

On the 'Wing... #115

CO8 Part 1 - The Airfoil

CO8, the seventh in a series of tailless models by a team led by Hans-Jürgen Unverferth, has now been flying for some time. It is substantially different from CO7, its immediate predecessor, in a number of ways, and so we will be devoting two columns to its description.

The first departure from most of the other models in the series is the use of an airfoil with a substantial negative pitching moment. Hans-Jürgen used the EH* sections as the basis for airfoil choice until CO7, for which he chose the RS001 and its derivatives. All of the EH sections have good lift capacity, excellent stall characteristics, and near zero pitching moments. They perform well in a variety of applications and are extremely popular with modelers of tailless aircraft.

CO8 uses the Reinhard Sielemann designed RS004A. Reinhard is quite adept at designing airfoils, and is author of PROFILEplus**, a multi-purpose computer application. The RS004A is 9% thick, which is fairly standard for sections designed for swept wing tailless gliders. With 1.64% camber it should perform well in both F3B and F3J. The pitching moment is calculated by PROFILEplus to be -0.0418, while the Eppler code gives -0.038.

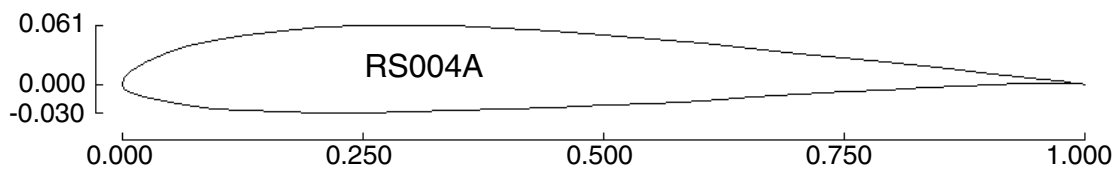
Hans-Jürgen's arguments for using this new section rather than one of the EH series are compelling. The EH sections were designed for use on swept wings where flaps are used only for landing. Deflecting the flap downward causes a lot of drag, as would be expected, but does not provide the expected gross change in lift. This is especially true when deflecting the flaps downward in small increments in efforts to improve thermal performance. Deflecting the flap upwards is not desirable as it simply increases the section reflex, increasing drag and decreasing lift. The RS004A, on the other hand, has no reflex. In fact, it has substantial positive camber near the trailing edge. Flap deflection can be used for landing, as with the EH sections, and small downward deflections can be used to augment lift during launch and while thermaling. Additionally, the trailing edge of the RS004A can be reflexed for high speed flight. These advantages outweigh the increased twist which must be put into the wing.

The included Table provides the RS004A coordinates, and geometric and aerodynamic data.

We'll describe the CO8 airframe in Part 2.

* "EH" stands for "Eppler Horten." The EH sections were developed by John Yost using the Eppler code and following the ideas formulated by the Horten brothers.

** PROFILEplus (German) for MS-DOS is available from Reinhard Sielemann Software, Sonnenkamp 5, 49504 Lotte, Germany. PROFILEplus is a coordinate editor and airfoil plotter, and can make use of scanned images. It computes geometric and aerodynamic data, and can export files in .dxf (CAD packages) and .xls (Microsoft Excel) formats. The package includes a “profile bibliography” of over 600 sections, and a demo version is available. If writing for information, please include at least three International Postal Reply Coupons. On the internet, go to <<http://home.t-online.de/home/reinhard.sielemann/>>.



The RS004A coordinate table is printed on the next page.

RS004A

X	Y	X	Y
100	0	0.274	-0.4865
99.726	0.0271	1.093	-0.9317
98.907	0.1177	2.447	-1.3795
97.553	0.2809	4.325	-1.8051
95.677	0.5044	6.699	-2.1959
93.301	0.7715	9.549	-2.5208
90.451	1.0796	12.843	-2.7540
87.157	1.4314	16.543	-2.8938
83.457	1.8233	20.611	-2.9504
79.389	2.2421	25	-2.9356
75	2.6868	29.663	-2.8618
70.337	3.1665	34.549	-2.7373
65.451	3.6739	39.604	-2.5742
60.396	4.1886	44.774	-2.3822
55.226	4.6781	50	-2.1791
50	5.1261	55.226	-1.9611
44.774	5.5202	60.396	-1.6926
39.604	5.8232	65.451	-1.3849
34.549	6.0203	70.337	-1.0865
29.663	6.1008	75	-0.8108
25	6.0526	79.389	-0.5631
20.611	5.8694	83.457	-0.3553
16.543	5.5528	87.157	-0.1884
12.843	5.1110	90.451	-0.0656
9.549	4.5538	93.301	0.0095
6.699	3.8939	95.677	0.0426
4.323	3.1421	97.553	0.0431
2.447	2.3175	98.907	0.0253
1.093	1.4527	99.726	0.0069
0.274	0.6395	100	0
0	0		

Thickness: 9% at 26.5% chord

Camber: 1.64% at 34.5%

Pitching moment: -0.0418 (-0.038 per Eppler)

Zero lift angle: -1.8062 degrees

Neutral point: 25.39%