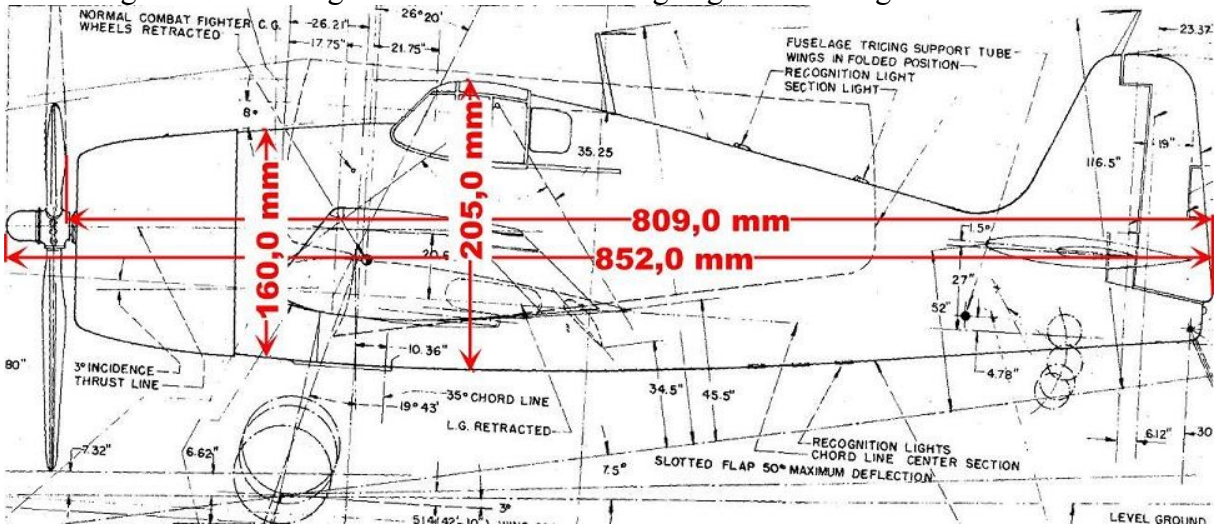
ACES Rules 2009-2010
Appendix 3.1 model measurements with examples

Rule 3.1:
The scale is 1:12 and the wing span and fuselage length may not deviate more than +/-5% from scale. All other measurements may not deviate more than 20mm from scale.
The fuselage length is measured from the back surface of the propeller to the rear edge of the fuselage/tail.
If you wish to manufacture your own aircraft or check other models to make sure they are built inside ACES rules, here are some words of explanation.

Appendix 3.1.1 model data is a data file with measuring dates.

1. How to take basic measurements.

In most publications, only the "over all" length is specified. Because model aircraft have different length propeller spinners/nuts the ACES founders created a better, more accurate way to measure the length of a model.
Wherever possible, use a 1/12 scale drawing of your aircraft using published specifications. Now the drawing can be used to accurately measure different parts of the model aircraft.
In the picture below you can see four different measurements.
Overall length, length measured from the back side of the propeller, maximum overall height and the height of the fuselage measured at the leading edge of the wing.



The overall length of the model is allowed to deviate by no more than 5%.
Example: - Length = 809mm. 5% tolerance = 40mm (approx)
This means your model may have a length, measured at the same position, of between 769mm and 849mm.
All other measurements are allowed to deviate by no more than 2cm.
Example: - Maximum height = 205mm +/- 20mm.
This means your model may have a height of between 185mm and 225mm.

2. Measuring the width of fuselage:

The 20mm rule applies in all other areas of the model aircraft, including fuselage width, (You should take the widest part of the fuselage as your guide) tail plane span and rudder etc.
If you have a good drawing to use, it is easy to draw on two new outlines, one larger than scale and another smaller. Your model aircraft outline should fit in-between these tolerance lines. Be aware that some drawings are inaccurate and you should always check dimensions before building.
Example: - Maximum fuselage width = 127mm +/- 20mm.
This means your model may have a fuselage width of between 107mm and 147mm.

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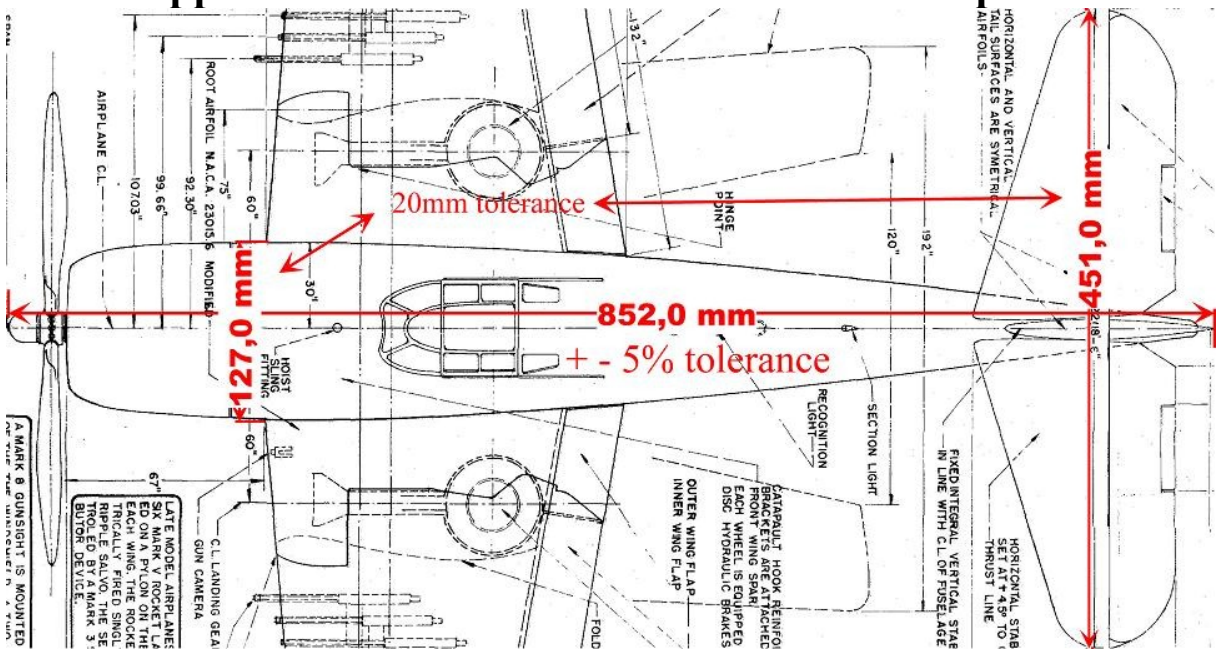


3. Wing dimensions.

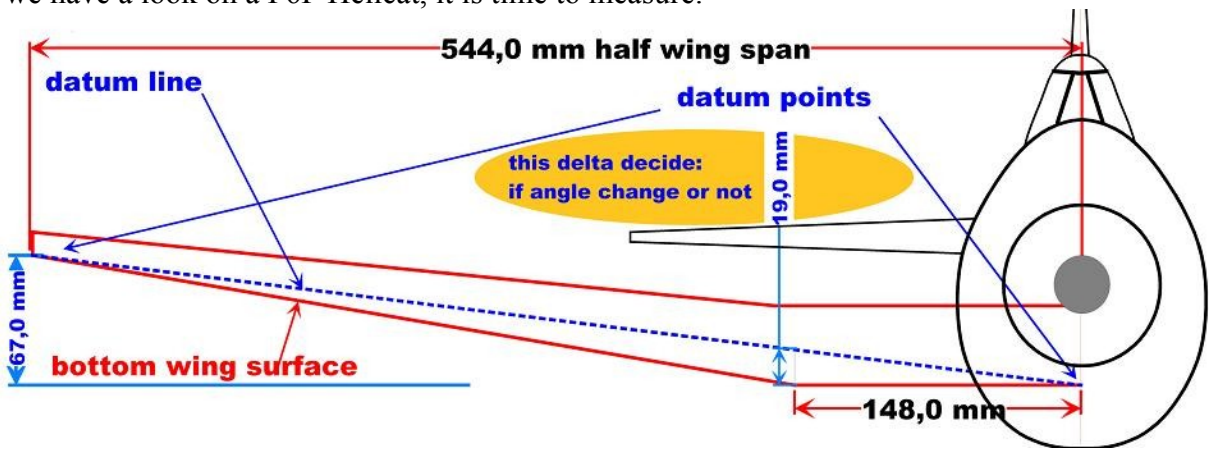
The wing is a little bit more work and a good 1/12 scale drawing will be very helpful to show what you need to build.
From 2010 Aces will be using a standard wing measuring method which should help pilots build legal model aircraft suitable for any competition. Here are the steps.

Step 1. Viewed from the front.

The wing root datum point is positioned at the centre of the wing (root) level with the bottom wing surface. The wing tip datum point is positioned at the wing tip level with the bottom surface. A straight line drawn between these two points will be our datum line from which all measurements are taken.

If the original aircraft, drawn in 1/12 scale, had a deviation/crank which leaves the datum line by more than **20mm** the model aircraft must be manufactured to look like the original by using a suitable angle change.

If we look to a FW 190 fighter, we see only one angle change at the centerline of the wing creating dihedral only. These wings can be built in two parts and only the dihedral angle needs to allow the building of a suitable V-angle of the wing .
If we have a look on a F6F Hellcat, it is time to measure.



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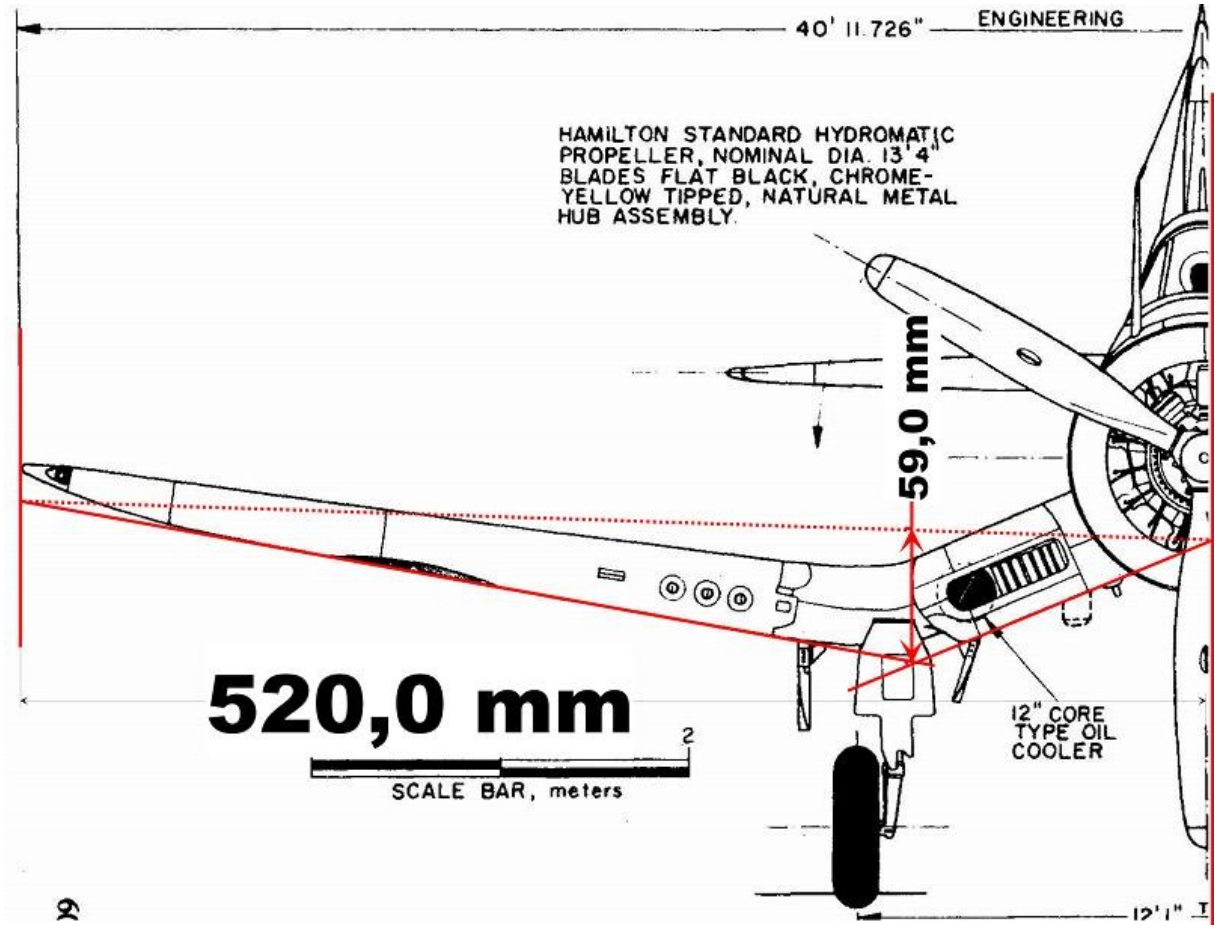
The first result is: The Hellcat is from the front view inside the 20mm rules; you may build it with a straight wing creating only dihedral to achieve the suitable position of the wing tips. You are free however to make a four piece wing and achieve a very scale looking model if you wish to.



If we look at the drawing of an F4U Corsair, you can see the difference between the datum line (------) and the bottom surface of the wing is more than the allowed 20mm deviation. In this instance you can see your model wing will need to be built with a crank/angle change to remain within the 20mm permitted tolerance.

Using this method for all aircraft you can check if your model needs to be built with a cranked or straight wing. Remember we use only the bottom surface of the wing as reference.

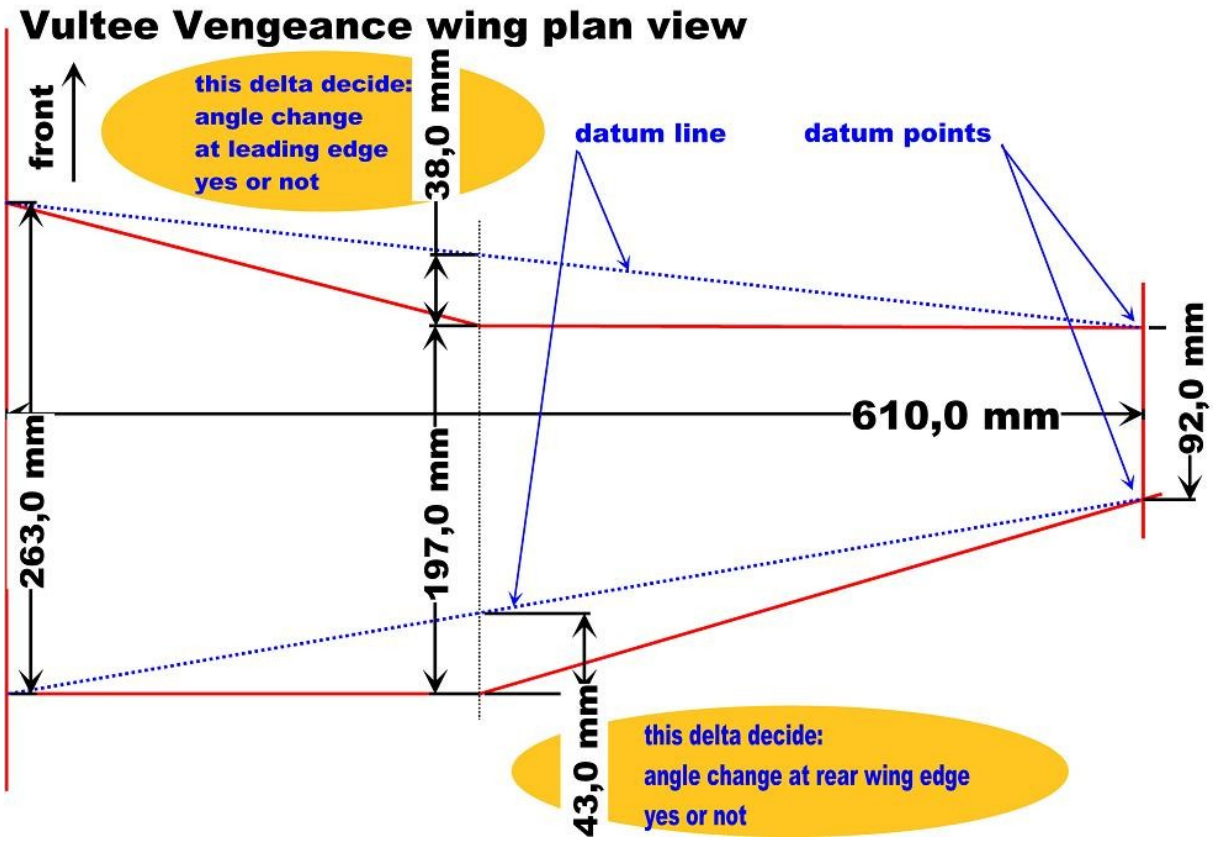
Step 2. Viewed from the top.

When viewed in plan form. The wing datum points are positioned at the true leading and trailing edges of the wing root and wing tip.

Straight lines drawn between these datum points will show us our leading and trailing edge datum lines from which all measurements are taken.

If the original aircraft wing outline, drawn in 1/12 scale, had a deviation or angle change which leaves the datum line by more than 20mm the model aircraft must be manufactured to look like the original by using a suitable angle change at the leading and/or trailing edges. The wing outline must remain within the 20mm allowed deviation from scale.

The FW 190 and the Hellcat have no angle change when viewed from the top. A different example is the Vultee Vengeance.



You can see clearly that there is more than 20mm deviation from the datum lines (-----) at both the leading and trailing edges of the wing. This means your model should also be built with similar angle change.
After establishing these angle changes are the wing tip and root chords allowed to be modified in size or position on the model keeping within the 20mm tolerance. (Top View only)

Step 3. Setting the wing chords.
Now we have decided, straight or cranked wing, we take both the wing root and tip chords and search for a position inside allowed deviation. Wing chord lengths and their position can be altered by up to 20mm to remain within tolerance.

This is a long explanation but nothing is new. Experience has shown we need a consistent and fair way of measuring our models so pilots can build with confidence.
And in all these drawings are the major measuring points and some useful datum lines.

Please regard, this appendix is a help to decide what to do in the construction, buying and building time. At the contest application, some of the most important measuring dates can be controlled.

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