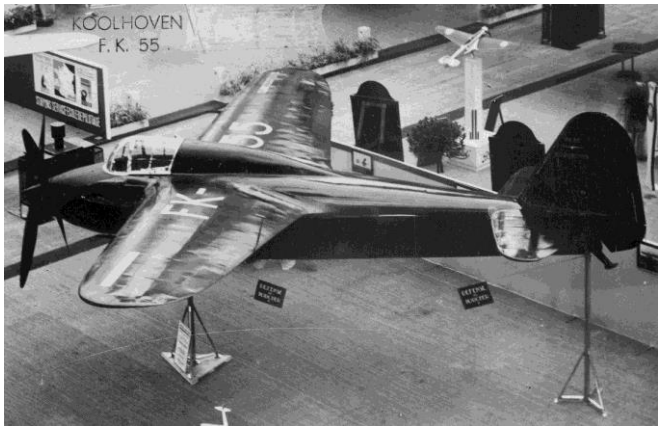
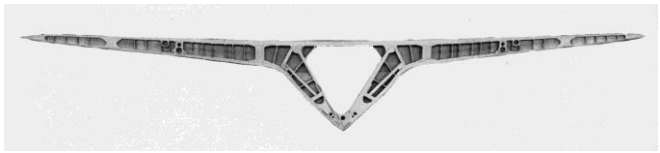
Koolhoven F.K.55 HA Models masters and resin kit

Fighter first prototype

Scale 1:72



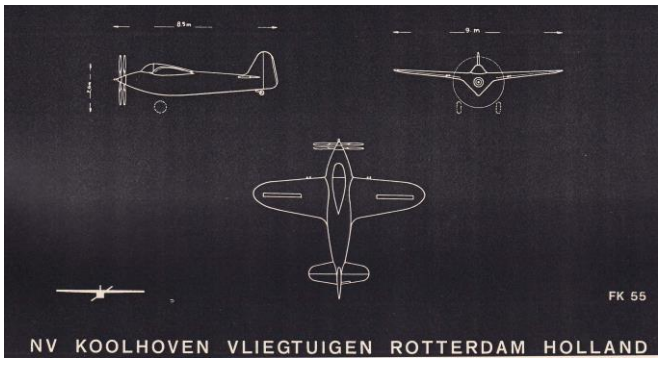


The Koolhoven F.K.55 was a shoulder wing fighter with a Lorraine Petrel engine, which powered via a transmission mechanism two counter rotating propellers, eliminating the engine torque. The engine was located in the centre of the fuselage, resulting in a very good manoeuvrability, but also leading to a long shaft between engine and propellers, which was also designed and produced by Lorraine. The pilot was seated before the wing. Maintenance of the engine was difficult and accessibility required many small hatches. After removal of the aft fuselage the engine was slid forward in the fuselage. The forward fuselage could also be separated from the mid-section after removal of some bolts. The ailerons had been replaced by slits in the outer wings. The wing, tail planed and fuselage mid- and aft section were constructed from wood. The construction is well illustrated by the picture of the main spar at the right. The engine was placed in the triangular space. The forward fuselage was a steel tube construction covered by metal plates.

The maximum speed of the fighter was calculated to be 545 km/hr, armament was an Oerlikon canon firing through the hollow propeller shaft and four Browning FN guns in the wing. The undercarriage was retractable in fuselage and wing, a complex construction due to the high wing. The high wing was the result of Koolhoven's opposition against low wing aircraft ("Such aircraft fall over; ever seen a bird with wings under the belly?").

There are a number of pictures of the black painted aircraft exhibited on the 1936 Salon Aéronautique in Paris and shown during the 1937 Avia exhibition in The Hague. This first prototype has never flown, although its construction was compatible with the regulations in force. It was generally shown with a retracted undercarriage, as the extension and retraction had to be done manually and was difficult to do.

A second prototype was constructed afterwards. The general layout was the same, but the complex wing-fuselage contraction had disappeared. It made an unsatisfactory short flight of two minutes on June 30, 1938 and was stored in the factory afterwards with the first prototype. Both prototypes have been lost during the bombing of Waalhaven in May 1940.



The first prototype is the subject of this building report. For a long time I had only a small three-view drawing of the first and second prototype from the facsimile edition of the originally brochure of Koolhoven. Somewhere I also found a drawing to construct a rubber powered free flight model of the F.K.55. So not much documentation to start producing a model kit, far too little in fact. Until a lucky event happened, as reported below.

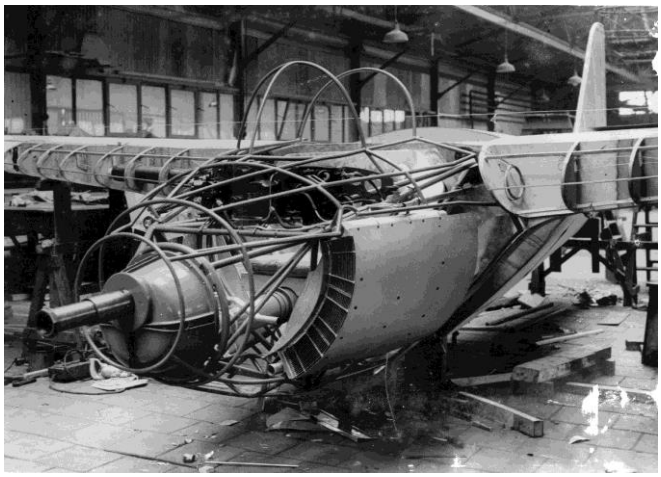
The references for this model are relatively limited. The best one is ref. 1 by Harry van der Meer and Roland Dijkstra. Then there is the original Koolhoven brochure (ref. 2) and the books of Dik Top (ref.3) and Theo Wesselink (ref.4). But most important is ref. 5, the presentation by Frank van Dalen and the AutoCAD 3D model going with it.

Some data of the aircraft:

	Ref.	*1:72*	*Original kit*	*Completed model*
Span	9.00 m	111.1 mm	107.2 mm	
Length	8.40 m	101.4 mm	99.3 mm	
Height	2.60 m	39.6 mm	36.0 mm	
Engine	Lorraine Pétrel I, 860 hp			
Crew	1			
Armament	1 Oerlikon cannon; 2 or 4 Browning FN machine guns			

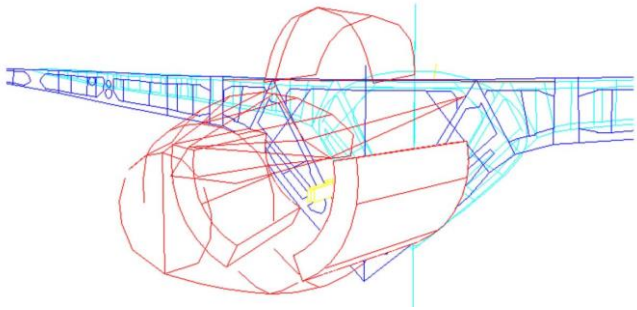
Drawing production and master concept

I had a lucky meeting with Frank van Dalen, Chief Engineer of Fokker Aerostructures in the Netherlands. A long time ago he had developed software to construct a three dimensional model based on pictures of an aircraft, taken from different points of view. As the subject to show the result of the operation he had selected the first prototype of the Koolhoven F.K.55. The pictures in this section have been taken from a PowerPoint presentation by Frank of February 19, 2015.



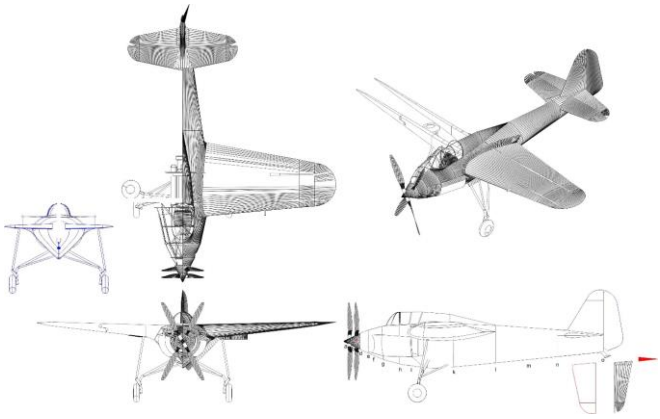
From the picture at the right and from the photograph of the main spar in the introduction the structure of the fuselage frame have been derived.

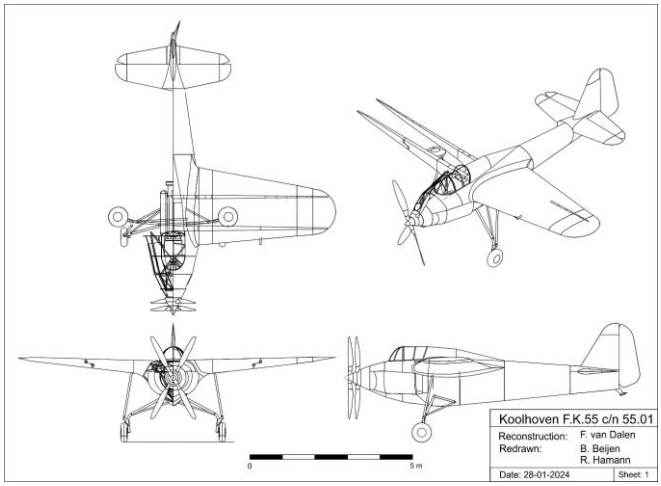
Combined with data derived from other photographs the full structure model was assembled.

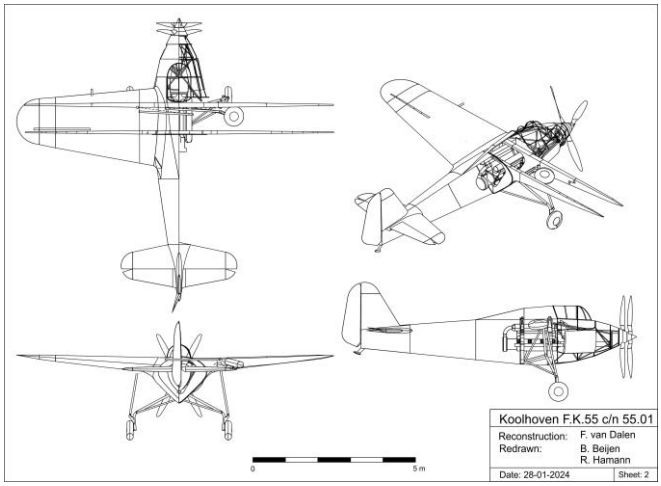


Covering all surfaces the final model resulted.

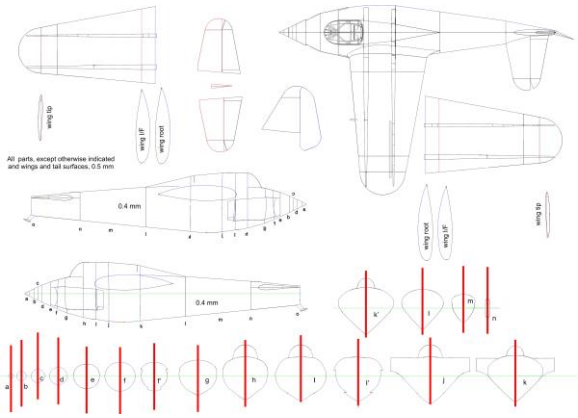
I have received the AutoCAD model from Frank and a former colleague of mine from Fokker Space (Airbus NL) has produced a number of views from it (see appendix). He did not manage to extract the fuselage cross-sections from it, so I have reworked his results by removing one by one the surface elements from the 3D CAD model. In the end I have obtained decent quality dimensioned drawings.







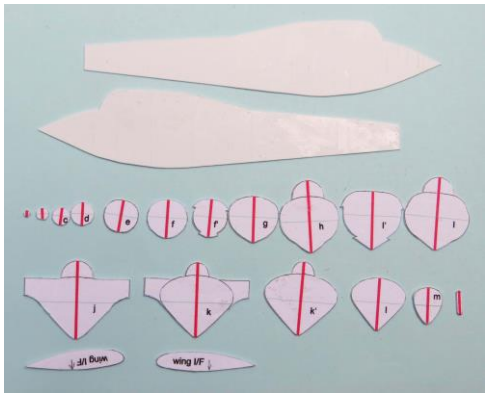
Next step was to process the drawings to a cross-section plan for the master. A fellow modeler, having access to and experience with AutoCAD, did not manage to do that. I have processed the drawings by hand to a set parts required to produce the master. This took about a day of work, which was less than a had expected. The interface wing ribs have been included twice, once to glue against the two cross-sections at the wing spar position and once as the "root" of the wings to be produced. The actual root wing ribs will be cut in three pieces and will be pitted in the right position between these two cross-sections.



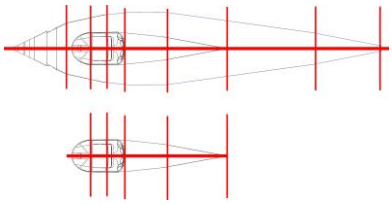
Because the fuselage will be rather heavy, if produced as one piece, it will be made hollow, lengthwise split in two parts, which will be cut from 0.4 mm styrene, glued together with Microscale Kristal Klear to enable easy separation when the fuselage outer surface has been finished. All (half) cross-sections will be made of 0.5 mm thick styrene, the space between them filled with piece of styrene and epoxy clay. Next the canopy part will be separated, which will form the master for the transparent cockpit cover. Then the fuselage halves may be separated and excess material removed. Wings and tail surfaces will be solid. The landing gear will be assembled from a brass main leg and styrene parts. Wheel bays and doors will be a difficult job, and can only be done once the fuselage and wings have been finished. I have not decided yet whether to do this before or after separating the fuselage halves.

Master production

I have glued a copy the side views and cross-sections on styrene sheet and have cut out the side views. I have indicated the place of the cross sections on the side view by lightly carving the lines on the styrene sheet before removing the paper.



I have glued the two side views to each other with Kristal Klear, applied rather sparingly. The red lines, which are 0.8 mm wide, have been removed from the cross-sections. All half cross-section have been marked with pencil and glued one by one to the side views.



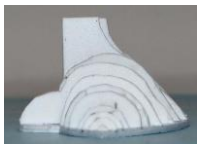
To better represent the shape of the fuselage I have also derived two waterlines, one at the largest fuselage width and one at the lower edge of the cockpit canopy.

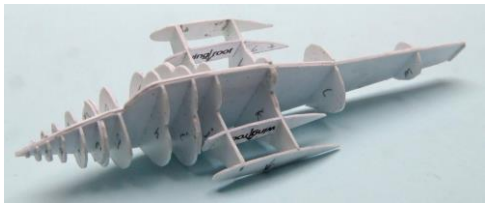
Fuselage

I have first glued the two side view together with Kristal Klear, hoping that this would make it easier to separate the

fuselage halves later on. I have cut out the port half cross sections, removed the paper and marked them.

I have joined the cross sections at the cooler inlet and outlet together, as well as the cross sections at the rear wing spar. Next I have glued all cross sections them to the side view. In front view the profile of the fuselage appeared already.

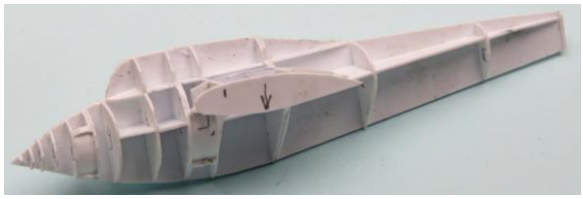




I have repeated the process at the starboard side and have also glued the wing root and interface ribs to the wing spars, cutting the ribs in sections and aligning them well with the spars. The wing root ribs showed already that the interface between the wing leading edge and the radiator exhaust would be complex as I had to remove the front part of the rib, which was interfering with a cross section.

Next I have glued a strip of 0.25 mm styrene sheet between the doubled cross section of the radiator inlet and the cross section in front of it and reenforced the top and bottom edge with a piece of strip. I have repeated this for the cross section at the radiator exhaust and the cross section behind it.

In order to form the fuselage well I have also glued the "water line" under the canopy on the side view between the cross sections. This will also be useful, when I have to separated the canopy from the fuselage to use it as a mould for the transparent part.



I have filled up the space between the cross sections with pieces of styrene, the remaining room to be filled up with epoxy clay.

Wing

The outer wings are 6 mm thick according to the drawing. I have glued the top view of both wings on three layers of 2 mm styrene glued together and have cut them out roughly with a saw and adjusted the shape by sanding. I have glued a 0.5 mm thick styrene copy of the wing interface ribs to the root of the outer wings.

Undercarriage

Cockpit

Tail surfaces

Decals

Canopy

Parts

Prototype build

Wings and tail

Cockpit

Painting the model and applying the decals

Undercarriage

Ailerons, elevator and rudder

Propeller and exhaust

Summary

Below are some pictures of the finished model.

References

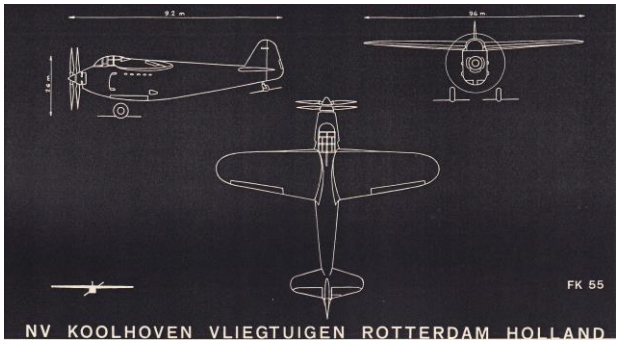
1. H. van der Meer & R. Dijkstra, *F.K.25*, 2023
2. Anon., *Koolhoven Vliegtuigen, 1910-1940*, 1940
3. D. Top, *Frits Koolhoven en zijn Vliegtuigproductie*, 1996
4. T. Wesselink, *Koolhoven Vliegtuigen*, ISBN 978-90-818510-2-2, 2012
5. F. van Dalen, *Combining multiple photograhs into a 3D model, Koolhoven FK.55, P3V Version 2.0*, 2015

Appendix F.K.55 documentation

Paint table

HE = Humbrol enamel (old numbering), R = Revell Aqua, V = Vallejo, O = Van Gogh oil paint

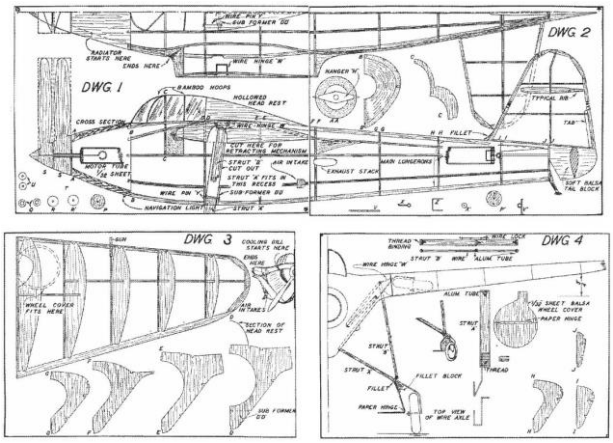
Code	*Colour*	*Where*
HE21	Black	Control stick handle, propeller edges, propeller spinner, all outer surfaces
HE62	Leather	Cockpit opening edges
HE113	Rust	Exhaust
HE125	Dark grey	Seats, control sticks, instrument panels, frame tubes
HE129	Light grey	Cockpit wall and floor, undercarriage
R36178	Tank grey	Tyres
V71.072	Gun metal	Exhaust (dry brushed)
V71.062	Aluminium	Propeller



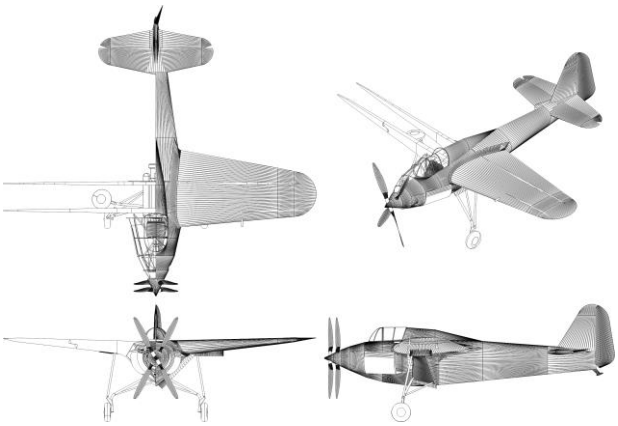
[Source: ref.2; second prototype]

Photographs and drawings

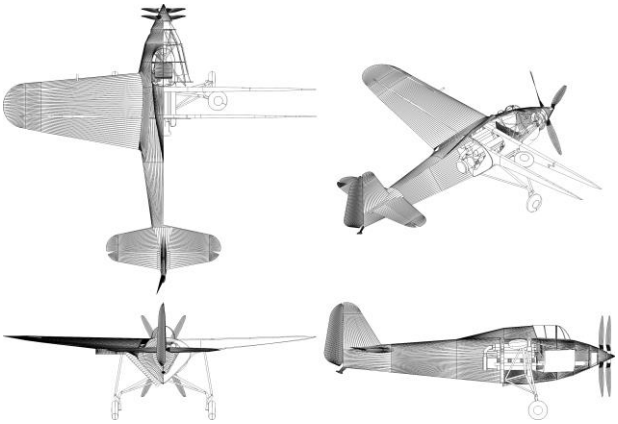
All pictures: Source ref. 5, unless otherwise indicated.



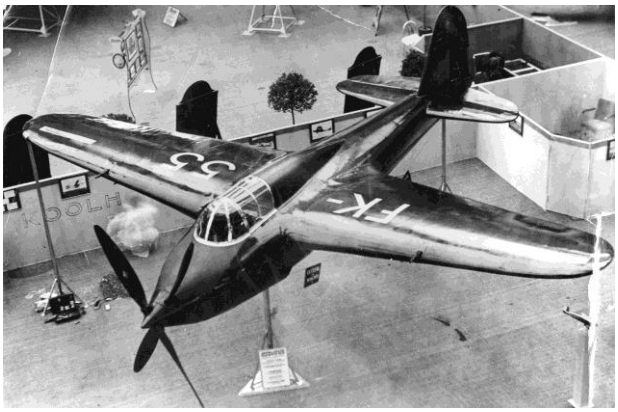
[Balsa model]

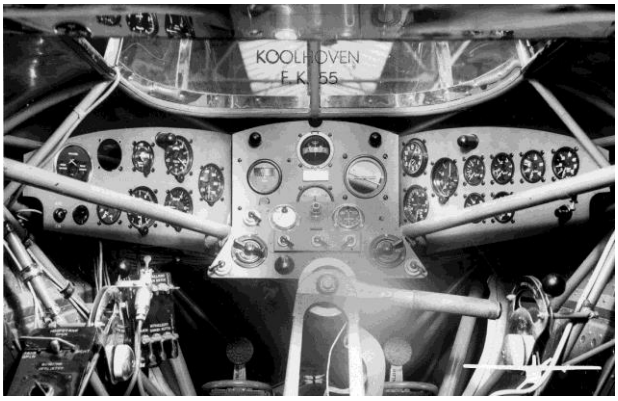


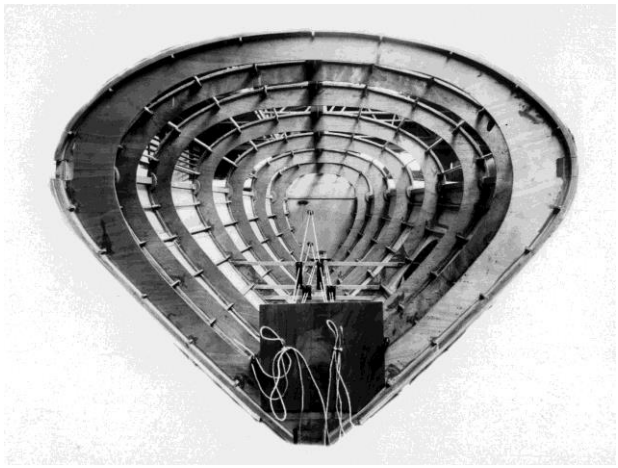
[Views AutoCAD model]

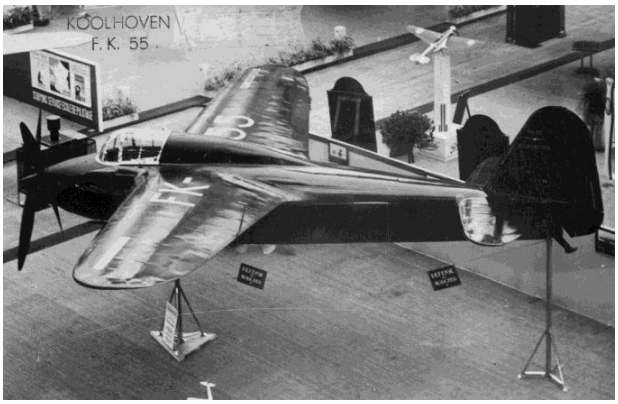


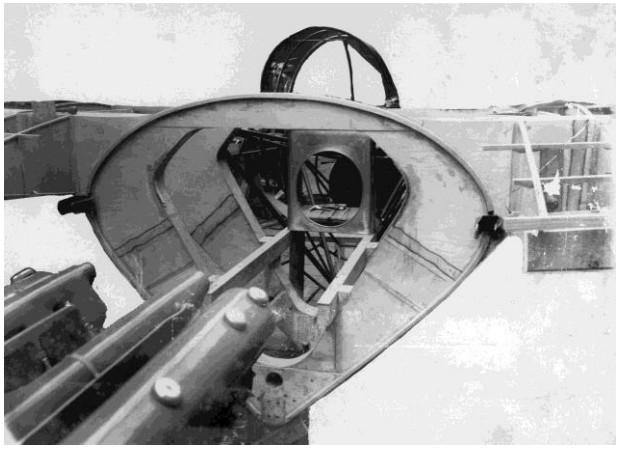
[Views AutoCAD model]



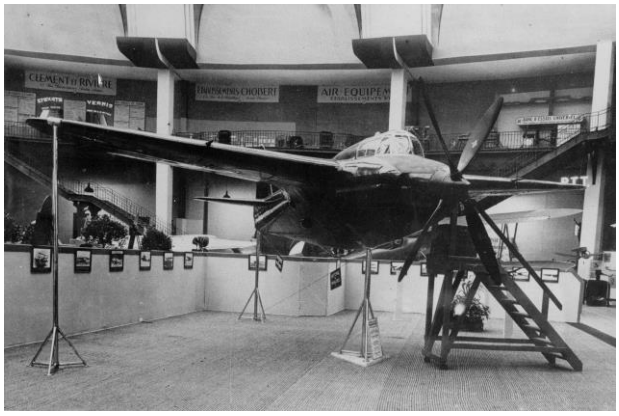

KOOLHOVEN
F.K. 55

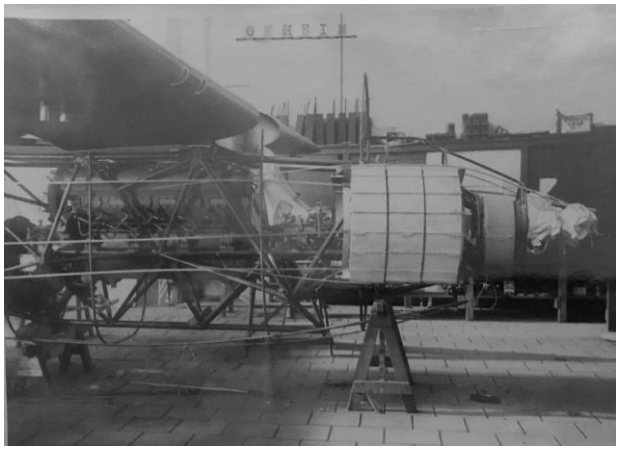


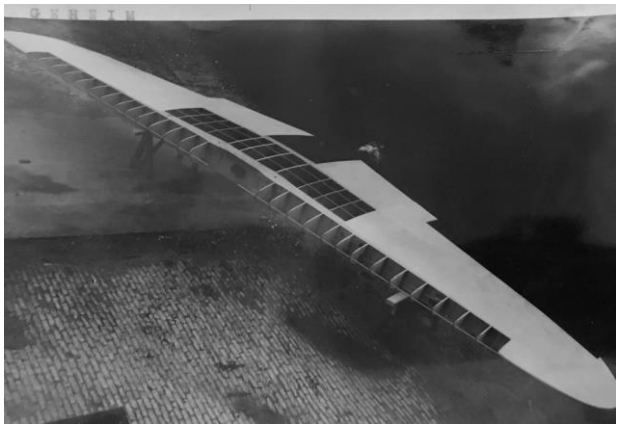

KOOLHOVEN
F.K. 55

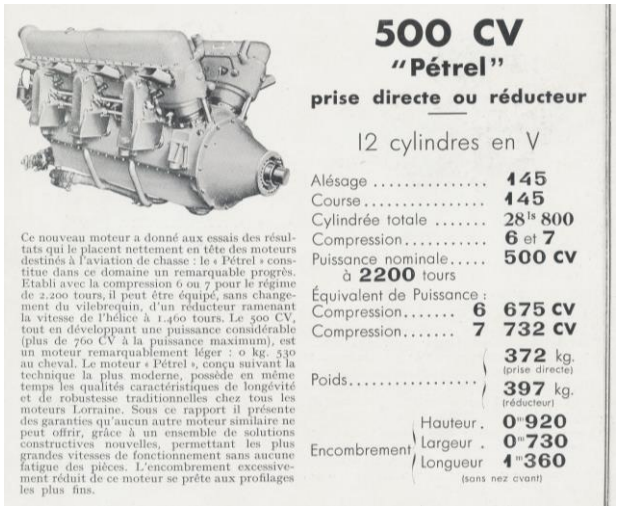



V. KOOLHOVEN VLIE









500 CV
"Pétrel"
prise directe ou réducteur

12 cylindres en V

Alésage	145
Course	145
Cylindrée totale	28 lt 800
Compression	6 et 7
Puissance nominale à 2200 tours	500 cv
Équivalent de Puissance :	
Compression 6	675 cv
Compression 7	732 cv
Poids	372 kg. (prise directe) / 397 kg. (réducteur)
Encombrement Hauteur	0m920
Encombrement Largeur	0m730
Encombrement Longueur (sans nez avant)	1m360

Ce nouveau moteur a donné aux essais des résultats qui le placent nettement en tête des moteurs destinés à l'aviation de chasse : le « Pétrel » constitue dans ce domaine un remarquable progrès. Etabli avec la compression 6 ou 7 pour le régime de 2.200 tours, il peut être équipé, sans changement du vilebrequin, d'un réducteur ramenant la vitesse de l'hélice à 1.460 tours. Le 500 CV, tout en développant une puissance considérable (plus de 760 CV à la puissance maximum), est un moteur remarquablement léger : 0 kg. 530 au cheval. Le moteur « Pétrel », conçu suivant la technique la plus moderne, possède en même temps les qualités caractéristiques de longévité et de robustesse traditionnelles chez tous les moteurs Lorraine. Sous ce rapport il présente des garanties qu'aucun autre moteur similaire ne peut offrir, grâce à un ensemble de solutions constructives nouvelles, permettant les plus grandes vitesses de fonctionnement sans aucune fatigue des pièces. L'encombrement excessivement réduit de ce moteur se prête aux profilages les plus fins.