Structural drawings

The objectives to make a structural drawing of the airplane are:

- To get an easy consultation guide of the mockup assemblage order.
- To produce a matrix for the construction of molds and model's parts.
- To make important notations on the airplane's details, and the original assemblage of the real thing.
- To get a quickly way to measure distances and angles between the scaled aircraft parts.

To produce this structural drawing, it is necessary to you to possess the diagrams, or 3 view drawings (top, side and front at least) of the airplane. But what is the difference between a structural drawing and a diagram? Well, this may not be the way as these words are normally used, but for use on this tutorial, I stipulate that a diagram is all and any drawings that allows you to get the lines, and so only the lines that define the shape of an object, or its composition. You must think about a diagram of an electronic circuit... At other hand, a structural drawing is a diagram, that besides containing the lines that define the shape and composition of the objects, it still brings useful information on the order of assembly, used materials, special techniques for the accomplishment of folds and joints, among others some possibilities of data and information that assist in the assembly of the model. In this way, this structural drawing specifically aims at the assembly of the model, and not on the real aircraft's technical information.

When you posses a diagram to use as basis for creation of a structural drawing, you can follow some steps to achieve our objective... This particular drawing we are madding will only be useful to the construction of a model, through the technique of multi planar and perpendicular scaffolding. For the other available technique (the solid primitives), the method must be adapted.

Step 1

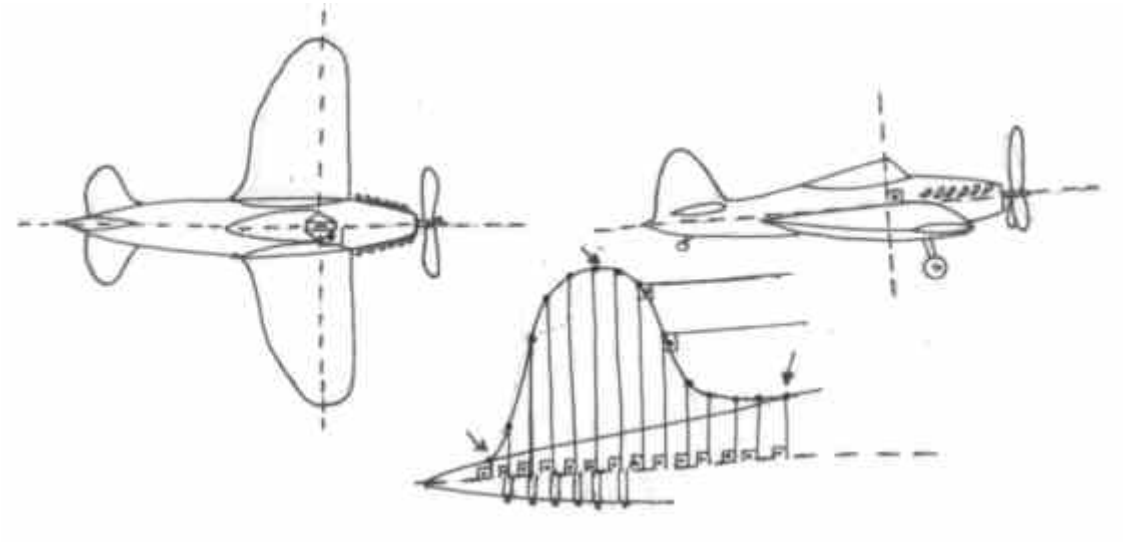
The drawing can serve for the production of molds... In such a way, it is interesting that your drawing meets the same scale chosen for assembly of the model. This eliminates the necessity of constant calculations during the assembly process.

You must take the original diagram of the airplane, and to trace straight lines between the extreme points of the length and wingspan. This will be the central reference of the multi planar scaffolding to be produced. You will still consider these perpendicular straight lines, as the axles of a cartesian grid...

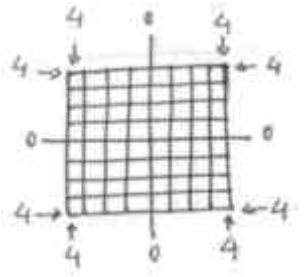
From these straight lines, you must trace perpendicular lines (first to length, and later to wingspan) that cross themselves in some points coincident with significant silhouette points of the parts of the airplane. This will produce a grid (it does not need to

be a regular grid) where each point of intersection will possess a measurable coordinate. The traced straight lines will be parallel bars to its axle, and perpendiculars to the competing axle.

Them, you must writes down in each line of that grid the correspondent distance to the parallel central axle.



That coordinates grid is similar to a cartesian grid, however, the axles of length and wingspan of the airplane will be situated in the position zero, and all the quadrants possess positive distances to the origin. If you want to work with negative values, the choice is yours... Moreover, you will be free to dislocate the axles to some side. The coordinates system is yours, remembers of this!



Step 2

You must determine the scale used in the original diagram, if this was not just supplied. To get the scale used in the diagram you are using, you must follow this example: Suppose an airplane with a length of 11,3m, represented in the original diagram with 10cm of lenght.

If real length = 11,3m --- the diagram's length is 10cm
Soon
If real length = (x)cm --- the diagram's length is 1cm

1130cm*1cm = 10cm*x

x=113cm

The scale of the diagram is 1cm/113cm or just 1/113.

Let us say that we want a model in 1/32 scale...

How many times 1/32scale is bigger than 1/113 scale? You see that we deal with fractions, and how much bigger the denominator, minor is the scale...

To get the size of the airplane in 1/32 scale, it is enough to divide the denominator of the minor scale, by the one of the biggest scale. In the example, we have 113/25 = 3.53125. Soon, each measure in 1/32 scale will be 3,53125 times bigger than its correspondent in 1/113 scale. Thus, 10cm in the original diagram, will correspond to 1130cm in the real airplane, and to 35,3125cm in the structural drawing at a 1:32 scale...

Step 3

You must draw a new grid in white paper, with its correspondent component lines far one from another with the new distance values obtained from the scale conversion. I must advice you that isn't necessary to know the real values for these above distances in 1:1 scale, since we know that the distances between the lines of the new grid will be 3,53506 times bigger them the original diagram lines.

Them, you must mark some control points for drawing in the new grid (That control points correspond to known coordinates of the aircraft's silhouette) and transcribes the aircraft's shape with the aid of these points. You can see this step like a bidding points game... You will only have to calculate the position of the lines in the grid!

It is important to mark points in the places of the wings / fuselage joints, avionics, or other important reference points. (A important reference point can be the most external point of the wing). This will guarantee that serious deformations will not occur in the structural drawing.

Step 4

You must now to delimit each one of the parts that you intent to construct in separated groups, as you have imagined can be better. I suggest you to follow the instructions in the earlier suggested assemblage order on this tutorial. The definition of the shape and extent of the above aircraft parts will depend exactly on this order of assembly. To differentiate such parts you have delineated in your drawing, use colors and visual patterns as legends for each type of piece.

Step 5

You must visually emphasize the limits of the model's parts with colors, as soon as the silhouette of the airplane, to make visualization easy. This will leave the less important information in second plan, or background, and will prevent visual confusion.

If the density of information in your drawing gets excessive, you may create a collection of drawings separated by subjects. Former: a drawing of model's parts; a drawing of folds; a drawing of joints; a drawing to store notations; Any variety you want.

Step 6

Now, you must transcribe in numbers, all the angles and distance measures relevant for your new drawing, in a way you can refer to this information with easy.

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