The Genesis revisited 2002 by Mat Redsell

It was back in 1995 that I wrote the first article on the Genesis in soaring Magazine and I thought it was time to revisit the whole project.

As of 2003 the Genesis project seems to have been abandoned in Lithuania, its assets sold for one dollar, a sorry demise for a lofty project and a number of things have come to light since that article was written.

The glider was an excellent product in workmanship and its performance is quite respectable but I believe it could have been much better by about 15% overall if Jim's original plans had been used for a all flying wing. But at the time I wrote the article for Soaring the only flying wings I had flown were my hang gliders and my minibat, so I could not comment. That was about to change!

Jim Marske was let go from the project and I felt so strongly about his gliders that I joined him in Marion and formed Marske Flying Wings to research and develop his gliders.

I have found that by talking with Jim Marske that he came to the project with the understanding of producing a racing glider and he had in hand a drawing of a flying wing with an L/d of about 51 at a speed of about 55 mph and a sink rate of 100 fpm at 48 mph but through the ensuing redesign process the theoretical L/d gradually was reduced to somewhere about 43:1 at 65 mph with a sink rate of about 135 fpm at 55 mph with the addition of an elevator on the tail, the pilot moved forward and twist put into the wing.

Now one could argue that there was a question of whether the Genesis could have flown without an elevator on the fin. And I'm sure a lot of people questioned Jim's initial approach but in hindsight I believe that Jim's glider indeed would have had the 51:1 glider ratio for a 15 meter and that it indeed would be an extremely competitive flier.

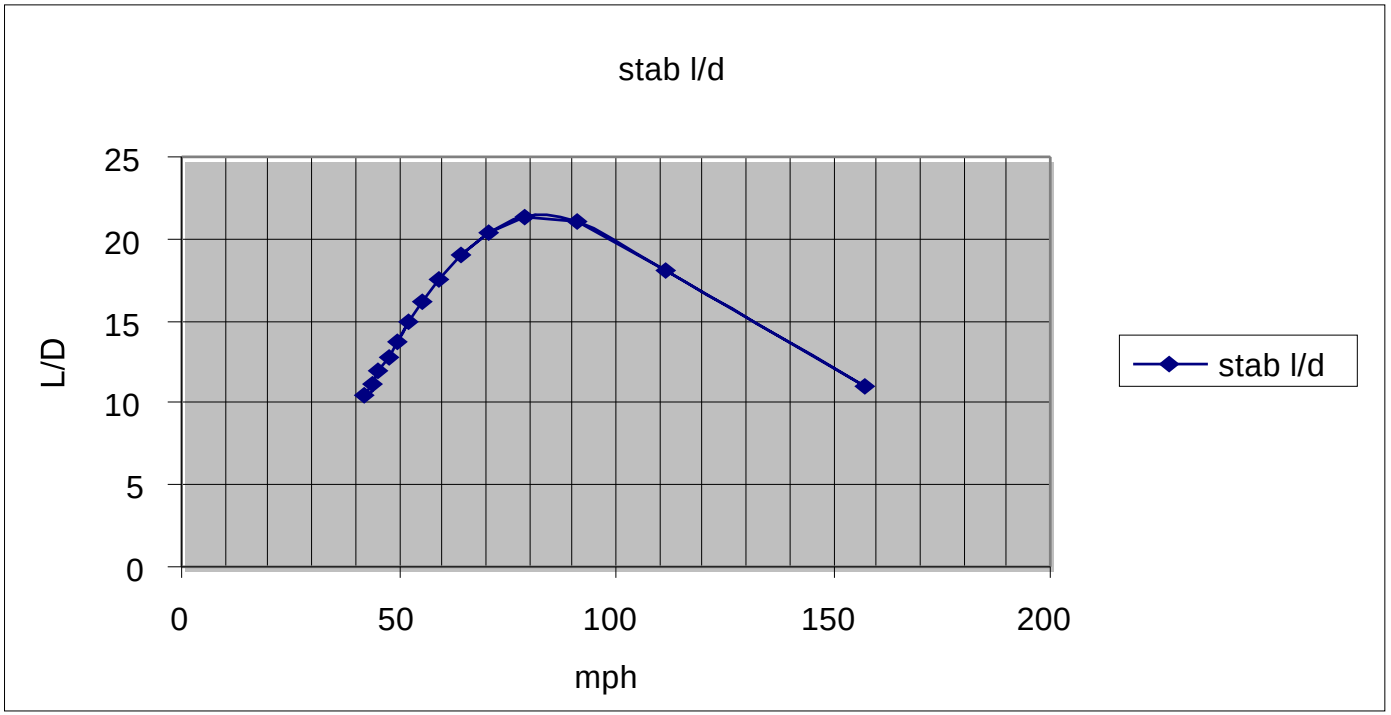
For example was it important for the pilot to be placed in front of the leading edge of the wing leaving the wing root high point at the same point where the fuselage starts to diminish. But how important was this? I believe cost the Genesis about three l/d points!

First consider the drag penalty of the elevator on the tail by just considering it in the same manner as the main wing. Jim Marske did most of the calculations and I put them into a spread sheet form and made charts so that it could be easily changed to suit differing wing loadings etc.

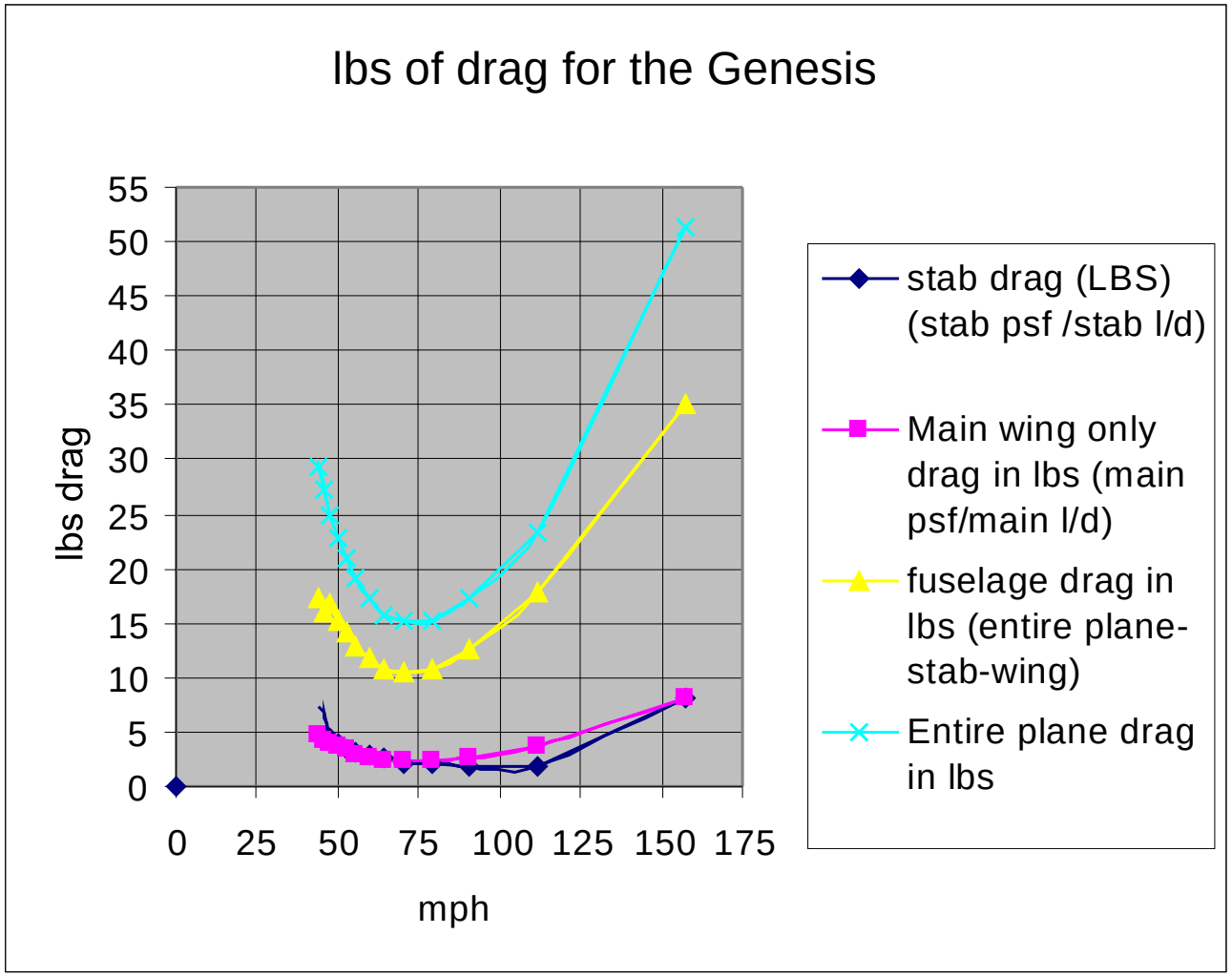
This stabilizer has a very short chord which means low reynolds numbers and the span is also quite small indicating a not so efficient wing back there.

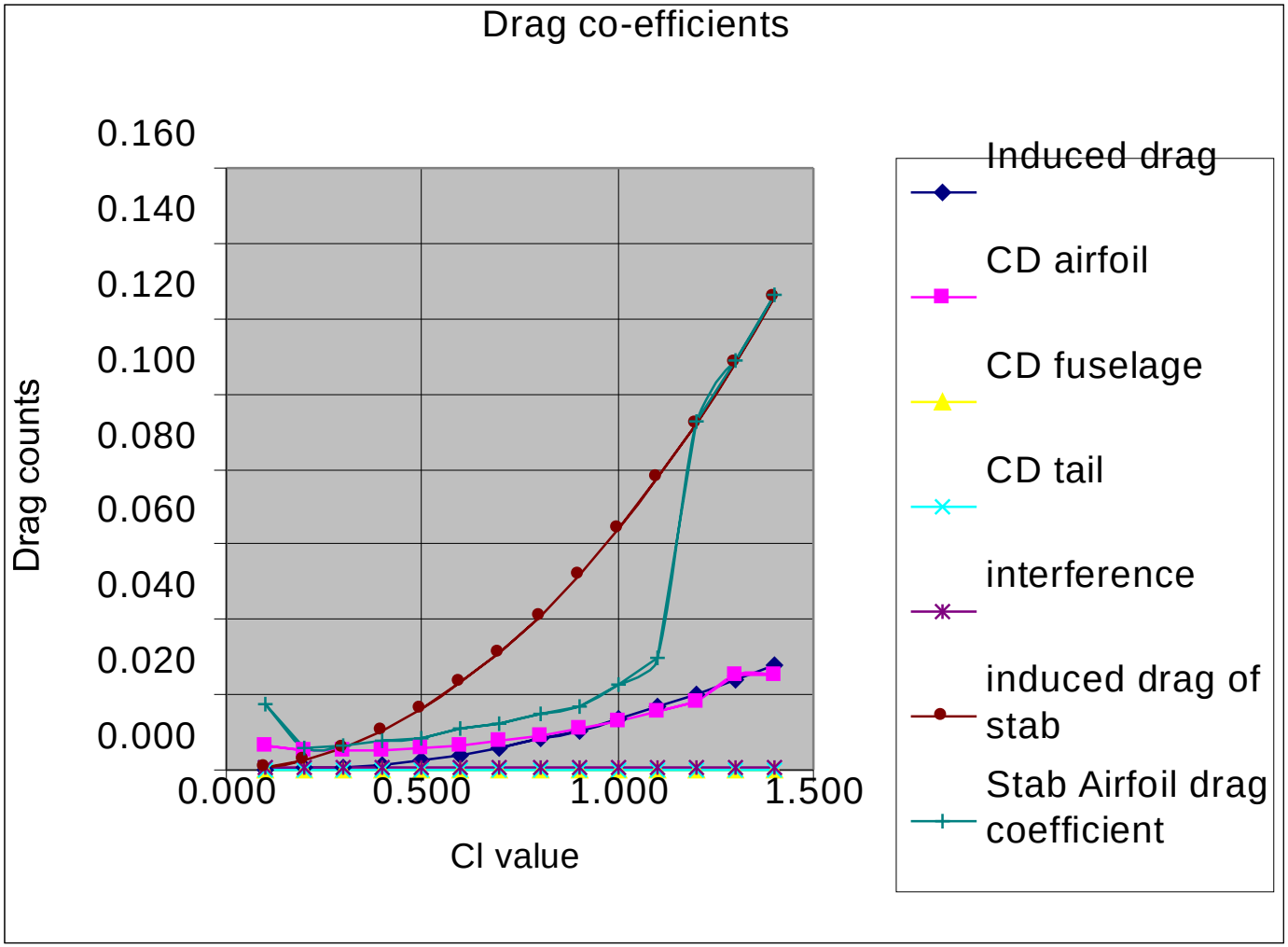
And how did I suspect this? Well I happened to initiate the rebuilt of one of Jim;s old Pioneer designs, the Pioneer IId. This glider was designed in the early 1970's using the same basic dimensions of the 1-26. But the result was far superior! The original Pioneer IId was purchased in very rough shape to begin with and in respect to the airfoil still is! But that glider has given me an awful lot of respect for Jim's designs and a whole new way of flying.

If we analyze the stabilizer as just a wing, The chart below is the L/D of the stabilizer at various speeds. Remember also that in flight this has a down load to keep the negative pitching main wing airfoil flying level.



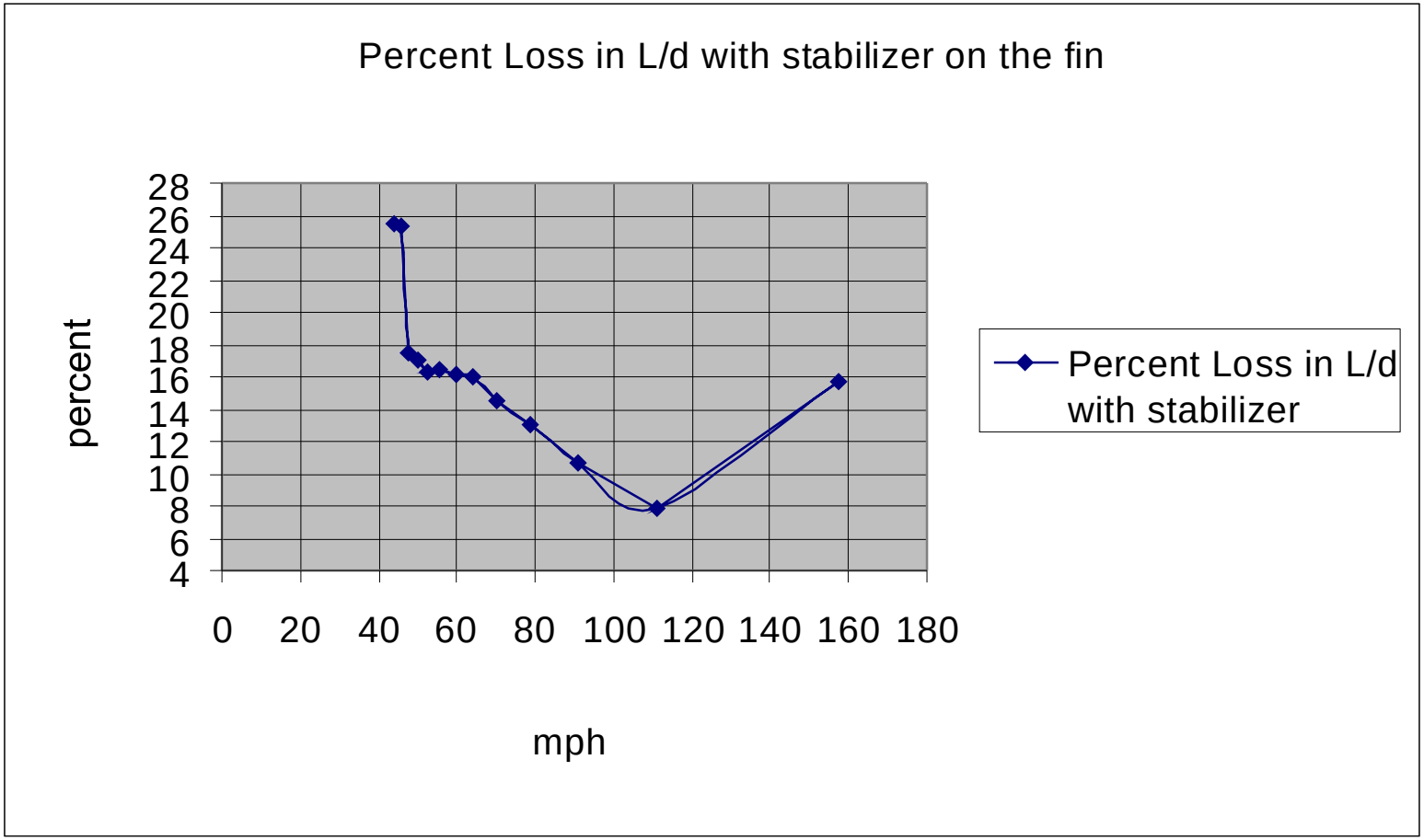
Below is a chart of the Drag in lbs of each component of the Genesis at various speeds. The fuselage drag was computed by deducting the main wing drag and the stabilizer drag from the entire plane drag. Note that the stabilizer has about as much drag as the main wing.

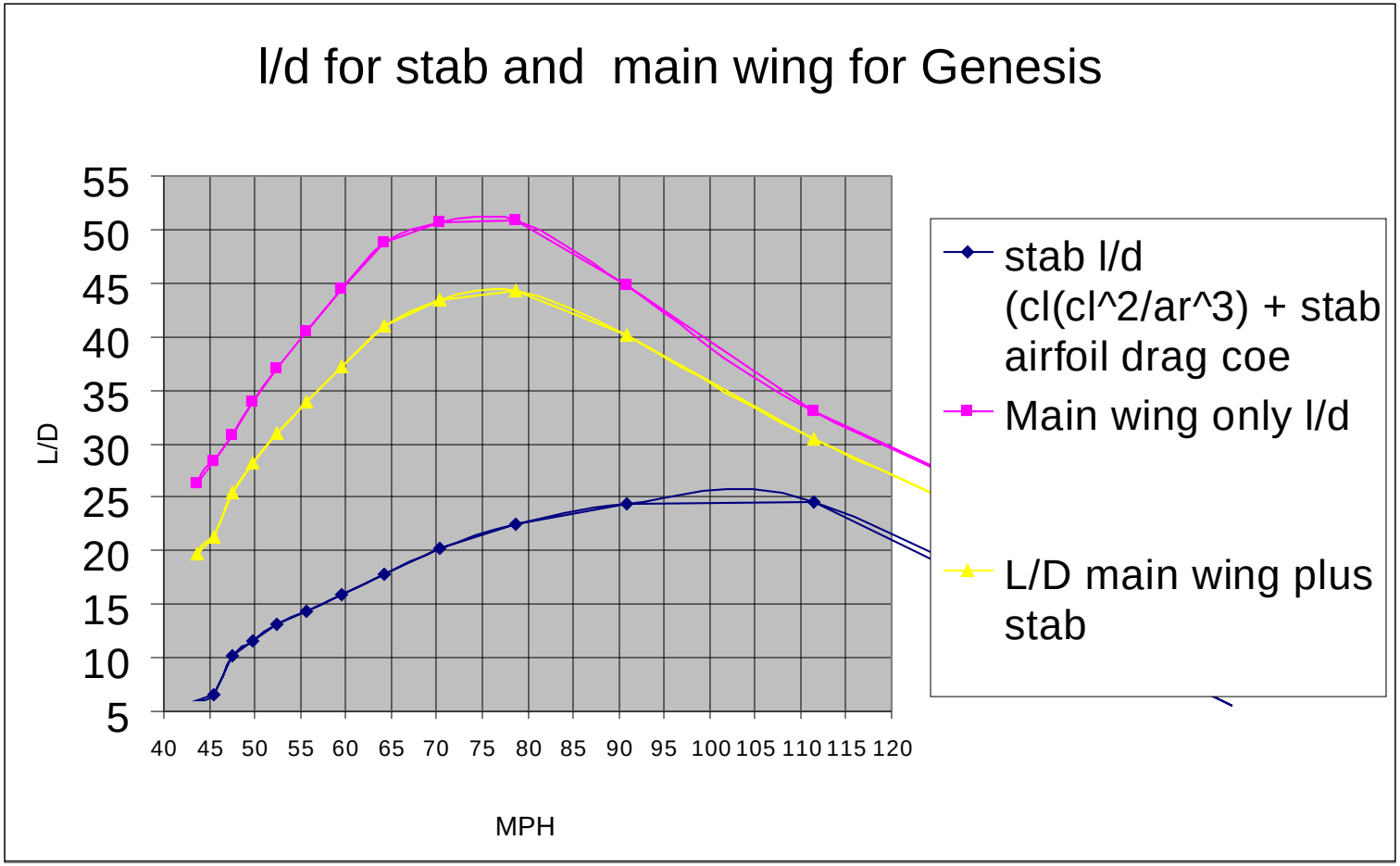


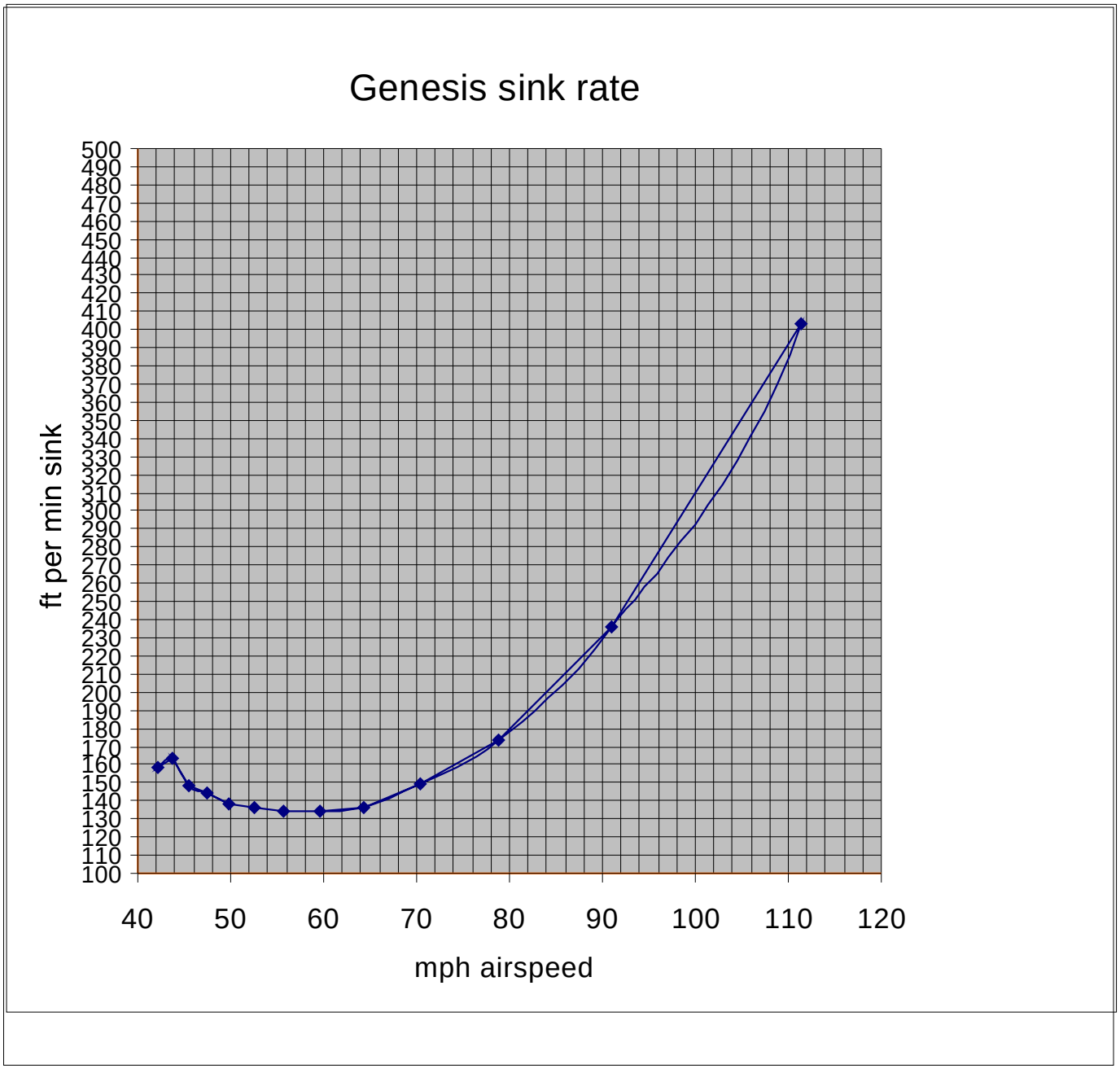


When you look at the combined drag co-efficients for each element of the stabilizer you realize that it has he most significant contribution to the overall drag of the Genesis. Note the especially the high induced drag of the stabilizer.

So if we add up the possible L/D the percent loss of having that stabilizer on the fin against the airspeed is shown below.




l/d for stab and main wing for Genesis
L/D
55
50
45
40
35
30
25
20
15
10
5
40 45 50 55 60 65 70 75 80 85 90 95 100 105 110 115 120
MPH
stab l/d (cl(cl^2/ar^3) + stab airfoil drag coe
Main wing only l/d
L/D main wing plus stab


Genesis sink rate
ft per min sink
500
490
480
470
460
450
440
430
420
410
400
390
380
370
360
350
340
330
320
310
300
290
280
270
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
40
50
60
70
80
90
100
110
120
mph airspeed