1:32 Scale Model

Fokker D.III (Early)

assembly instructions
Welcome to the future of modeling!

If you are reading these instructions, you’re contemplating—or have even purchased—the Flugzeugwerke Fokker D.III kit sets printed and delivered to you from Shapeways. Thank you! The revolution in 3D printing has opened up all kinds of possibilities for model enthusiasts. Flugzeugwerke is proud to be leading the way. This Fokker D.III model represents our first attempt to produce an entire kit with 3D printing. We hope you enjoy building it.

Bo Monroe
Flugzeugwerke
The Fokker D.III - A Brief History

Anthony Fokker was a prolific builder of World War I fighter aircraft and much of his output are justly famous, even iconic. Nearly every aviation fan knows of the Eindeckers, Dr.I Triplane, D.VII and D.VIII “Flying Razor.” Yet the Fokker D.III remains mostly forgotten. This is perhaps not undue, as in fact it was a mediocre aircraft at best, suffering from an unreliable engine, questionable structural integrity not to mention anachronistic wing-warping, while in the meantime the rest of the aeronautical world had fully moved on to ailerons. Still it has a place in history, for at the time of the formation of the first Jastas little better was available to Germany’s fighter pilots. The famous Ernst Udet flew one with a tin dummy observer. Oswald Boelcke, the father of fighter aviation tactics, scored the first victories as CO of the nascent Jasta 2 with a Fokker D.III.

The Fokker fighter biplanes of 1916 — types D.I through D.IV — shared much of the design philosophy and construction techniques as the preceding Eindeckers. Specifically: light weight fabric-covered steel tube fuselage and wooden, fabric covered wings. To compensate for the relatively low power available from the aero engines then available, emphasis was on lightness throughout — even characterized as flimsy by some. Unfortunately when combined with lax quality control (a problem that seemed to dog Fokker throughout his career) the inevitable accidents led to the grounding of all the Fokker D types including the D.III in November 1916. This effectively ended its career as a front line fighter, but in fact far better types from Halberstadt and especially Albratros were then coming on line. This in turn nearly ruined Fokker, and it wasn’t until late 1917 that he would again have a success with the Fokker Dr.I triplane. The D.III meanwhile, once cleared for use by Idflieg, was relegated to training units and backwater fronts. A few were supplied to the Jastas prior to arrival of the Fokker Dr.I as rotary engine conversion trainers. The Austro-Hungarian Fokker subsidiary MAG produced the airplane with the confusing nomenclature “Fokker(MAG) D.I Series 04.4.” The German government sold 10 refurbished D.IIIs fitted with aileron wings to The Netherlands in 1917, which were operated by the LVA.

Further Reference

The best English language reference is Albatros Productions’ Fokker Fighters D.I - D.IV (Classics of WWI Aviation).

http://www.windsockdatafilespecials.co.uk

WWI Aero #140 (May 1993) has some excellent drawings, including a 3-view cutaway on the cover. The issue is available for purchase as a pdf download.

http://ww1aeroinc.org

Out of print and thus rather expensive if you can find it, the essential reference on the equipment of the LFT is Austro-Hungarian Army Aircraft of World War One, by Grosz, Haddow and Schiemer. There are drawings and photos of the Fokker(MAG) D.I, the A-H licensed built version of the Fokker D.III.

Although not directly pertinent, the pair of Windsock Fokker Eindecker Compendiums, especially Volume 2, are very useful for details of the Oberursel U.III, associated equipment and mounting, Spandau lMG 08 mounting and synchronizing gear, as well as insights into early Fokker building practices.

Osprey’s Early German Aces of World War One has some nice profiles (though some mislabeled) including two D.IIIs flown by Udet as well as Boelcke’s 352/16.

http://ospreypublishing.com/

Aeronaute Book’s The Blue Max Airmen, Volume 1 by Lance Bronnenkant, Has many pictures of Boelcke’s D.III 352/16, as well as a nice color profile painting.

http://www.aeronautebooks.com

Achim Engel’s painstaking reconstruction of a trio of Fokker Eindeckers offers many insights into the type of construction that was also typical of the Fokker D.III:

https://www.youtube.com/watch?v=0f51_qwY9ZU
care and feeding of your 3D printed parts

FUD & FXD — what is this stuff?
What Shapeways calls “Frosted Detail Plastic” is actually an acrylic photopolymer that is produced on a machine called a Stratasys Objet. The Objet works by printing out dots of the acrylic goop, layer by layer, which are then exposed to UV light to harden it. Where support is necessary in order for the object to stand, a waxy substance is laid down to form a scaffold. When the part is complete, the waxy stuff is removed — well, most of it anyway. More on that below.

Shapeways offers parts made with this process in two grades: “Frosted Ultra Detail” (FUD) and “Frosted Extreme Detail” (FXD). The two materials are identical except for a single setting on the machine which controls how thick the layers are. FUD layers are 29 microns thick, while FXD layers are about half — 16 microns. So FXD has the potential for somewhat smoother surfaces as the “steps” between layers are smaller.

Material Properties
This acrylic photopolymer stuff is generally like most plastics but has some properties that are a bit different than the polystyrene you are probably used to. In particular, it is a bit more brittle, and tends to have an internal “grain” due to the layered nature in which it was made. It can be drilled and sanded and so forth but in all cases be gentle. Glue meant for styrene will not work on it, so use CA instead.

Cleaning Parts
Your parts will arrive with most of the aforementioned support wax removed — but not all of it — and in fact each part will have at least a thin coating of this substance overall. It will also be present in some cavities. The support must be removed before painting or gluing the parts. There are several ways to accomplish this:

— Ultrasonic Cleaner
Ultrasonic cleaning machines can be purchased for less than $40, and they are useful devices to have around. If you use an ultrasonic cleaner, be sure to put the parts in cool water with a drop or two of dishwashing detergent. If your machine has a heater, leave it off, and make sure the water doesn’t get too hot during the cleaning cycle as this could deform the parts.

— Dish Soap and Water
Alternately, you can simply wash the parts gently by hand with dish soap, but be very careful so as not to break anything.

— Acetone Bath
Acetone is quite effective in removing the support wax. Simply place the part in a covered container for a few minutes. Avoid leaving the parts in for any longer than that, though as the acetone will eventually attack the acrylic.

You’ll know the parts are clean when the areas that had support scaffolding take on a raised white frosty, fuzzy look.

Dealing With Printing Lines and Support “Fuzz”
The next step is dealing with those pesky printing artifacts- printing lines and support fuzz. We find the most expedient method is to give parts a very light coat of filling primer, such as Alclad’s grey micro filler primer. The primer coat will really help you see what needs addressing. The fuzzy support areas can usually be taken care with just a few swipes of a medium grade sanding stick. A fiberglass scratch pen is also useful. Print lines may require a few coats of a surfacing medium such as Mr. Surfacer, followed by careful sanding.

Warped Parts
Sometimes the parts may arrived warped from Shapeways. Don’t panic. In most cases any warpage is easily corrected but holding the part under hot tap water (not boiling!) and gently bending to the correct shape. Once cooled the part should hold its shape.
The Fokker D.III (Early) consists of 4 sets of parts which must be purchased separately. The parts will arrive in a uniform color; they are shown in various colors below to help you identify the various components and to serve as a rough painting guide. Red indicates support runners which can be discarded.

When you receive your shipment from Shapeways, please take a moment to inventory your parts. Check for damage as well as any missing parts. There are several very small parts, often these can be overlooked in the packing material.

If there are any missing or broken parts, please go directly to the Shapeways contact form and file a support ticket. They are very good about taking care of these kinds of things.
You’ll also need...

We’ve tried very hard to provide the most essential parts for your Fokker D.III model. Some items just don’t lend themselves to 3D printing, while others are already available in exceptional quality from other vendors.

One alternative to sourcing many of the parts not supplied is to obtain a Wingnut Wings Fokker E.IV -- this will yield an engine, propeller, machine guns with PE jackets, seatbelts and a host of other small parts.

Engine: Oberursel U.III
At least two choices are available at this writing; the easy to assemble and quite decent offering from WNW (available as an accessory sprue), and the truly exquisite Taurus Models resin offering. In fact the our kit was designed around the Taurus Models motor, which is closer to true 1:32 scale and thus slightly larger in diameter than the WNW version.

Wingnut Wings: http://www.wingnutwings.com/
Taurus Models: http://www.taurusmodels.pl

Machine Guns
lMG 08 “Spandau”
Excellent renditions are available from Gaspatch Models.

Schwarzlose (For A-H Fokker(MAG) D.I)
WNW Fokker E.I (check) contains a Schwarzlose MG.

Propeller
The best bet is your spares box. Each Wingnut Wings Fokker E model kit comes with two propellers, both are suitable for the Fokker D.III.

Tires
The wheels are supplied without tires. Rubber O-rings of diameter roughly 21.5mm OD/ 16.25 ID will work. Fokker D.III wheels were the same size as used on the Fokker Dr.I (710mm), in other words, smaller than those fitted to most german fighters with inline engines, and yet larger than those fitted to the majority of the E-types. (If you were lucky you scored some natural white rubber O-rings from Fat Otto while the getting was good.)

Harness:
In addition, HGW offers a Fokker E.IV PE set which may yield some useful parts that are appropriate for the D.III.

Brass Tubing:
You will need a selection of brass tubing to assemble the model
.7mm x 450mm (interplane and lg struts)
.8mm x 45mm (rudder post & control stick)
1.0mm x 212mm (wing spars, elevator axle)
1.2 mm x 48mm (landing gear crossbar)
1.5mm x 58.7mm (main gear axle)
preparing the wings

The four main wings are prepared identically.

First, locate the 1mm holes at the ends of each wing. Carefully clean these out with a 1mm drill bit. (they will be filled with support wax).

Next, remove the runners shown here in red by carefully snipping away with sprue cutters. Work one section at a time, first cutting the runner at the rib and then snipping that portion of the runner off.
internal rigging & trailing edges

Holes are provided for the internal bracing wires, which are arranged as shown. Again, all four wings are identical in this respect.

The wing’s trailing edges can be formed with wire or monofilament. Secure to the end of each rib with a thin piece of foil as shown.
prepare the fuselage

Carefully remove the supports shown in red.

lower wing spars

The holes in the fuselage longeron and wings are sized for 1.0mm x 42mm Long brass rod or tubing. Note you may wish to use one size smaller (.9mm) while test fitting, as 1.0mm will be a very tight fit.
With a razor saw carefully remove the filler cap, which is molded on the inside of the tank end cap, and set aside.

now assemble as shown
The main fuel tank is suspended by rigging as shown. There are 4 small openings where the tank cradle meets the support strap. Pass the rigging from the fuselage frame through these holes.
remaining fuselage rigging
Complete the remainder of the fuselage rigging as shown.

mg saddles
Make 4 saddles for the Spandau MGs from scrap .10mm brass. Solder a mounting pin of .25mm brass wire in the hole. Cut the pins so they extend about 1.0mm below the saddle.
CAUTION: tricky step!

Open up the four holes in the MG mounting posts from .15mm to .25mm to accept the saddle pins made in the previous step. Take your time! Start with a .15mm drill, followed by a .20mm drill and then finally a .25mm. Turn the drill very gently into the hole until it meets resistance. Then gently pull back with the drill bit. Think of the operation as more of a micro-carving exercise than drilling away. The first .15mm drill should go fairly quickly -- about 5 minutes per hole. The .20mm hole will take longer. Always remember don’t force it! When you meet resistance, go back to the previous size and use it like a file. You can do this!

Insert the 4 saddles into the posts, as shown. Be sure to bend the pins on the rear saddles forward slightly to match the angle of the post.
cockpit floor and side details

Most of the cockpit furnishings are the up to the modeller to supply. The floor can be fashioned from a simple piece of styrene card stock. It appears that the wing-warping versions had the control stick mounted on a transverse tube; we have provided a spot for mounting a .8mm x 26mm tube for this purpose.

seat

A seat frame is provided. You may wish to cover it with foil or some other material to simulate leather. Attach to the fuselage frame as shown.
ammunition bins

Front Fuel / Oil Tank

Remove the three filler caps (there is one spare) from the inside of the tank end plate and set aside. Then assemble as shown.
**cheek panels**
Slide the cheek panels forward so that they lock around the firewall structure, as shown.

**upper decking**
You will need to carefully sand down the area shown in red in order to get the upper decking to slip into place among the cabane struts. The Kaiser has ordered the designer of this part to be shot!
Turtle Deck

**elevator control horns**

Elevator control horns can be made from a variety of materials. We suggest making them from 1.0mm thick brass sheet, as shown:

- make 4 outer plates
- make 2 inner plates
elevator spar is made from 1.0mm x 77mm brass tubing or rod

rudder control horn
rudder

Insert the MGs (not provided) into the saddles as shown. We recommend the superb items from Gaspatch Models.

27mm x .8mm brass tube
engine & cowling
Please test fit your choice of engine between the firewall and the front support before gluing! You made need to make some modifications to the back of the WNW Oberusel in order to have it fit without bending the front support frame.

upper wing center section
42.5mm x 1.0mm brass tubing (make 2)
footstep
There was a footstep on the port side only. We suggest you fashion it from scrap plastic and wire as shown.

interplane struts

Make 8 8mm x 40mm

Make 6 -- radius ends by removing red areas

Fairing was natural wood, tube painted metal. Make 4 straps per strut as shown from decal sheet, foil, or ?

The inboard rear struts only had 2 piece fairings to allow the wing warping cable to clear these. Make 2 struts as shown, by splitting the remaining fairings into the dimensions shown.
wings
main landing gear

Make the struts from .7mm diameter tubing, with a .5mm OD tube inserted inside, as shown. The longer struts go in back.

The long axle tube is made from 1.5mm tubing. The shorter tubing is the landing gear cross piece.

Assemble the undercarriage as shown.