KNOX COUNTY RADIO CONTROL

Newsletter
Knoxville TN Oct. 2018 AMA #594
Editor..Mike Catlin..catlimi2000@yahoo.com
www.kcrctn.com
Webmaster..Jeff Prosise..jeffpro@wintellect.com

2018 Elected Officiers
Pres…….....Ed Dumas……..….....ed@eddumas.com
Vpres……...Paul Funk……....paulfunk24@gmail.com
Secretary……..Rick Thompso……..jrt1953@gmail.com
Tresurer (acting)..Mike Catlin……...catlimi2000@yahoo.com
Executive Board
Randy Philipps…….…....randy@accesssolutionsinc.com
John Baselone……...……...jrbfarm@yahoo.com
Rick Thompson…….……..…..jrt1953@gamil.com
Safety Officer
Denny Evans……..……...evans9633@bellsouth.net

KCRC Meeting Minutes 10/09/2018

OLD BUSINESS

The October 2018 KCRC meeting was held at the field. President Ed Dumas called the meeting to order at 7:03PM. There were 22 in attendance.

The September regular meeting minutes were approved by unanimous voice vote.

Michael Catlin gave the Treasurer's report which was accepted by unanimous voice vote.

Field Officer John Basalone gave a short field report: "We have mosquitoes!" And boy do we ever!

Joel Hebert reported that the Church Youth Group Fun Day, which took place at KCRC on September 29th, was a raging success. It was estimated that more than 30 attended from the youth group of Denny Evans' Church.

The gathering was organized and financed by Denny and activities consisted of buddy-boxing for the youth, flight demonstrations of airplanes, helicopters, quad copters (including virtual rides) and EDF jets. Weather was perfect and everybody had a wonderful time.

Ed reported that he is still attempting to set up a meeting with the new Director of Knox County Parks and Recreation. As of this time, the department has not responded to Ed's request.

On October 10th and 11th, the field will be closed for club members' flying from 1:00PM to 3:00PM each day. Horizon Hobby will be hosting "dealer days", first for Hobby Town dealers and then for all other dealers on each of those days respectively. Club members are welcome to come and watch during those hours. Horizon specifically invited club members to come and participate after 3:00PM on the second day.

Bob Helsel reported that the K9 center off Lovell Rd will be available for our use as an indoor flying site. The cost to the club will be approximately $120 for 4 hours of use. Joel Hebert made a motion for the club to allocate $120 for this purpose and offset this cost (or a portion thereof) by charging a $5 landing fee. The motion carried by unanimous voice vote.

Ed presented the proposed By-Law changes that were arrived at by the By-Laws committee appointed at the September meeting. The proposed changes are for the purpose of cleaning some ambiguous and inconsistent language should the club decide to have regular club meetings less frequent than monthly. There were no other changes proposed at this time. The changes were adopted after carrying by unanimous voice vote.

NEW BUSINESS

A nominating committee was appointed for the purpose of nominating candidates for the club's 2019 officers. The committee will consist of Randy Philipps, Rick Thompson and Ed Dumas.

Scott Anderson reported that President Trump signed into law the FAA Reauthorization Act of 2018. For the time being, no changes will take place – everything will stay the way it has been. This includes the 400' rule, which is waived for AMA members operating within the rules set forth by the AMA at an AMA chartered flying site. The club will be advised of any future changes as they happen.

Ed announced that the November and December meetings will be held at Fellowship Church on Middlebrook Pike as they have been in the past.

There were no entries for Model of the Month.

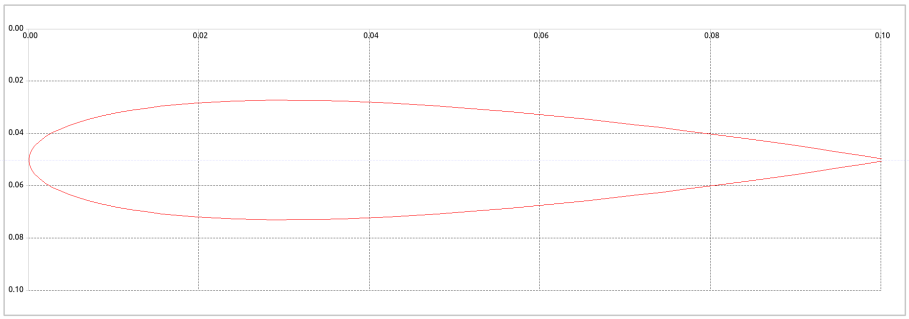
Crash of the Month was won by Steve Bayless for the unfortunate demise of his F-86 EDF jet. Steve's jet was on base leg for runway 23 (coming from the right) when a failed electrical connection caused complete loss of power and control. The jet crashed in the woods about 5 feet from the water's edge.

Respectfully Submitted,
Rick Thompson, Secretary

Just a few of the many, many pictures taken of the youth learning to fly at the hands of our instructors.

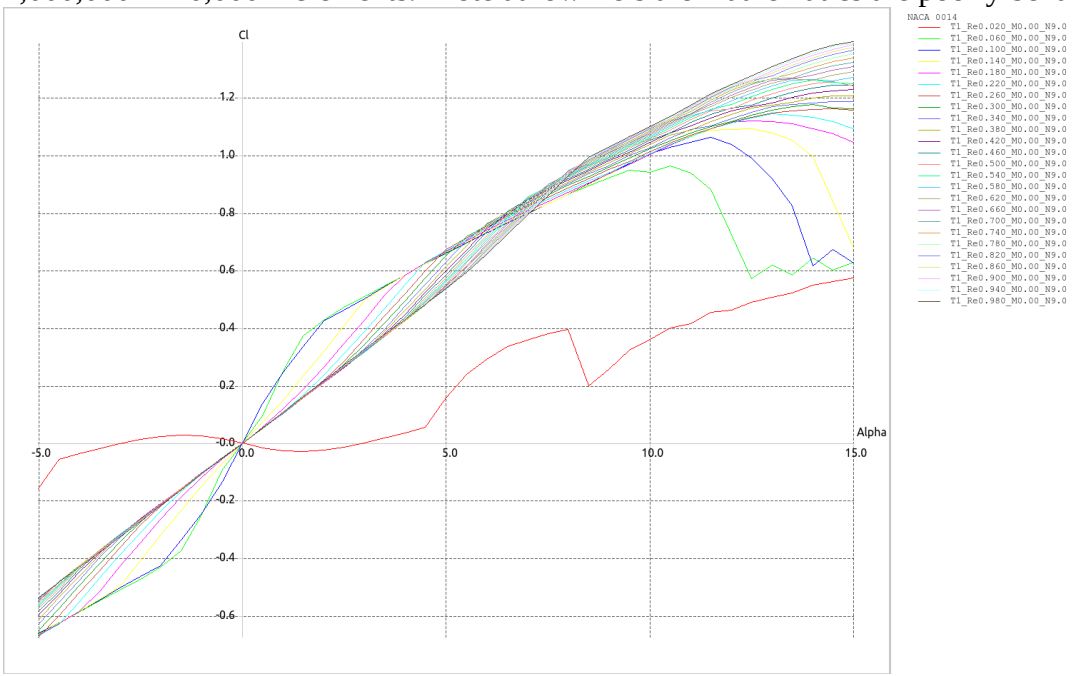
This month I thought I would expound on “flying planks” and how they remain stable without computer guidance. But first, I’ll need to provide a little background.

I’ll be using a NACA0014 airfoil. This airfoil is symmetrical as indicated by the leading zeros and it is 14% thick as indicated by the “14” as the last 2 digits. I’ll also be using the NACA0009 airfoil. This is the airfoil I used in the plane I have been flying for the last 8 months. It is typically the airfoil used in the tails of many general aviation aircraft. To generate the data I’ll be using FXLR5 an analysis tool for airfoils, wings and planes. (https://sourceforge.net/projects/xflr5/). XFLR5 is available for Linux, MAC and Windows.



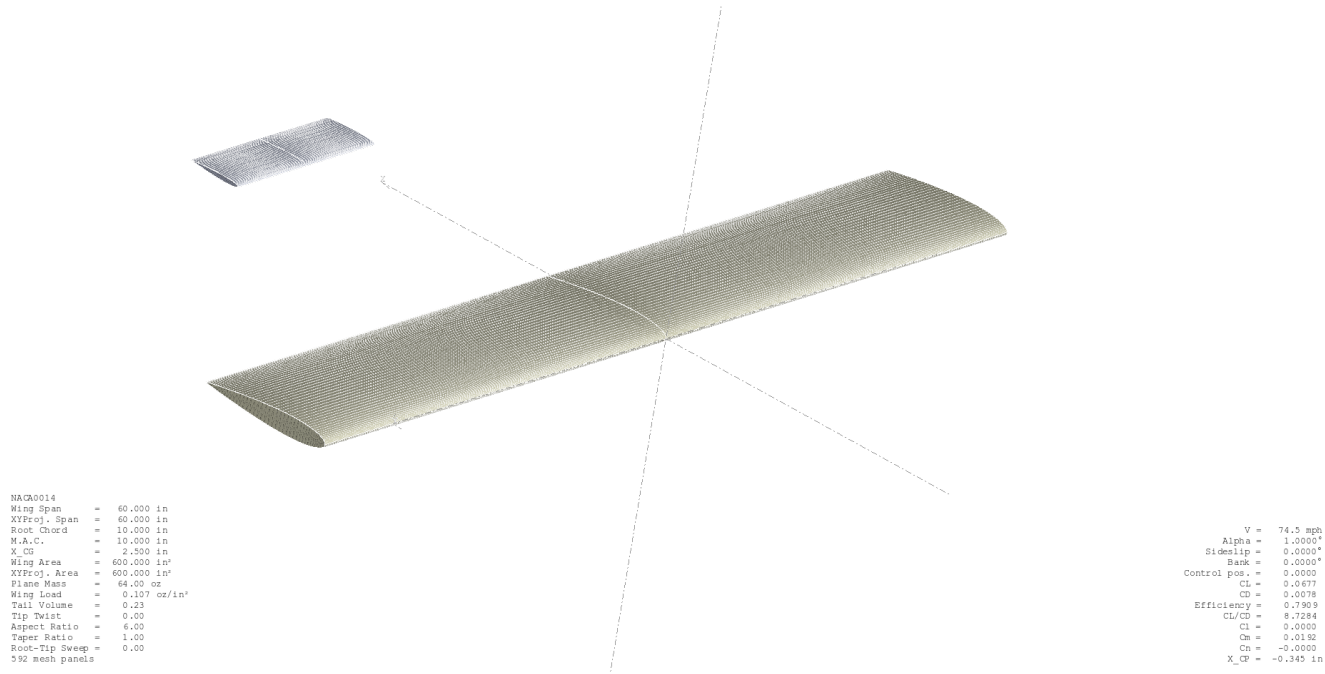
Thickness = 14.00%
Max. Thick.pos. = 29.20%
Max. Camber = 0.00%
Max. Camber pos. = 0.00%
Number of Panels = 99

The graph is the Cl (coefficient of lift) vs Alpha (angle of attack) for Re (Reynolds number) 20,000 to 1,000,000 in 40,000 increments. Note at low Re’s the mathematics are poorly behaved.

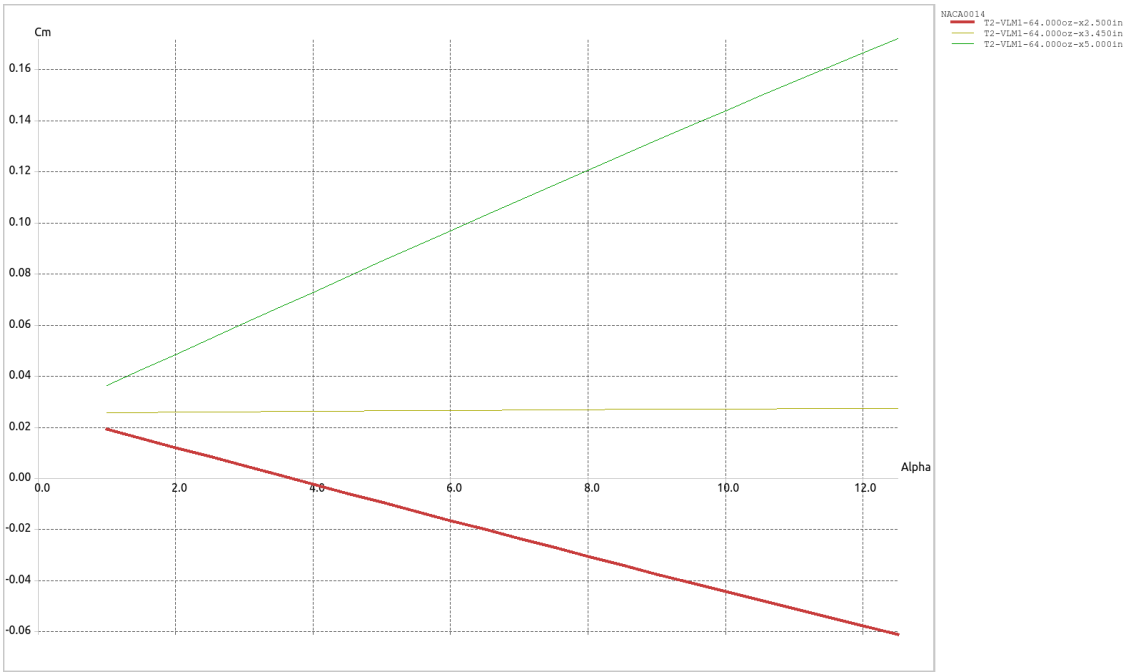


It is necessary to have this data run with different Re (Reynolds number) as it will be used in calculating the stability at different air speeds which will change the Re. Also, the wing and tail will be at different Re’s when flying at the same air speed do to the different surface chords involved.

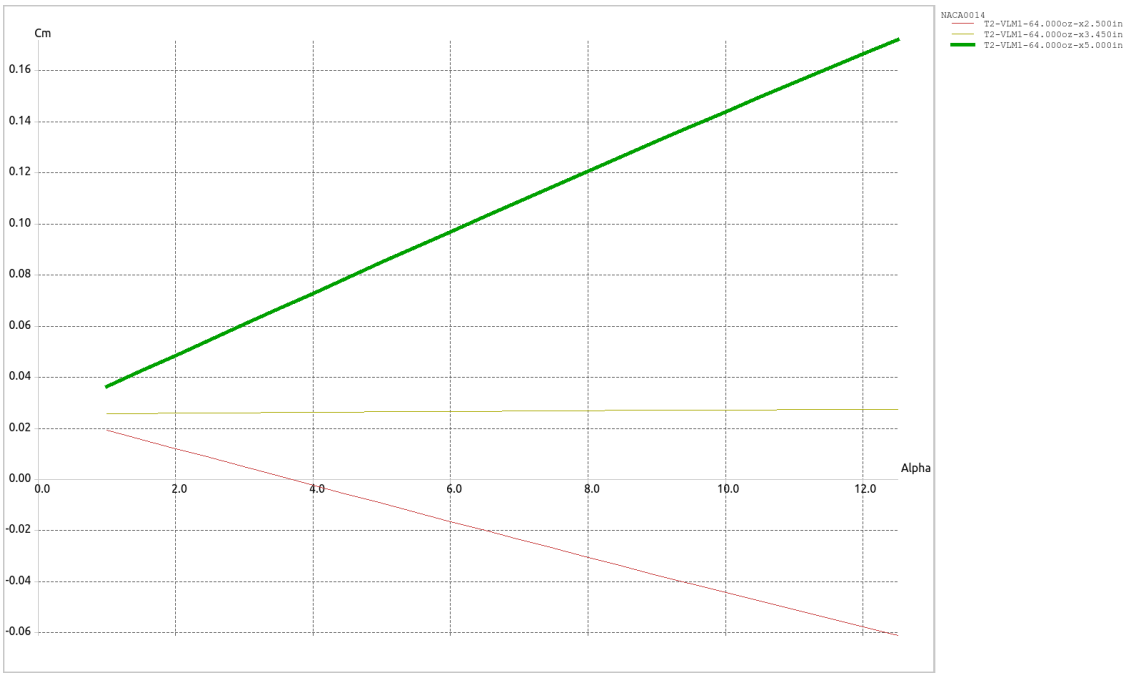
The wing spans 60 inches and has a constant chord of 10 inches. The horizontal stabilizer spans 12 inches and has a chord of 4 inches and is located 20 inches behind the wing with an incidence of -2 degrees. Pretty common size and layout. We will be doing a 'fixed lift' analysis where, as the angle of attack is varied the needed airspeed is calculated to support the weight. Weight of the model is 64 ounces (4 pounds).



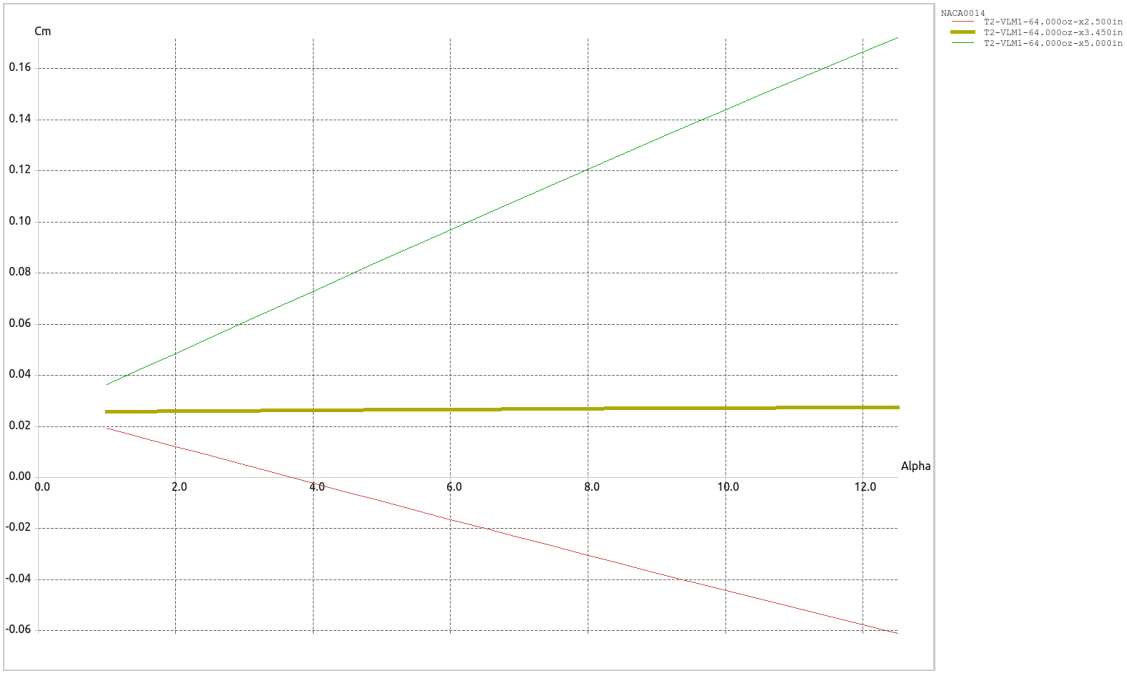
The first run will be at a CG of 25% chord or 2.5 inches. Notice how the pitching moment (Cm) becomes more and more negative as the angle of attack (Alpha) increases thus trying to force the nose down. This is the definition of positive static stability.



Next run will be with the CG at the 50% location (5 inches). The new line points up to the right meaning as Alpha (angle of attack) increases the aircraft will tend to nose up. You DO NOT want to fly at this condition.

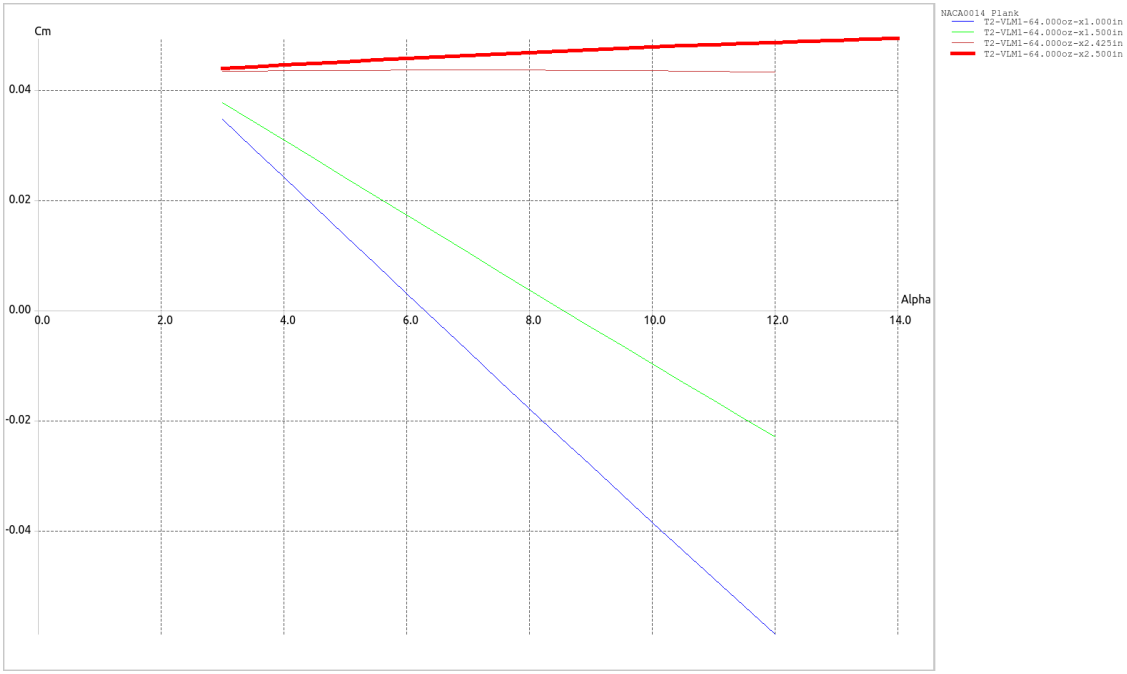


The final run will be at a CG at 37.45% and the new line is horizontal indicating that no matter what the angle of attack (Alpha) is the pitching moment (Cm) will not change. This is the neutral point and static margin is measured from this point.

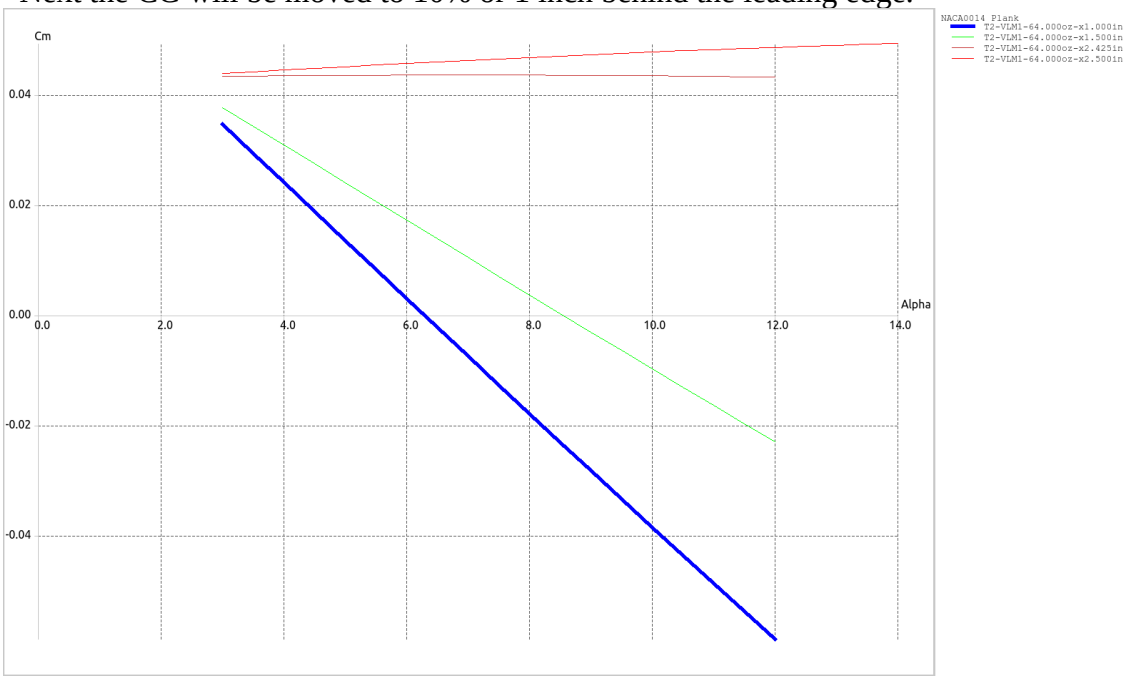


To analyze the plank flying wing we will use the same wing (60” x 10” NACA0014 (modified)) only this time we will not be including a horizontal stabilizer. The airfoil is the same NACA0014 but this time the trailing is deflected 4 degrees up pivoting about the 80% chord and the center line of the airfoil. Again we use a weight of 64 ounces and start with a CG location of 25% (2.5 inches behind the leading edge) as we did for the tailed aircraft.

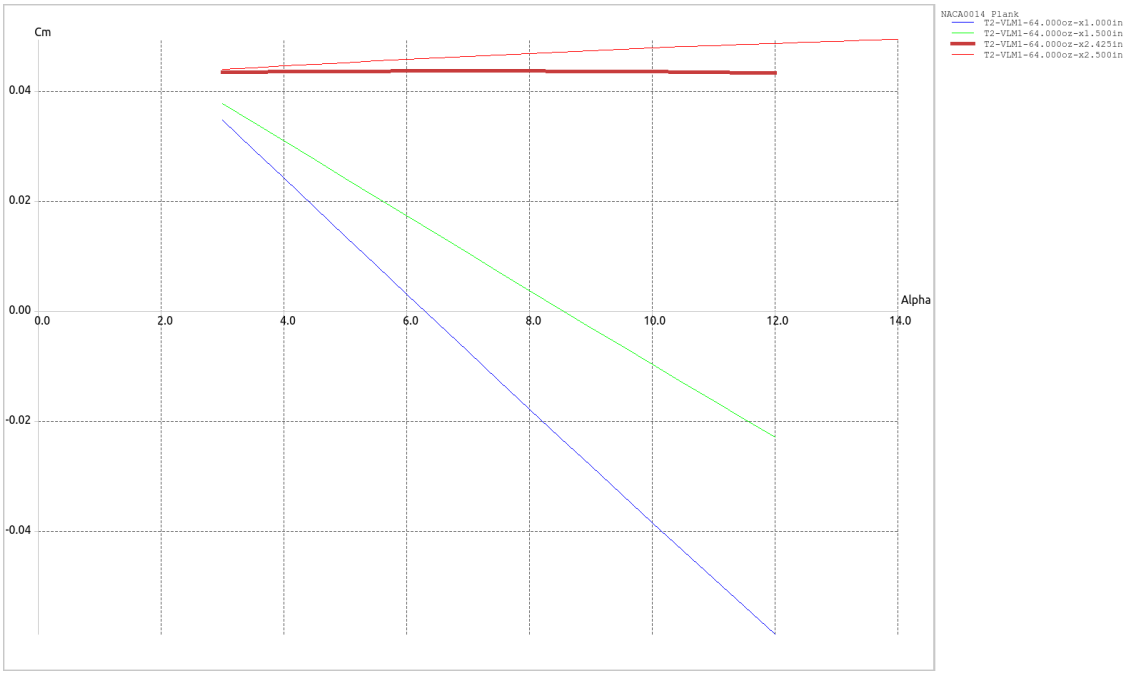
Notice that the Cm vs Alpha curve slopes up and to the right indicating the plank is unstable. This probably accounts for many of the first flight crashes.



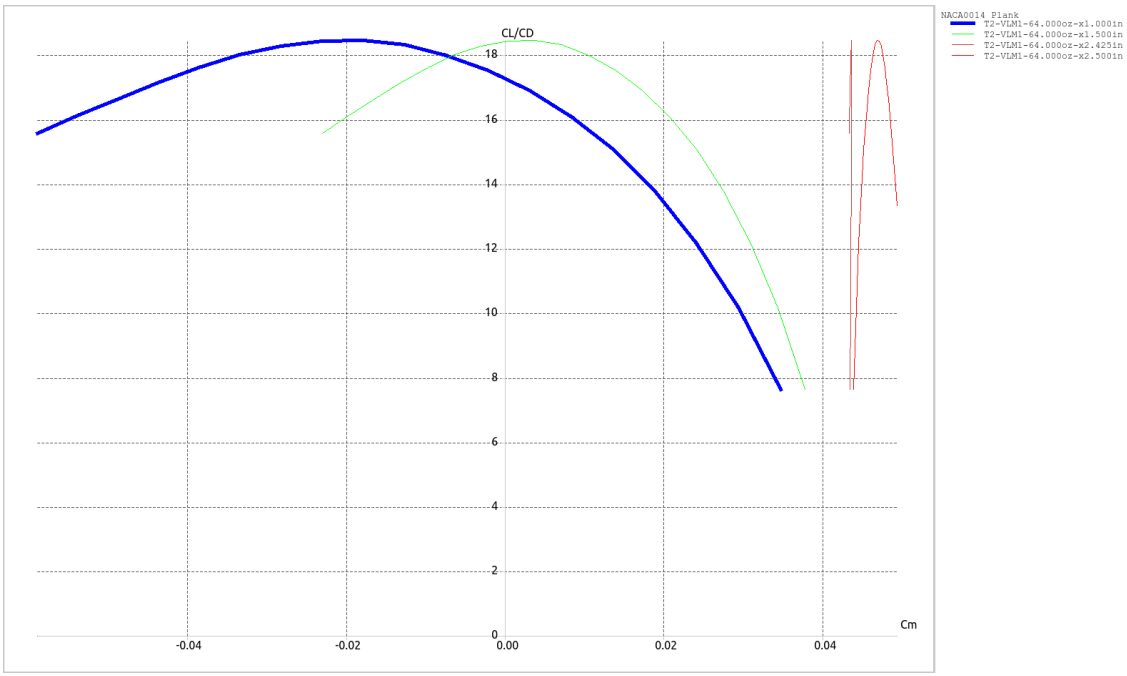
Next the CG will be moved to 10% or 1 inch behind the leading edge.



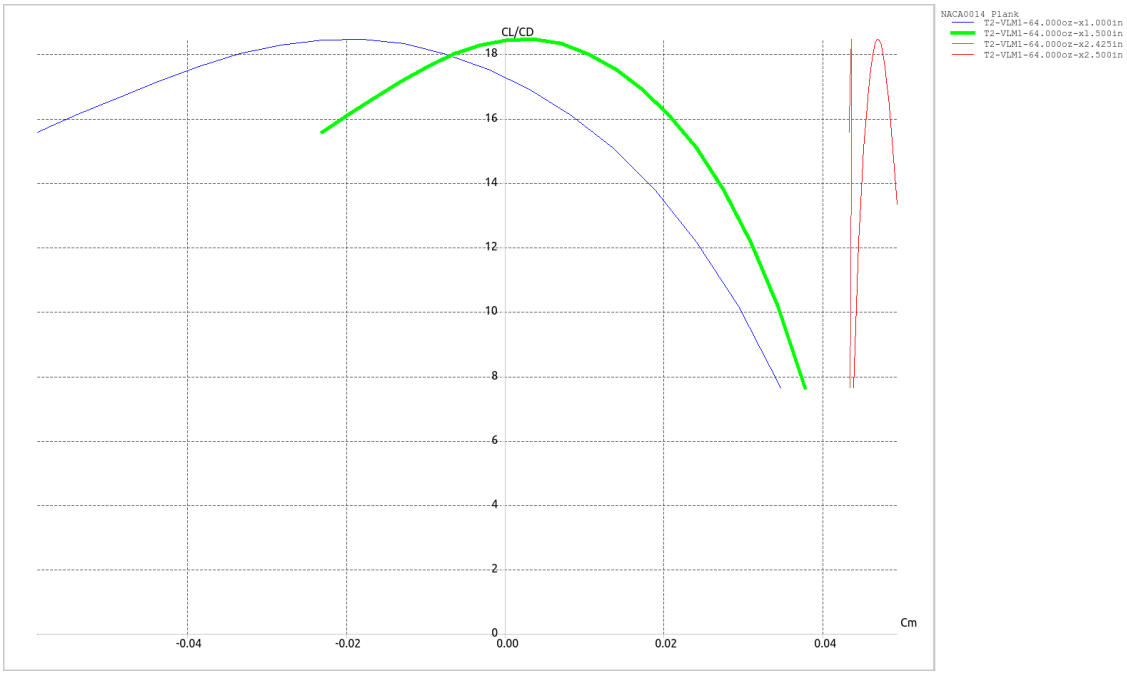
Notice how the Cm vs Alpha now slopes steeply down and to the right indicating strong stability. Experimenting with CG locations gives 24.25% (2.425 inches) back from the leading edge as the neutral point.



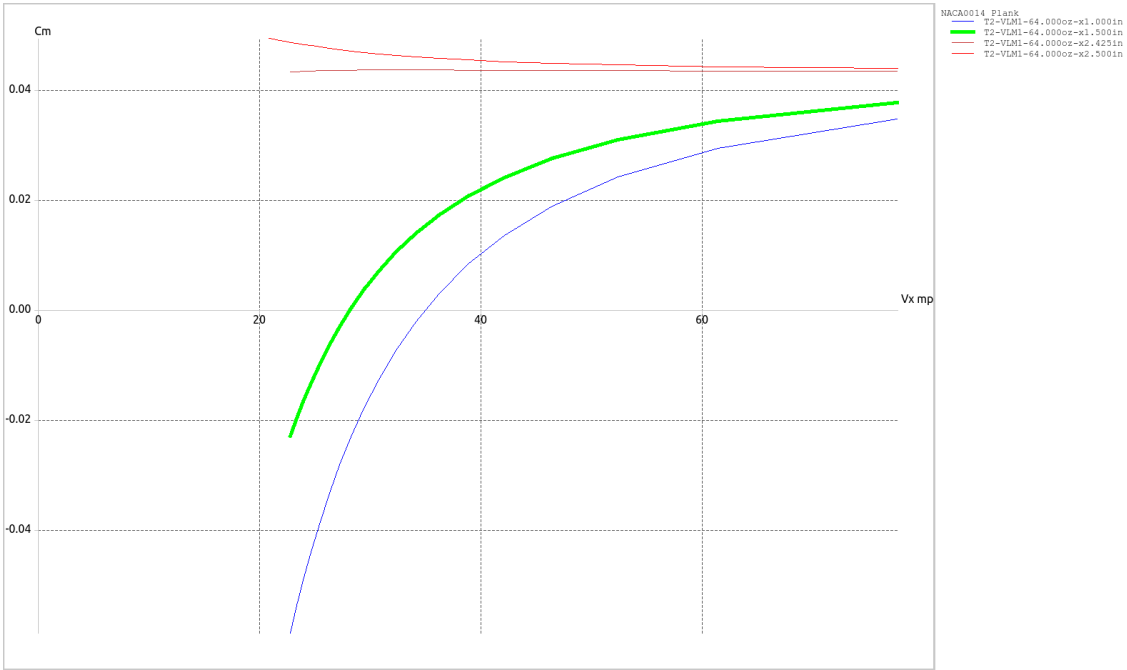
If we turn to the Cl/Cd vs Cm graph we see that only the 1 inch CG location has a graph that crosses the Cm=0 line. Cm needs to be 0 for the aircraft to be stable and the maximum Cl/Cd is to the left of the Cm=0 line indicating that there is some performance to be gained.



Since the CG locations more aft of this line are to the right of the Cm=0 line and we want to move the Cl/Cd curve to the right we will run the analysis at CG = 15% (1.5 inches) aft of the leading edge. The resulting Cl/CD curve is better centered on the Cm=0 line giving a stable plank with an estimated Cl/Cd of 18.5 which is not too bad.



Next we will use the Cm vs Vx (airspeed) graph to determine flying speed.



Where the curves cross the Cm=0 line provides an indication of the speed at which the aircraft will be flying at a trimmed speed. And for the CG at 1.5 inch location the speed is 28 miles per hour.

The results show that most people will balance a plank wing too far aft as a first try and find the wing unstable. Moving the CG forward can improve the stability but too far forward can destroy performance and cause an increase in the trimmed airspeed. By moving the CG aft the aircraft can be made to fly slower but with decreased stability. Also notice that a plank aircraft has a narrow CG range. One man carrying plank aircraft had the elevator control linkage separate and the pilot was able to land by leaning forward and aft in the cockpit to control the aircraft in pitch. This must have been a harrowing experience but quick thinking and knowing the sensitivity of a plank CG location probably saved his life.

I hope this gave you all some ‘enlightenment’ into what factors affect stability and performance of conventional tailed aircraft as well as plank aircraft.

For more information on using XFLR5 check out the UTube videos at https://www.youtube.com/channel/UC8J8lyEPdxwmT7cGceO3wFQ There you will find very good instructions for using this program.