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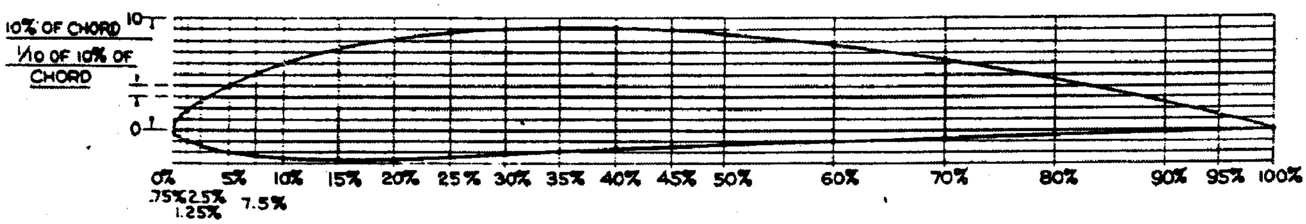
THE DAVIS AIRFOIL

We modelers are always looking for a good airfoil to improve our model's performance. One good one is the Davis. It was developed and patented in 1934. During World War II the Davis airfoil was used on the B-24 and a Consolidated twin engine flying boat. It was also tested in a wind tunnel at Cal Tech and found to be 100% efficient. Now don't jump on me and say that's impossible. This is what Cal Tech reported. Anyhow, I have built quite a few rubber models that used the Davis airfoil. In the January 1942 Air Trails we find the article on the Davis airfoil with the break down of the upper and lower ordinates and the formula. to thicken or thin the airfoil. This was done with some of those rubber jobs I built and they worked quite well. Now it's your turn to use this airfoil and improve the performance of your model. If you have problems while making the airfoil thicker or thinner, don't ask me. Seek out Hewitt Phillips or Jim Penland, they have the answers.



Since the airfoil formula can be solved only with the help of Mr. Davis, the next best procedure, for model application, was to enlarge the airfoil development shown in the 1934 *Patent Gazette*, find the airfoil ordinates, and in order to get thick or thin sections multiply the ordinates by .5, .75, 1.25, or any multiple of increase or decrease desired. Sounds pretty simple, eh?

Just to satisfy you mathematicians, the contents of the patent appear below:

"FLUID FOIL"

PATENT NO. 1,942,688 1934 PATENT GAZETTE

DAVID R. DAVIS, LOS ANGELES, CALIF

– DRAWING –

(EDITOR'S NOTE: THE PATENT DRAWING IS REPRODUCED AT THE END OF THIS ARTICLE)

– DESCRIPTION –

A FOIL HAVING AN UPPER AND LOWER PROFILE, SAID PROFILES BEING CORRELATED AND CONFORMING TO THE FOLLOWING FORMULA, SUBSTANTIALLY AS DESCRIBED

FORMULA FOR SUCTION FACE OR UPPER CAMBER

$$X_S = \sin\theta[0.6366198(A-B)+B] + \tan\theta[\{1-(0.6366198)(\theta)\}(1-A)]$$

$$Y_S = \cos\theta[0.6366198(A-B)+B] - A[1-(0.6366198)(\theta)]$$

FORMULA FOR PRESSURE FACE OR LOWER CAMBER

$$X_P = \sin\theta[0.6366198(A-B)+B] + \tan\theta[\{1-(0.6366198)(\theta)\}(1-A)]$$

$$Y_P = \cos\theta[0.6366198(A-B)-B] - (A-2B)[1-(0.6366198)(\theta)]$$

The airfoil is laid out by *ordinates* in the following steps:

1. Determine your chord distance.
2. Determine percentage points by slant line division method of plane geometry.

Chord Stations	Upper Camber Ordinates	Lower Camber Ordinates
0%	0%	0%.
.75%	1.3	−.7
1.25%	1.8	−1.0
2.5%	2.7	−1.4
5%	4.05	−2.05
7.5%	5.1	−2.25
10%	6.0	−2.6
15%	7.4	−2.7
20%	8.25	−2.65
25%	8.75	−2.45
30%	9.0	−2.25
35%	9.15	−2.0
40%	9.1	−1.7
45%	8.85	−1.5
50%	8.6	−1.3
60%	7.7	−1.0
70%	6.25	−.75
80%	4.6	−.45
90%	2.5	−.2
95%	1.35	−.1
100%	0%	0%

3. Use 1/10 (10 percent) of chord as measuring stick for determining height of airfoil in vertical units of 1 percent of chord.
4. Lay off these 1 percent vertical units above and below the chord line as many as are necessary for the particular thickness of airfoil that you have decided upon (using multiples of ordinates like .5, .75, 1.5, et cetera).
5. If at all possible, free-hand copies of the Davis airfoil should be avoided in models because the efficiency will drop rapidly with guesswork-designed airfoils.
6. Slight liberty may be taken in flowing in the airfoil with French curves, and ship curves. However, extreme care should be taken because it is easy to decide points are wrong when using certain French curves. Take the time to fit the curves perfectly.

It is not known if this section will revolutionize model performance. However, its visible characteristics obviously show a fine airfoil very successfully applicable to your model airplanes. Note the slight under camber, rather pointed leading edge, the maximum upper camber occurring between thirty-five and forty percent of the chord, and the slightly curved-out lower camber of the leading edge. This airfoil looks like a sure bet for a win in that next contest.