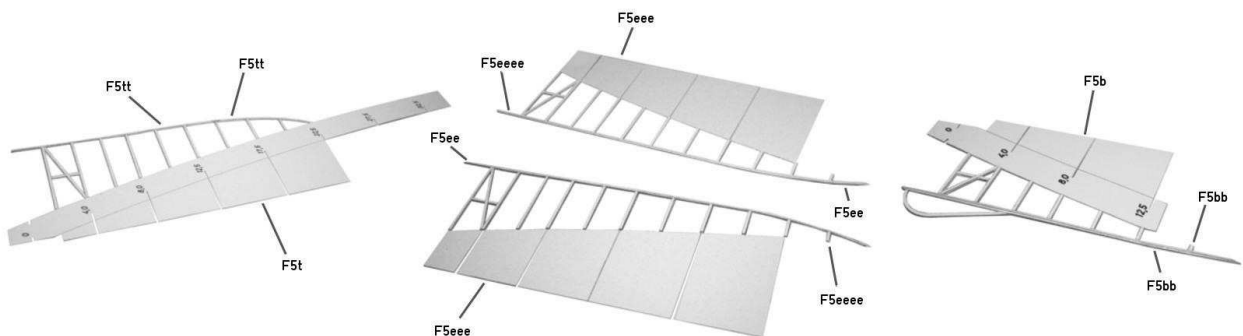
Skeleton

The skeleton is built with a series of rings and longitudinal girders. It is divided into five sections. The skeleton is **NOT** symmetrical across its diameter! The sector which depicts the keel of the ship is marked with the value of the original longitudinal coordinate (in meters), measured from the last ring forward.

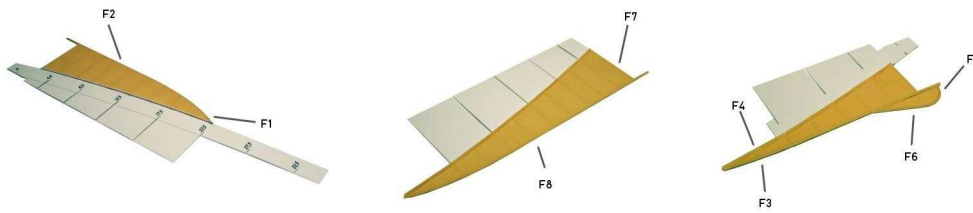
Additionally, a "backbone" with triangular cross-section is run into the rings. Construction starts with the backbone.



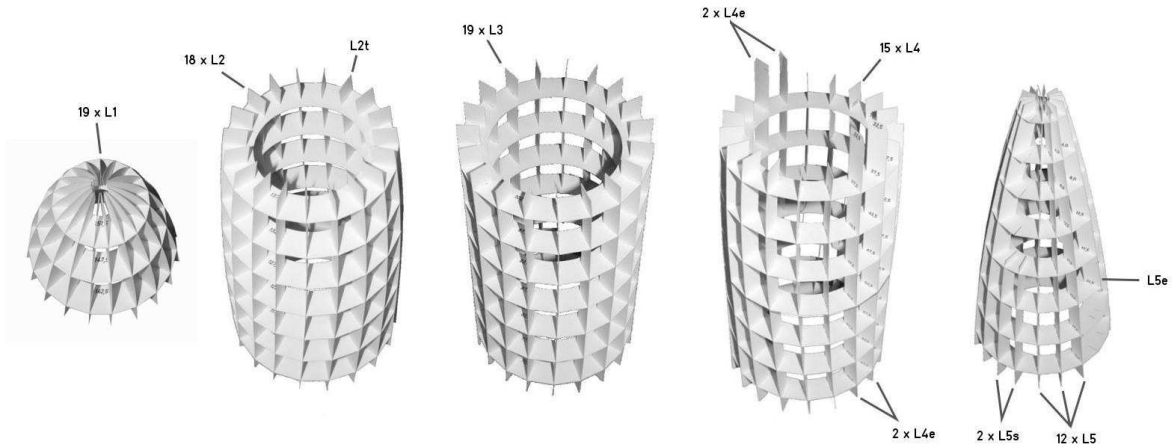
Parts **St1** are glued to a triangular tube using tabs **TSt1**. The same is done with parts **St2**, **St3**, **St4** and **St5** and their respective tabs. Parts **St2-a,b,c** and **St5-a,b,c** have slits and openings (red rectangles) and have to be positioned like seen on the front and back views above. The slits seen in the back view (red lines) must not be closed! Extensions of the fins' formers will slide through them. The sections are connected with the joiner tabs (**JstX-Y**).



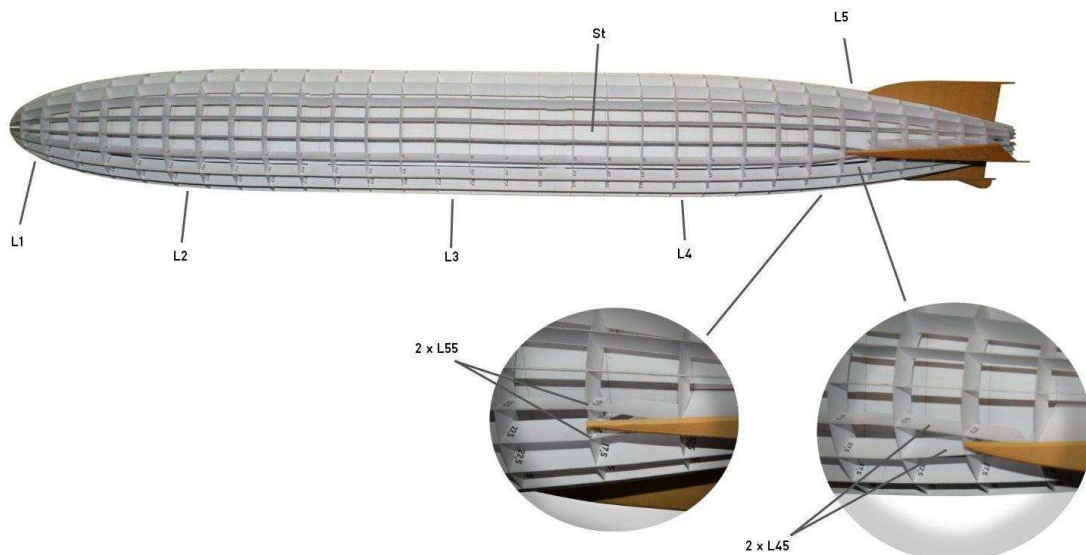
Assembly continues with the fins. For the top fin, one part **F5tt** is glued on each side of part **F5t**. The same is done for the lower fin with parts **F5bb** and **F5b**. For the left and right horizontal fins, part **F5eeee** is on the bottom, **F5eee** is in the middle and **F5eee** is on top. Two mirrored examples are made by laminating these parts together. The thin joints have to be soaked with CA (superglue) to avoid the fins from sagging on the finished model.



The fin trussworks are covered with their skins (parts **F1-F8**) as seen above, the tabs on the parts need to be folded 90° away from the skeleton.



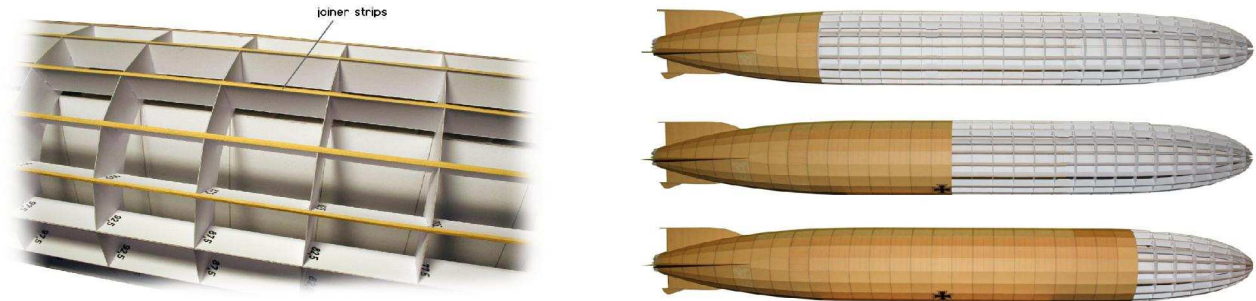
The formers of the main body are assembled by plugging the longitudinal girders and rings together. The rings and slits on the longitudinal girders are labeled with their 1:1-station number for identification. The station number is located on the keel side of each ring so that all rings align along the keel. **L2t** with the cutout for the platform has to be placed in the roof ring slits. Parts **L4e** are positioned near the slots for the elevators on each side, **L5e** follow behind them. The roof slits of the sternmost segment are empty.



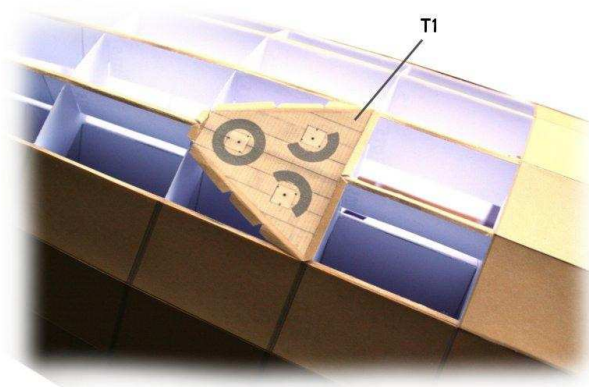
The upper and lower fins are inserted in their respective slits. The horizontal fins' extensions run above the horizontal longitudinal beams towards the center. All extensions may be connected with strips of paper. Parts **L45** are placed in front of the lower fin, parts **L55** in front of the horizontal fins as seen above. The segments are plugged onto the backbone and joined with the parts **JX**.

Hull

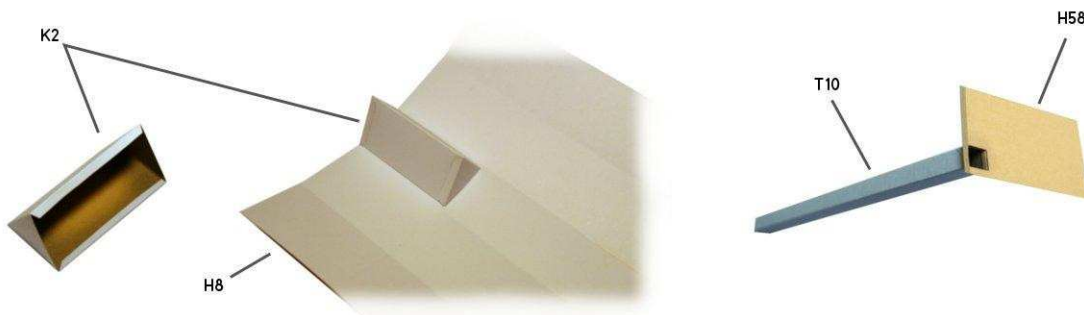
The hull is made from individual tapering strips at the bow and stern and bigger parts at the cylindrical sections. First, on all longitudinals **joiner strips** are glued.



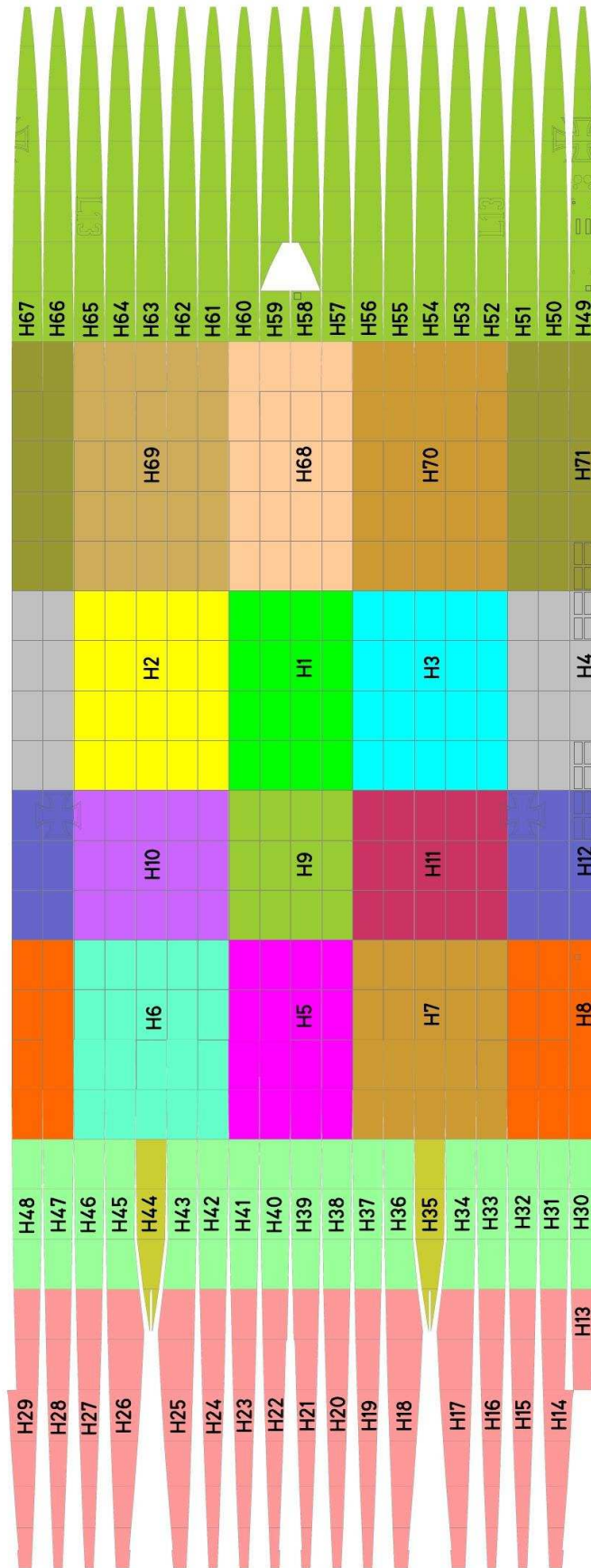
The skin application is best started with the last strips around the control surfaces (**parts H14-H29**), working forward. A map on the next page shows the parts' exact positions. Part **H02** closes the hull at the bow, part **H01** at the stern.

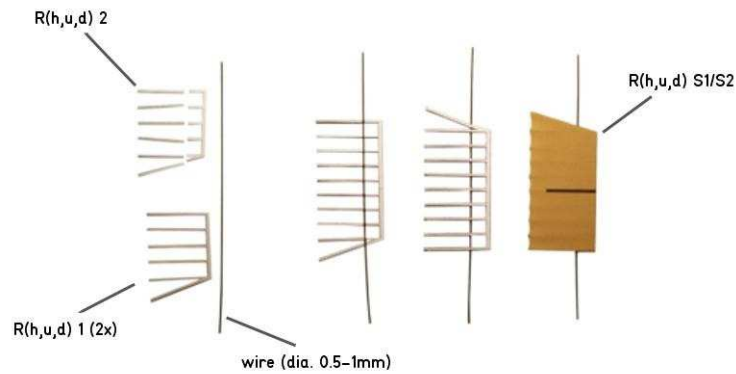


The gun platform (part **T1**) must be glued into the cut out in part **L2t** before the surrounding skin is applied.

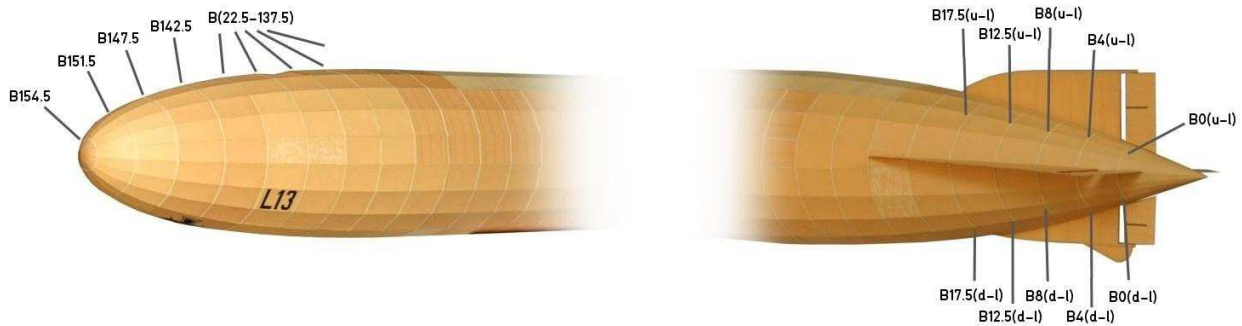


Above each gondola a hatch may be cut out (black rectangles on parts **H8** and **H49**). Then, parts **K2** and **K1** have to be folded as seen above and glued to the backside of the hull parts, imitating the gangway of the real ship. The hatch to the upper gun platform on part **H58** can be cut out and part **T10**, formed to a rectangular tube, will serve as staircase. This will go through the openings in parts **St2-a/b**.





For the control surfaces, parts **R(h,u,d) 1** and **2** (h=horizontal, u=top, d=bottom) are laminated in the order 1-2-1. Between the single strips of part **R(h,u,d) 2**, a piece of wire is placed to serve as an axis. Then the rudder is covered with parts **R(h,u,d) S1/S2**. The trailing edge is slightly pressed into the gaps between the struts to represent the sagging of the fabric.



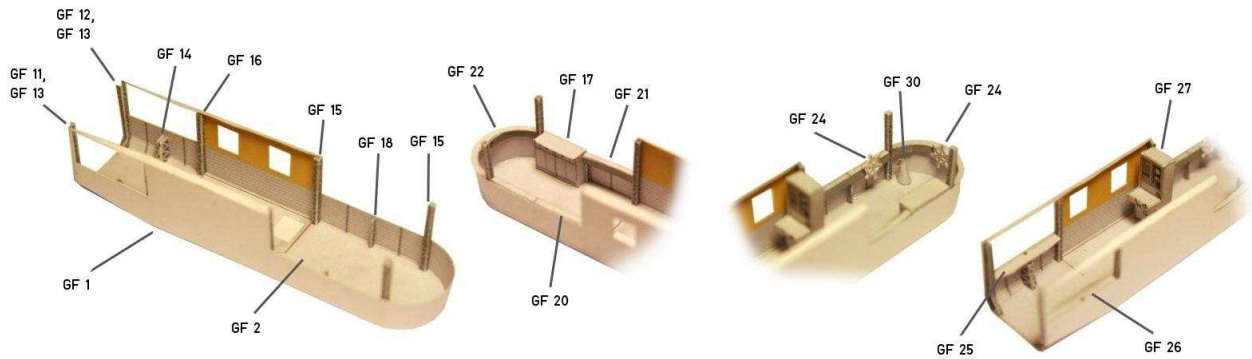
The rudder axes are then plugged into the small holes in the longitudinal beams behind the stabilizers. Onto each dark stripe on the hull a thin ring (parts **BX**) is glued. The number (**X**) thereby stands for the longitudinal station number of the real Zeppelin. Between the control and stabilizer surfaces, the parts are divided into four (u=top, d=bottom, l=left, r=right).

The body of the airship is now finished.

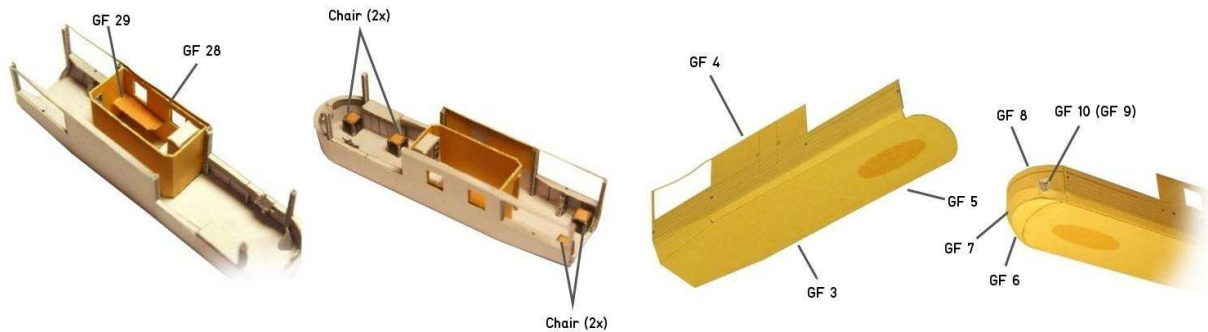


Front gondola

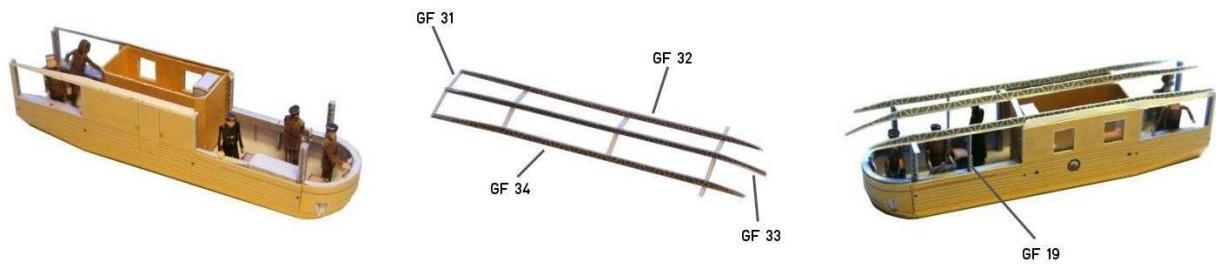
First the commander's car is built.



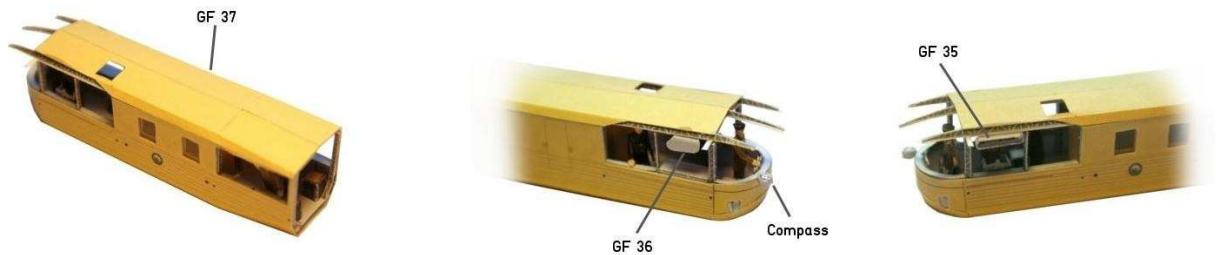
The interior of the commander's car is formed by parts GF 1 and GF 2. Trusses, tables and other items are glued to the marked areas as seen in the pictures.



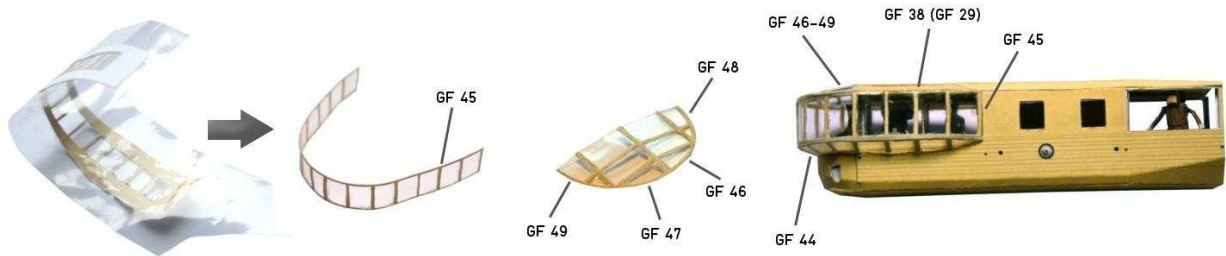
The radio room is separated by part **GF 28** with a table (part **GF 29**). Chairs are placed inside the car. A crew may be added now. Parts **GF 3-GF 8** are assembled and **GF 9** and **GF 10** are glued behind the openings. Cellophane has to be glued behind the two small windows.



The interior is glued into the outer face. The trusswork for the ceiling is built up from parts **GF 31**, **GF 32**, **GF 33** and **GF 34**. Two trusses (**GF 19**) are added before the trusswork for the ceiling is placed on top of all vertical beams.

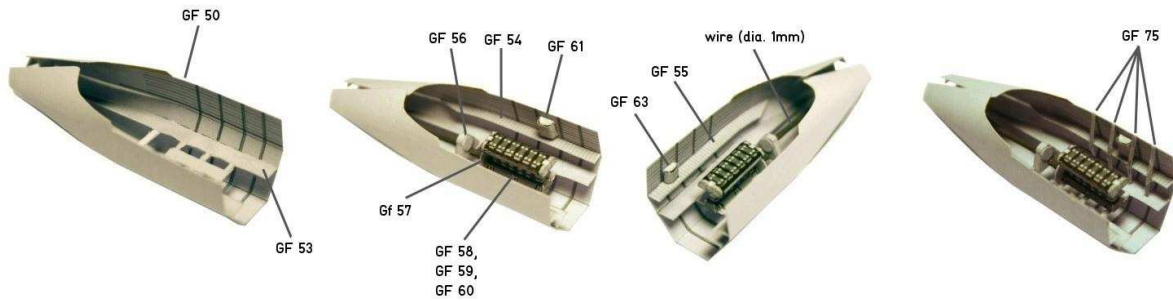


The ceiling (**GF 37**) is placed on top and the last interior parts are added.

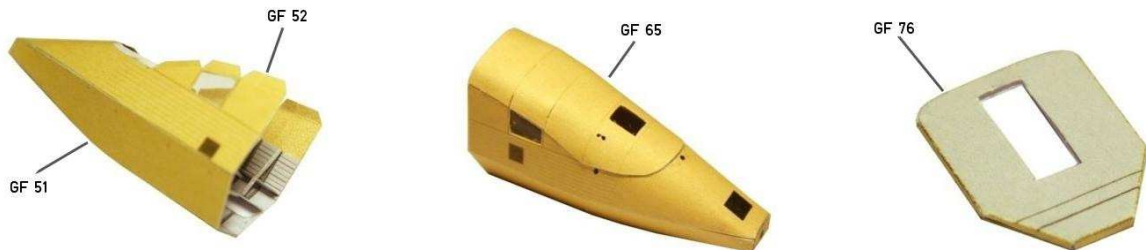


For the windows, the openings in parts **GF 44-GF 49** are cut out first and the paper is glued to cellophane, with the parts already shaped to avoid distortion. After the glue is dry, they are cut out completely and placed on the car like seen above.

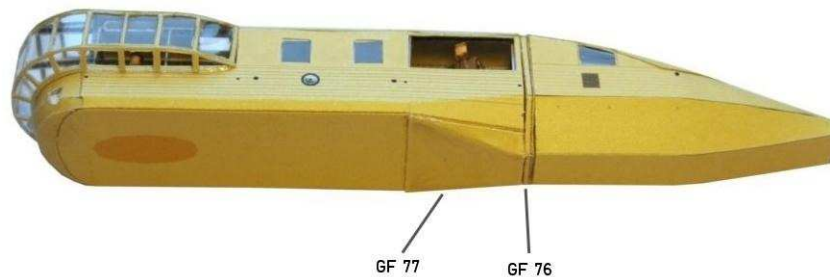
Then the front engine car is built.



The interior is formed by parts **GF 50** and **GF 53**. The engine is assembled from parts **GF 58**, **GF 59** and **GF 60**. A wire shaft is added between motor and gear and from the gear to the aft end. Small parts are placed in the car as seen in the pictures.



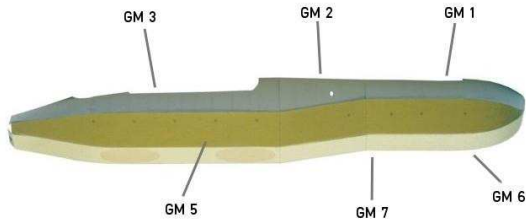
The exterior parts (**GF 51** and **52**) are glued onto the interior (add transparent foil behind the windows) and part **GF 65** is glued on top. Part **GF 76** connects the two forward cars.



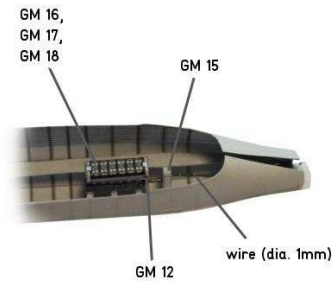
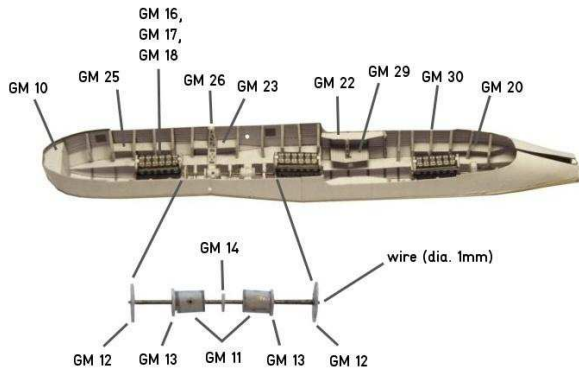
After the front engine car and the commander's car are joined together by part **GF 76**, part **GF 77** seals the step between the sections.

Rear gondola

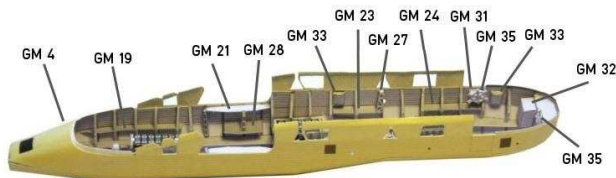
The rear engine car is built up similar to the front engine car.



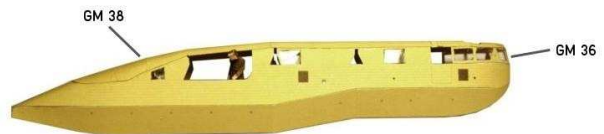
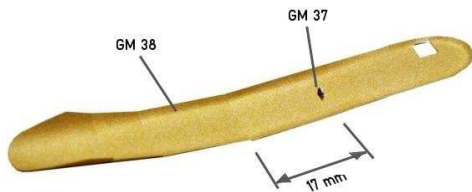
Parts **GM 1**, **GM 2** and **GM 3** are held together by parts **GM 5**, **GM 6** and **GM 7**. Floors are added (parts **GM 8** and **GM 9**).



The engines (parts **GM 16**, **GM 17** and **GM 18**) and gears (parts **GM 11**-**GM 15**) are placed inside the car with wire as axes. Various floors, trusses and other items are added.



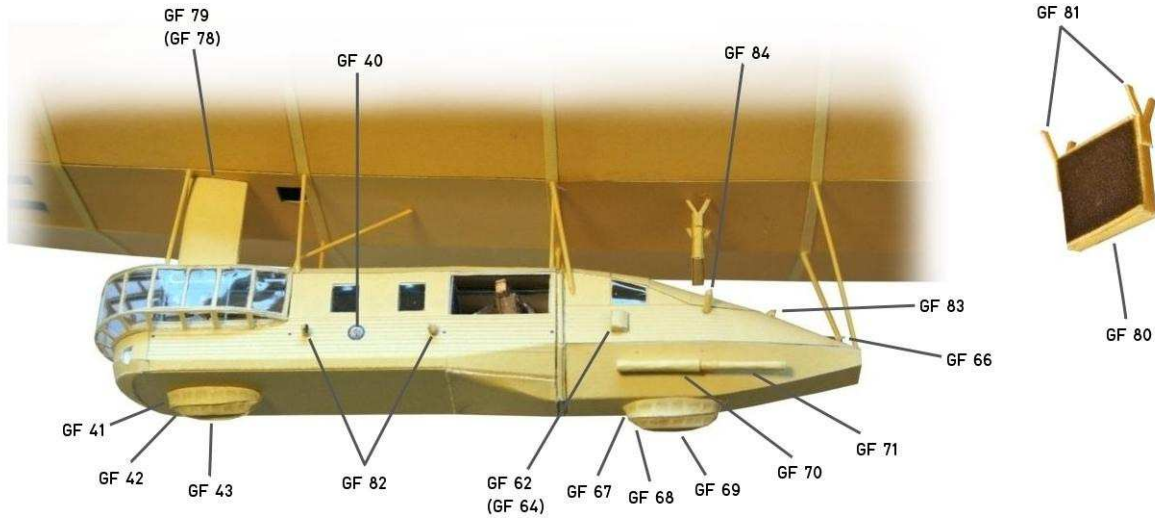
Cellophane is glued behind the windows of the part for the exterior skin (part **GM 4**) before it is added to the interior. The last interior parts are glued into the gondola.



Part **GM 38** is preformed as the ceiling and part **GM 37** is glued 17mm in front of the first fold to the inside. Then the ceiling is glued to the gondola. The front windows are treated as the ones for the commander's gondola and glued to the car.

Final assembly and details

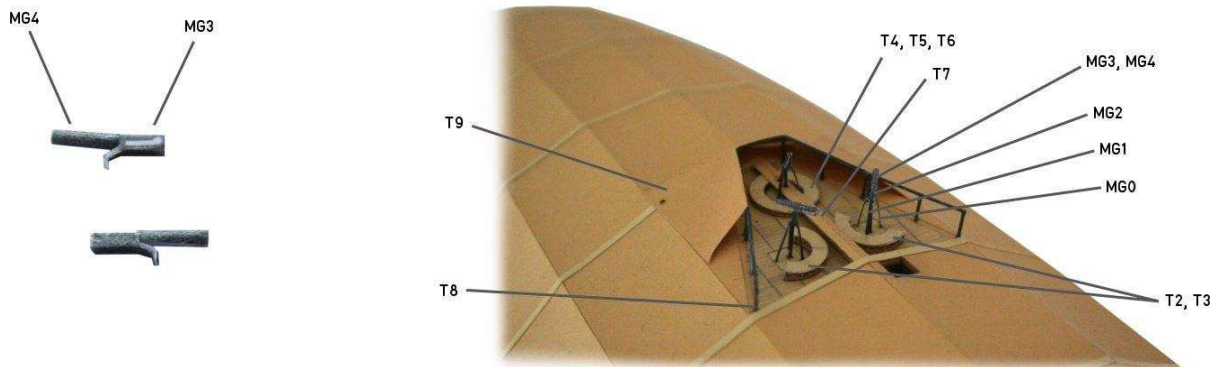
The front gondola is attached to the airship's hull with struts.



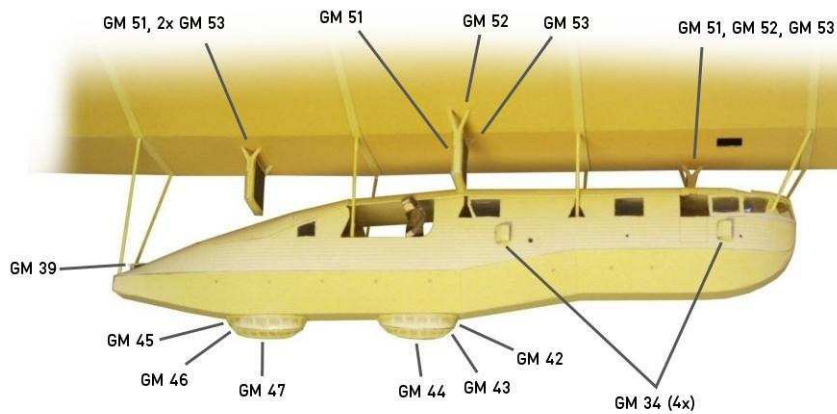
The drawings at the end of this document show the exact lengths and positions of the struts. An oil cooler is shaped from part **GF 80** and fixed to the hull with parts **GF 81**. Other parts are added to the gondola according to the picture above.



Handrails have to be made from plastic rod or wire. Templates are provided at the end of this document. The propeller is assembled from parts **GF 72**, **GF 73** and **GF 74** and then glued to the black circle at the aft end of the engine car.



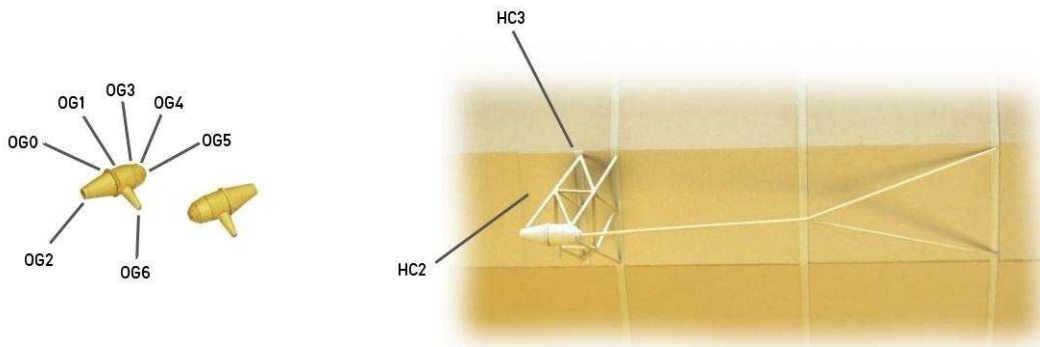
Six machine guns are made from parts **MG3** and **MG4** each. The MG nest at the top of the ship is completed like seen in the picture. The handrail (part **T8**) can be substituted with plastic rod for a better finish. The platform is equipped with three tripods (parts **MG0**, **MG1**, **MG2**) but only two machine guns. The other weapons may be glued to the tables behind each of the large windows of the gondolas.



The rear gondola is glued to the hull with struts in the same manner as the front gondola. As usual, templates for all struts are provided at the end of the document.

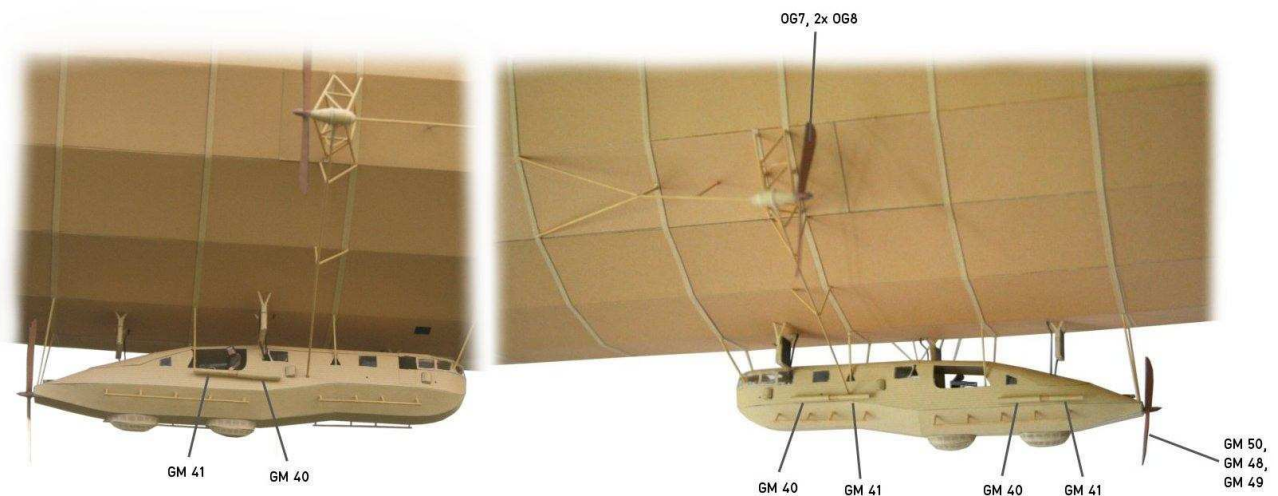
Here, three oil coolers (parts **GM 51-GM 53**) are added. Thereby the longer struts (parts **GM 52**) are for the outermost trusses, **GM 53** for the inner trusses.

Further detail can be added by connecting the oil coolers with the gondolas and the body of the airship like seen on the drawings.

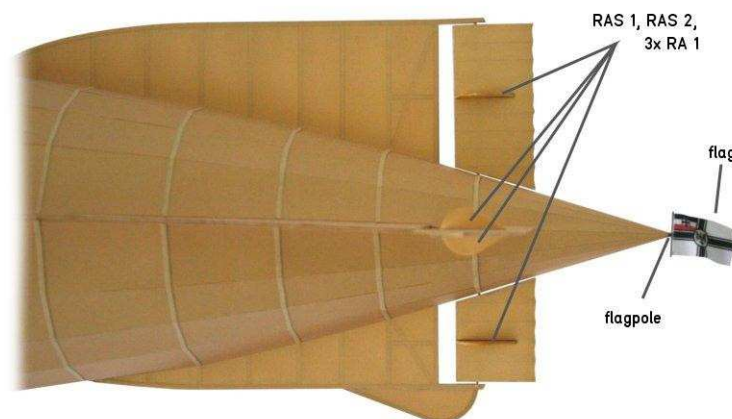


The outrigger gearboxes are identical on each side but are not located symmetrically on the hull. On the left side, the truss frames are attached in front of ring 57.5, on the right side behind ring 57.5.

The gears themselves are built up from parts **OG0-OG6**. The trusswork needs to be assembled from 0.5mm plastic rod. The drawings at the end of this document may serve as templates for the struts.



The remote drive shafts link the outrigger gears to the gears in the engine car, the skin of the gondola therefore has one small hole on each side. Handrails and other details are added like on the front gondola.



The rudder horns consist of three parts RA 1 laminated together with RAS 1 and RAS 2 as skin. One rudder horn is glued to both sides of each rudder. The flag is laminated together and added to the flagpole (Two versions are provided, one with the pole in paper and one with only the endcap. For the latter, the pole itself is built from wire.). The flagpole is then fixed to the point of the airship's stern. The model is finished*.

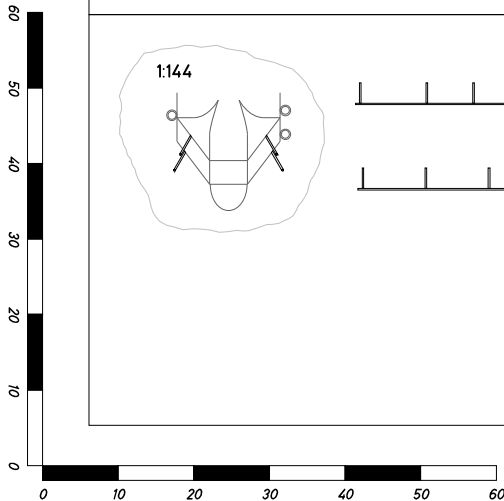
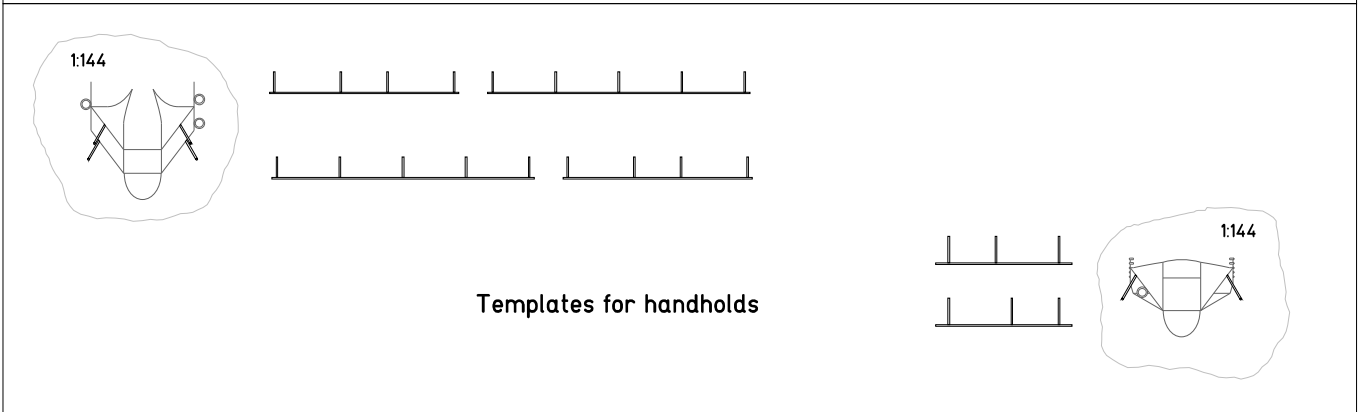
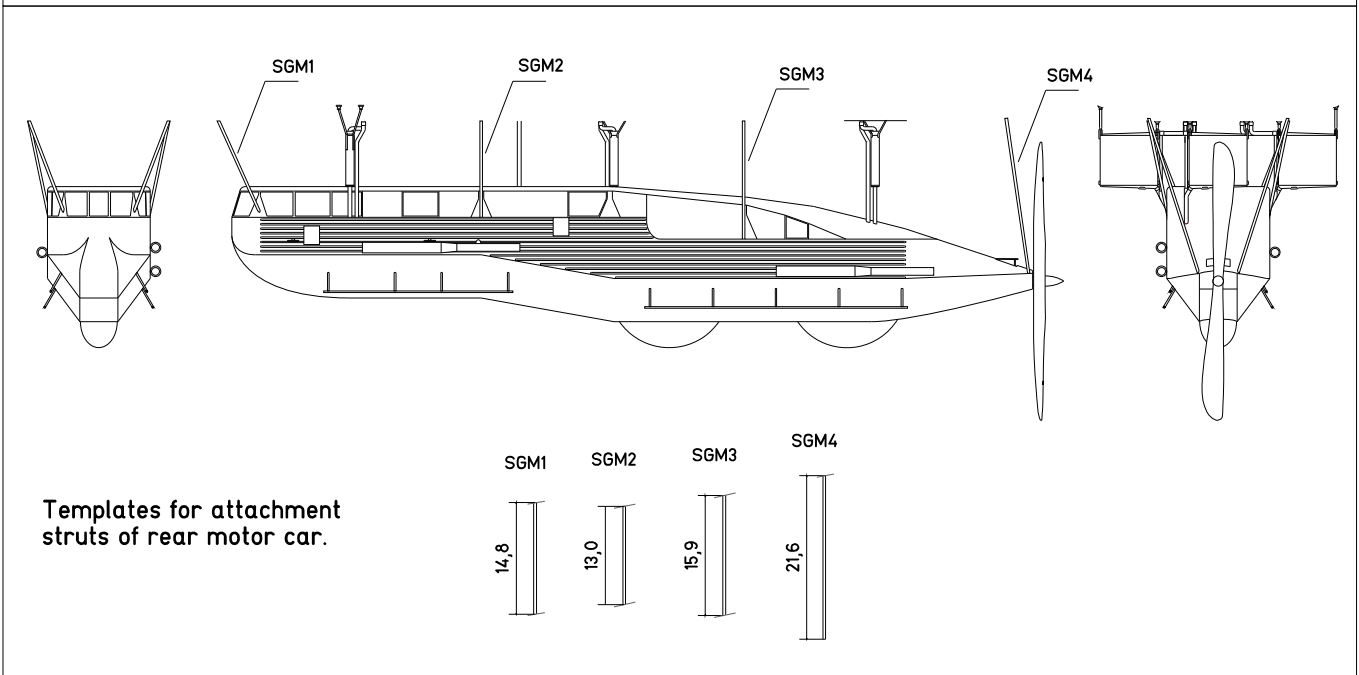
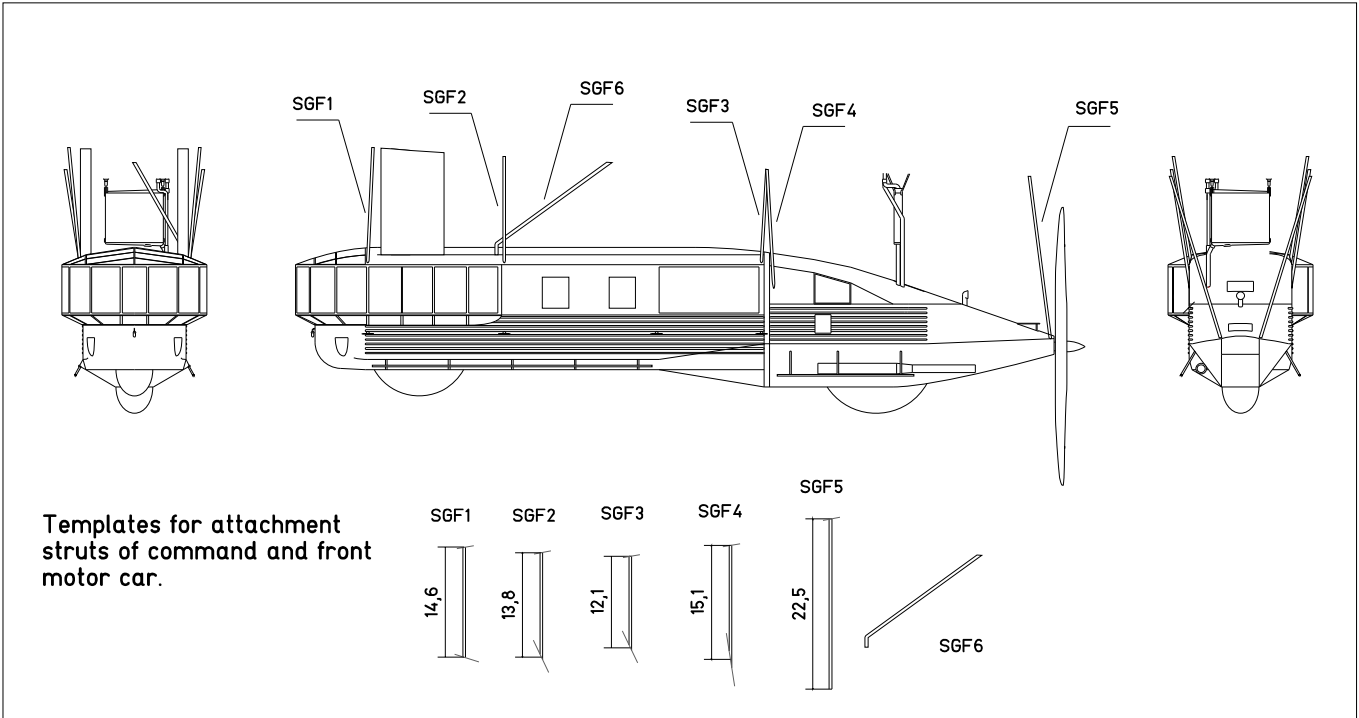
* The Zeppelin featured extensive rigging between the body and the gondolas and to the fins. However, the cables can only be seen on close up pictures, so the most common model rigging methods would result in an out-of-scale impression. Additionally, no reliable data on the fins' rigging could be found.

References

- Admiralty War Staff Intelligence Division, *German Rigid Airships*, The Naval & Military Press Ltd, 1917 (Reprint 2008)
- Rimell, R. L., *Windsock Datafile Special Zeppelin Vol. 1*, Albatros Productions Ltd, 2006
- Robinson, D. H., *Deutsche Marineluftschiffe 1912-1918*, Mittler & Sohn GmbH, 2005
- Author unknown, *Schiffskunde LZ 45*, Archiv der Luftschiffbau Zeppelin GmbH, 1915
- Author unknown, *various detail drawings and photos of p-class Zeppelins*, Archiv der Luftschiffbau Zeppelin GmbH, 1915-1918

Additionally, I'd like to thank Andreas Horn and Harry Redner for their extensive and competent support on the subject, and Major Charles Davenport and Janina Lange for corrections of the instructions.

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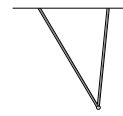


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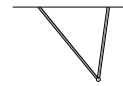
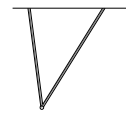
Templates for drive shaft struts and side propeller frames.
Use plastic rod or wire
(diameter approx. 0.4–0.5 mm).
Assemble as shown in the drawings.

Left Side

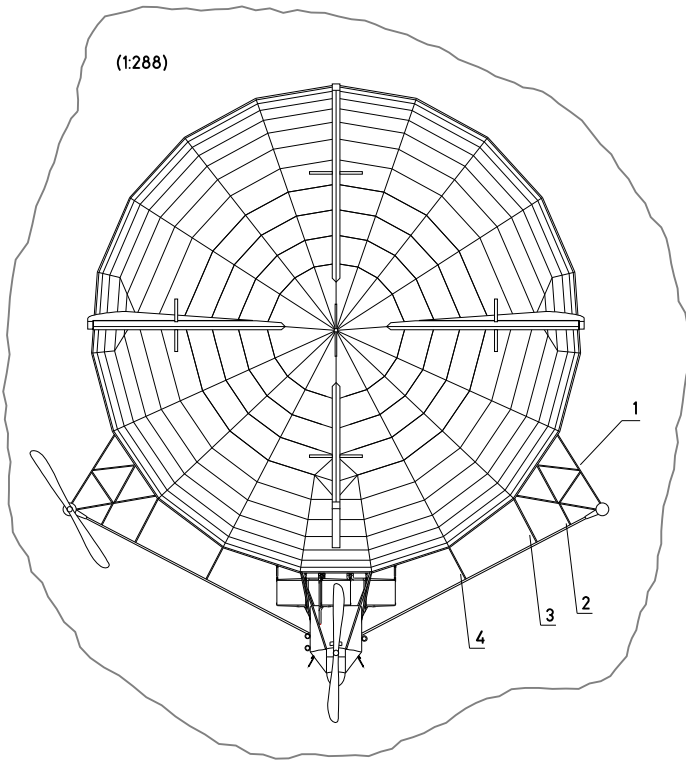
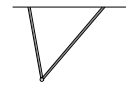
Right Side



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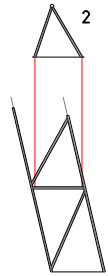
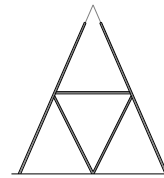
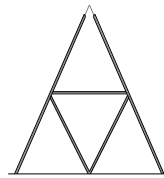


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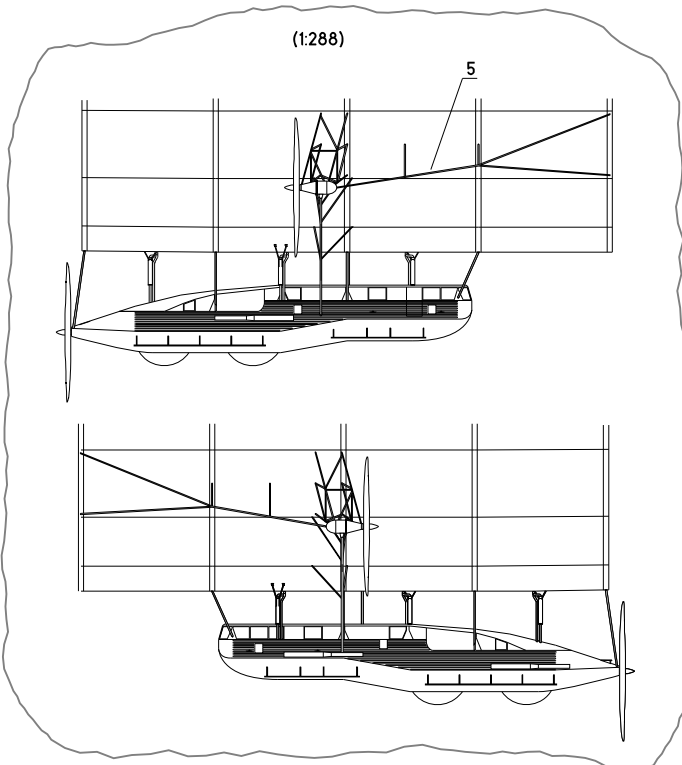
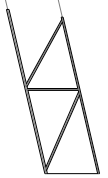
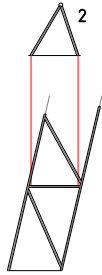
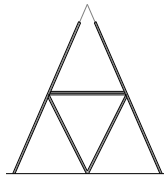
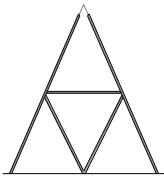
1

Right Side

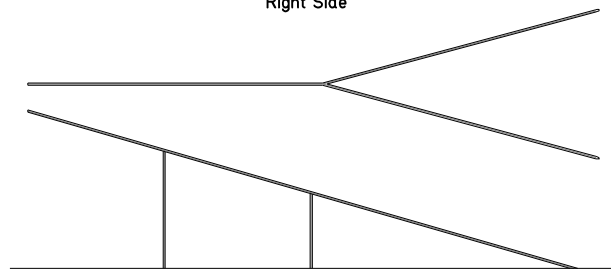


1

Left Side



Right Side



5

Left Side

