

Polaren für einige der Original-HQ-Profile

Mithilfe des Eppler PROFILE07-Programms wurden für einige HQ-Profile, die im Laufe der 80er Jahre und z.T. auch noch danach am häufigsten Anwendung bei den Segelflugmodellen fanden, die hauptsächlich interessierenden Polaren berechnet, die im Nachfolgenden dargestellt sind. Zu jedem Profil gibt es mehrere Polaren, die sein Verhalten bei unterschiedlichen Re-Zahlen und Turbulenzgraden/Oberflächenrauheiten N verdeutlichen.

HQ-0/9

HQ/0/12

HQ-1/8

HQ-1/12

HQ-1,5/9

HQ-1,5/10...12

HQ-2/8

HQ-2/10...12

HQ-2,5/8

HQ-2,5/10...14

HQ-3/9

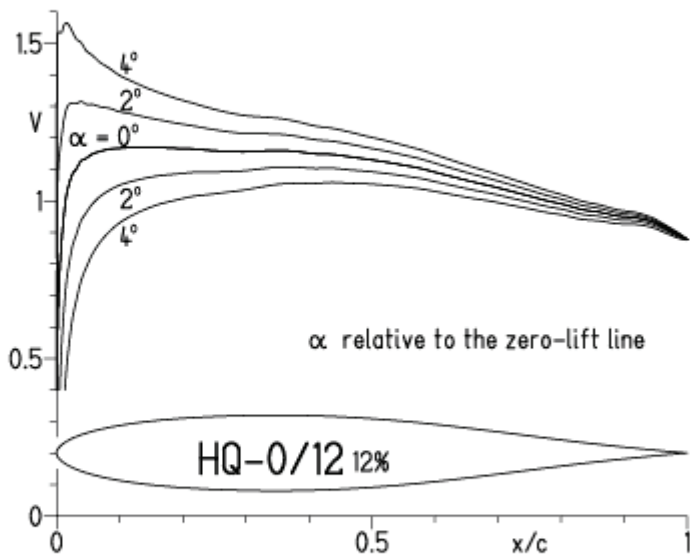
HQ-3/10...14

HQ-3,5/9

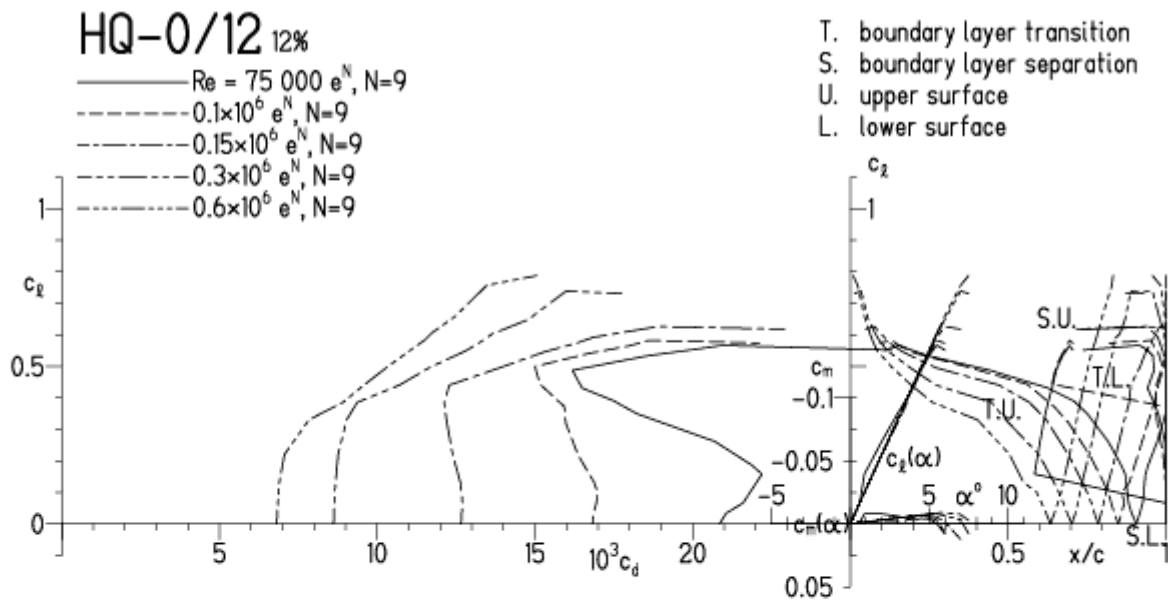
HQ-3,5/12...15

HQ-0/12, N=9

EPPLER 2005 V. 8.5.07 RUN 17.3.13 18:11



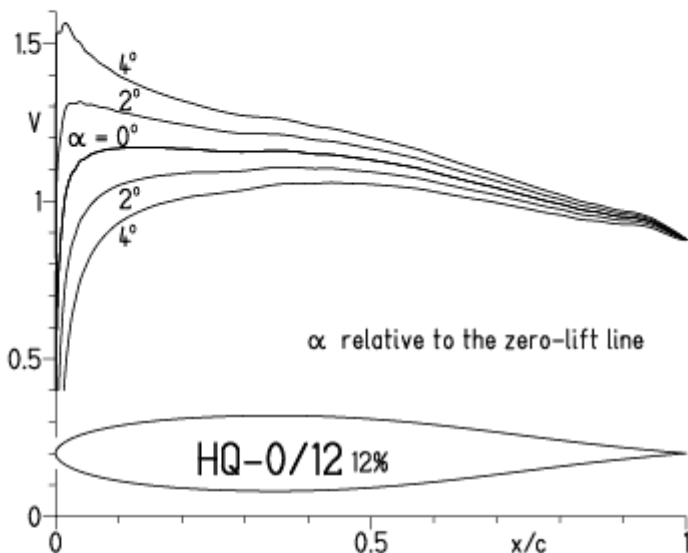
EPPLER 2005 V. 8.



HQ-0/12, N=9, Turbulatoreffekt

Doppelseitig erforderlich bei kleinen Re-Zahlen und geringen Höhenleitwerkstiefen

EPPLER 2005 V. 8.5.07 RUN 17.3.13 18:23

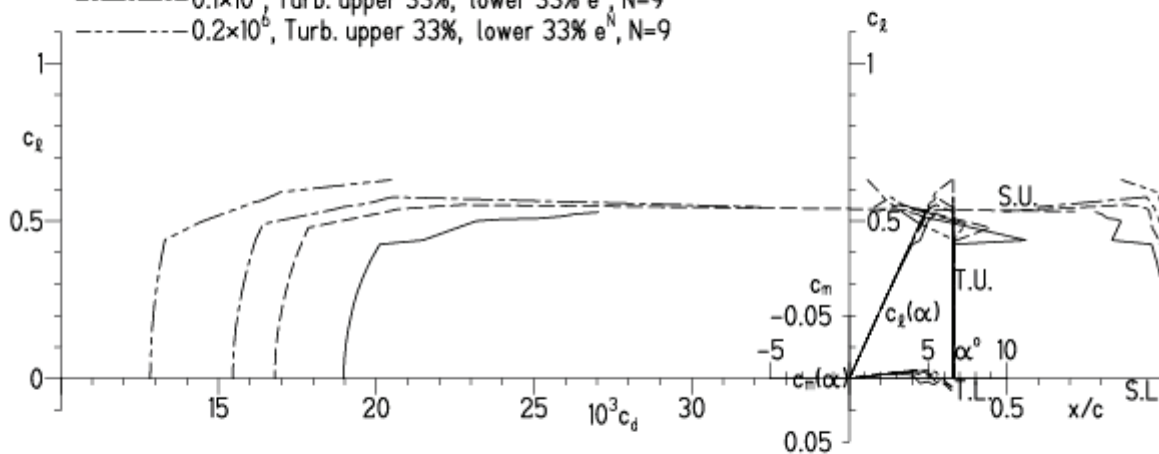


EPPLER 2005 V. 8.5.07 RUN 17.3.13 18:23

HQ-0/12 12%

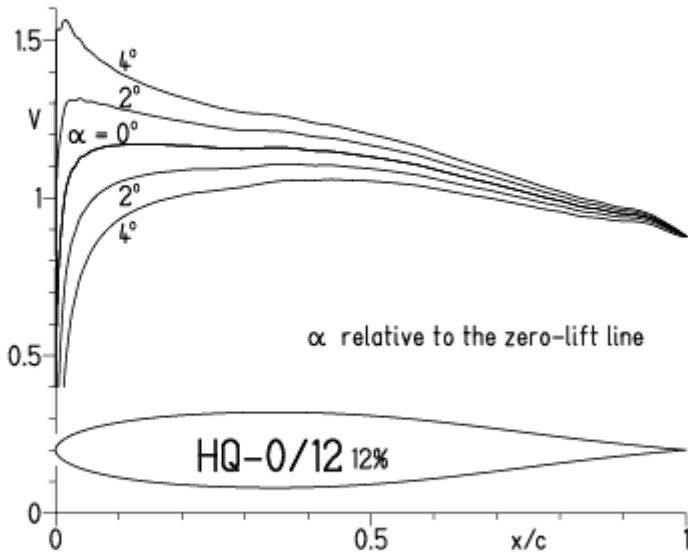
- Re = 50 000, Turb. upper 33%, lower 33% e^N , N=9
- - - 75 000, Turb. upper 33%, lower 33% e^N , N=9
- · - 0.1 × 10⁶, Turb. upper 33%, lower 33% e^N , N=9
- · · - 0.2 × 10⁶, Turb. upper 33%, lower 33% e^N , N=9

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface

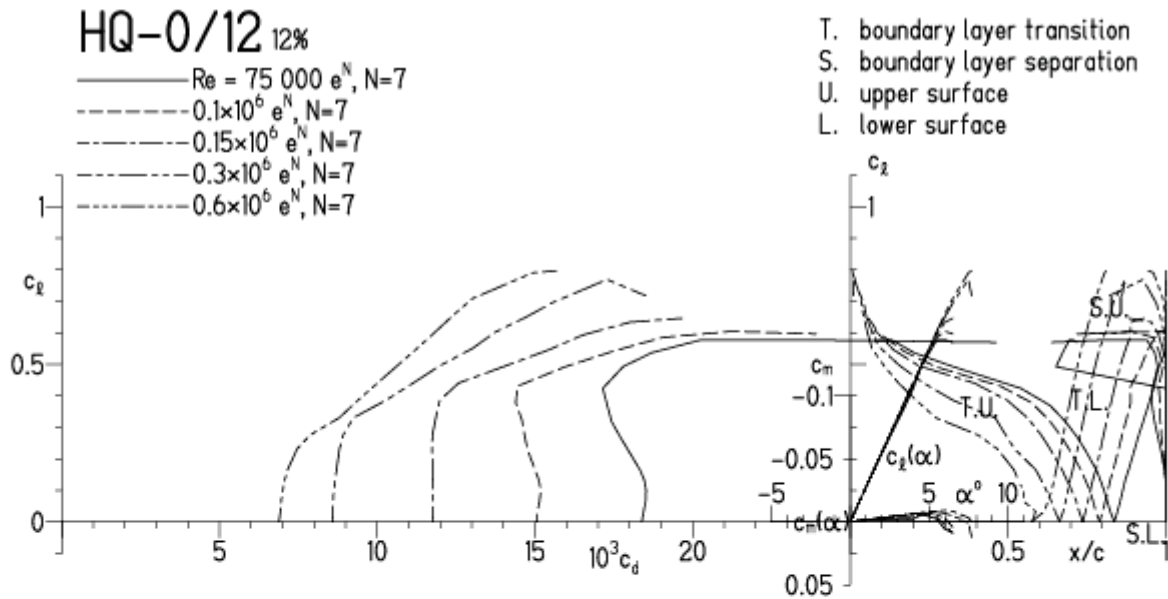


HQ/W-0/12, N=7

EPPLER 2005 V. 8.5.07 RUN 17.3.13 18:39

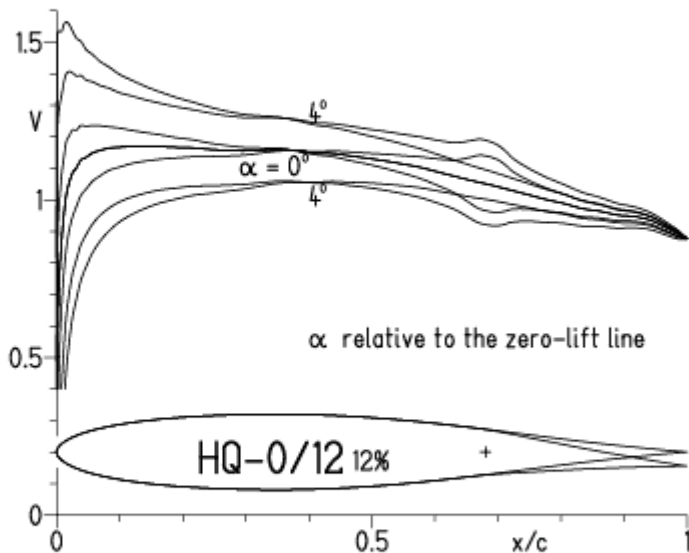


EPPLER 2005 V. 8.5.07 RUN 17.3.13 18:39

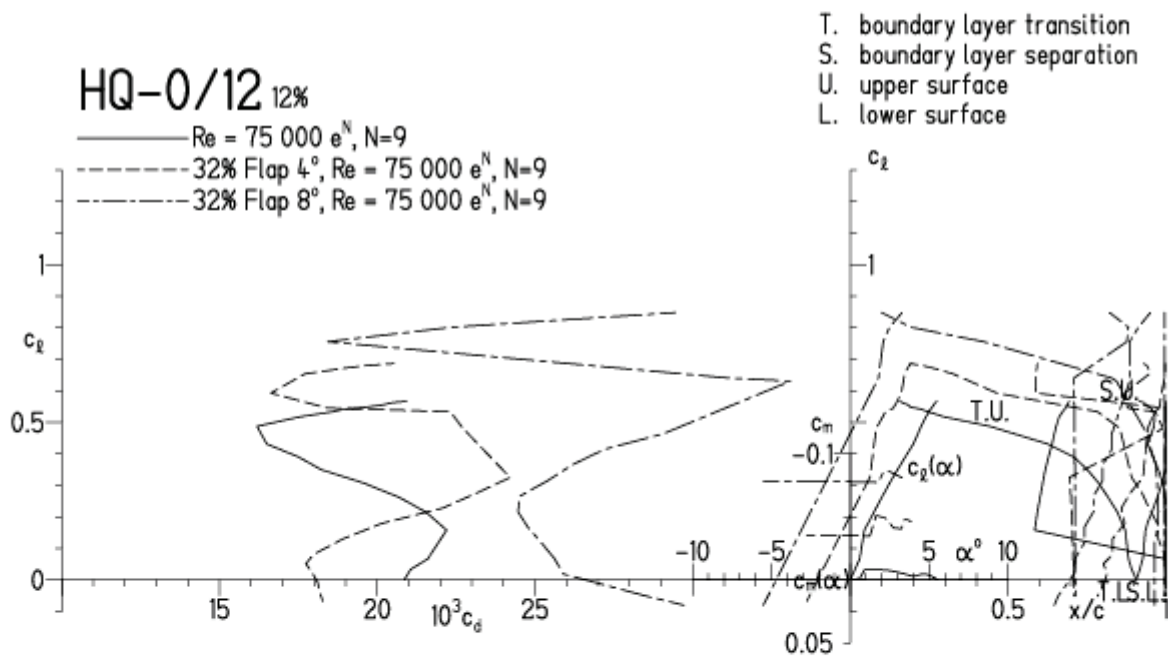


HQW-0/12, N=9, Ruder mit 32% von l, niedrige Re

EPPLER 2005 V. 8.5.07 RUN 17.3.13 19:31

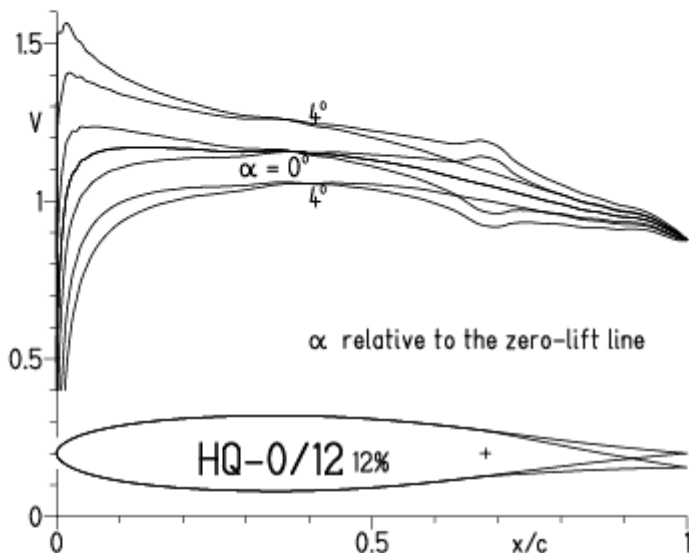


EPPLER 2005 V. 8.5.07 RUN 17.3.13 19:31

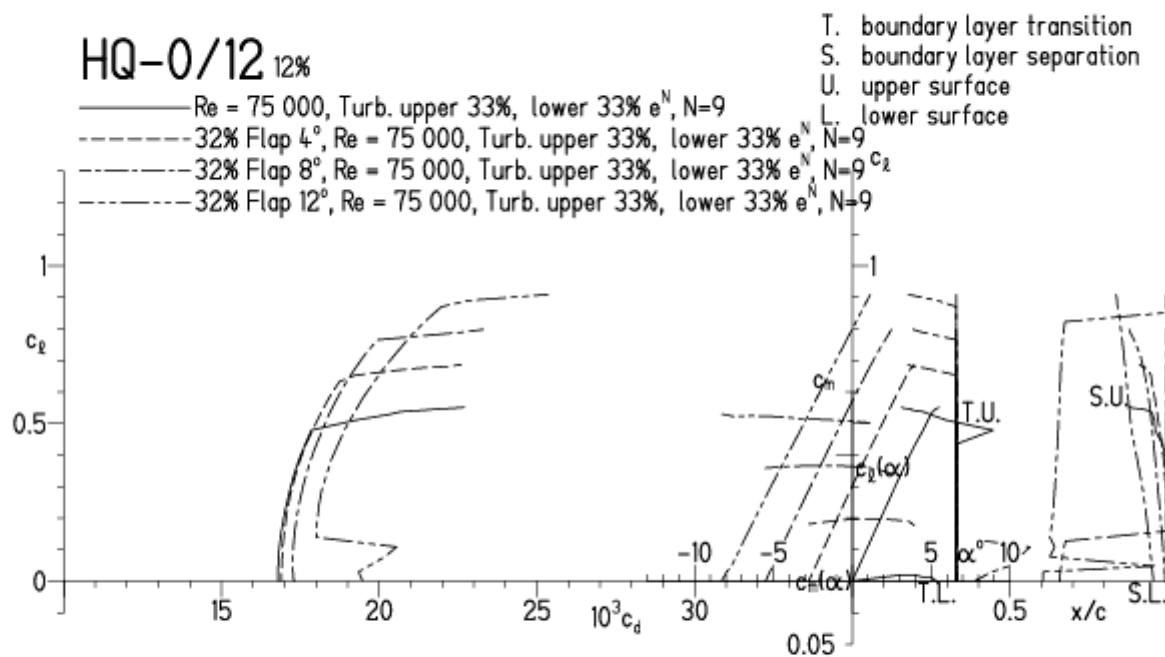


HQ-0/12, N=9, Re = 75 000, Ruder mit 32% von I, Turbulatoreffekt
 Doppelseitig erforderlich bei kleinen Re-Zahlen und geringen Höhenleitwerkstiefen

EPPLER 2005 V. 8.5.07 RUN 17.3.13 18:50

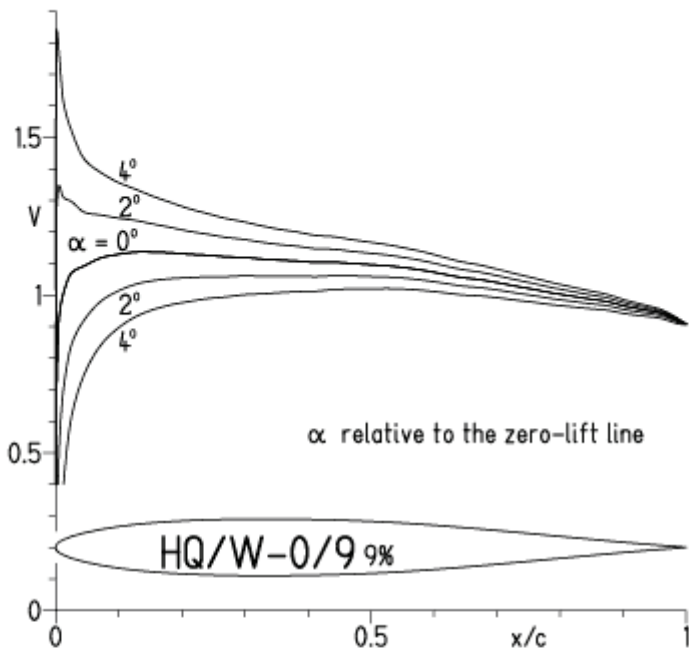


EPPLER 2005 V. 8.5.07 RUN 17.3.13 18:50

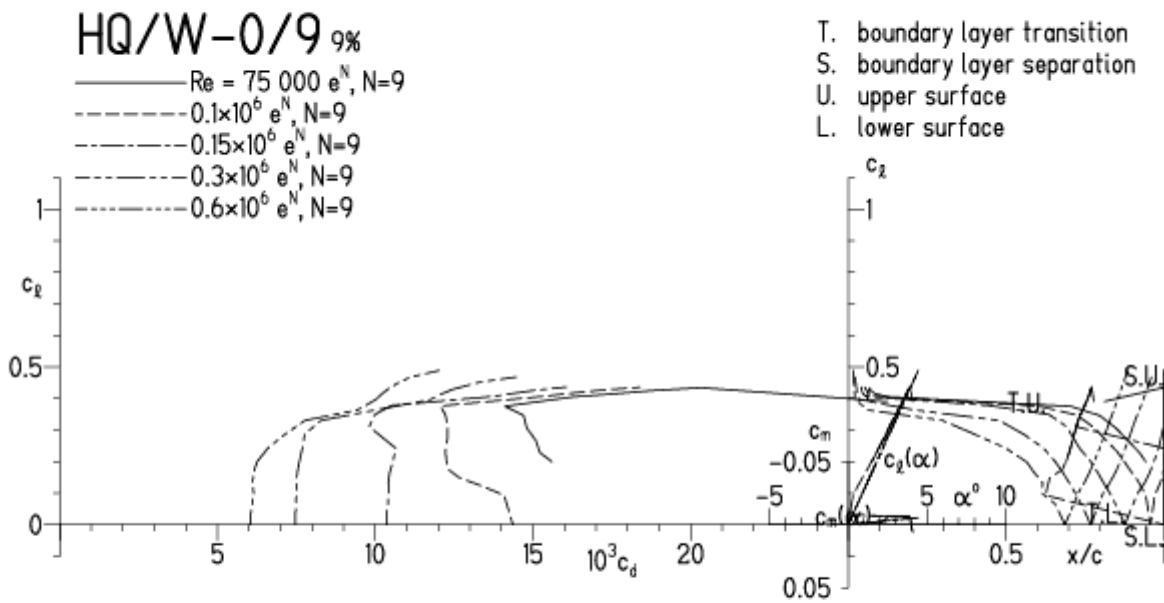


HQ-0/9, N=9

EPPLER 2005 V. 8.5.07 RUN 18.3.13 10:48



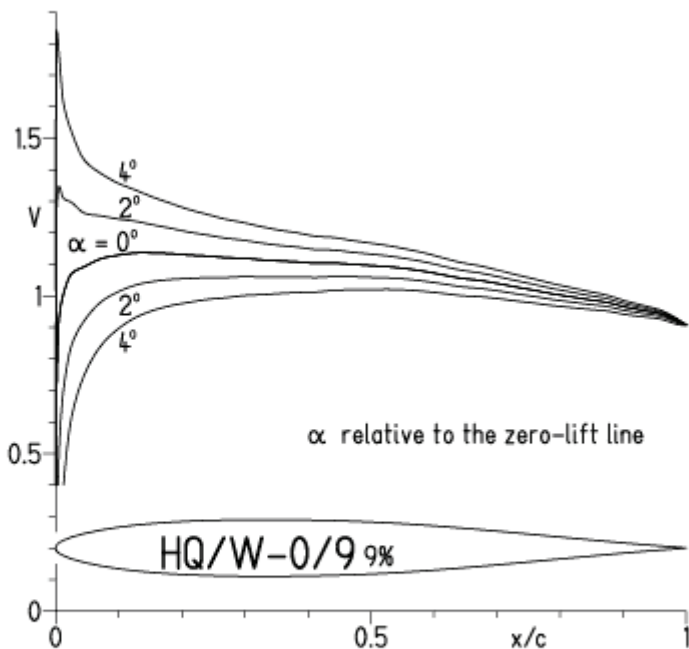
EPPLER 2005 V. 8.5.07 RUN 18.3.13 10:48



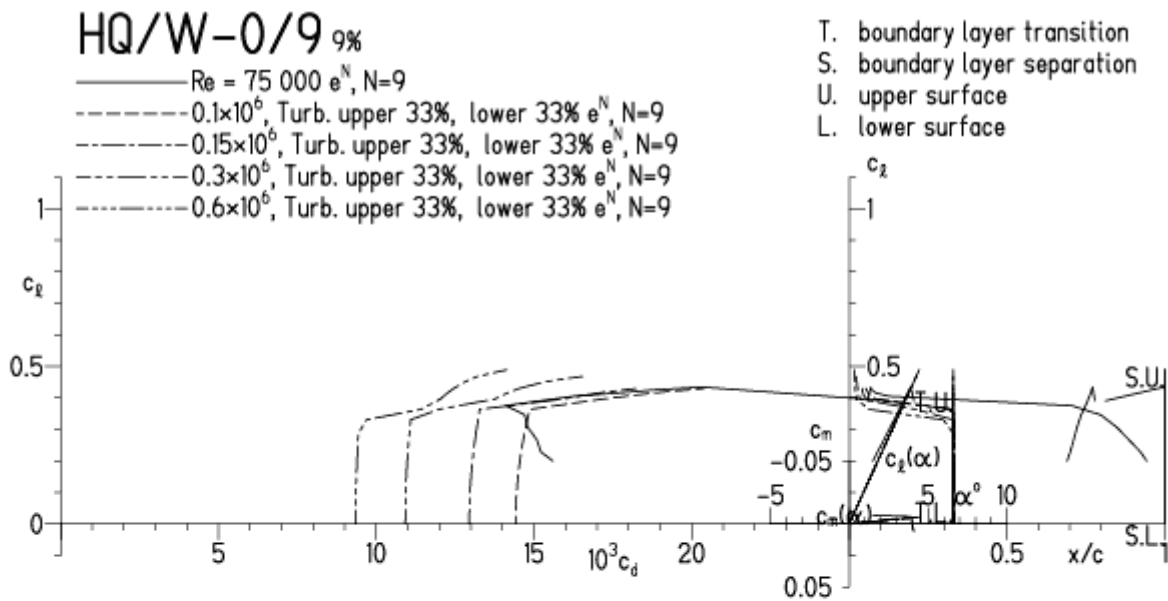
HQ/W-0/9, N=9, Turbulatoreffekt

Doppelseitig erforderlich bei kleinen Re-Zahlen und geringen Höhenleitwerkstiefen

EPPLER 2005 V. 8.5.07 RUN 18.3.13 10:55

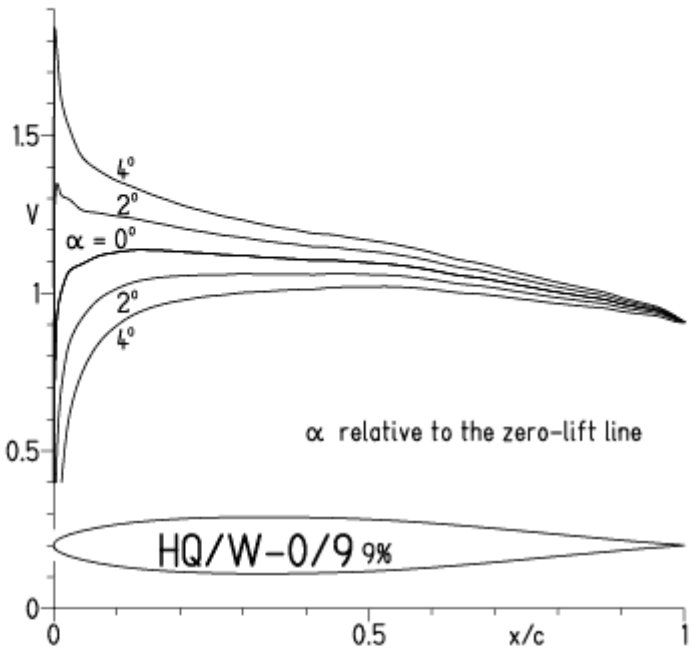


EPPLER 2005 V. 8.5.07 RUN 18.3.13 10:55

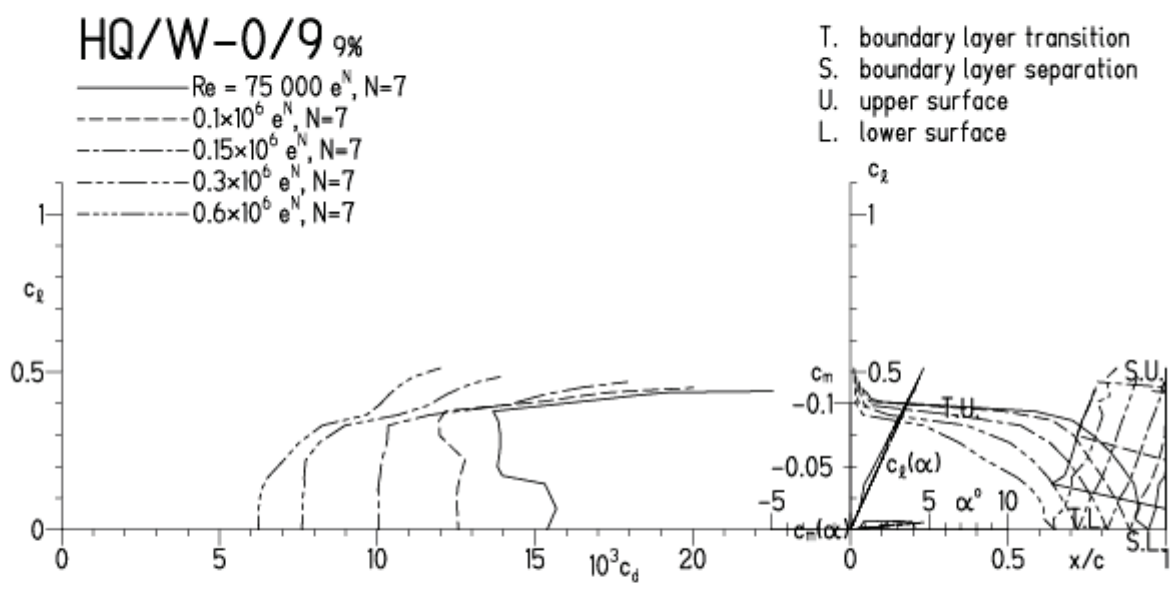


HQ/W-0/9, N=7

EPPLER 2005 V. 8.5.07 RUN 18.3.13 11:06



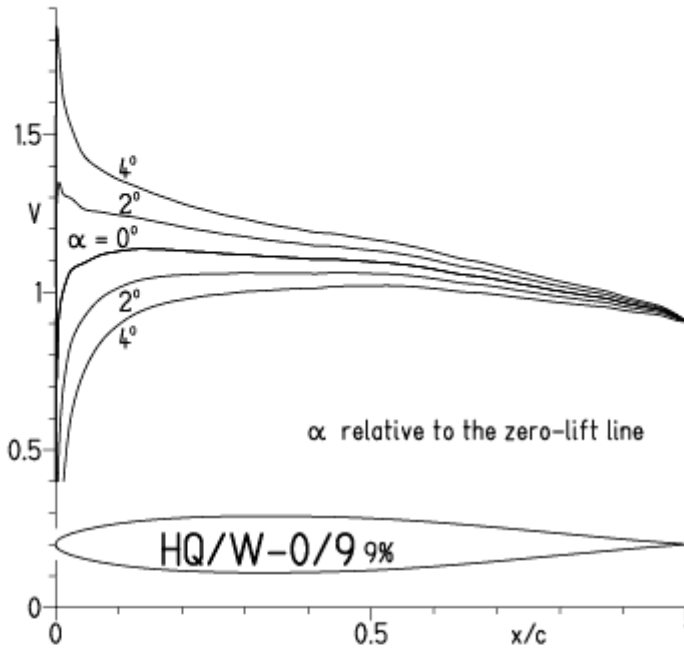
EPPLER 2005 V. 8.5.07 RUN 18.3.13 11:



HQ/W-0/9, N=7, Turbulatoreffekt

Doppelseitig erforderlich bei kleinen Re-Zahlen und geringen Höhenleitwerkstiefen

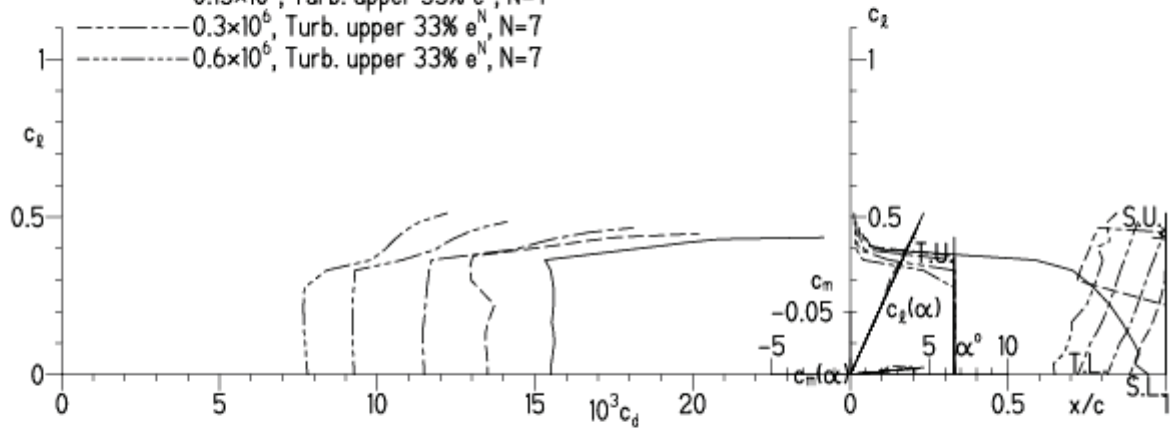
EPPLER 2005 V. 8.5.07 RUN 18.3.13 11:09



EPPLER 2005 V. 8.5.07 RUN 18.3.13 11:09

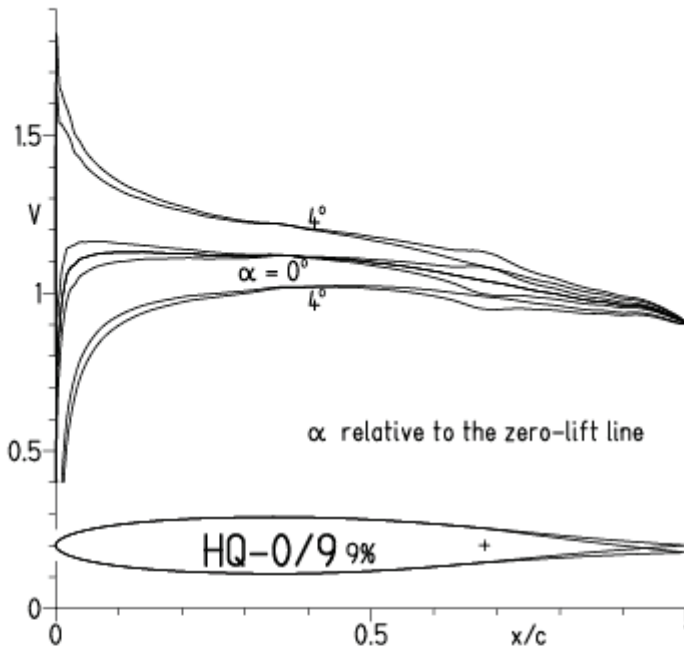
HQ/W-0/9 9%

- Re = 75 000, Turb. lower 33% e^N, N=7
- - - 0.1×10⁶, Turb. upper 33% e^N, N=7
- · - 0.15×10⁶, Turb. upper 33% e^N, N=7
- · · - 0.3×10⁶, Turb. upper 33% e^N, N=7
- · · · 0.6×10⁶, Turb. upper 33% e^N, N=7



HQ/W-0/9, N=9, Re = 75 000, Ruder mit 32% von I

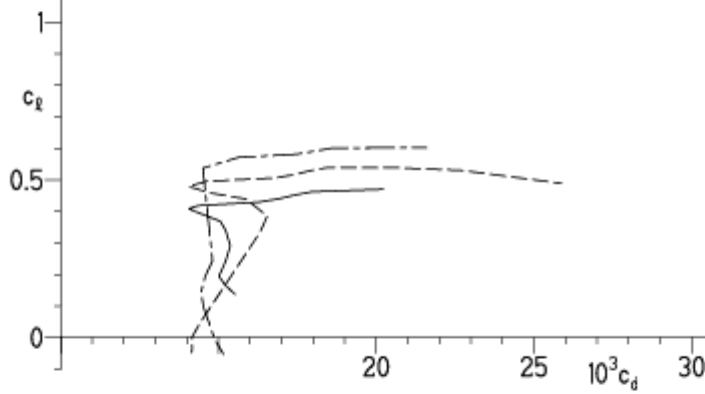
EPPLER 2005 V. 8.5.07 RUN 18.3.13 11:19



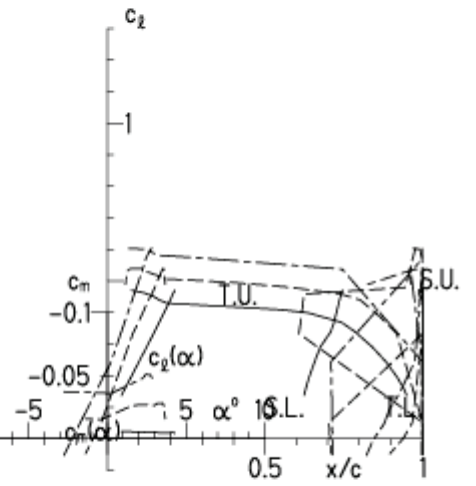
EPPLER 2005 V. 8.5.07 RUN 18.3.13 11:19

HQ-0/9 9%

- Re = 75 000 e^N, N=9
- - - 32% Flap 2°, Re = 75 000 e^N, N=9
- · - 32% Flap 4°, Re = 75 000 e^N, N=9

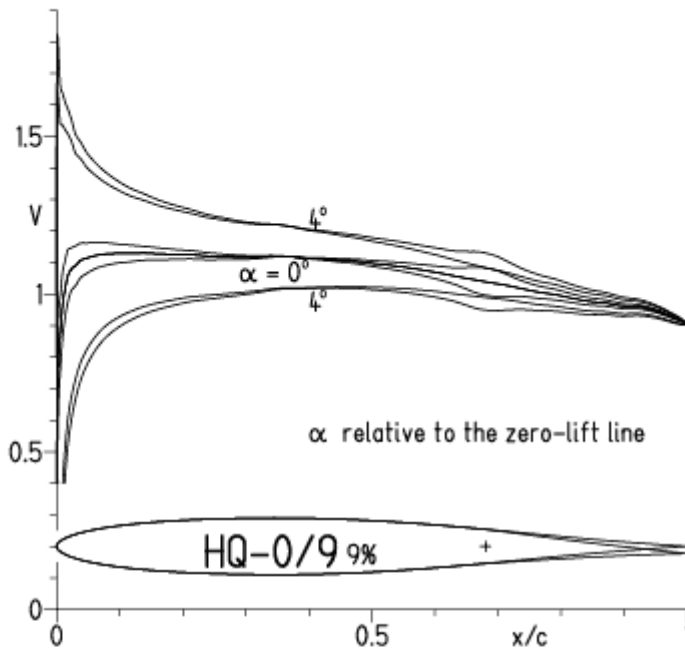


- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface

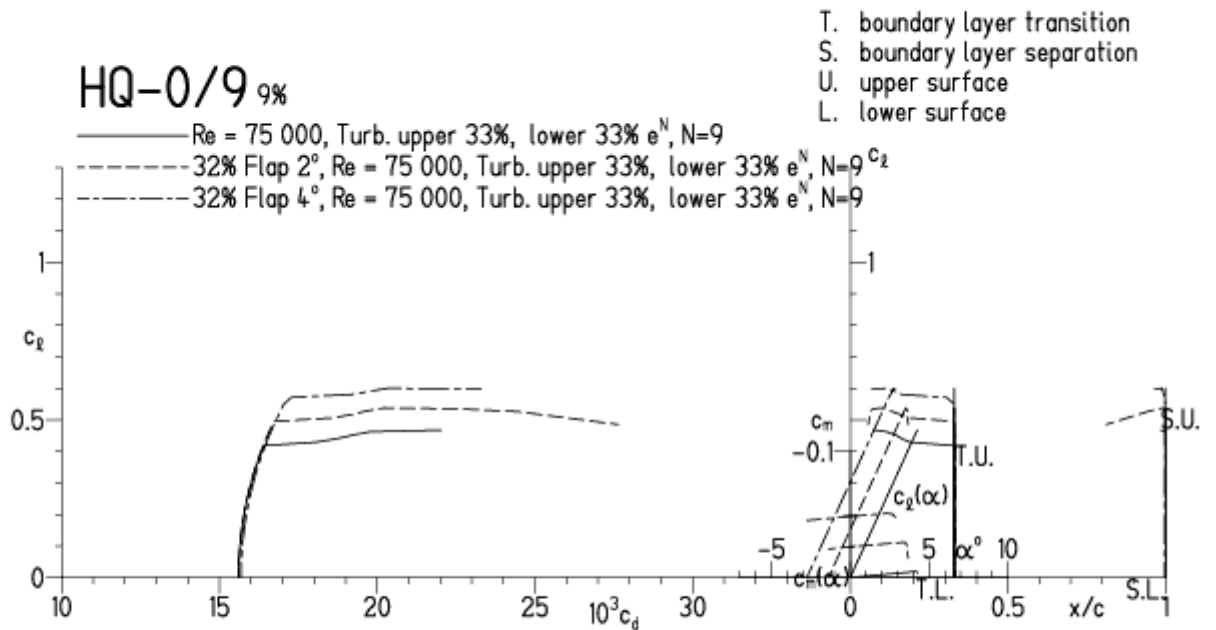


HQ/W-0/9, N=9, Re = 75 000, Ruder mit 32% von I, Turbulatoreffekt
 Doppelseitig erforderlich bei kleinen Re-Zahlen und geringen Leitwerkstiefen

EPPLER 2005 V. 8.5.07 RUN 18.3.13 11:23

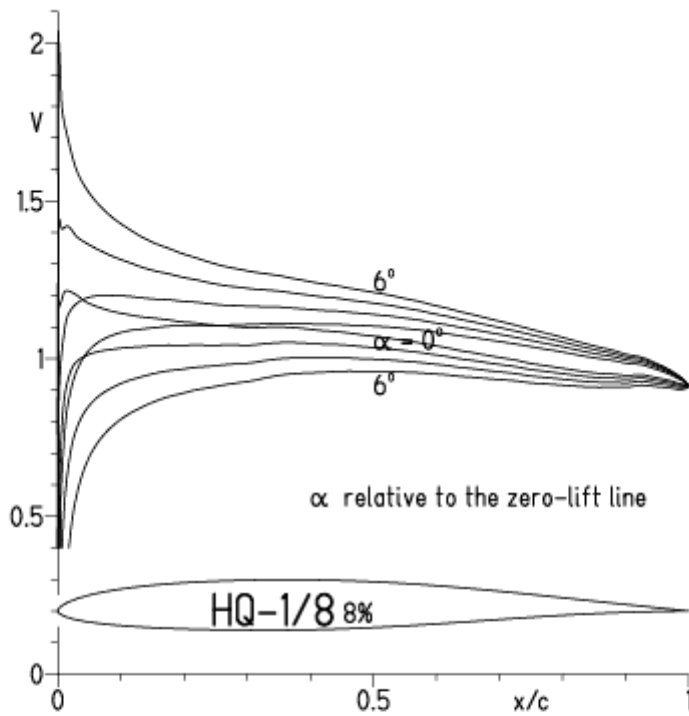


EPPLER 2005 V. 8.5.07 RUN 18.3.13 11:23



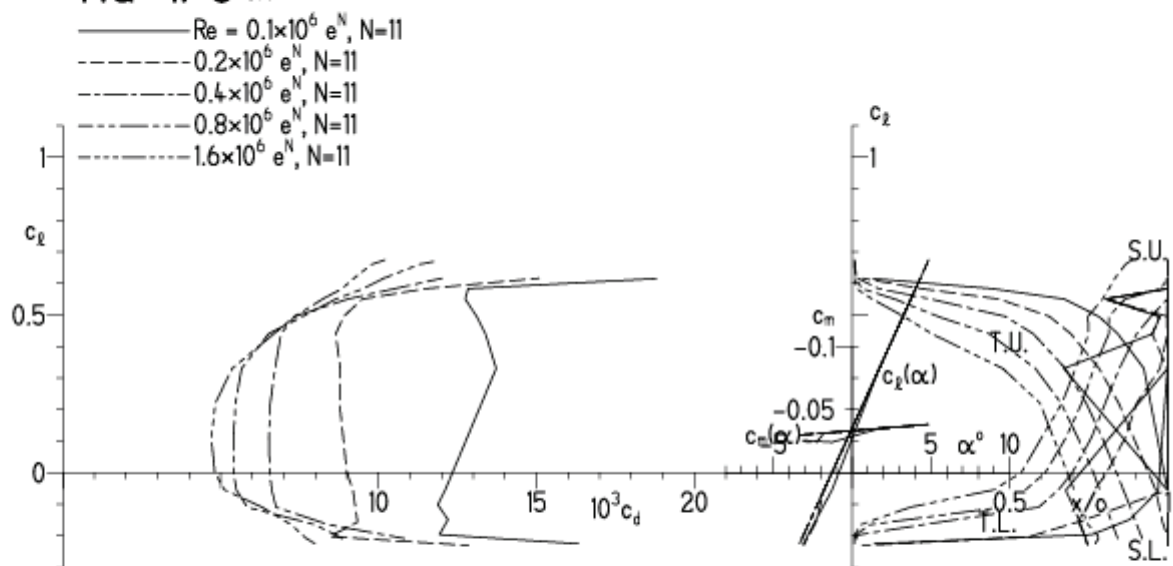
HQ-1/8, N=11

EPPLER 2005 V. 8.5.07 RUN 18.3.13 11:48



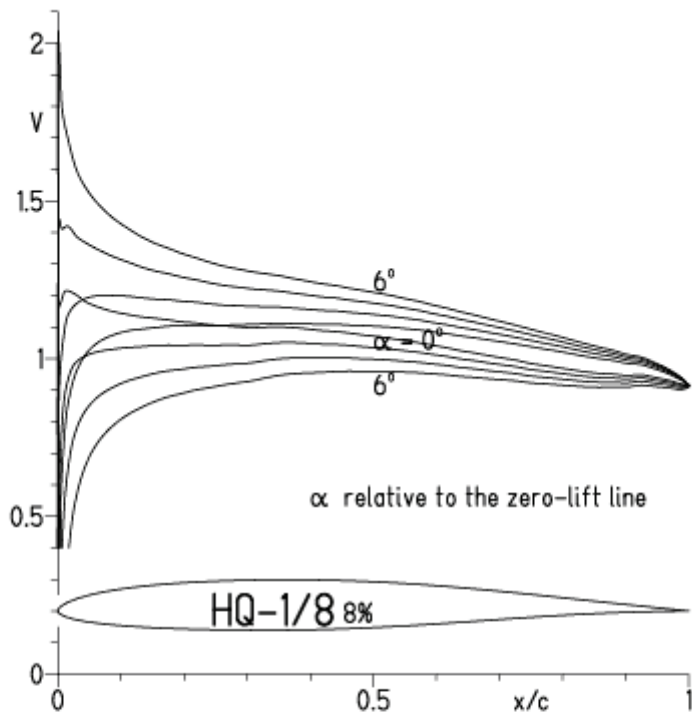
EPPLER 2005 V. 8.5.07 RUN 18.3.13 11:48

HQ-1/8 8%



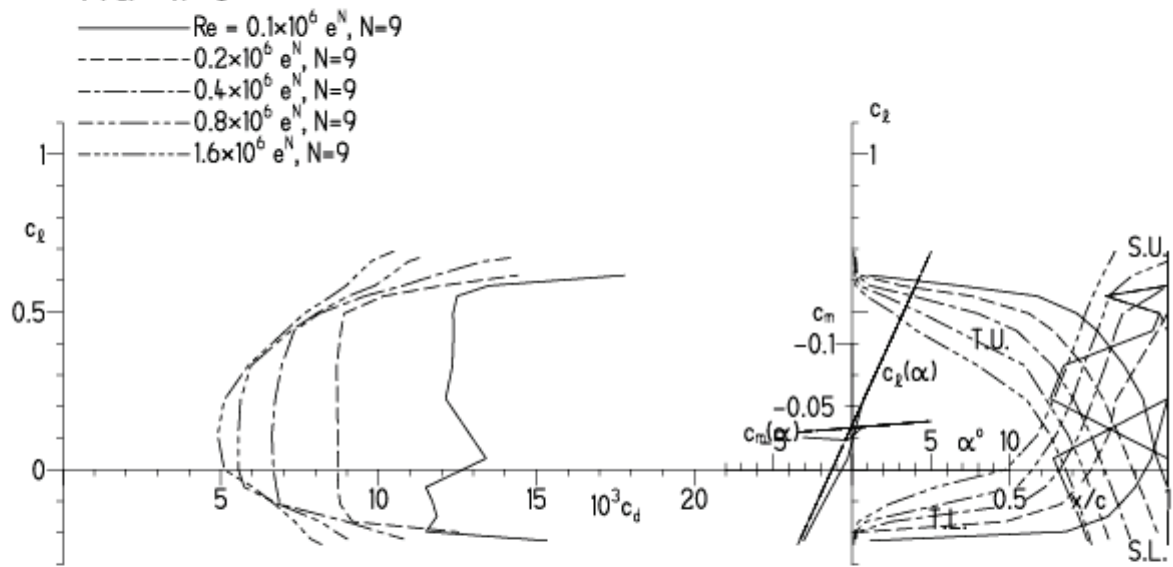
HQ-1/8, N=9

EPPLER 2005 V. 8.5.07 RUN 18.3.13 11:57



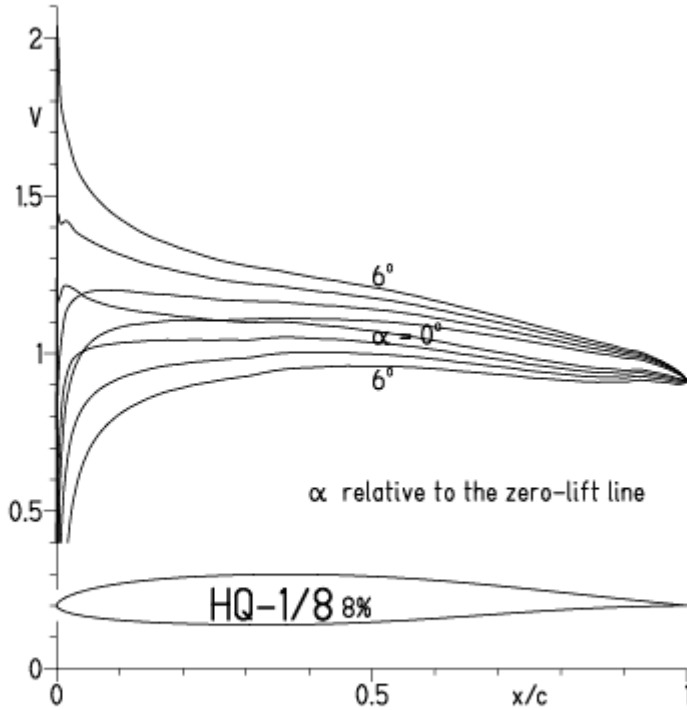
EPPLER 2005 V.

HQ-1/8 8%



HQ -1/8, N=9, Turbulatoreffekt (optimal bei 45 – 55 % von l)

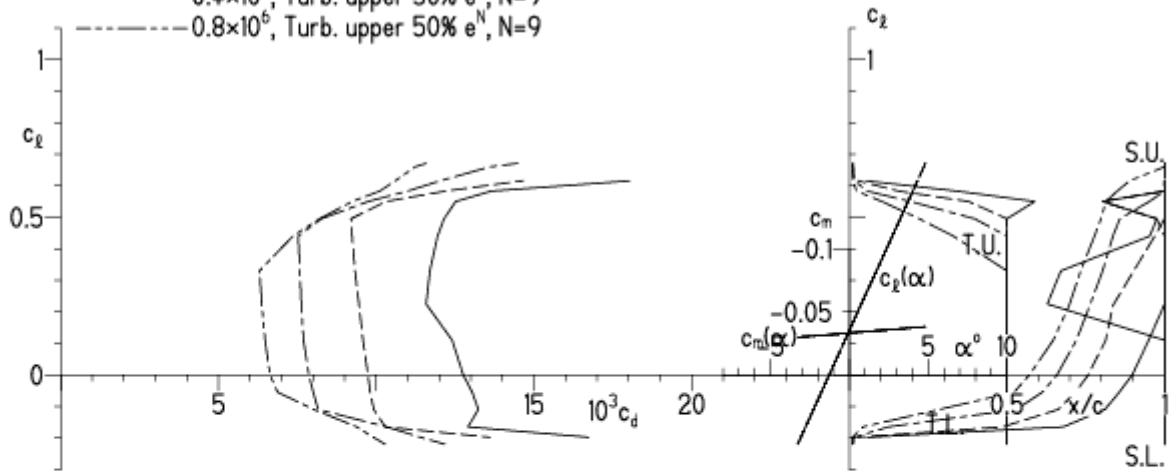
EPPLER 2005 V. 8.5.07 RUN 18.3.13 12:09



EPPLER 2005 V

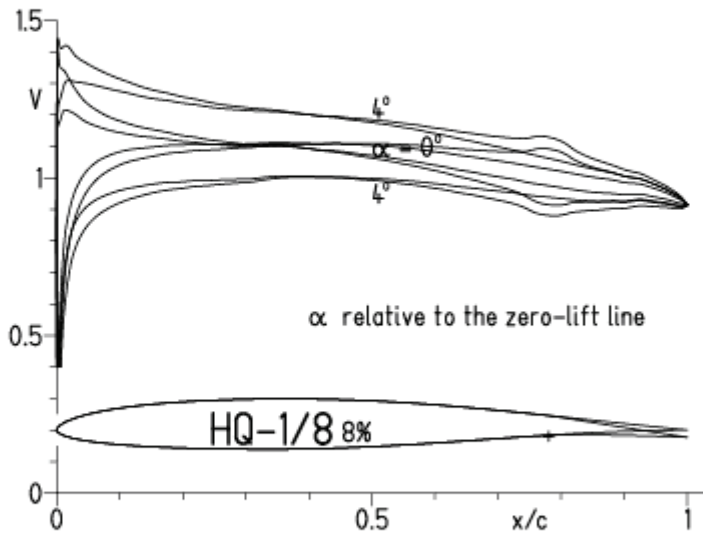
HQ-1/8 8%

- $Re = 0.1 \times 10^6$, Turb. upper 50% e^N , N=9
- - - 0.2×10^6 , Turb. upper 50% e^N , N=9
- · - 0.4×10^6 , Turb. upper 50% e^N , N=9
- - - 0.8×10^6 , Turb. upper 50% e^N , N=9



HQ-1,5/8, N=11, mit +3° Wölbklappenausschlag

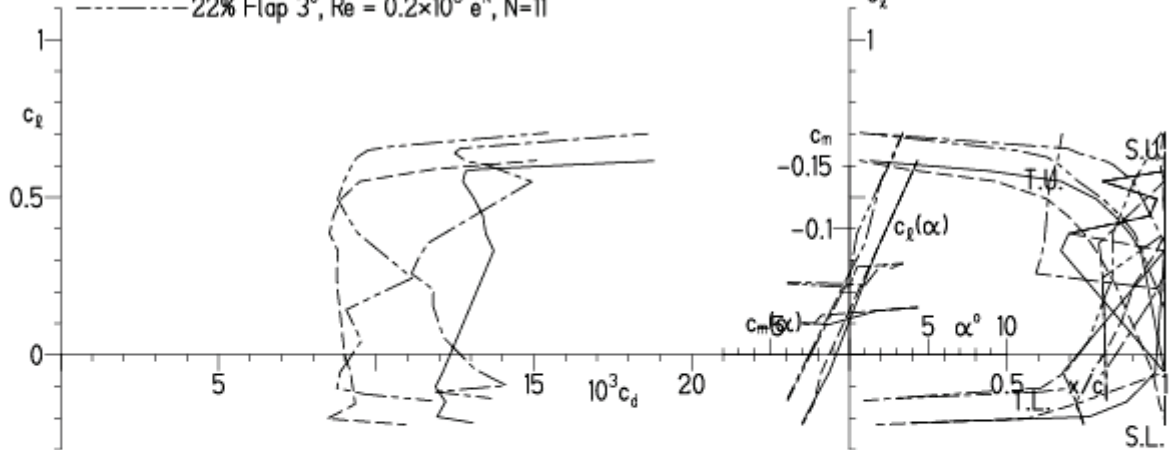
EPPLER 2005 V. 8.5.07 RUN 18.3.13 12:19



EPPLER 2005 V. 8.5.07 RUN 18.3.13 12:19

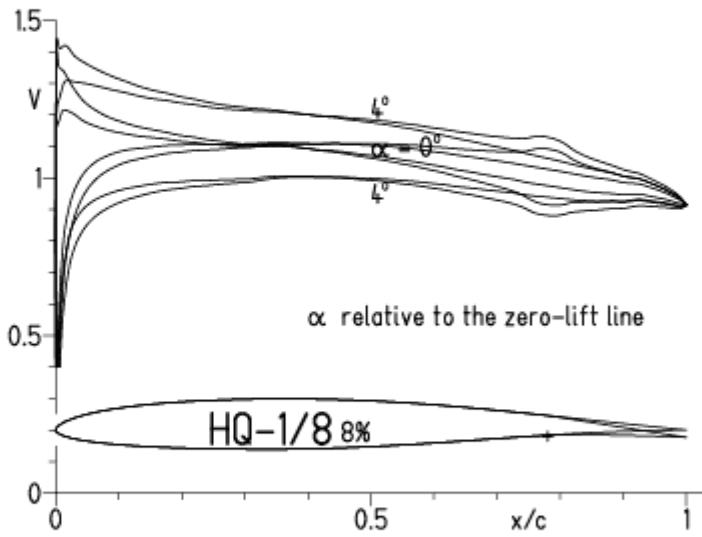
HQ-1/8 8%

- $Re = 0.1 \times 10^6 e^N, N=11$
- - - $0.2 \times 10^6 e^N, N=11$
- · - · 22% Flap 3°, $Re = 0.1 \times 10^6 e^N, N=11$
- · - · 22% Flap 3°, $Re = 0.2 \times 10^6 e^N, N=11$



HQ-1,5/8, N=9, mit +3° Wölbklappenausschlag

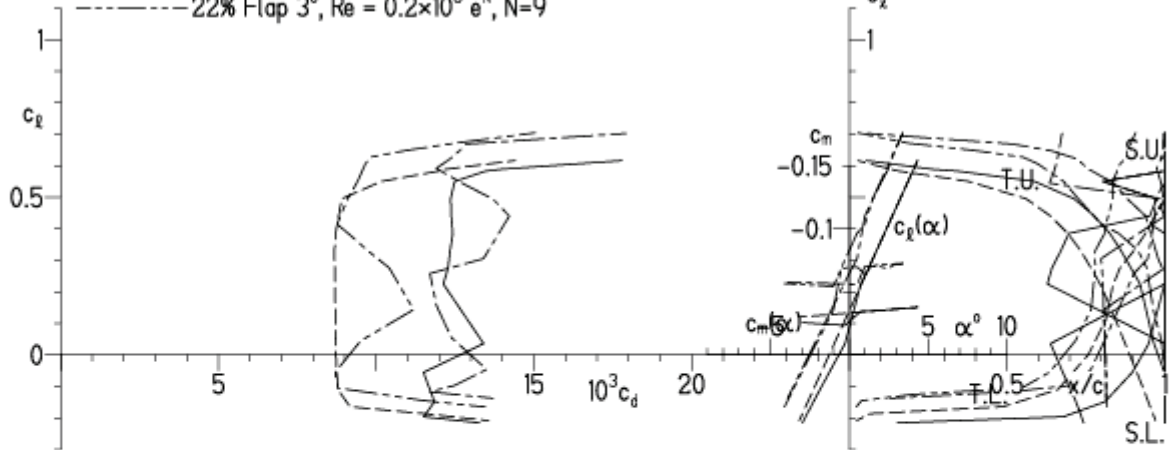
EPPLER 2005 V. 8.5.07 RUN 18.3.13 12:28



EPPLER 2005 V. 8.5.07 RUN 18.3.13 12:28

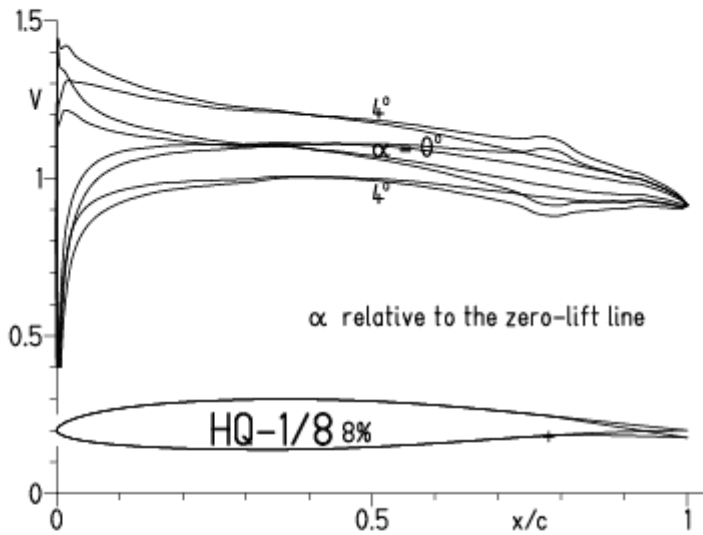
HQ-1/8 8%

- $Re = 0.1 \times 10^6 e^N, N=9$
- - - $0.2 \times 10^6 e^N, N=9$
- · - · 22% Flap 3°, $Re = 0.1 \times 10^6 e^N, N=9$
- · - · 22% Flap 3°, $Re = 0.2 \times 10^6 e^N, N=9$



HQ-1/8, N=9, mit +3° Wölbklappenausschlag, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

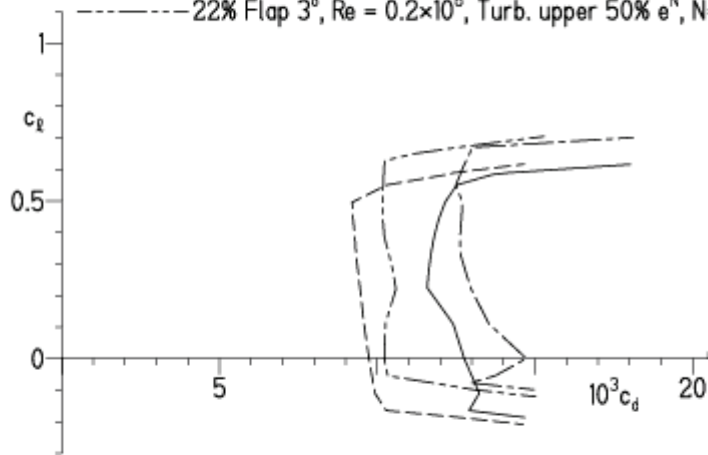
EPPLER 2005 V. 8.5.07 RUN 18.3.13 12:25



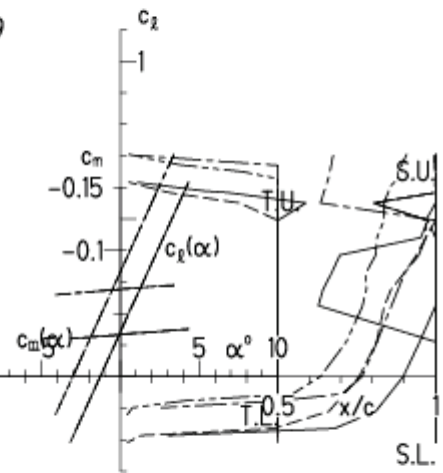
EPPLER 2005 V. 8.5.07 RUN 18.3.13 12:25

HQ-1/8 8%

- Re = 0.1×10^6 , Turb. upper 50% e^N, N=9
- - - Re = 0.2×10^6 , Turb. upper 50% e^N, N=9
- · - 22% Flap 3°, Re = 0.1×10^6 , Turb. upper 50% e^N, N=9
- · - 22% Flap 3°, Re = 0.2×10^6 , Turb. upper 50% e^N, N=9

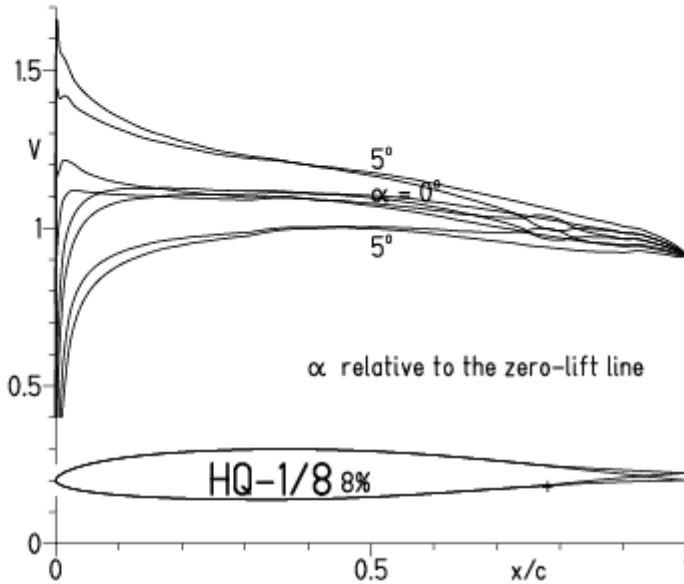


- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ/W-1/8, N=11, mit -3° Wölbklappenausschlag
 (Segelmodelle haben damit das Potential für hohe Endgeschwindigkeiten)

EPPLER 2005 V. 8.5.07 RUN 18.3.13 12:47

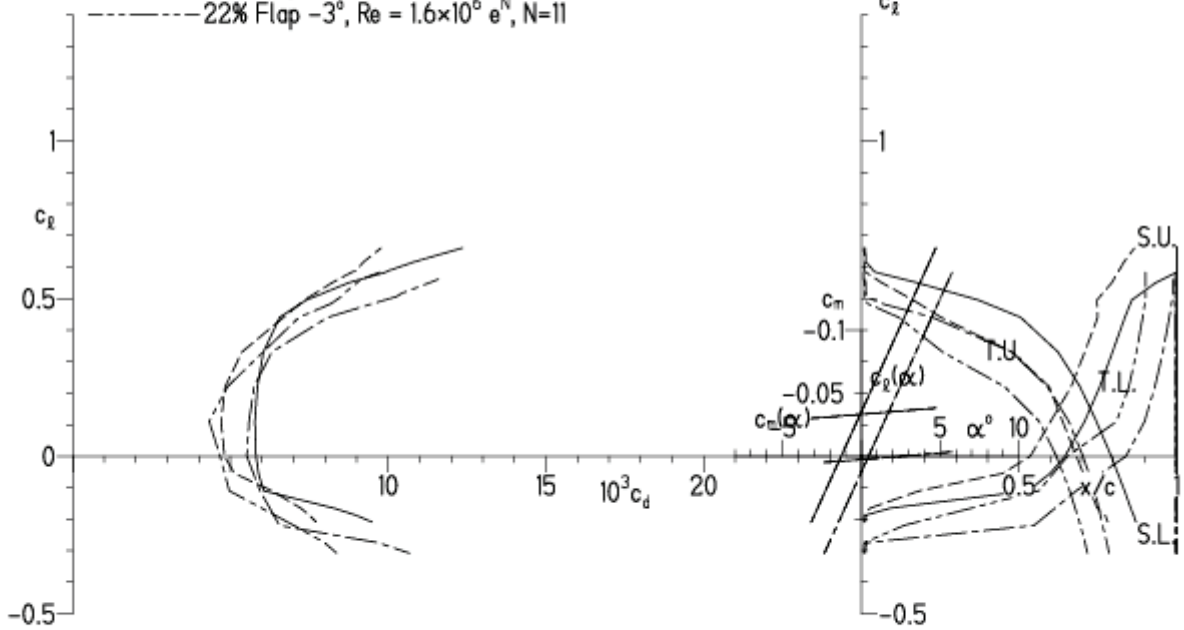


EPPLER 2005 V.

HQ-1/8 8%

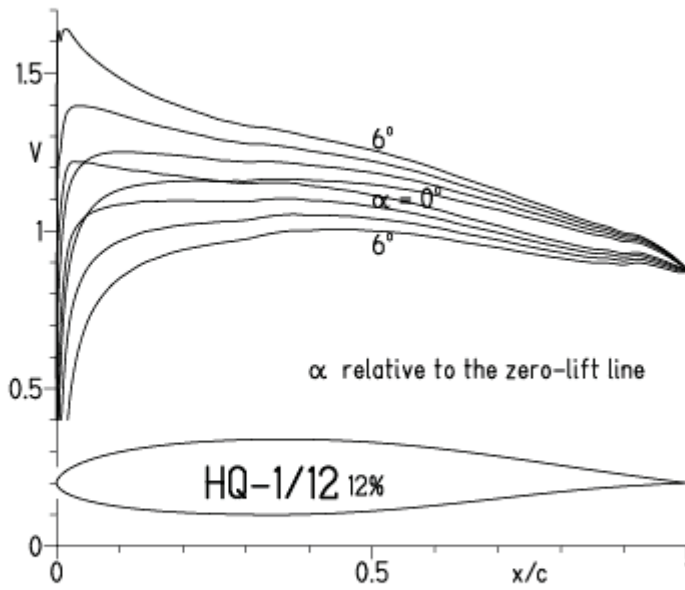
- Re = 0.6×10^6 e^N, N=11
- - - - 1.6×10^6 e^N, N=11
- · - · - 22% Flap -3°, Re = 0.6×10^6 e^N, N=11
- · - · - 22% Flap -3°, Re = 1.6×10^6 e^N, N=11

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface

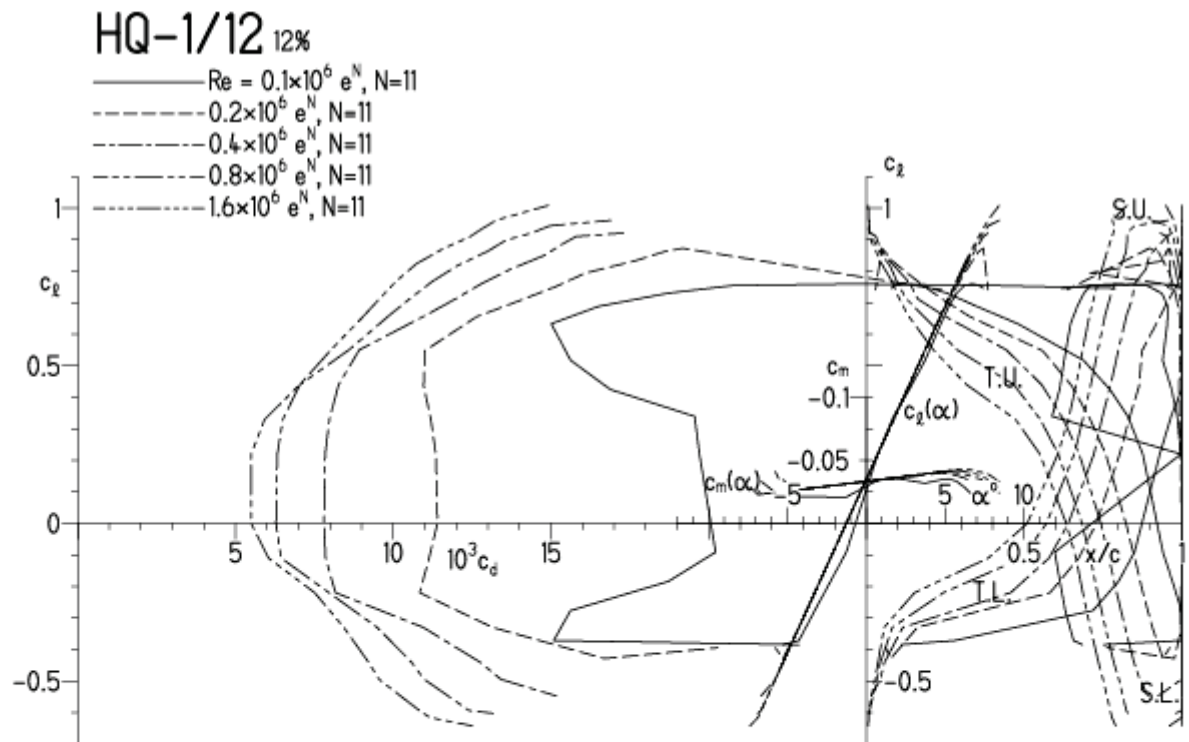


HQ-1/12, N=11

EPPLER 2005 V. 8.5.07 RUN 18.3.13 13:17

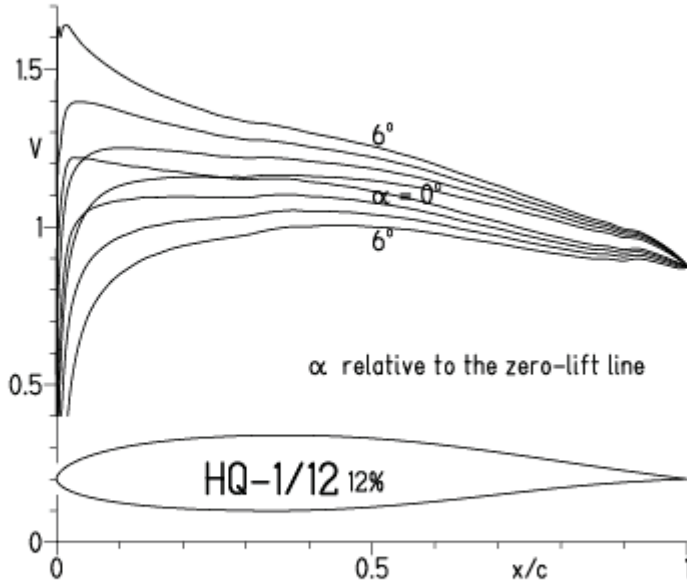


EPPLER 2005 V. 8.

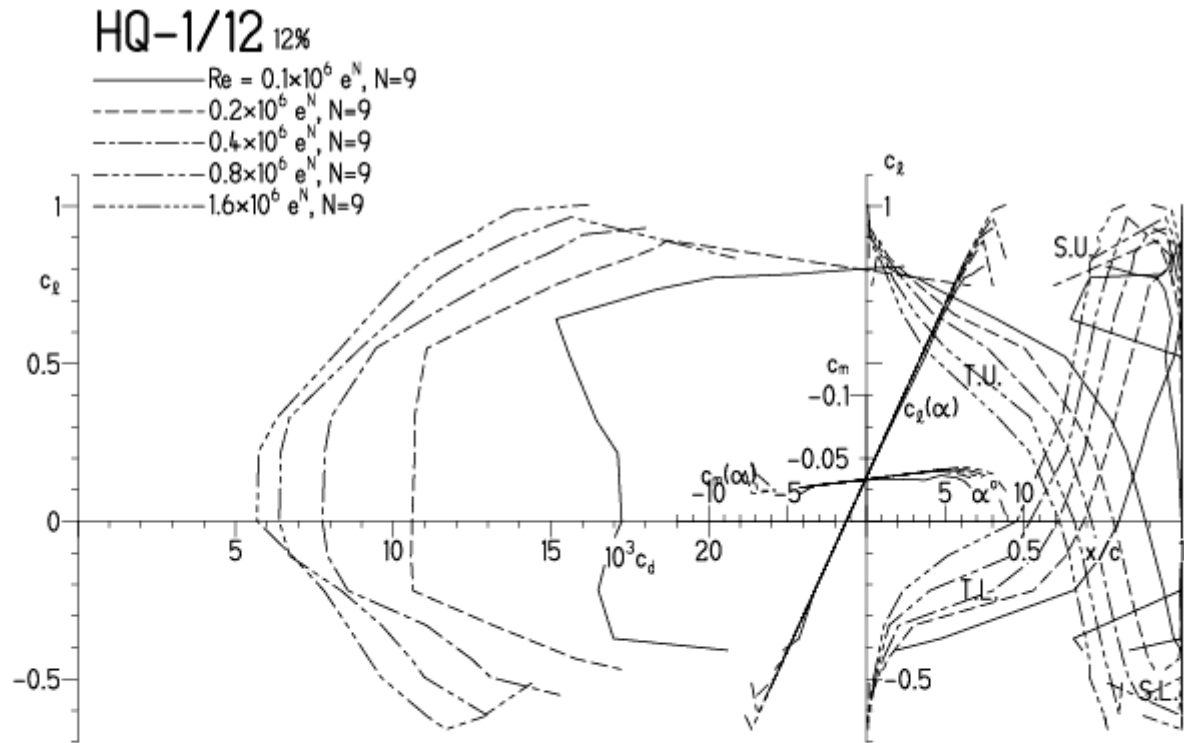


HQ-1/12, N=9

EPPLER 2005 V. 8.5.07 RUN 18.3.13 15:38

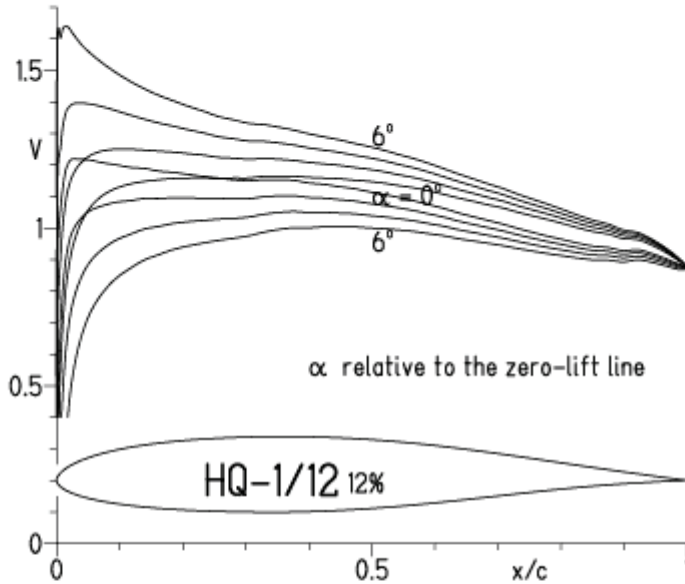


EPPLER 2005 V. 8.5.07 RUN 18.3.13 15:38



HQ-1/12, N=9, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

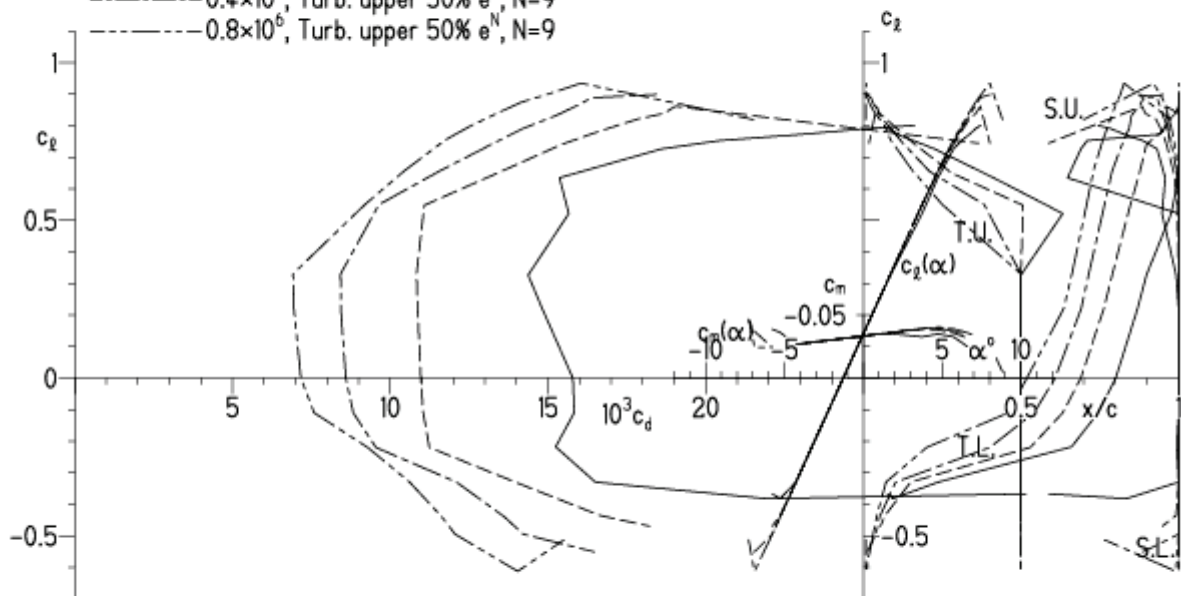
EPPLER 2005 V. 8.5.07 RUN 18.3.13 15:42



EPPLER 2005 V. 8.5.

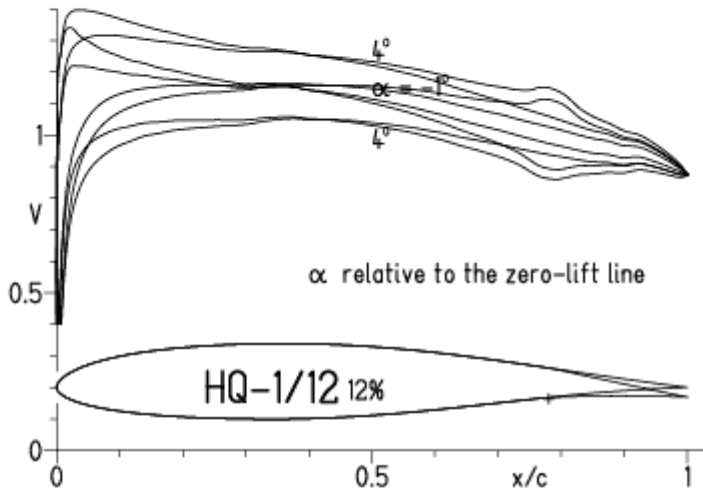
HQ-1/12 12%

- $Re = 0.1 \times 10^6$, Turb. upper 50% e^N , $N=9$
- - - 0.2×10^6 , Turb. upper 50% e^N , $N=9$
- · - 0.4×10^6 , Turb. upper 50% e^N , $N=9$
- - - 0.8×10^6 , Turb. upper 50% e^N , $N=9$

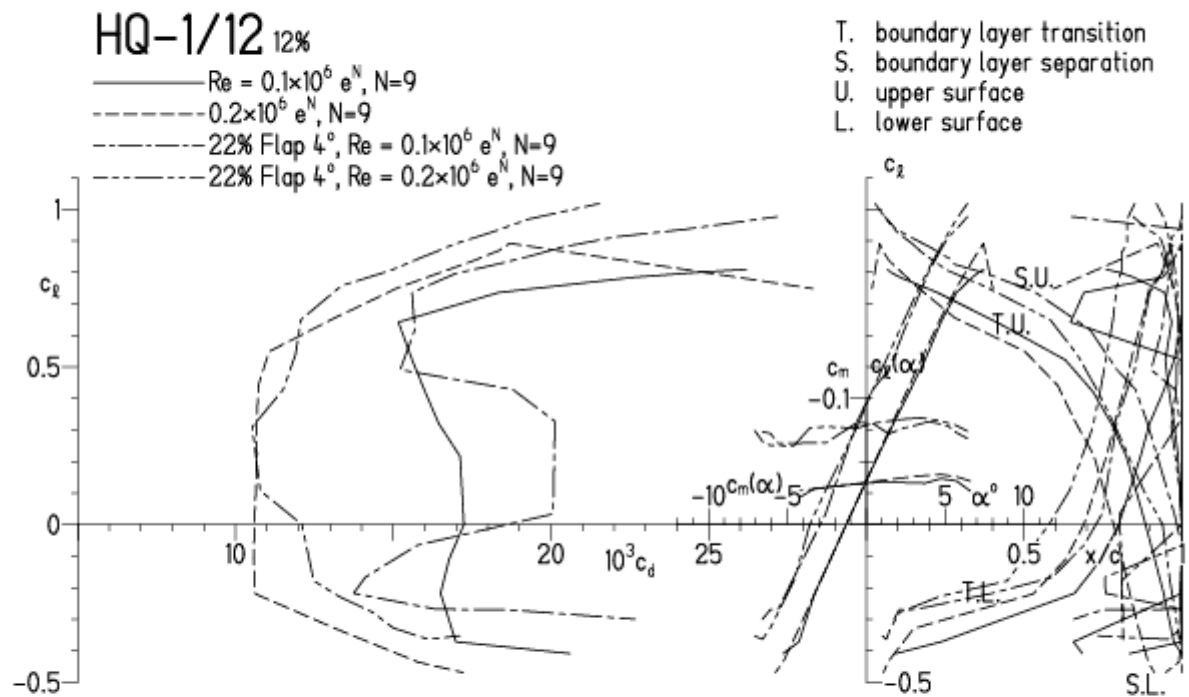


HQ-1/12, N=9, mit +4° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 18.3.13 15:56

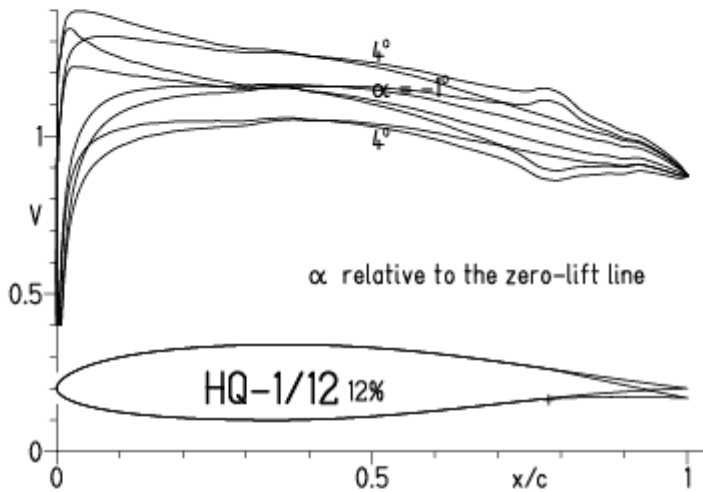


EPPLER 2005 V. 8.5.07 RUN 18.3.13 15:56

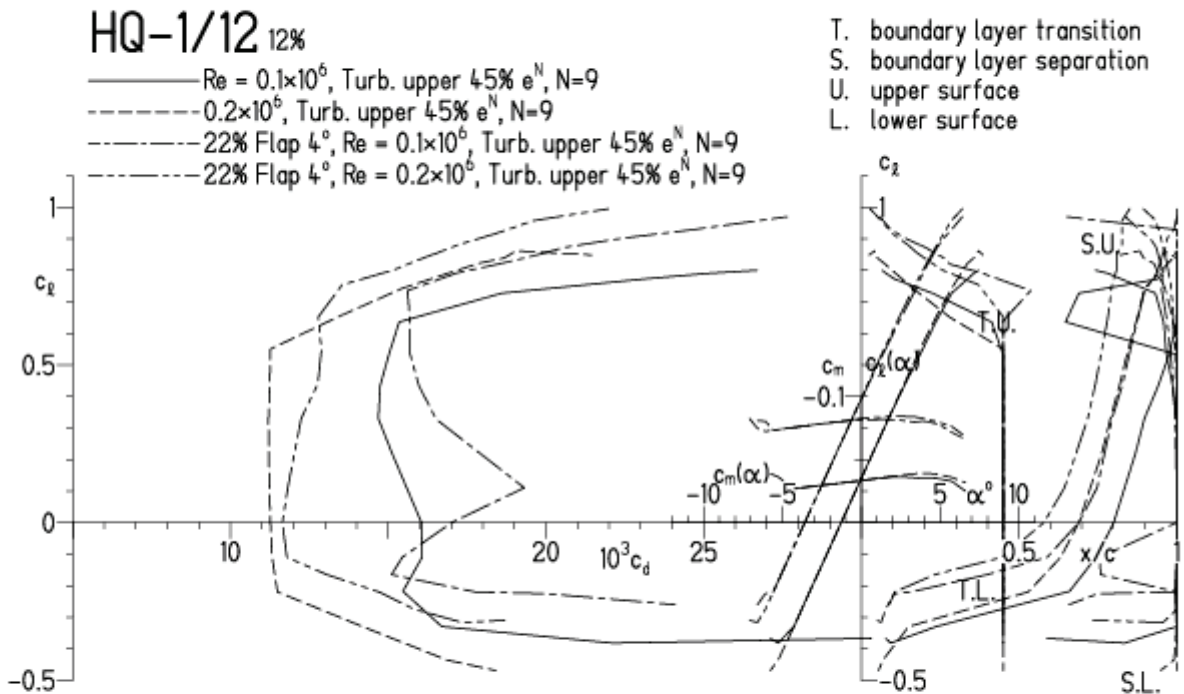


HQ-1/12, N=9, mit +4° Wölbklappenausschlag, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

EPPLER 2005 V. 8.5.07 RUN 18.3.13 16:06

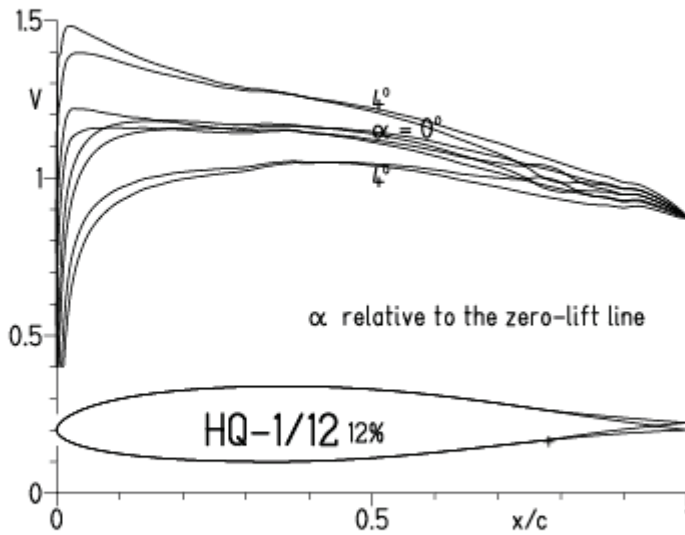


EPPLER 2005 V. 8.5.07 RUN 18.3.13 16:06

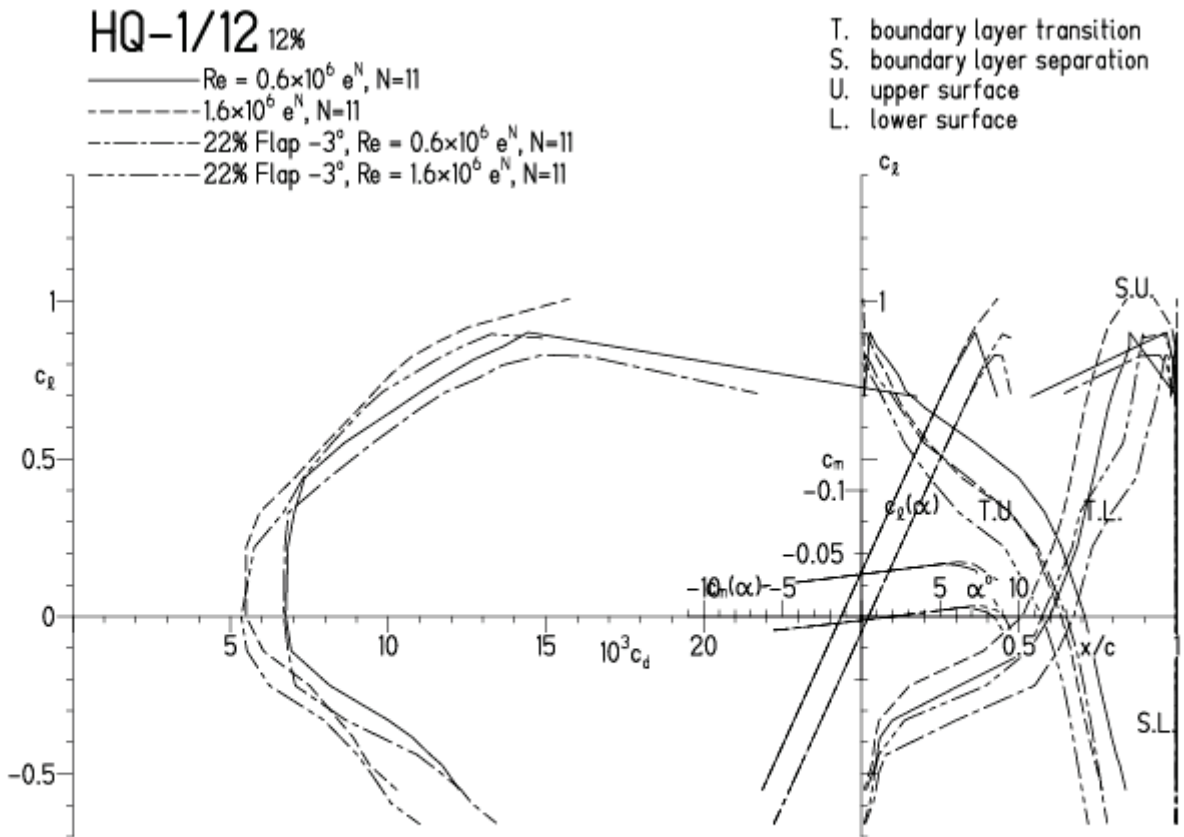


HQ-1/12, N=11, mit -3° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 18.3.13 16:28

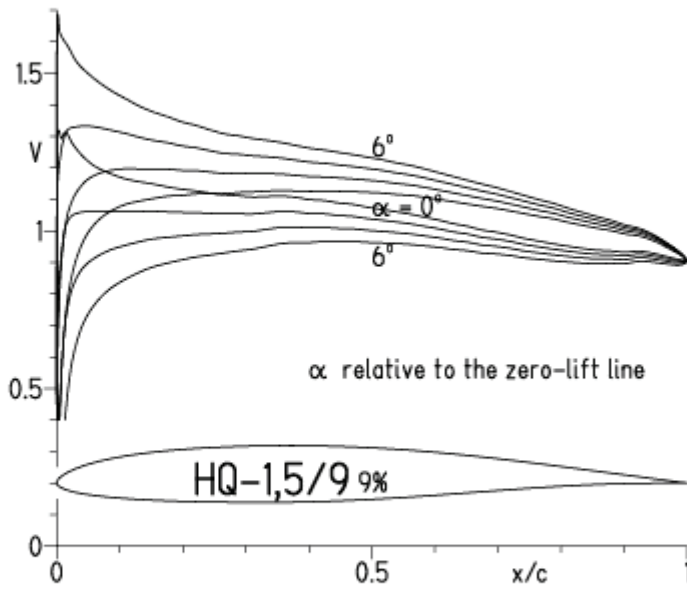


EPPLER 2005 V. 8.5.07 RUN 18.3.13 16:28



HQ-1,5/11, N=11

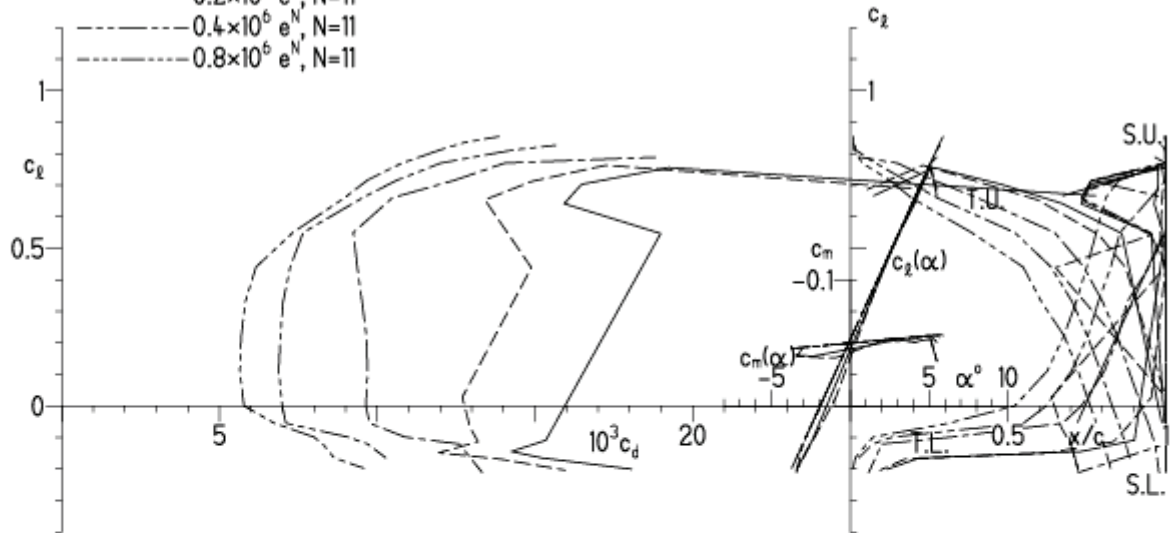
EPPLER 2005 V. 8.5.07 RUN 18.3.13 16:56



EPPLER 2005 V. 8.5.07 RUN 18.3.13 16:56

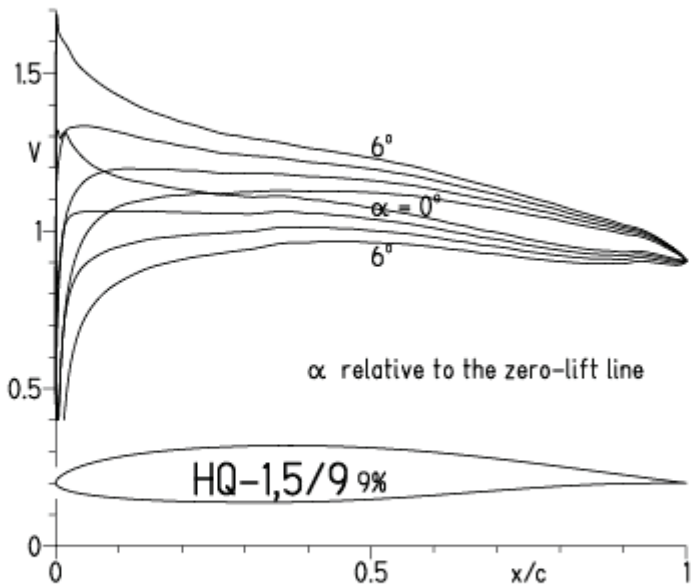
HQ-1,5/9 9%

- $Re = 75\ 000 e^N, N=11$
- - - $0.1 \times 10^6 e^N, N=11$
- · - $0.2 \times 10^6 e^N, N=11$
- · - · $0.4 \times 10^6 e^N, N=11$
- · - · - $0.8 \times 10^6 e^N, N=11$



HQ-1,5/9, N=11

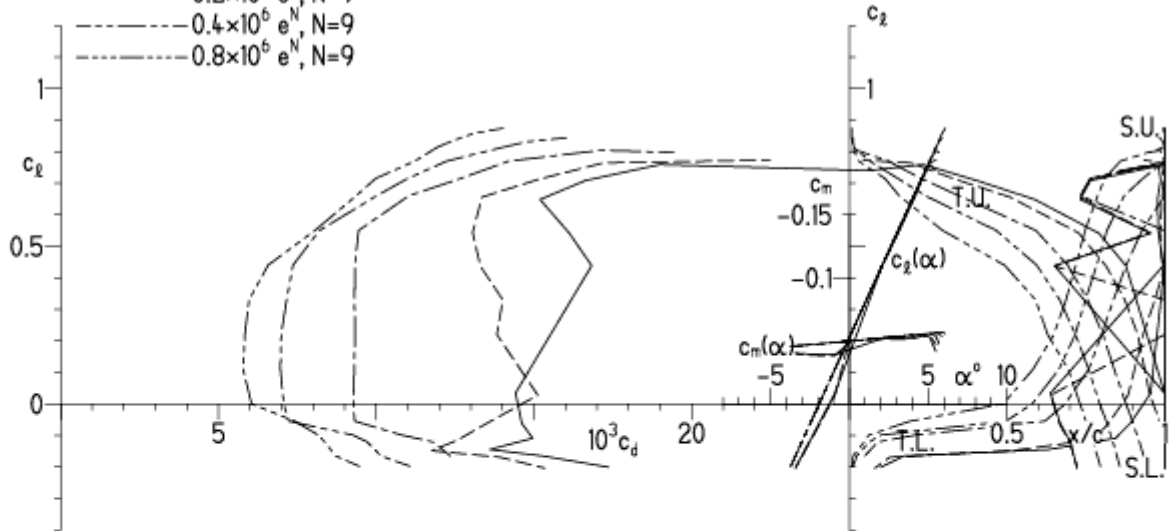
EPPLER 2005 V. 8.5.07 RUN 18.3.13 17:03



EPPLER 2005 V. 8.5.07 RUN 18.3.13 17:03

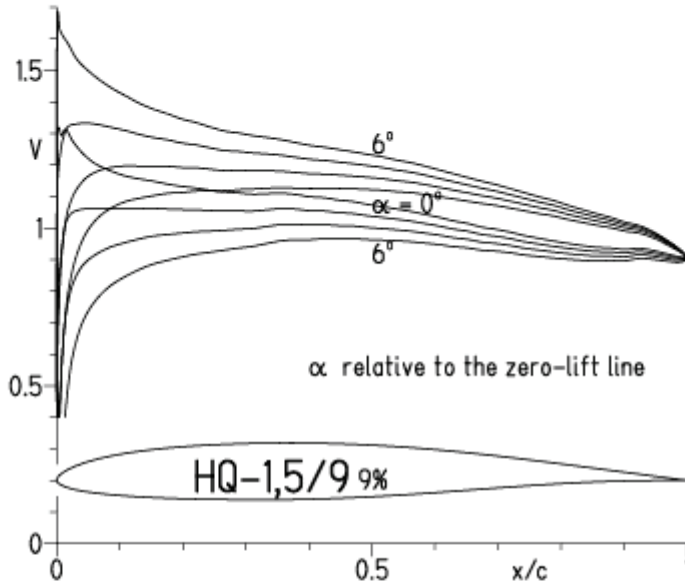
HQ-1,5/9 9%

- $Re = 75\,000 e^N, N=9$
- - - $0.1 \times 10^6 e^N, N=9$
- · - $0.2 \times 10^6 e^N, N=9$
- · · - $0.4 \times 10^6 e^N, N=9$
- · · · - $0.8 \times 10^6 e^N, N=9$



HQ-1,5/9, N=9, Turbulatoreffekt (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

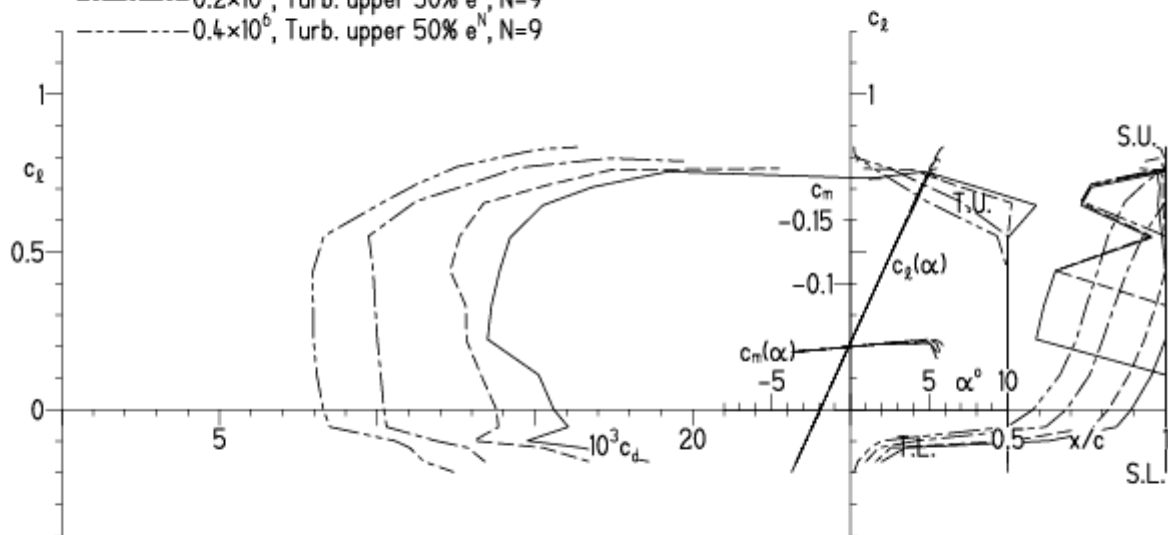
EPPLER 2005 V. 8.5.07 RUN 18.3.13 17:08



EPPLER 2005 V. 8.5.07 RUN 18.3.13 17:0

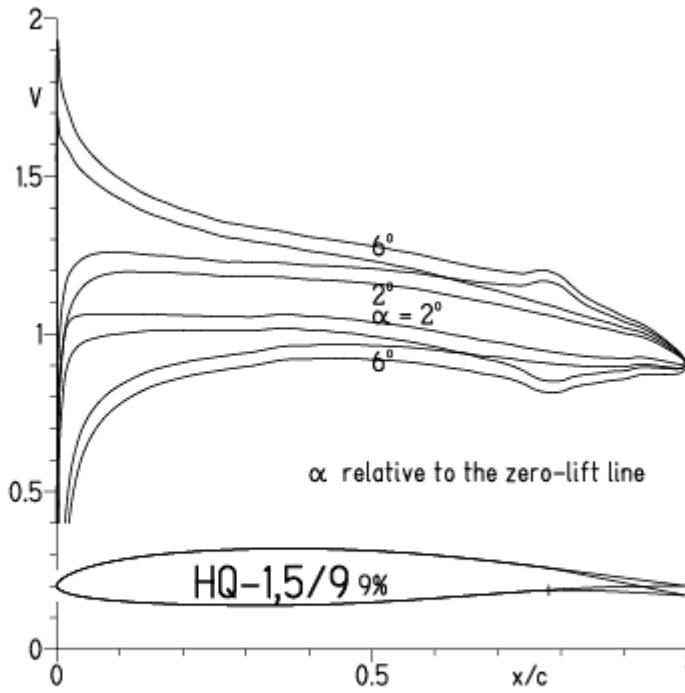
HQ-1,5/9 9%

- $Re = 75\,000$, Turb. upper 50% e^N , $N=9$
- - - 0.1×10^6 , Turb. upper 50% e^N , $N=9$
- · - 0.2×10^6 , Turb. upper 50% e^N , $N=9$
- - - 0.4×10^6 , Turb. upper 50% e^N , $N=9$



HQ-1,5/9, N=9, mit +4° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 18.3.13 17:22

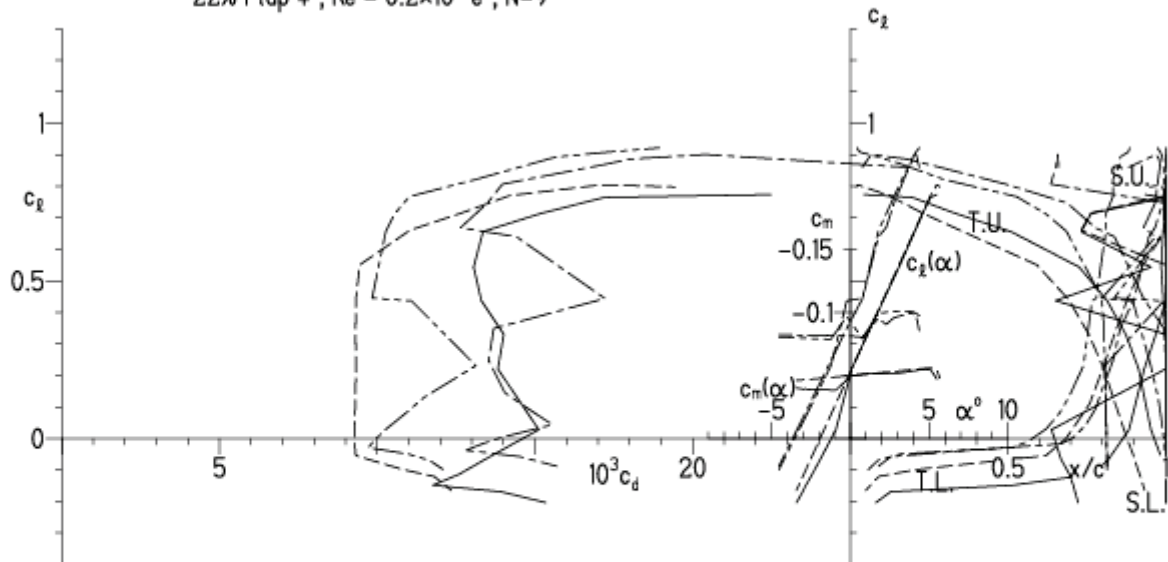


EPPLER 2005 V. 8.5.07 RUN 1

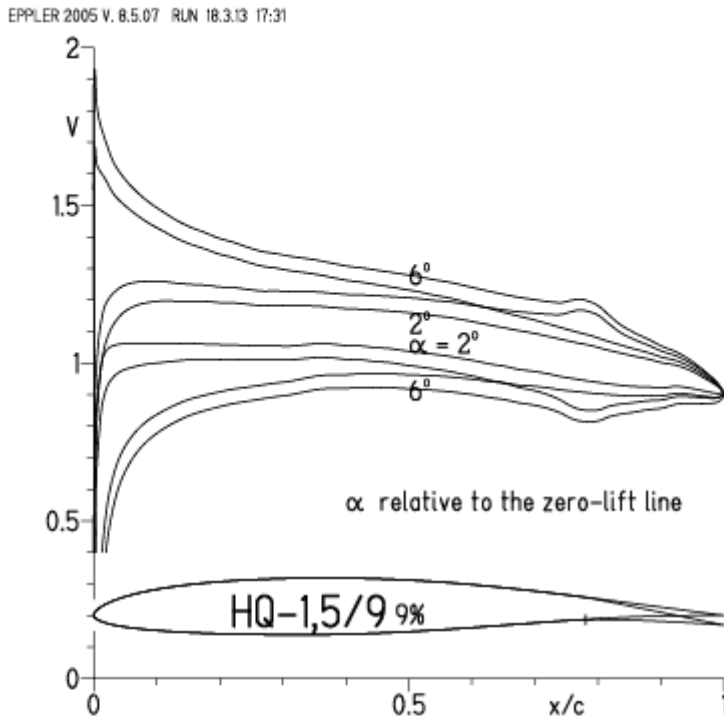
HQ-1,5/9 9%

- $Re = 0.1 \times 10^6 e^N$, $N=9$
- - - $0.2 \times 10^6 e^N$, $N=9$
- · - · - 22% Flap 4°, $Re = 0.1 \times 10^6 e^N$, $N=9$
- · - · - 22% Flap 4°, $Re = 0.2 \times 10^6 e^N$, $N=9$

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-1,5/9, N=9, mit +4° Wölbklappenausschlag, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

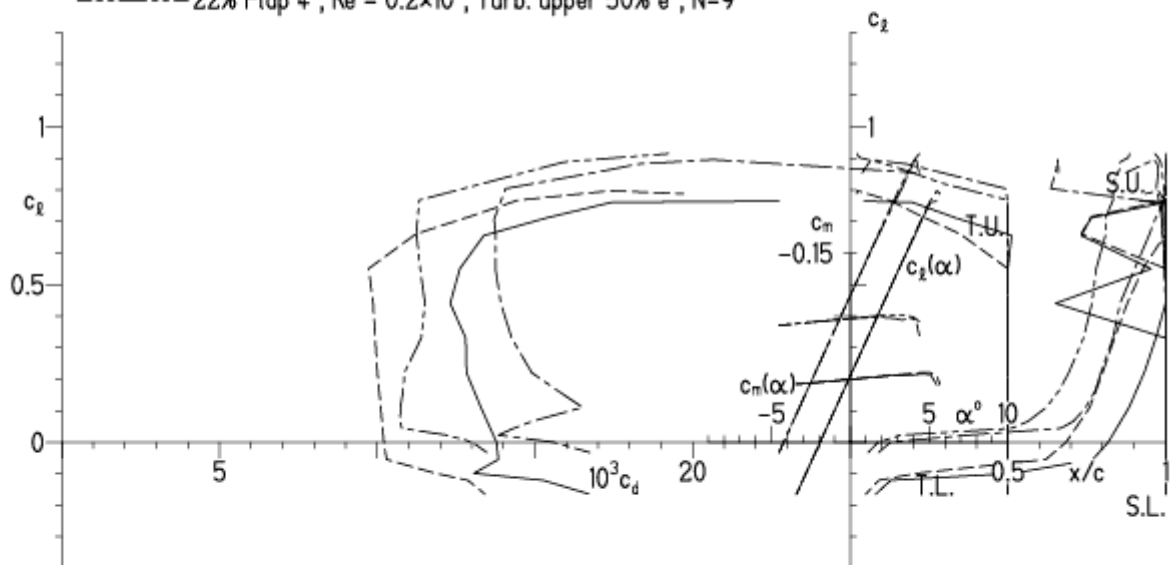


EPPLER 2005 V. 8.5.07 RUN 18.3.13 17:31

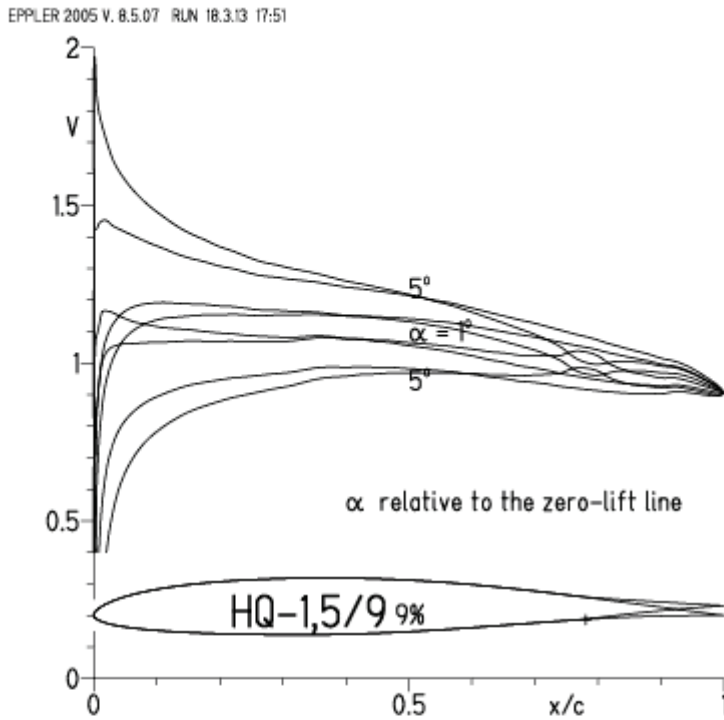
HQ-1,5/9 9%

- $Re = 0.1 \times 10^6$, Turb. upper 50% e^N , $N=9$
- - - 0.2×10^6 , Turb. upper 50% e^N , $N=9$
- · - · 22% Flap 4° , $Re = 0.1 \times 10^6$, Turb. upper 50% e^N , $N=9$
- · - · 22% Flap 4° , $Re = 0.2 \times 10^6$, Turb. upper 50% e^N , $N=9$

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



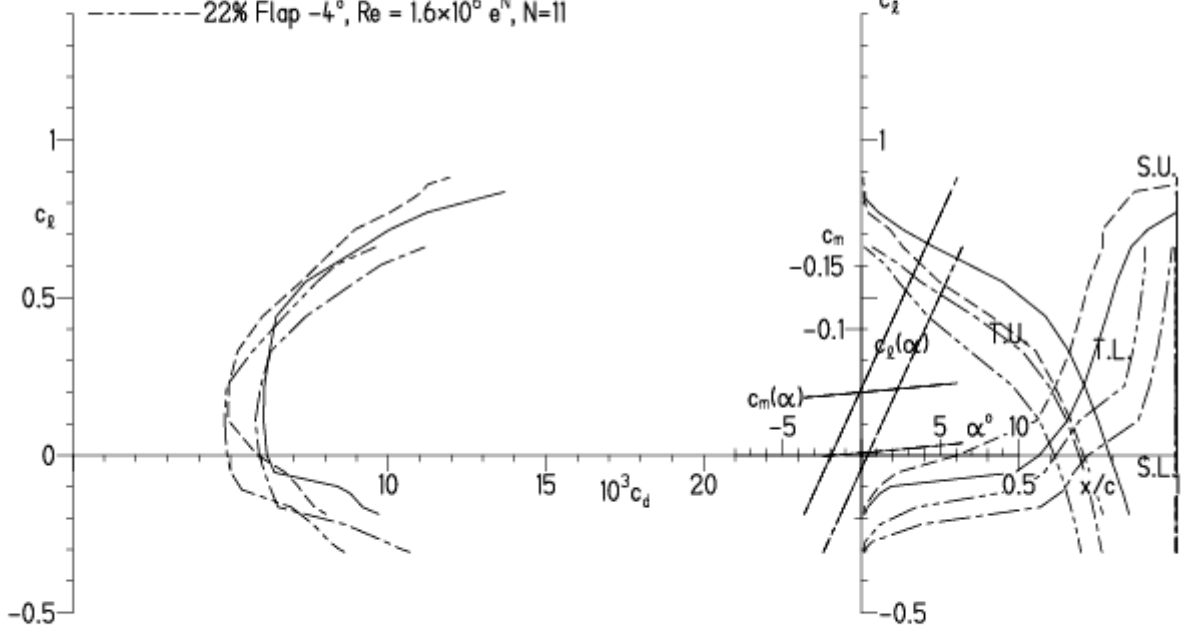
HQ-1,5/9, N=11, mit -4° Wölbklappenausschlag
 (Segelflugmodelle mit > 50 g/dm² erreichen damit über 300 km/h Höchstgeschwindigkeit)



EPPLER 2005 V

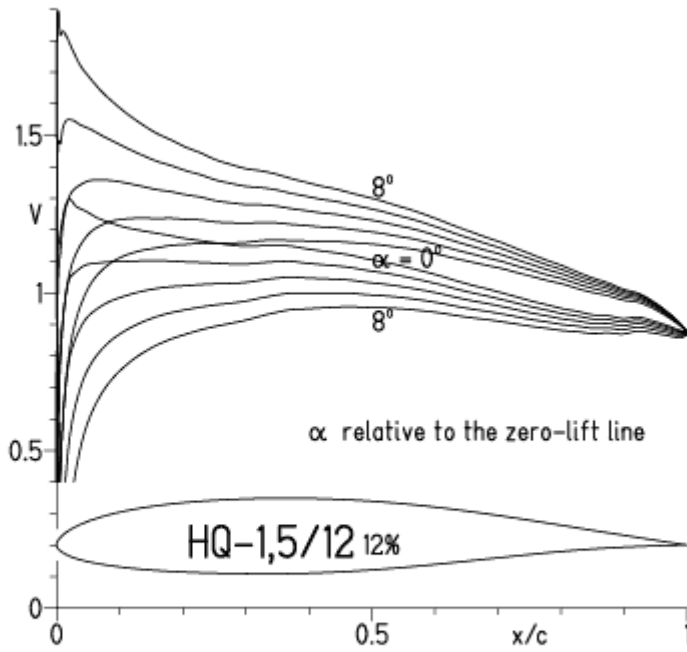
HQ-1,5/9 9%

- $Re = 0.6 \times 10^6 e^N, N=11$
- - - $1.6 \times 10^6 e^N, N=11$
- · - · 22% Flap -4°, $Re = 0.6 \times 10^6 e^N, N=11$
- · - · 22% Flap -4°, $Re = 1.6 \times 10^6 e^N, N=11$

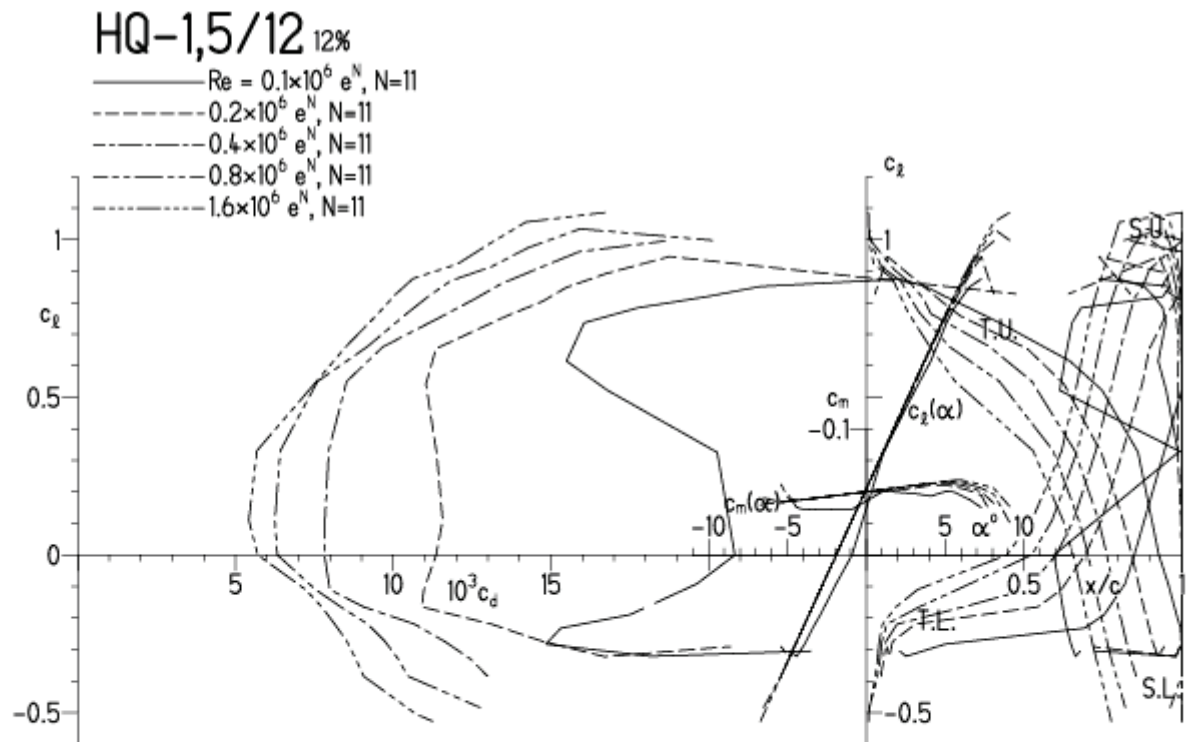


HQ-1,5/12, N=11

EPPLER 2005 V. 8.5.07 RUN 19.3.13 12:24

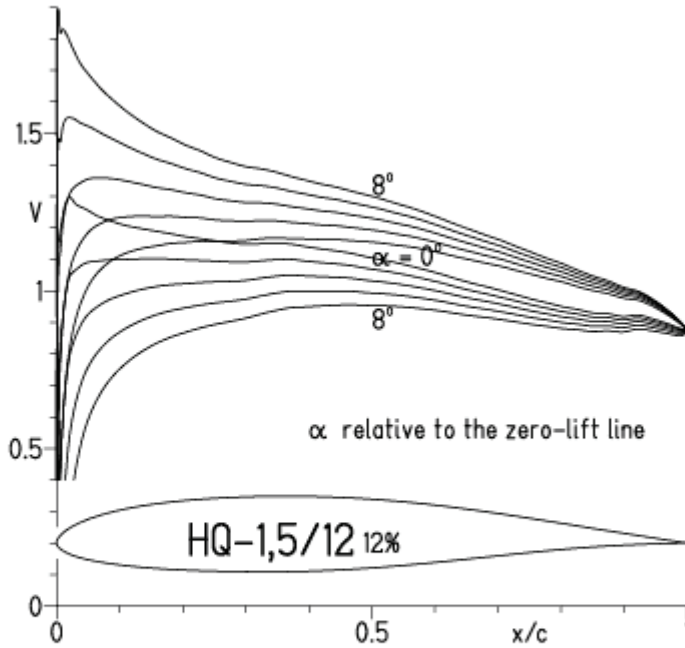


EPPLER 2005 V. 8.5.07 RUN 19.3.13 12:24



HQ-1,5/12, N=9

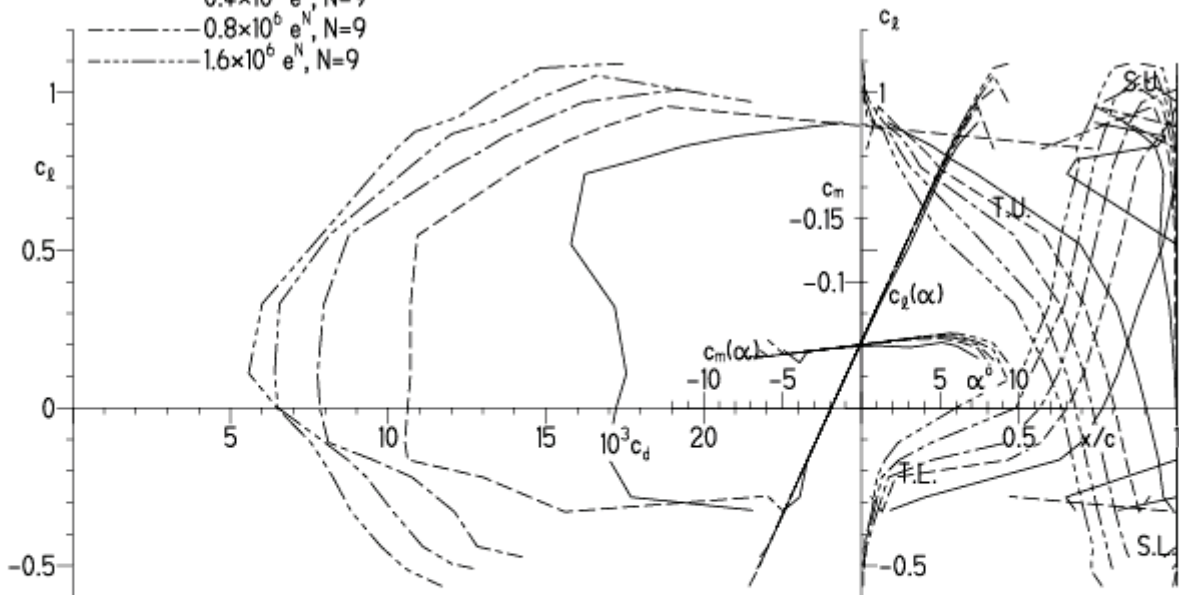
EPPLER 2005 V. 8.5.07 RUN 19.3.13 12:45



EPPLER 2005 V. 8.5.07 RUN 19.3.1

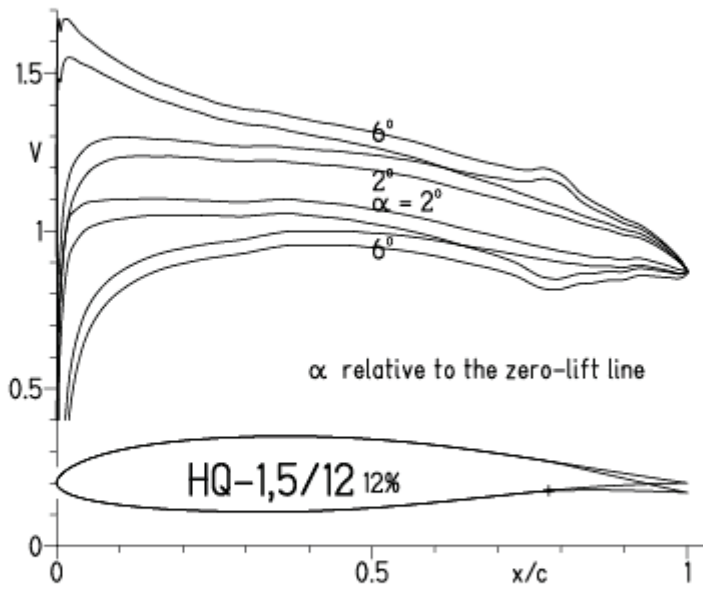
HQ-1,5/12 12%

- $Re = 0.1 \times 10^6 e^N, N=9$
- - - $0.2 \times 10^6 e^N, N=9$
- · - $0.4 \times 10^6 e^N, N=9$
- · - · $0.8 \times 10^6 e^N, N=9$
- · - · - $1.6 \times 10^6 e^N, N=9$



HQ-1,5/12, N=11, mit +4° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 19.3.13 13:04

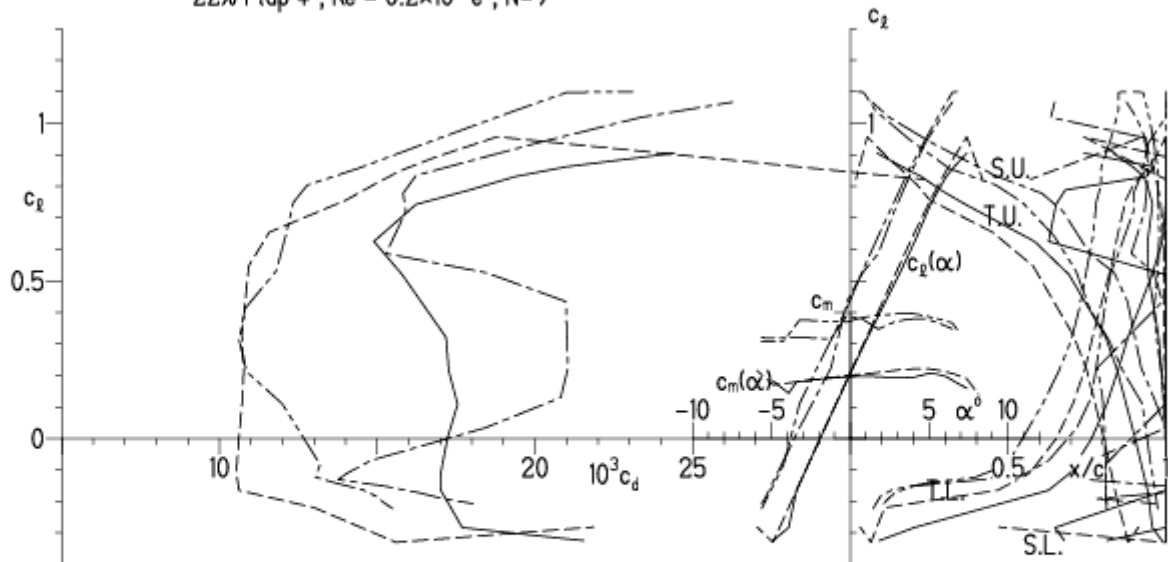


EPPLER 2005 V. 8.5.07 RUN 19.3.13 1

HQ-1,5/12 12%

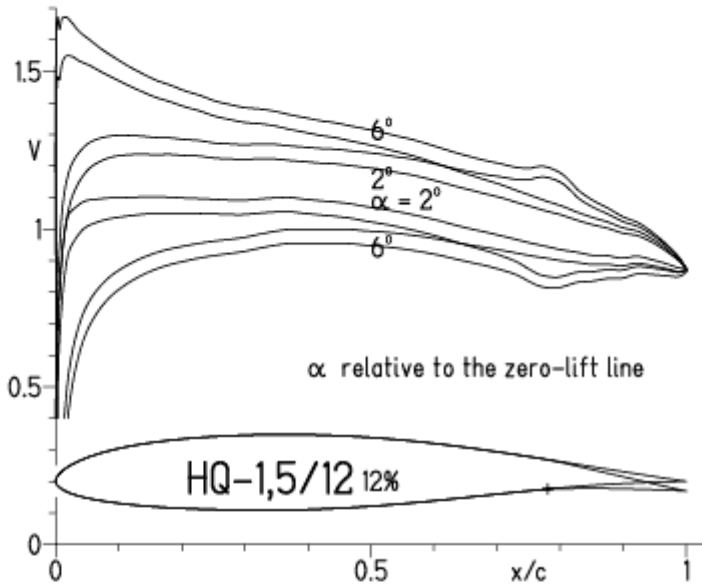
- $Re = 0.1 \times 10^6 e^N, N=9$
- - - $0.2 \times 10^6 e^N, N=9$
- · - · 22% Flap 4°, $Re = 0.1 \times 10^6 e^N, N=9$
- · - · 22% Flap 4°, $Re = 0.2 \times 10^6 e^N, N=9$

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-1,5/12, N=9, mit +4° Wölbklappenausschlag
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

EPPLER 2005 V. 8.5.07 RUN 19.3.13 13:10

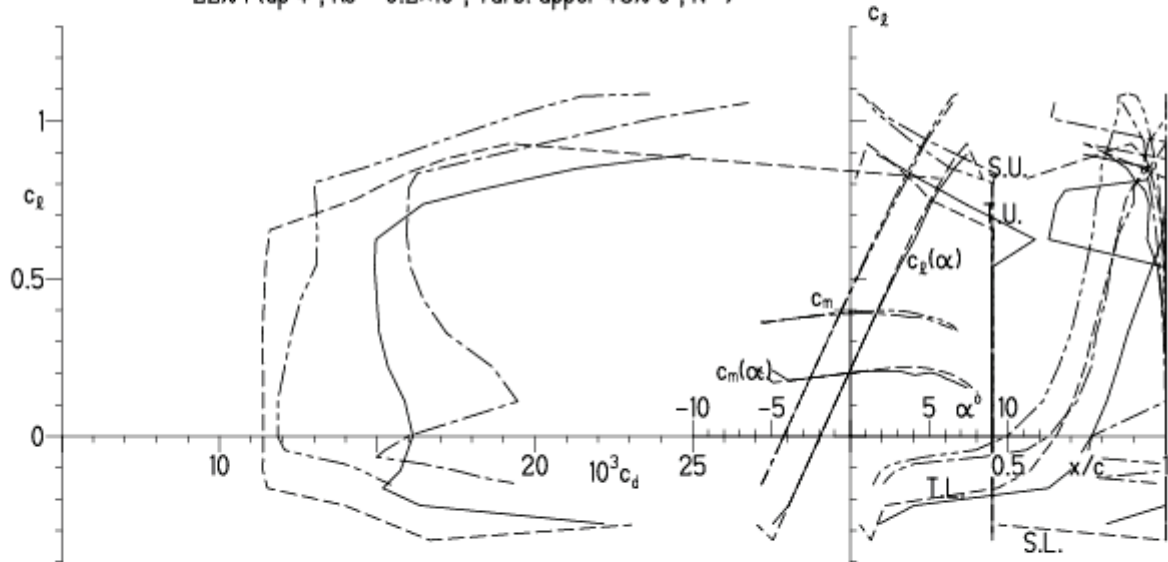


EPPLER 2005 V. 8.5.07 RUN 19.3.13 13:10

HQ-1,5/12 12%

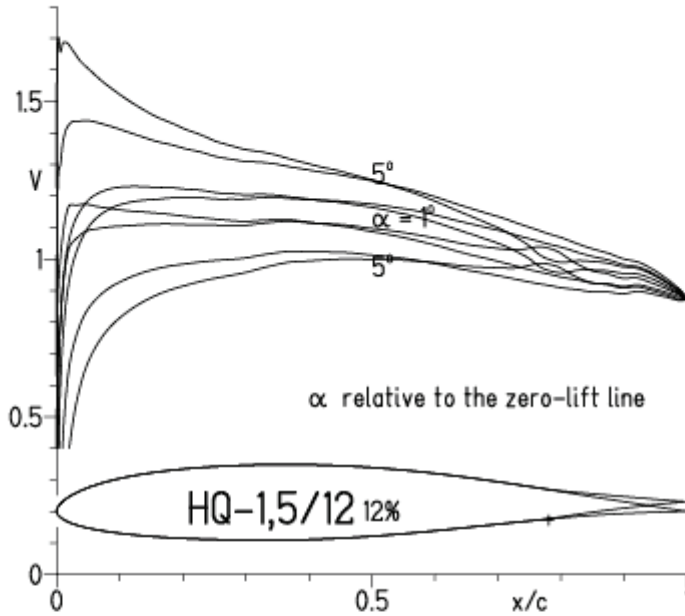
- Re = 0.1×10⁶, Turb. upper 45% e^N, N=9
- - - 0.2×10⁶, Turb. upper 45% e^N, N=9
- · - 22% Flap 4°, Re = 0.1×10⁶, Turb. upper 45% e^N, N=9
- · - 22% Flap 4°, Re = 0.2×10⁶, Turb. upper 45% e^N, N=9

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-1,5/12, N=11, mit -4° Wölbklappenausschlag
 (Segelmodelle erreichen damit hohe Endgeschwindigkeiten)

EPPLER 2005 V. 8.5.07 RUN 19.3.13 13:25

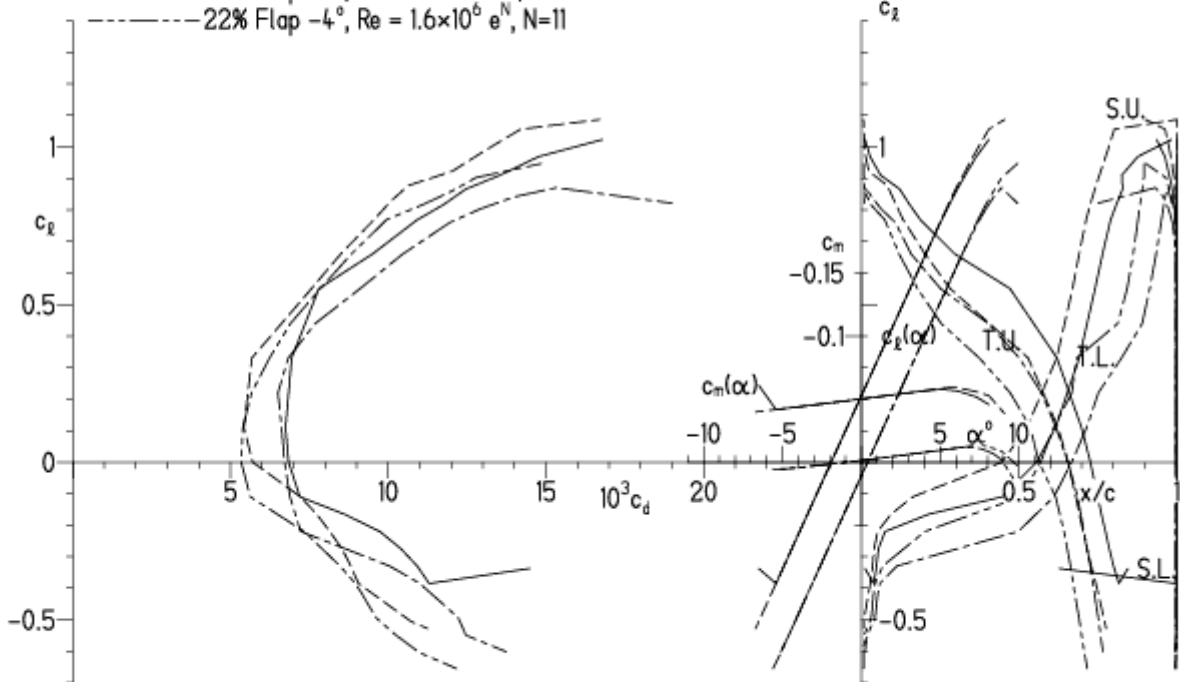


EPPLER 2005 V. 8.5.07 RUN 19.3.13 13:25

HQ-1,5/12 12%

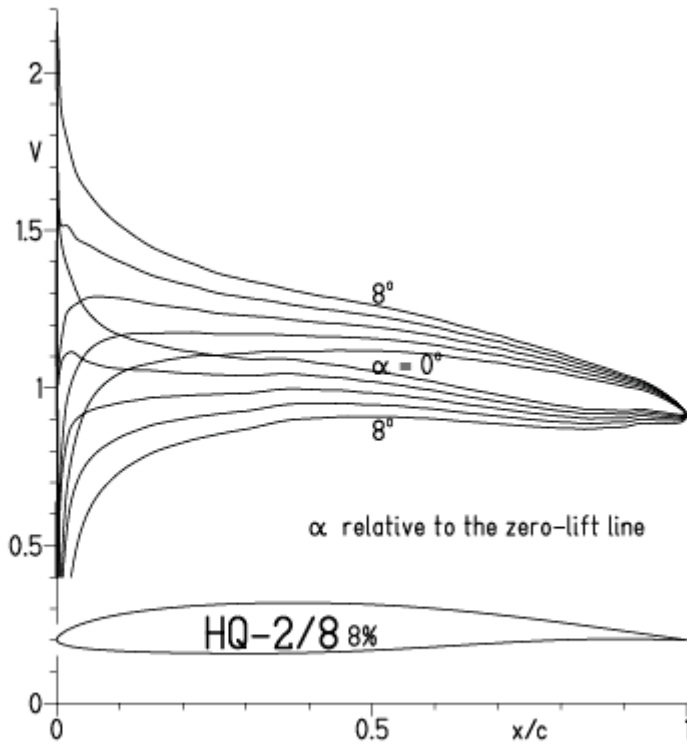
- $Re = 0.6 \times 10^6 e^N, N=11$
- - - $1.6 \times 10^6 e^N, N=11$
- · - · 22% Flap -4°, $Re = 0.6 \times 10^6 e^N, N=11$
- · - · 22% Flap -4°, $Re = 1.6 \times 10^6 e^N, N=11$

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-2/8, N=11

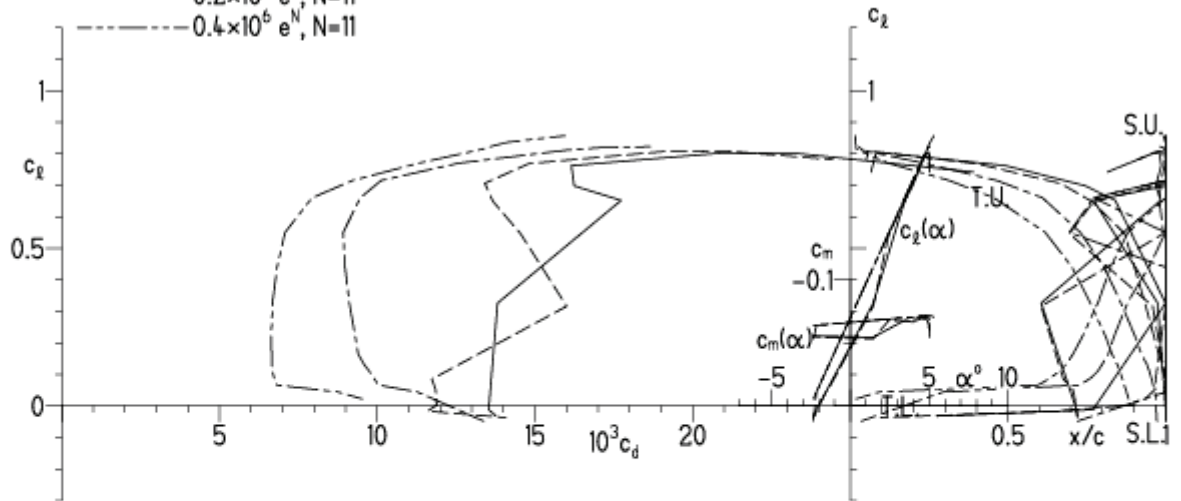
EPPLER 2005 V. 8.5.07 RUN 19.3.13 16:49



EPPLER 2005 V. 8.5.

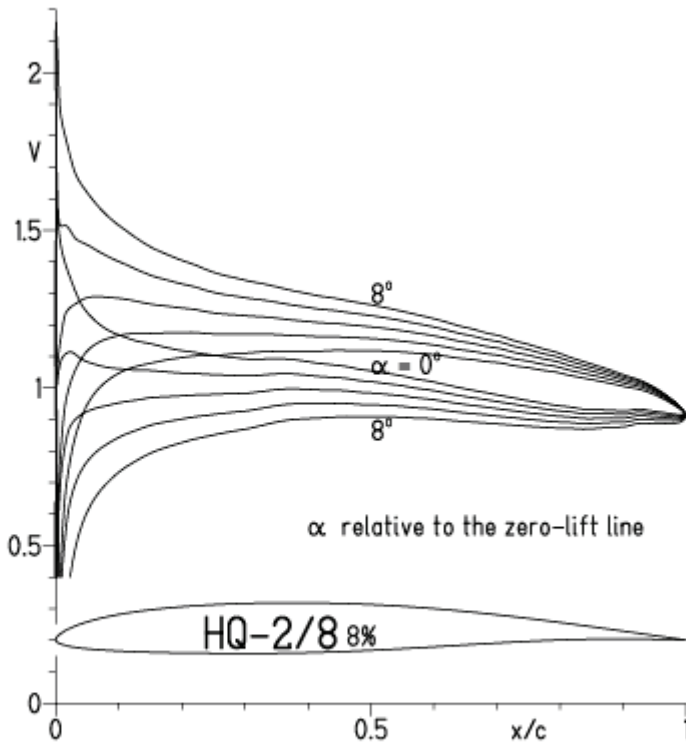
HQ-2/8 8%

- $Re = 75\,000 e^N, N=11$
- - - $0.1 \times 10^6 e^N, N=11$
- · - $0.2 \times 10^6 e^N, N=11$
- - - $0.4 \times 10^6 e^N, N=11$



HQ-2/8, N=9

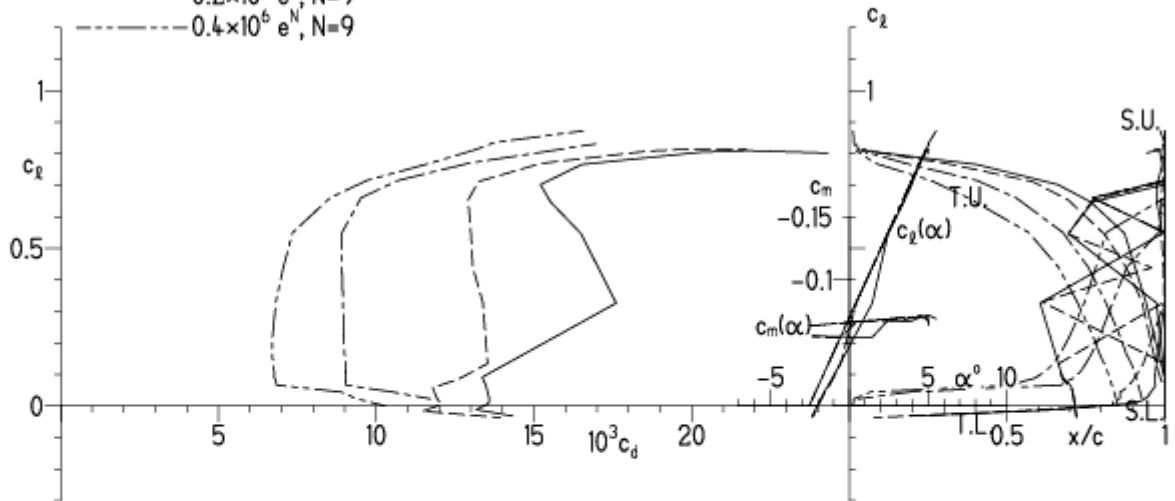
EPPLER 2005 V. 8.5.07 RUN 19.3.13 17:01



EPPLER 2005 V. 8.5.07 RUN 19.3.13 1

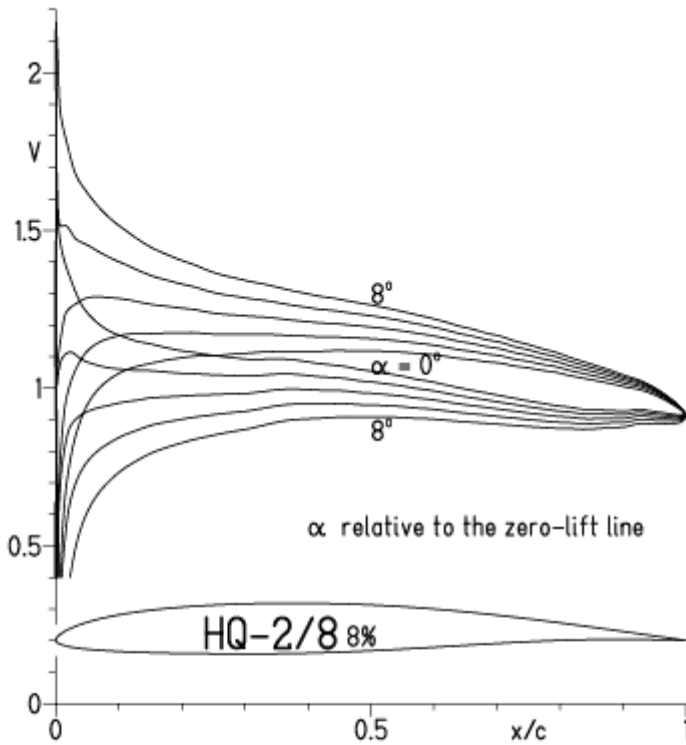
HQ-2/8 8%

- $Re = 75\,000 e^N, N=9$
- - - $0.1 \times 10^6 e^N, N=9$
- · - $0.2 \times 10^6 e^N, N=9$
- - - $0.4 \times 10^6 e^N, N=9$



HQ-2/8, N=9, mit +4° Wölbklappenausschlag, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

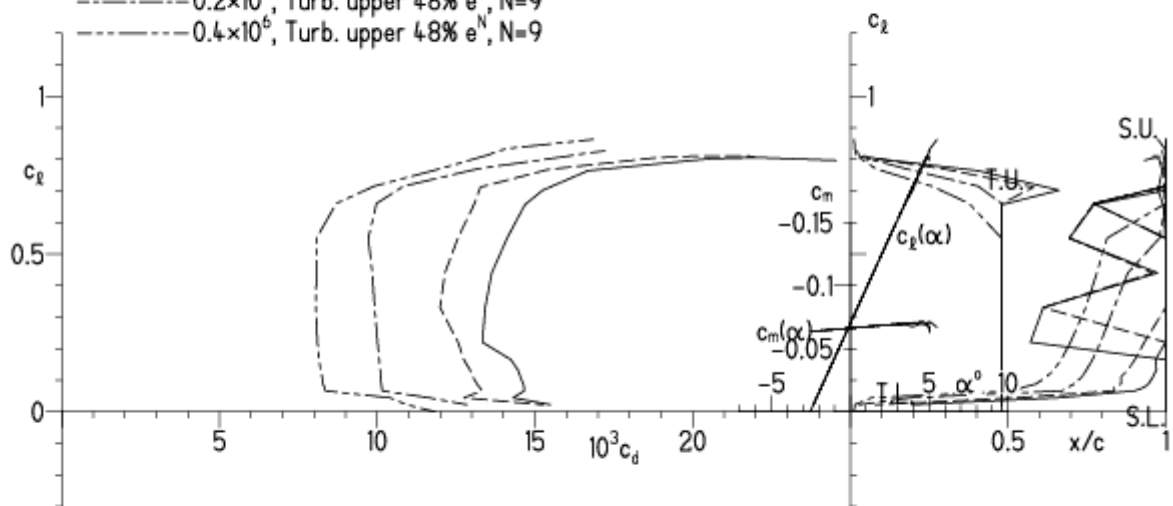
EPPLER 2005 V. 8.5.07 RUN 19.3.13 17:08



EPPLER 2005 V. 8.5.07 RUN 19.3.13 17:08

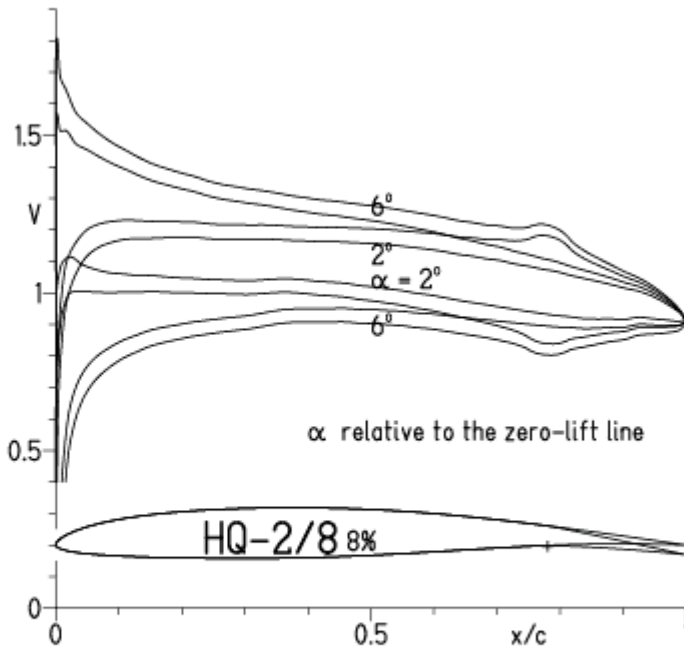
HQ-2/8 8%

- Re = 75 000, Turb. upper 48% e^N, N=9
- - - 0.1×10⁶, Turb. upper 48% e^N, N=9
- · - 0.2×10⁶, Turb. upper 48% e^N, N=9
- · · - 0.4×10⁶, Turb. upper 48% e^N, N=9



HQ-2/8, N=9, mit +4° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 19.3.13 17:17

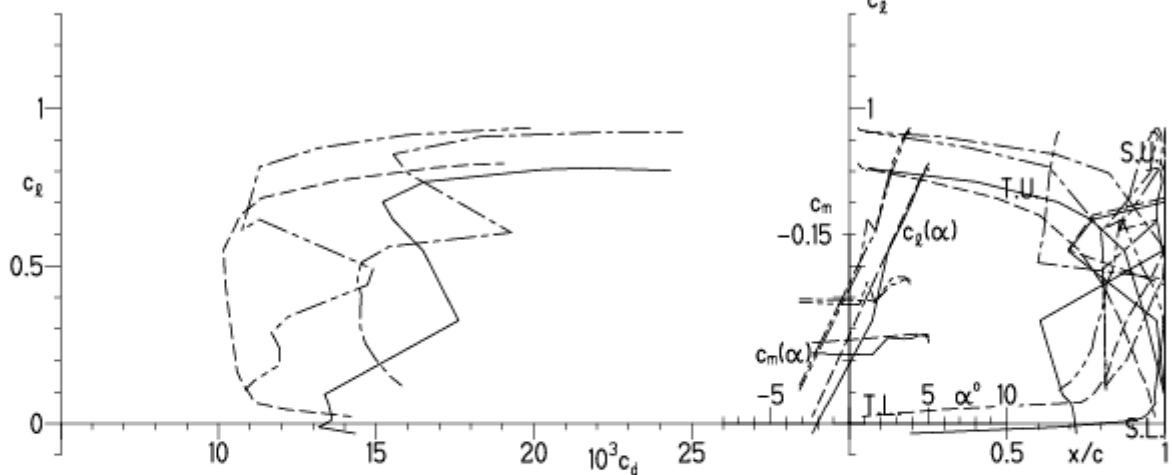


EPPLER 2005 V. 8.5.07 RUN 19.3.13 17:

HQ-2/8 8%

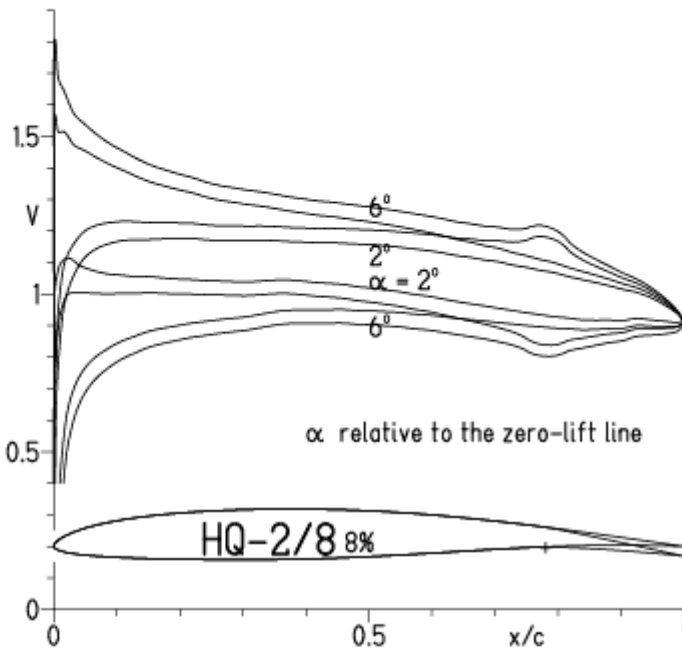
- $Re = 75\,000 e^N, N=9$
- - - $0.15 \times 10^6 e^N, N=9$
- · - · 22% Flap 4°, $Re = 75\,000 e^N, N=9$
- · - · 22% Flap 4°, $Re = 0.15 \times 10^6 e^N, N=9$

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-2/8, N=9, mit +4° Wölbklappenausschlag, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

EPPLER 2005 V. 8.5.07 RUN 19.3.13 17:20

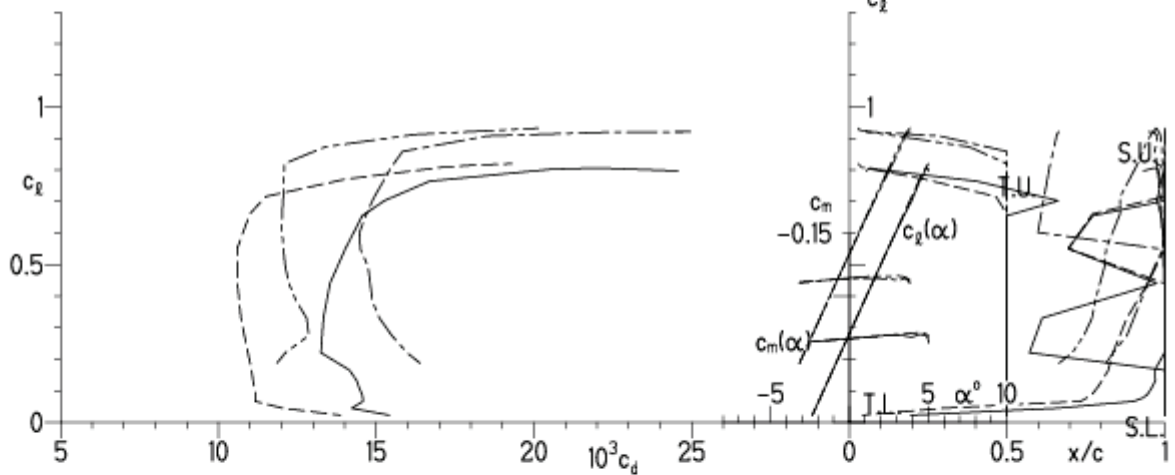


EPPLER 2005 V.

HQ-2/8 8%

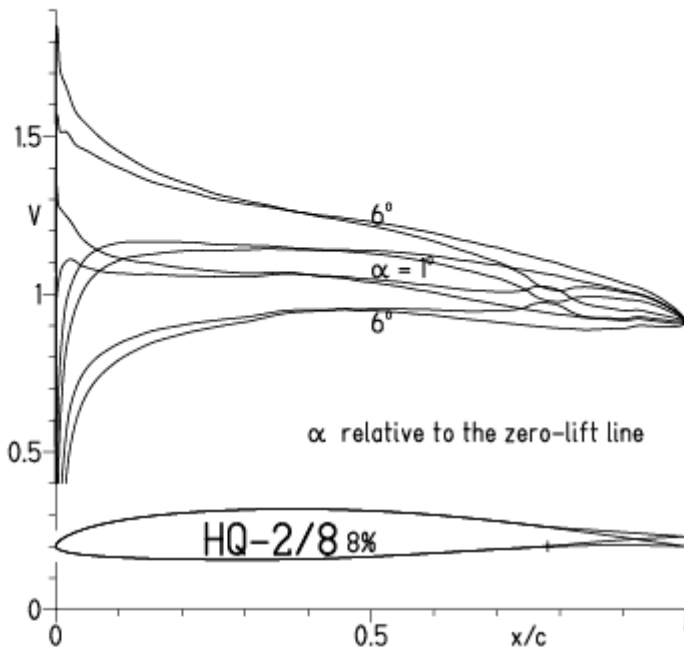
- Re = 75 000, Turb. upper 50% e^N, N=9
- - - 0.15×10⁶, Turb. upper 50% e^N, N=9
- · - 22% Flap 4°, Re = 75 000, Turb. upper 50% e^N, N=9
- · - 22% Flap 4°, Re = 0.15×10⁶, Turb. upper 50% e^N, N=9

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-2/8, N=11, mit -4° Wölbklappenausschlag
 (Segelflugmodelle erreichen damit hohe Endgeschwindigkeiten)

EPPLER 2005 V. 8.5.07 RUN 19.3.13 17:51

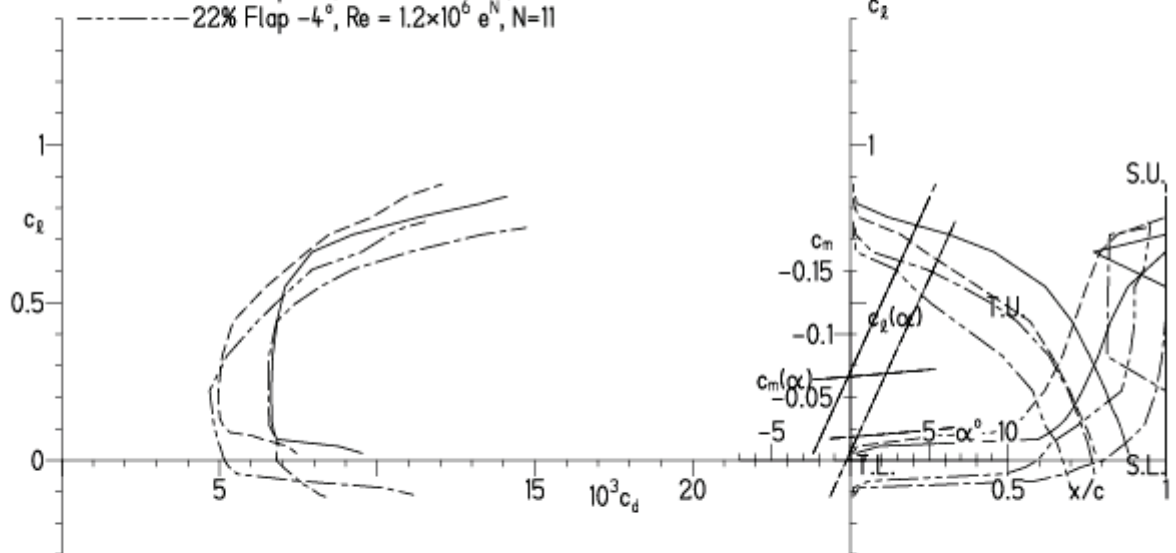


EPPLER 2005 V. 8.5.07 RUN 19.3.13 17:51

HQ-2/8 8%

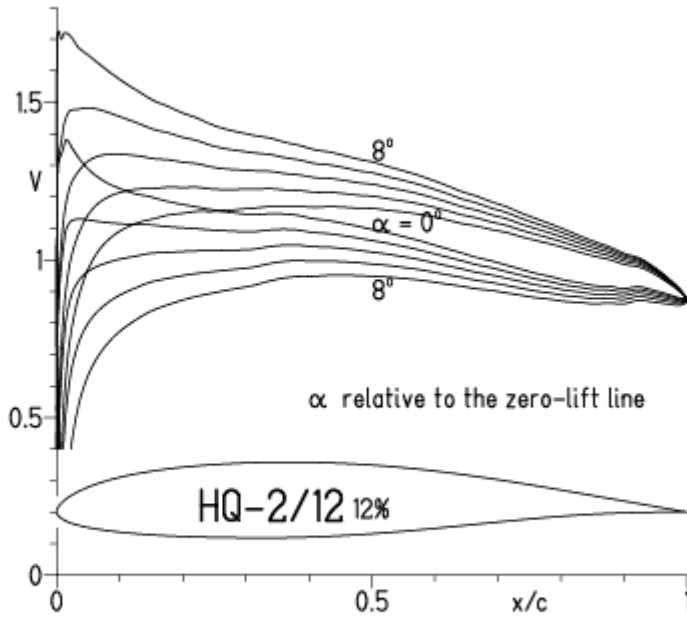
- $Re = 0.4 \times 10^6$ e^N, N=11
- - - 1.2×10^6 e^N, N=11
- · - · 22% Flap -4°, $Re = 0.4 \times 10^6$ e^N, N=11
- · - · 22% Flap -4°, $Re = 1.2 \times 10^6$ e^N, N=11

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-2/12, N=11

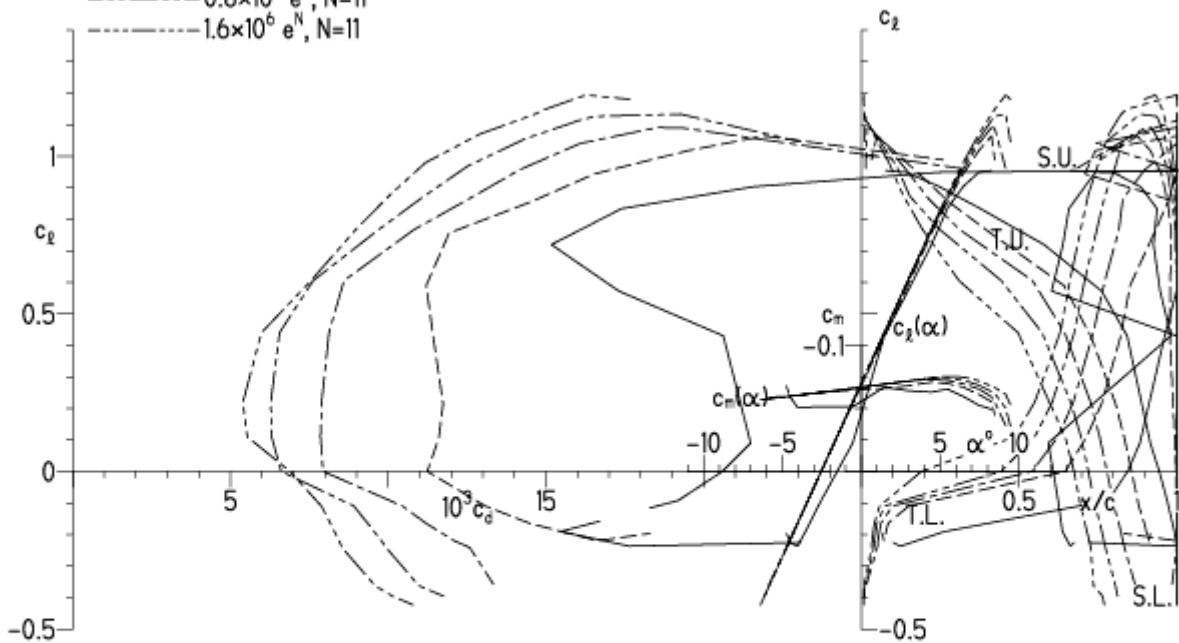
EPPLER 2005 V. 8.5.07 RUN 19.3.13 18:39



EPPLER 2005 V. 8.5.07 RUN 19.3.13 18:39

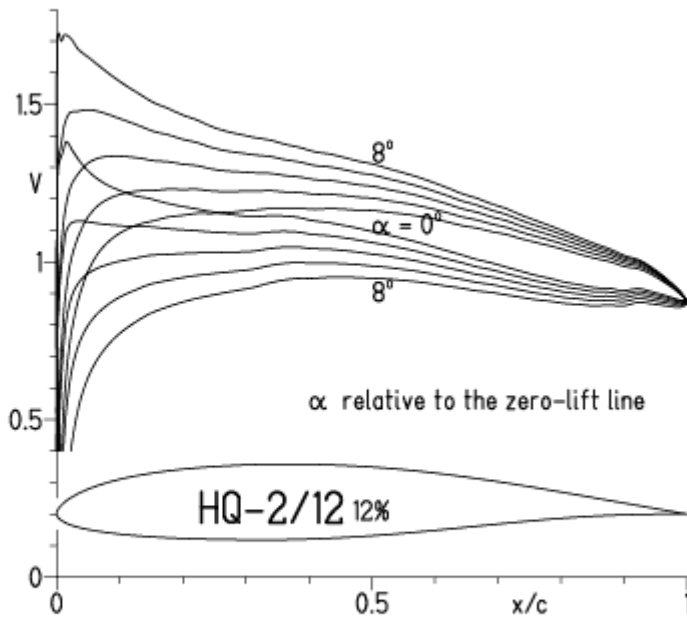
HQ-2/12 12%

- $Re = 0.1 \times 10^6 e^N, N=11$
- - - $0.2 \times 10^6 e^N, N=11$
- · - $0.4 \times 10^6 e^N, N=11$
- · - $0.8 \times 10^6 e^N, N=11$
- · - $1.6 \times 10^6 e^N, N=11$



HQ-2/12, N=9

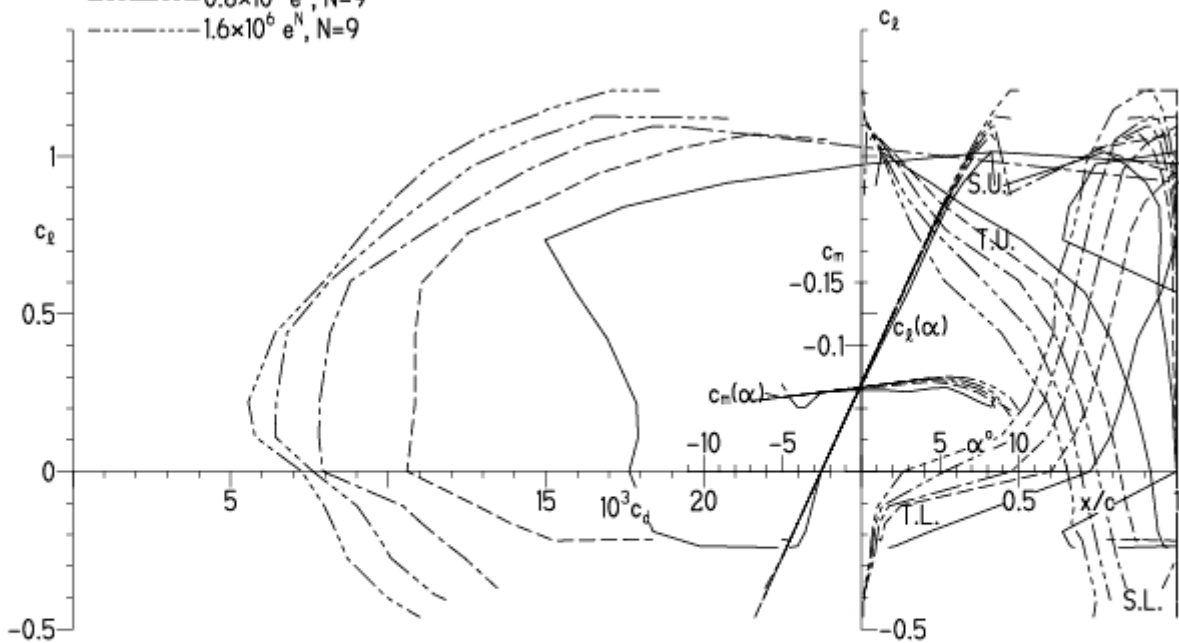
EPPLER 2005 V. 8.5.07 RUN 19.3.13 18:52



EPPLER 2005 V. 8.5.07 RUN 19.3.13 18:52

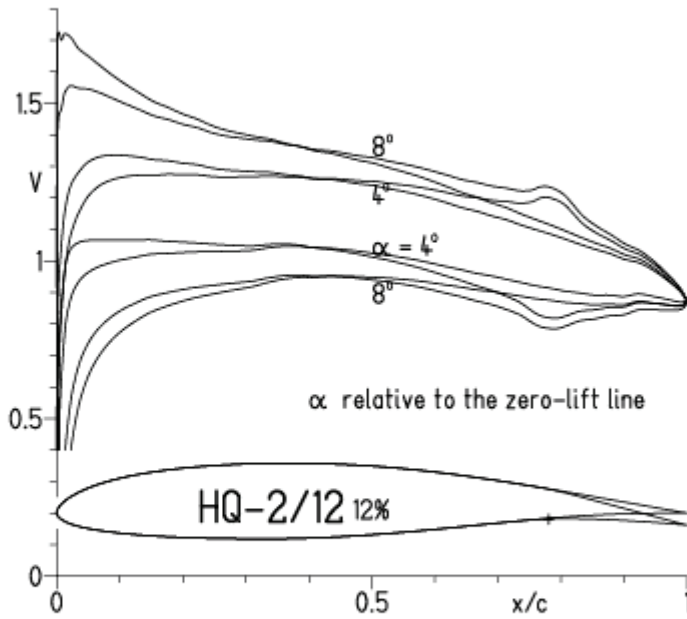
HQ-2/12 12%

- $Re = 0.1 \times 10^6 e^N, N=9$
- - - $0.2 \times 10^6 e^N, N=9$
- · - $0.4 \times 10^6 e^N, N=9$
- · - · $0.8 \times 10^6 e^N, N=9$
- · - · - $1.6 \times 10^6 e^N, N=9$



HQ -2/12, N=9, mit 5° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 20.3.13 9:46

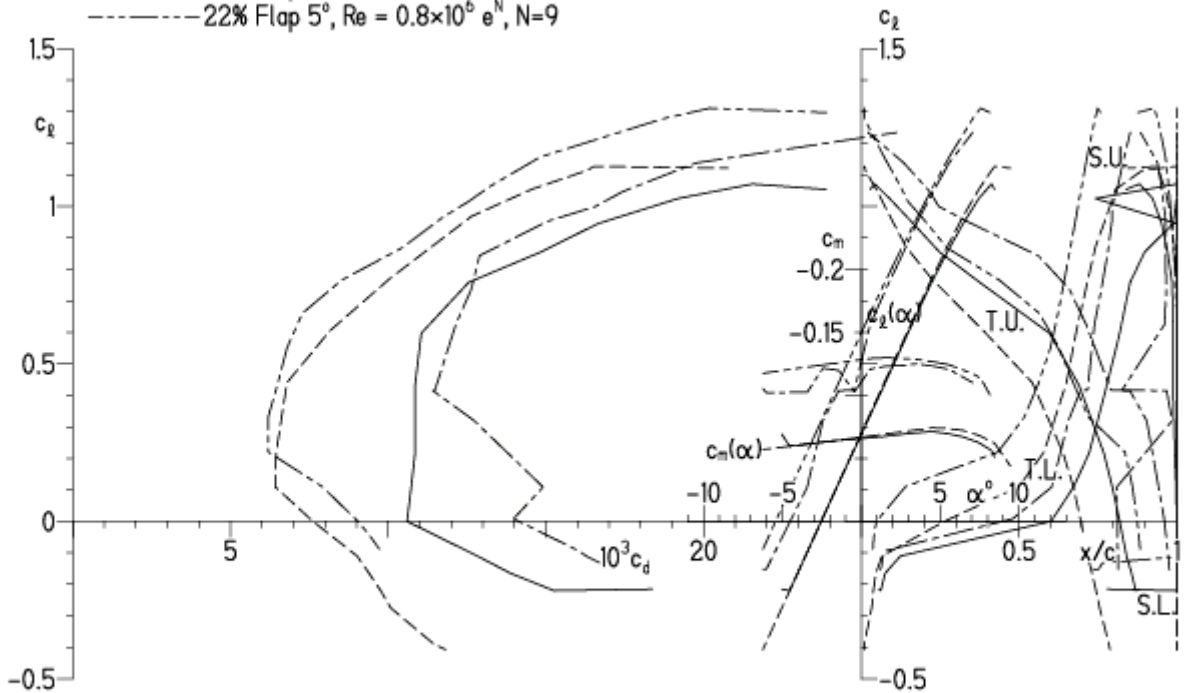


EPPLER 2005 V. 8.5.07 RUN 20.3.13 9:46

HQ-2/12 12%

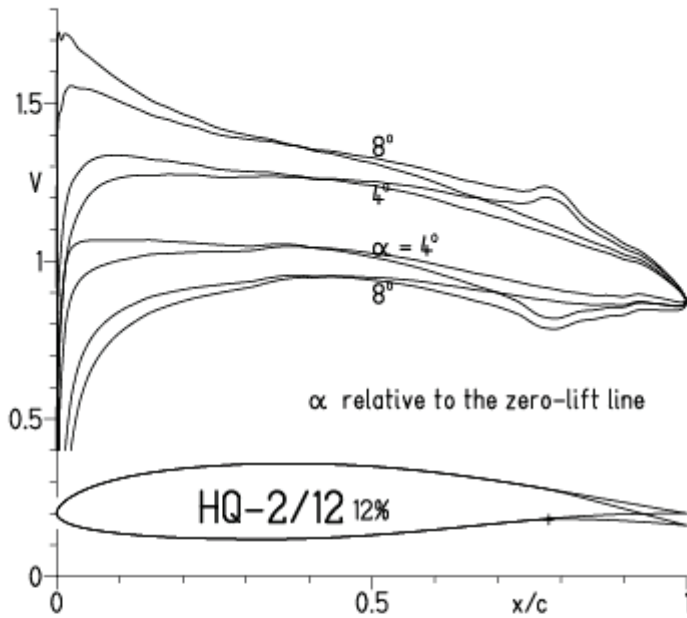
- $Re = 0.2 \times 10^6 e^N, N=9$
- - - $0.8 \times 10^6 e^N, N=9$
- · - · 22% Flap 5°, $Re = 0.2 \times 10^6 e^N, N=9$
- · - · 22% Flap 5°, $Re = 0.8 \times 10^6 e^N, N=9$

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ -2/12, N=9, mit 5° Wölbklappenausschlag, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

EPPLER 2005 V. 8.5.07 RUN 20.3.13 9:58

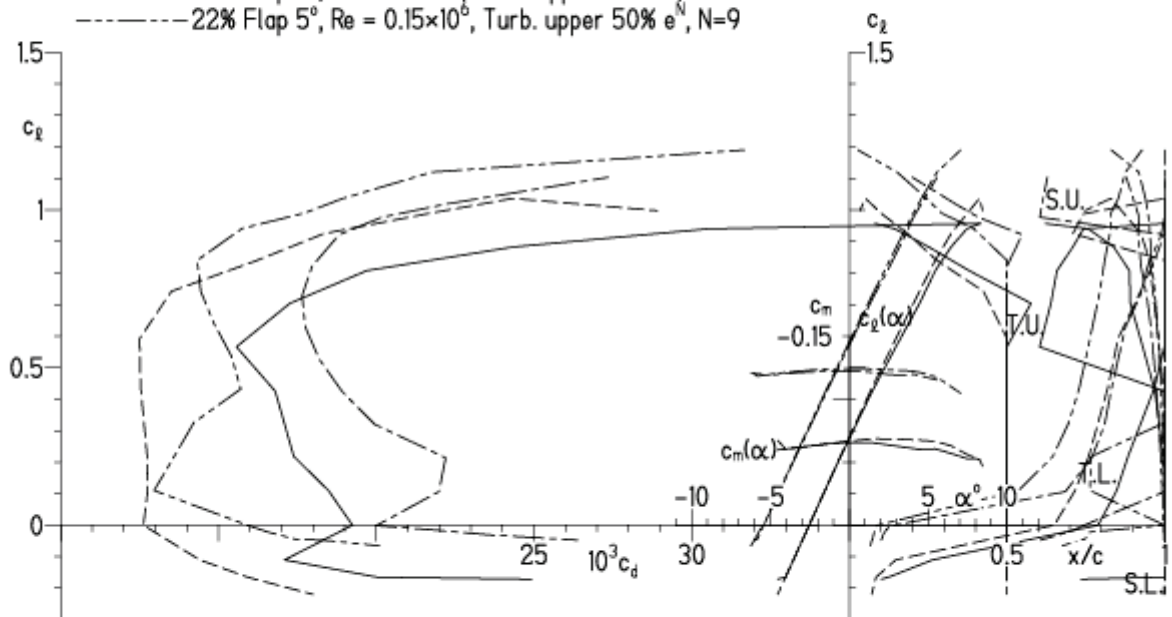


EPPLER 2005 V. 8.5.07 RUN 20.3.13 9:58

HQ-2/12 12%

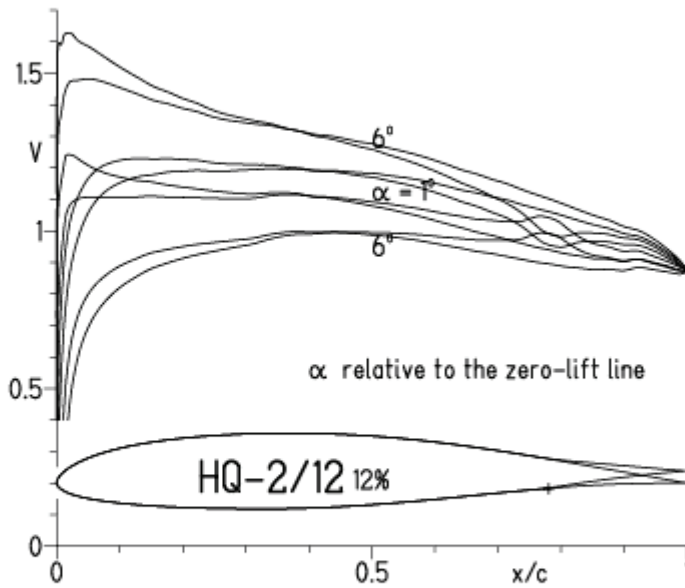
- Re = 75 000, Turb. upper 50% e^N, N=9
- - - 0.15x10⁶, Turb. upper 50% e^N, N=9
- · - 22% Flap 5°, Re = 75 000, Turb. upper 50% e^N, N=9
- · - 22% Flap 5°, Re = 0.15x10⁶, Turb. upper 50% e^N, N=9

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface

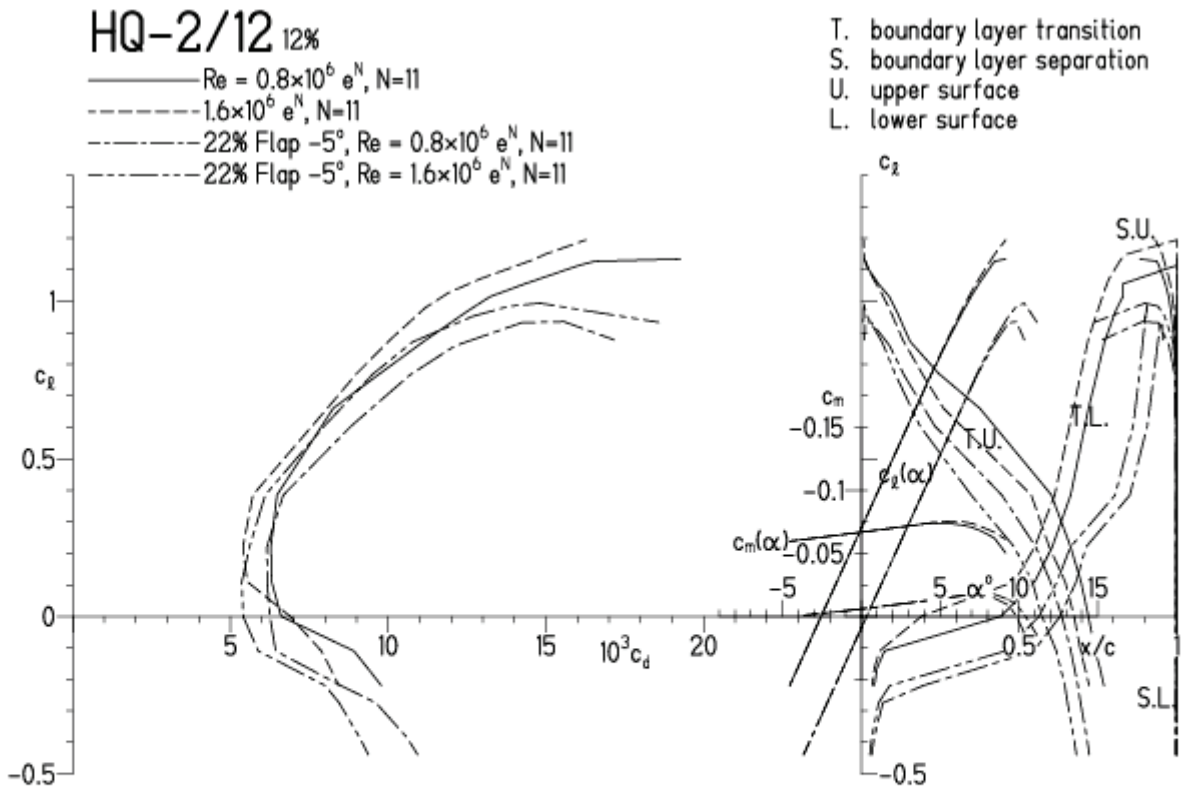


HQ-2/12, N=11, mit -4° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 20.3.13 10:06

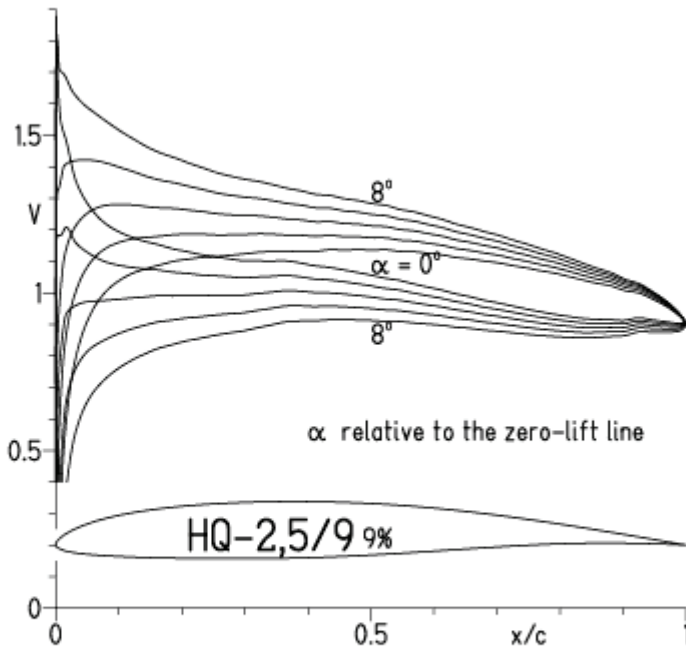


EPPLER 2005 V. 8.5.07 RUN 20.3.13 10:06



HQ-2,5/9, N=11

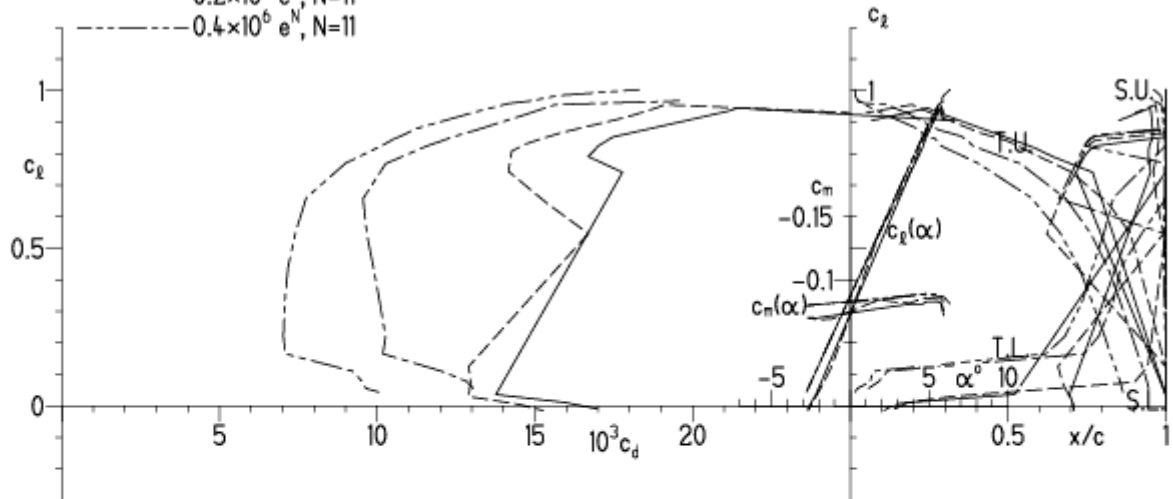
EPPLER 2005 V. 8.5.07 RUN 20.3.13 10:23



EPPLER 2005 V. 8.5.07 RUN 20.3.13 10:23

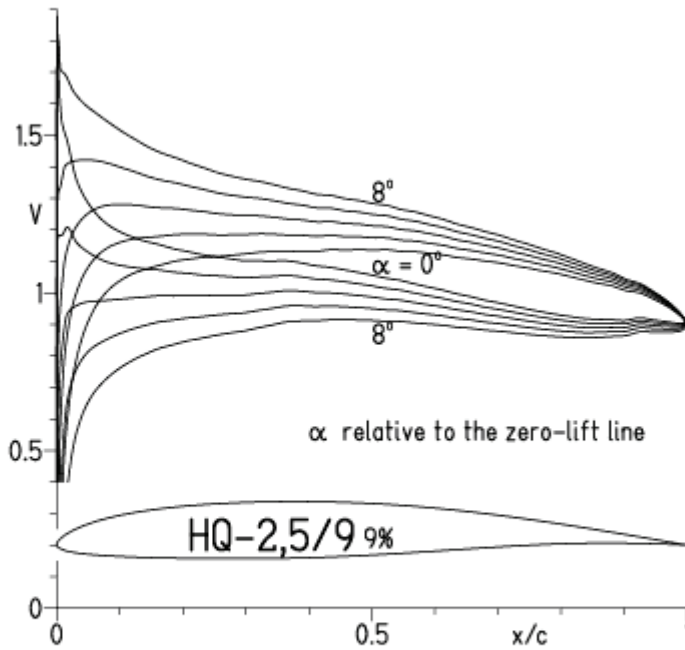
HQ-2,5/9 9%

- $Re = 75\,000 e^N, N=11$
- - - $0.1 \times 10^6 e^N, N=11$
- · - $0.2 \times 10^6 e^N, N=11$
- - - $0.4 \times 10^6 e^N, N=11$



HQ-2,5/9, N=9

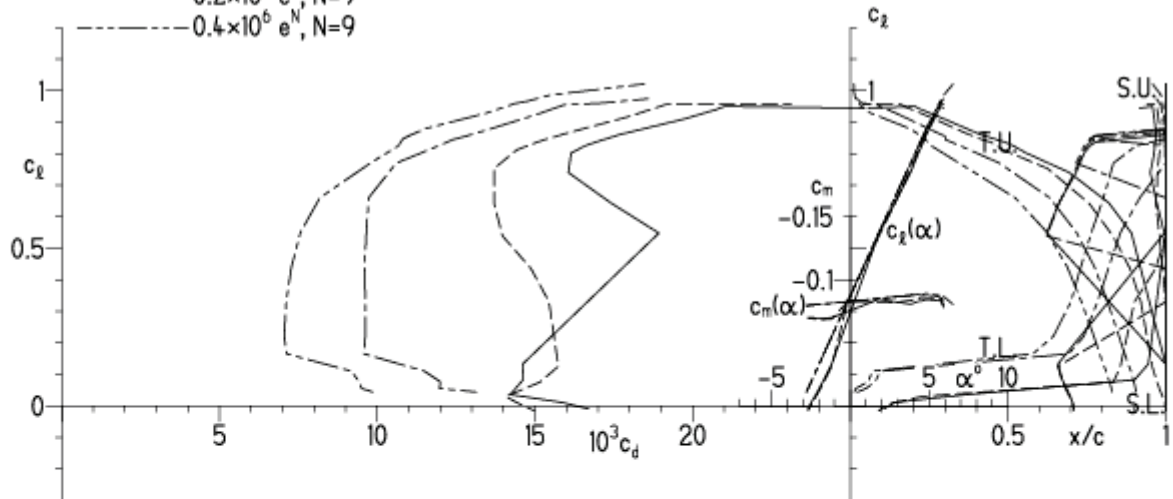
EPPLER 2005 V. 8.5.07 RUN 20.3.13 10:29



EPPLER 2005 V. 8.5.07 RUN 20.3.13 10:29

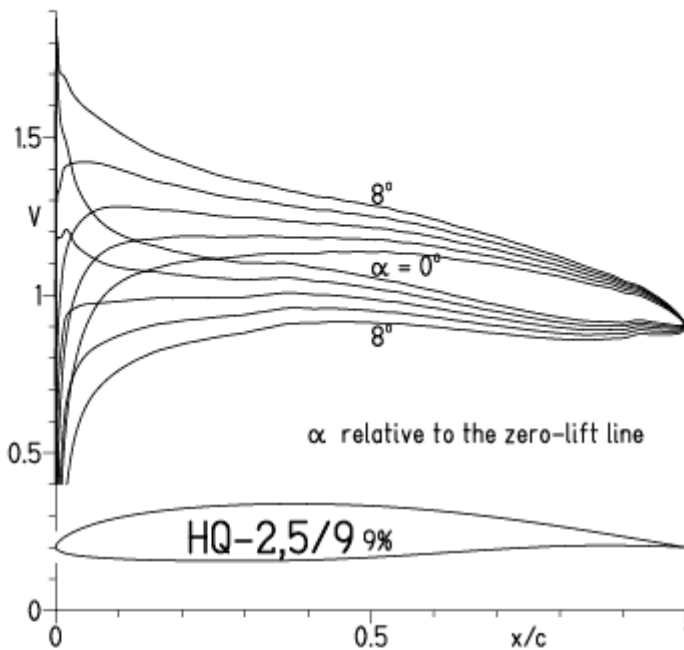
HQ-2,5/9 9%

- $Re = 75\ 000 e^N, N=9$
- - - $0.1 \times 10^6 e^N, N=9$
- · - $0.2 \times 10^6 e^N, N=9$
- - - $0.4 \times 10^6 e^N, N=9$



HQ-2,5/9, N=9, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

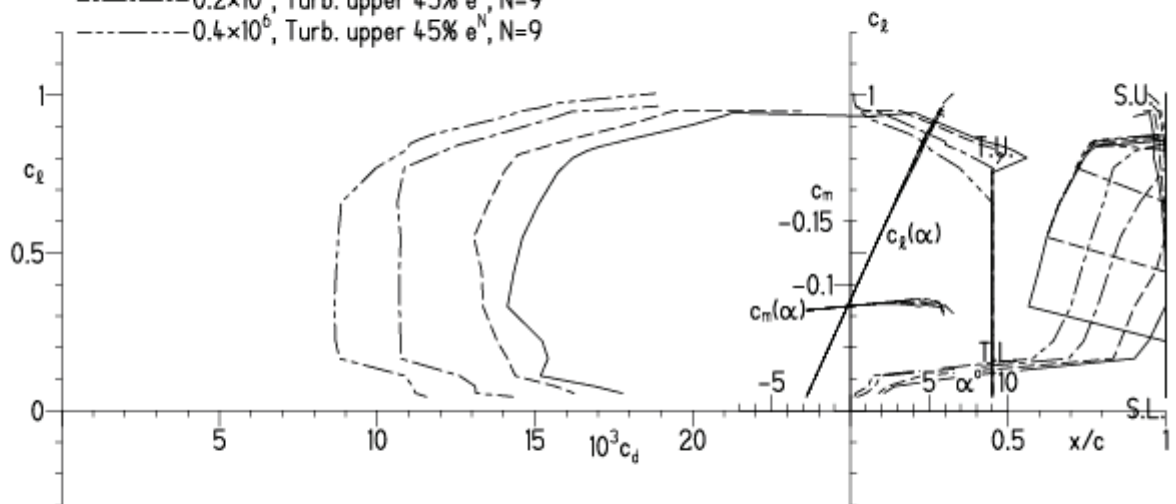
EPPLER 2005 V. 8.5.07 RUN 20.3.13 10:37



EPPLER 2005 V. 8.5.07 RUN 20.3.13 10:37

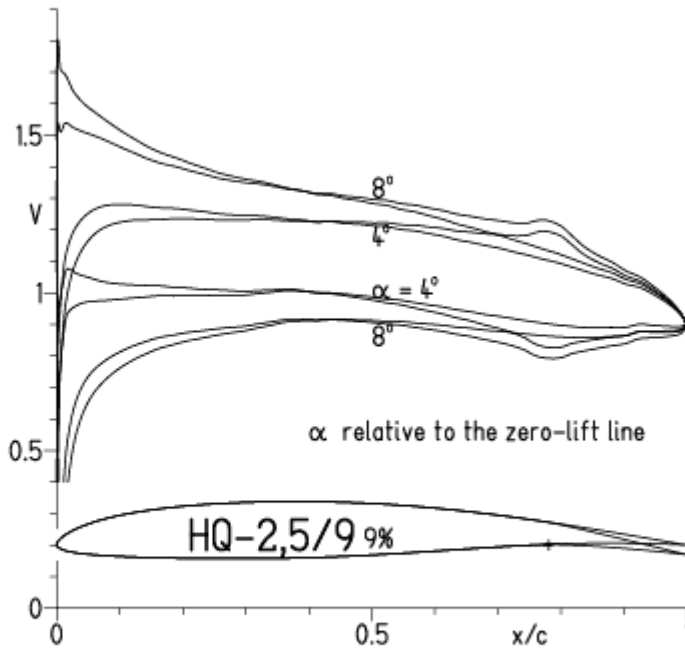
HQ-2,5/9 9%

- $Re = 75\,000$, Turb. upper 45% e^N , $N=9$
- - - 0.1×10^6 , Turb. upper 45% e^N , $N=9$
- · - 0.2×10^6 , Turb. upper 45% e^N , $N=9$
- - - 0.4×10^6 , Turb. upper 45% e^N , $N=9$



HQ-2,5/9, N=9, mit +4° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 20.3.13 10:54

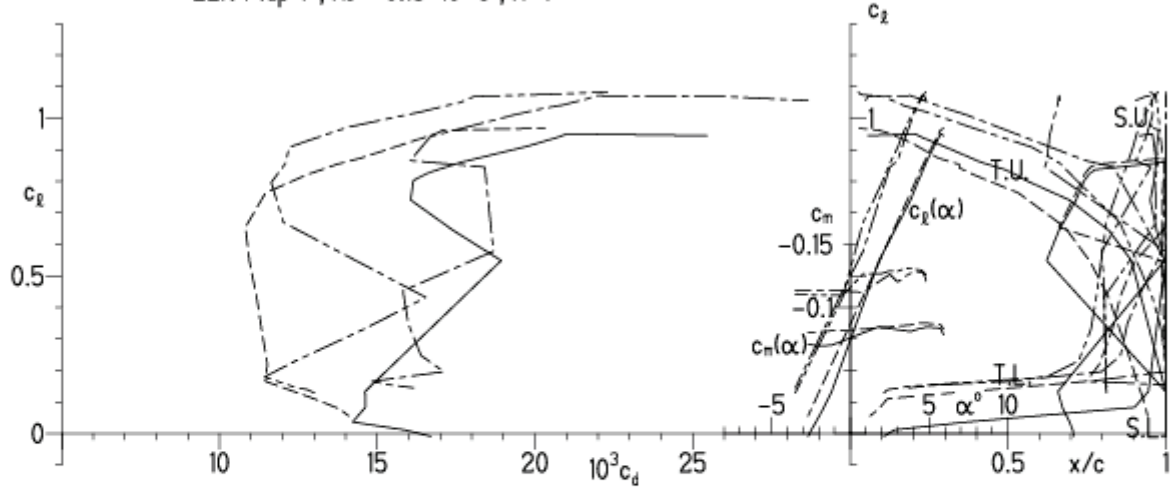


EPPLER 2005 V. 8.5.07 RUN 20.3.13 10:54

HQ-2,5/9 9%

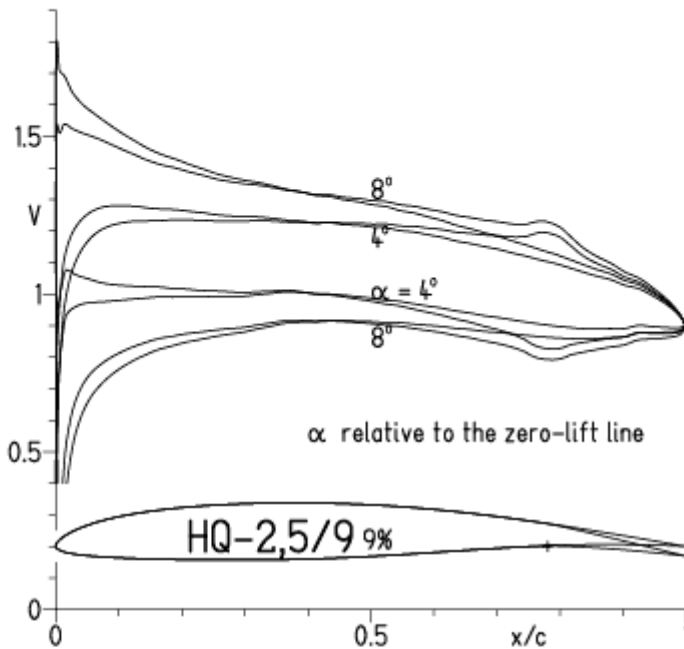
- Re = 75 000 e^N, N=9
- - - 0.15x10⁶ e^N, N=9
- · - 22% Flap 4°, Re = 75 000 e^N, N=9
- · - 22% Flap 4°, Re = 0.15x10⁶ e^N, N=9

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-2,5/9, N=9, mit +4° Wölbklappenausschlag, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

EPPLER 2005 V. 8.5.07 RUN 20.3.13 10:59

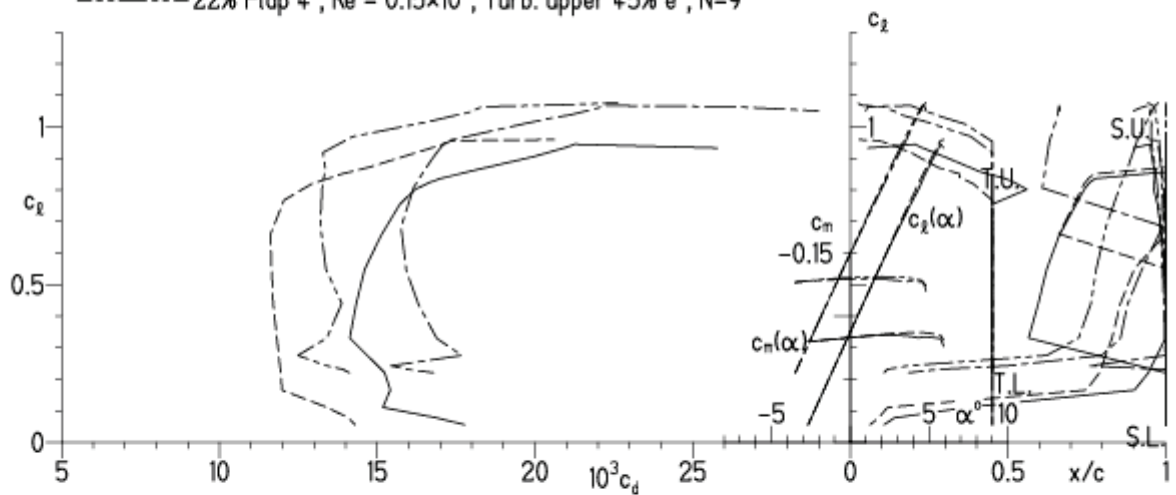


EPPLER 2005 V. 8.5.07 RUN 20.3.1

HQ-2,5/9 9%

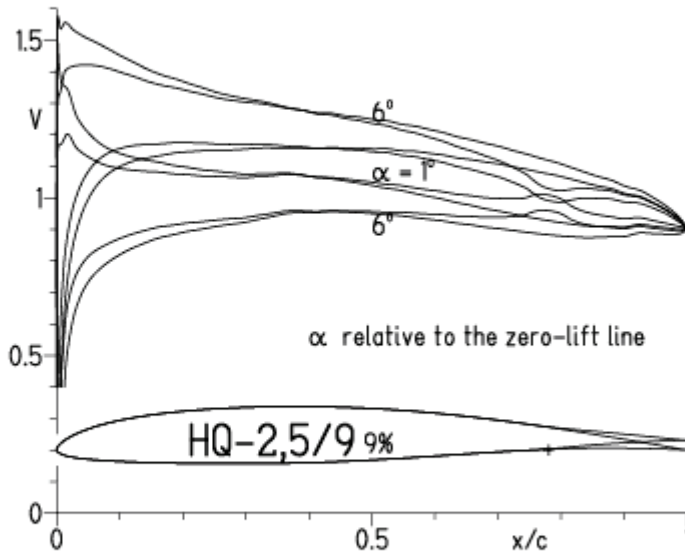
- Re = 75 000, Turb. upper 45% e^N, N=9
- - - 0.15x10⁶, Turb. upper 45% e^N, N=9
- · - 22% Flap 4°, Re = 75 000, Turb. upper 45% e^N, N=9
- · - 22% Flap 4°, Re = 0.15x10⁶, Turb. upper 45% e^N, N=9

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface

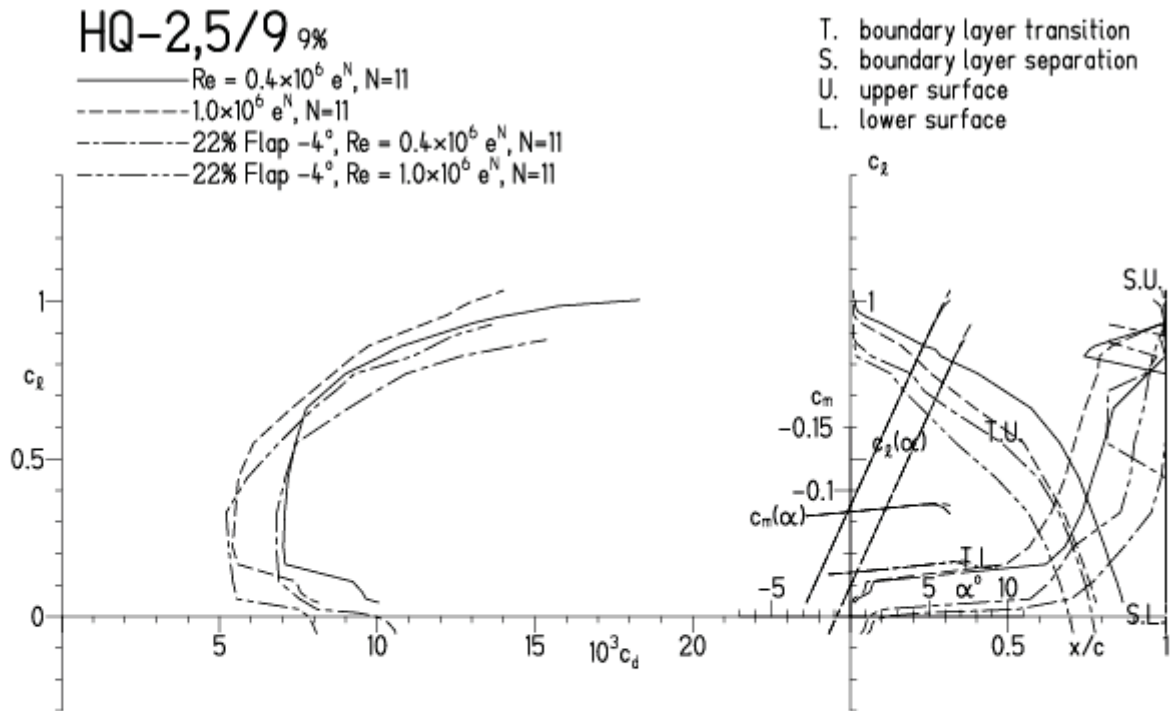


HQ-2,5/9, N=9, mit -4° Wölbklappenausschlag
 (Hohe Endgeschwindigkeiten sind damit leider nicht zu realisieren!)

EPPLER 2005 V. 8.5.07 RUN 20.3.13 11:22

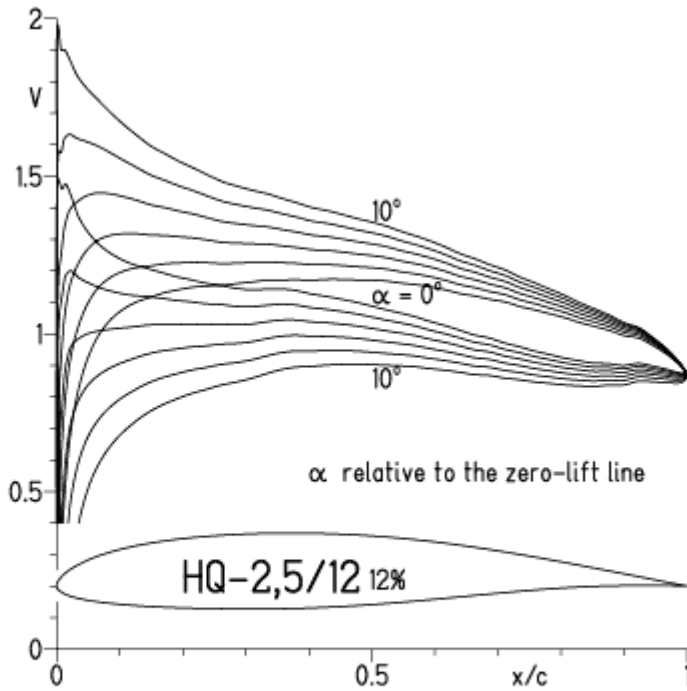


EPPLER 2005 V. 8.5.07 RUN 20.3.13 11:22



HQ-2,5/12, N=11

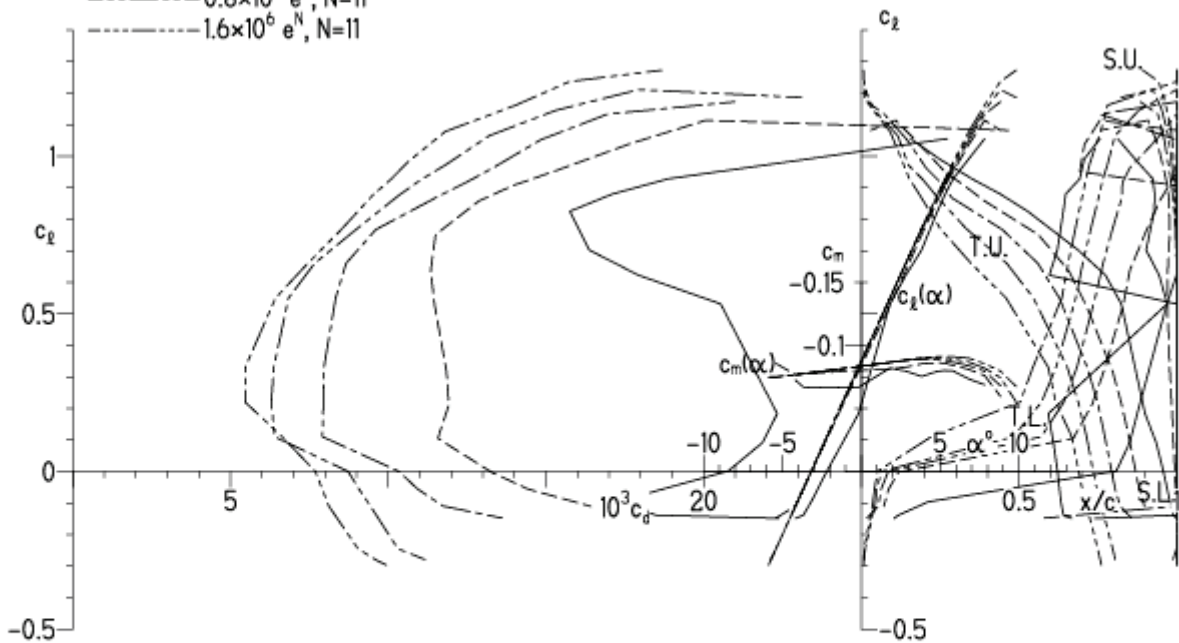
EPPLER 2005 V. 8.5.07 RUN 20.3.13 11:56



EPPLER 2005 V. 8.5.07 RUN 20.3.13 11:56

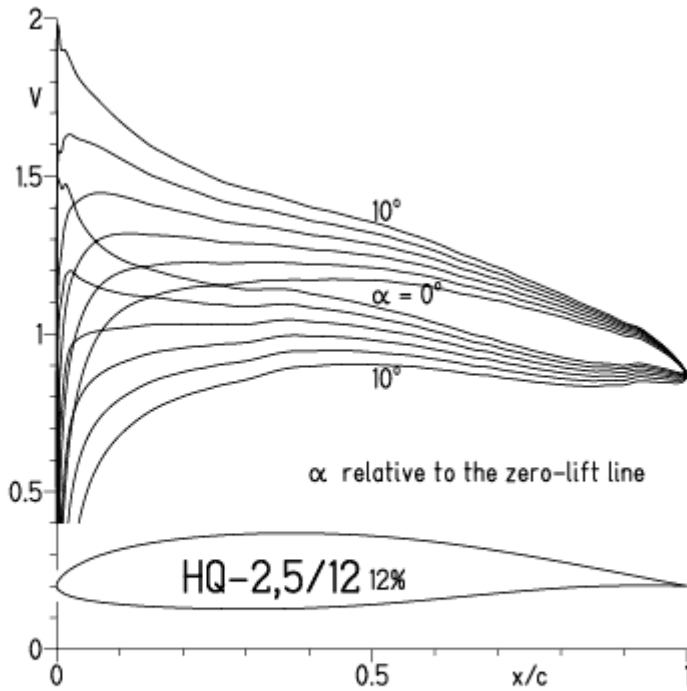
HQ-2,5/12 12%

- $Re = 0.1 \times 10^6 e^N, N=11$
- - - $0.2 \times 10^6 e^N, N=11$
- · - $0.4 \times 10^6 e^N, N=11$
- · - $0.8 \times 10^6 e^N, N=11$
- · - $1.6 \times 10^6 e^N, N=11$



HQ-2,5/12, N=9

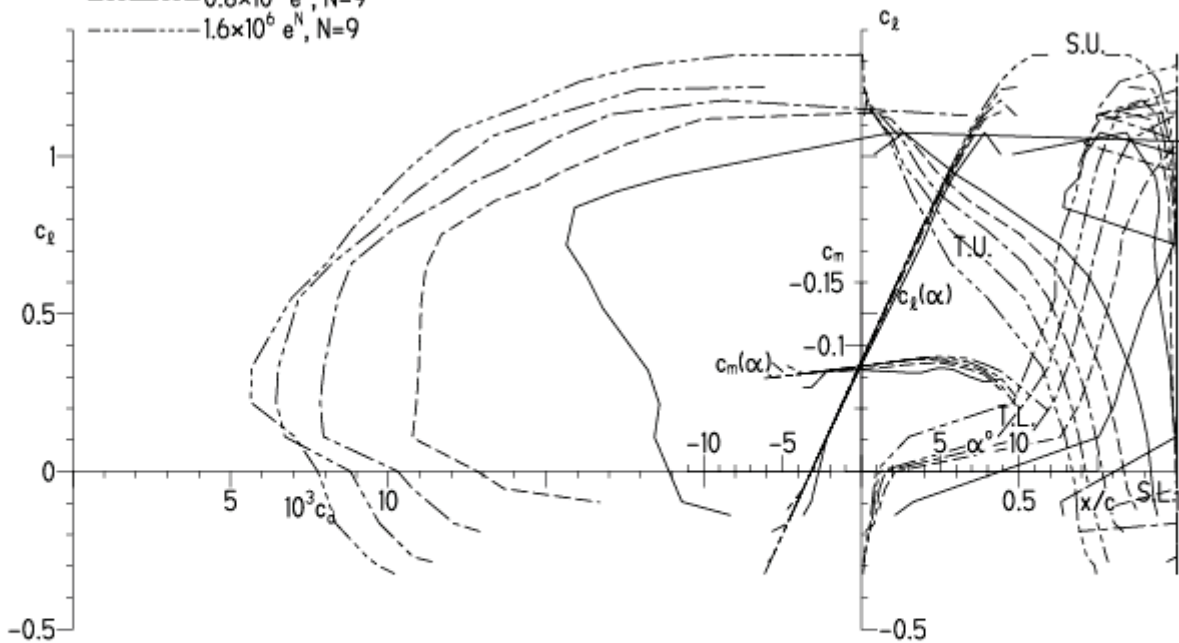
EPPLER 2005 V. 8.5.07 RUN 20.3.13 12:13



EPPLER 2005 V. 8.5.07 RUN 20.3.13 12:13

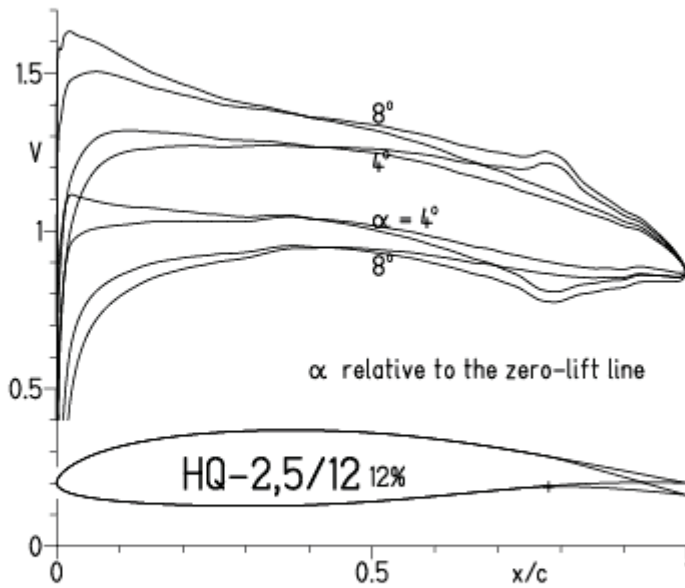
HQ-2,5/12 12%

- $Re = 0.1 \times 10^6 e^N, N=9$
- - - $0.2 \times 10^6 e^N, N=9$
- · - $0.4 \times 10^6 e^N, N=9$
- · - · $0.8 \times 10^6 e^N, N=9$
- · - · - $1.6 \times 10^6 e^N, N=9$



HQ -2,5/12, N=9, mit 5° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 20.3.13 12:34

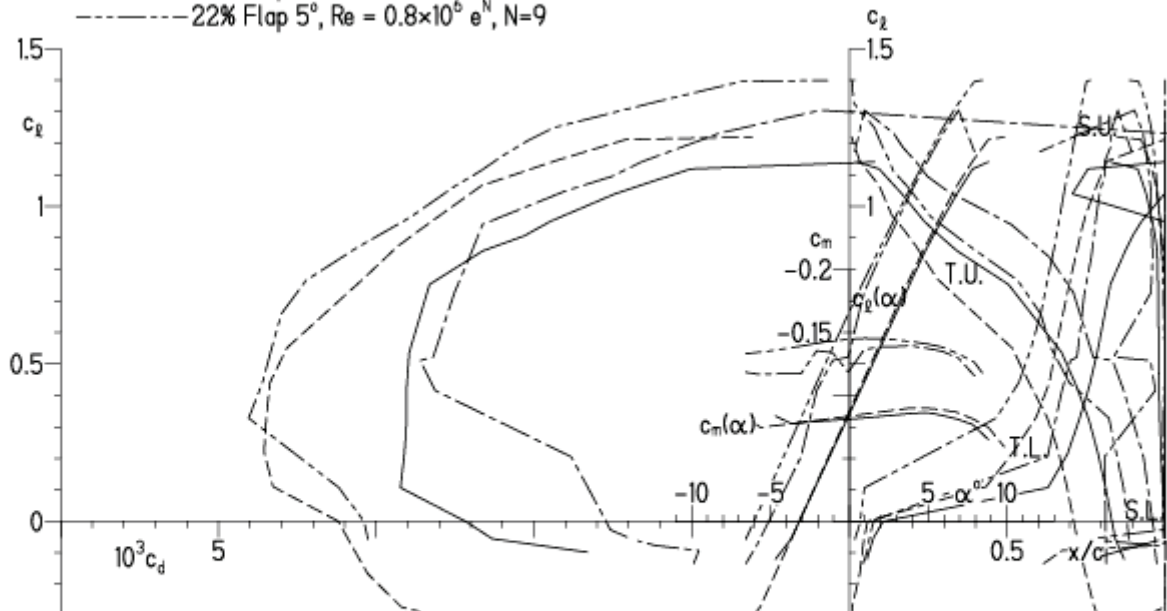


EPPLER 2005 V. 8.5.07 RUN 20.3.13 12:34

HQ-2,5/12 12%

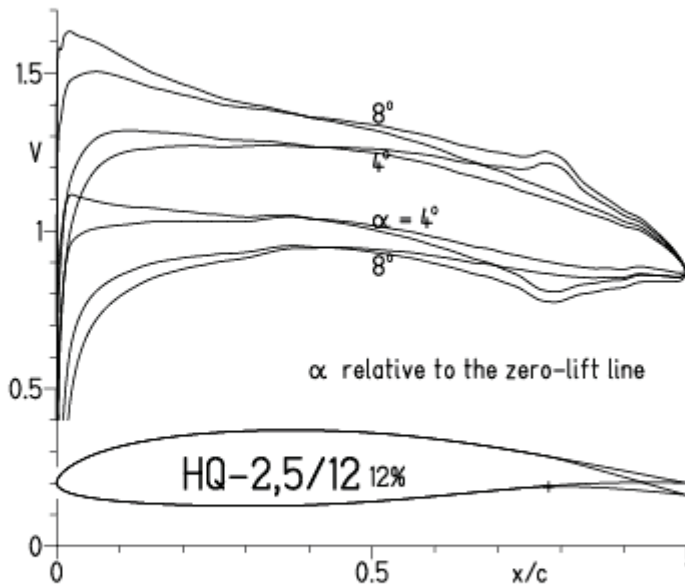
- $Re = 0.2 \times 10^6 e^N, N=9$
- - - $0.8 \times 10^6 e^N, N=9$
- · - · 22% Flap 5°, $Re = 0.2 \times 10^6 e^N, N=9$
- · - · 22% Flap 5°, $Re = 0.8 \times 10^6 e^N, N=9$

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ -2,5/12, N=9, mit 5° Wölbklappenausschlag, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

EPPLER 2005 V. 8.5.07 RUN 20.3.13 12:50

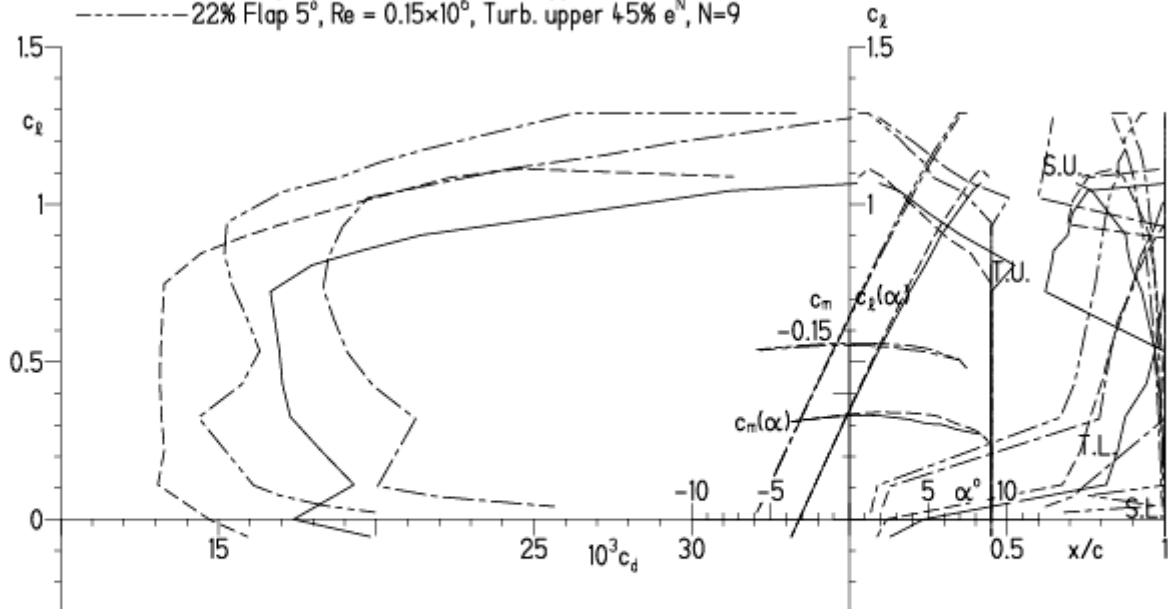


EPPLER 2005 V. 8.5.07 RUN 20.3.13 12:50

HQ-2,5/12 12%

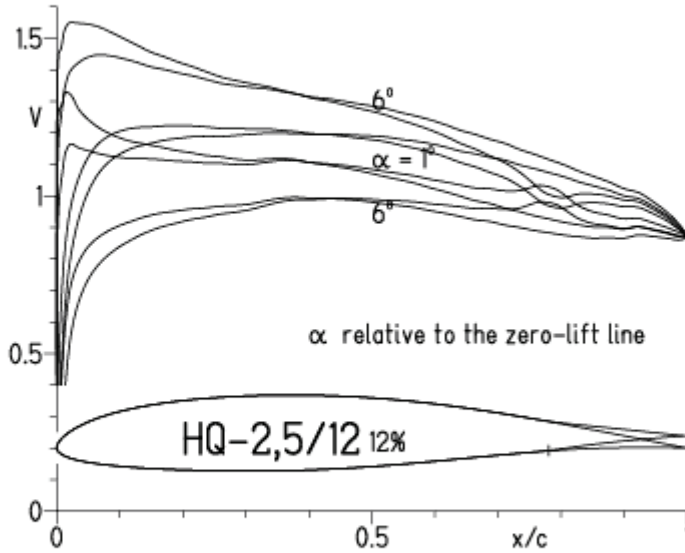
- Re = 75 000, Turb. upper 45% e^N, N=9
- - - 0.15x10⁶, Turb. upper 45% e^N, N=9
- · - 22% Flap 5°, Re = 75 000, Turb. upper 45% e^N, N=9
- · - 22% Flap 5°, Re = 0.15x10⁶, Turb. upper 45% e^N, N=9

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface

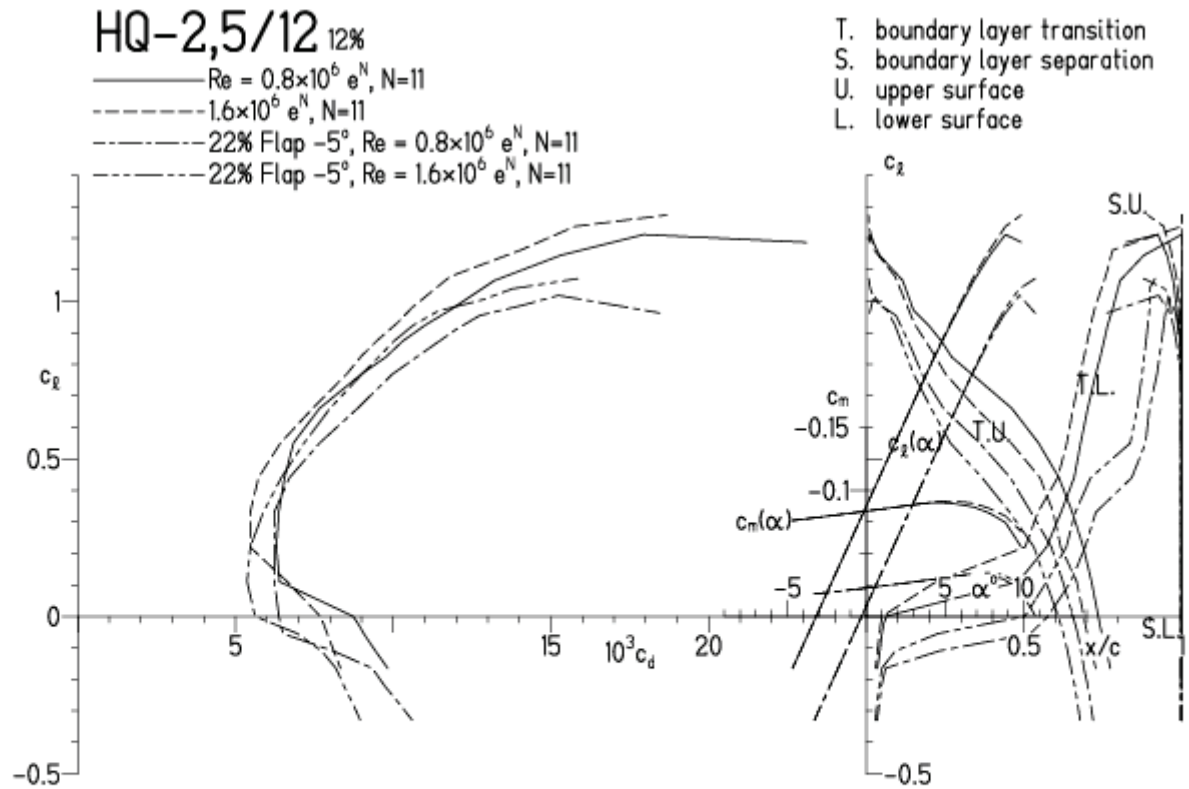


HQ-2,5/12, N=11, mit -5° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 20.3.13 12:59

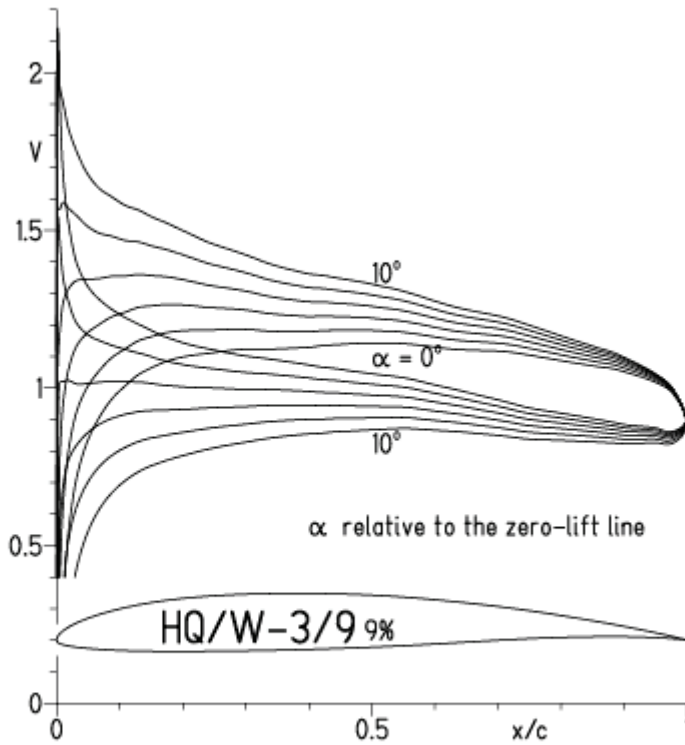


EPPLER 2005 V. 8.5.07 RUN 20.3.1



HQ-3/9, N=11

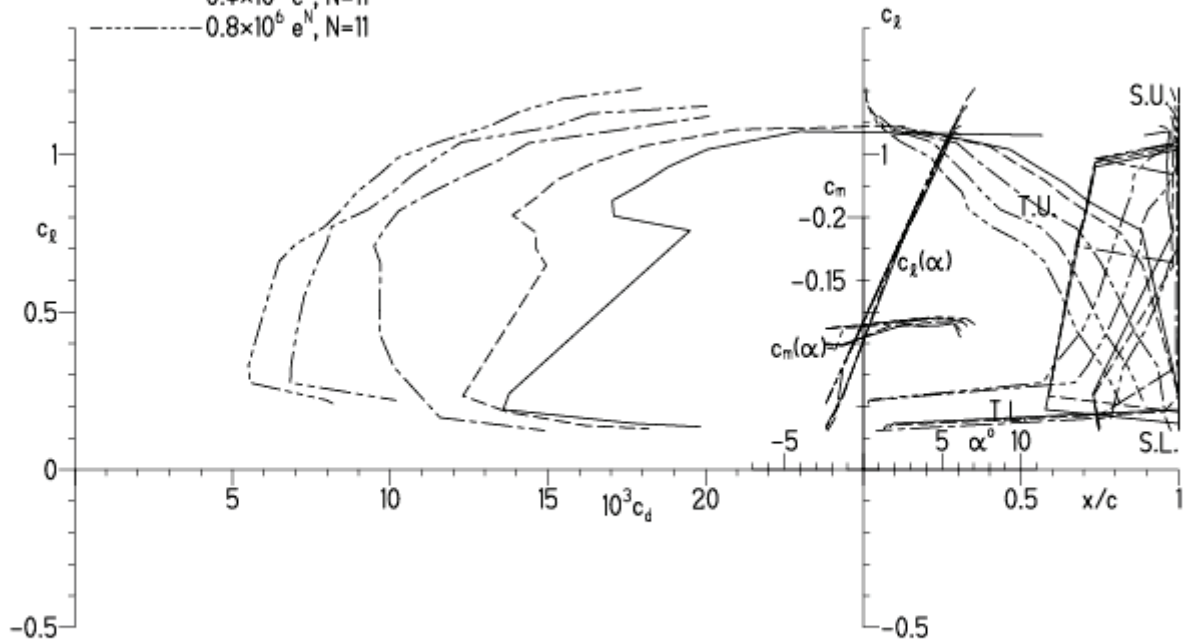
EPPLER 2005 V. 8.5.07 RUN 20.3.13 17:36



EPPLER 2005 V

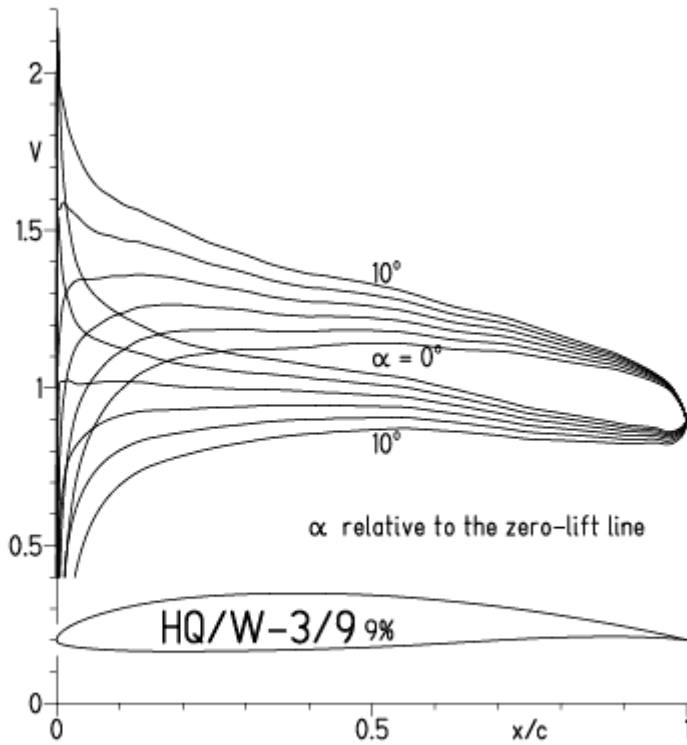
HQ/W-3/9 9%

- $Re = 75\ 000 e^N, N=11$
- - - $0.1 \times 10^6 e^N, N=11$
- · - $0.2 \times 10^6 e^N, N=11$
- · · - $0.4 \times 10^6 e^N, N=11$
- · · · - $0.8 \times 10^6 e^N, N=11$



HQ-3/9, N=9

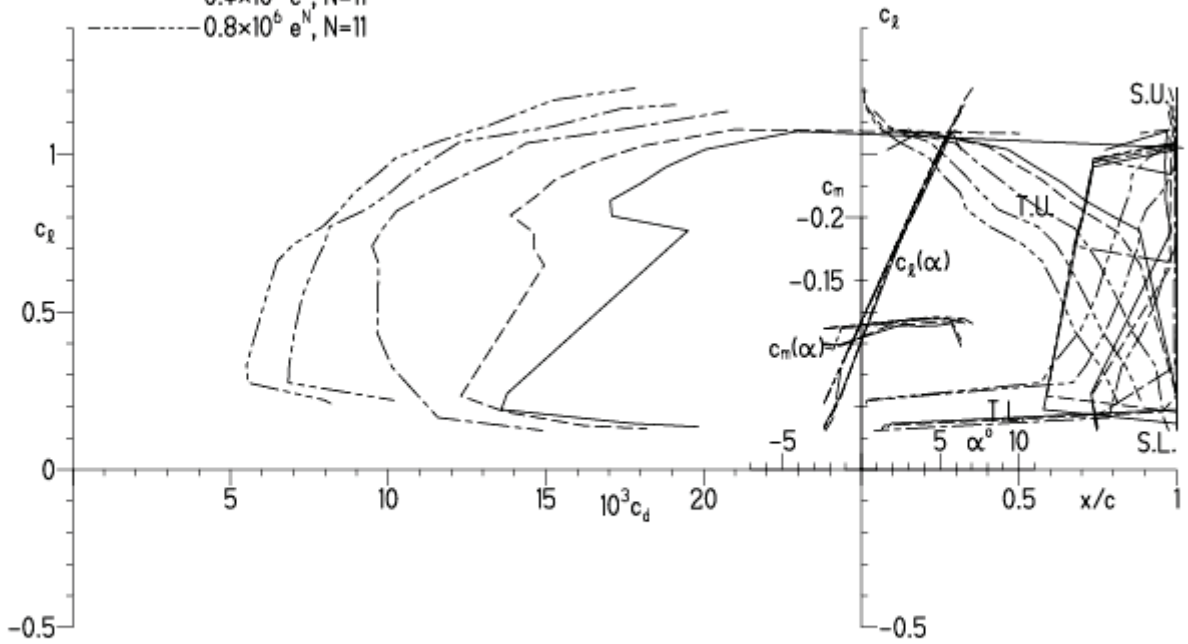
EPPLER 2005 V. 8.5.07 RUN 20.3.13 17:52



EPPLER 2005 V. 8.5.07 RUN 20.3.13 17:

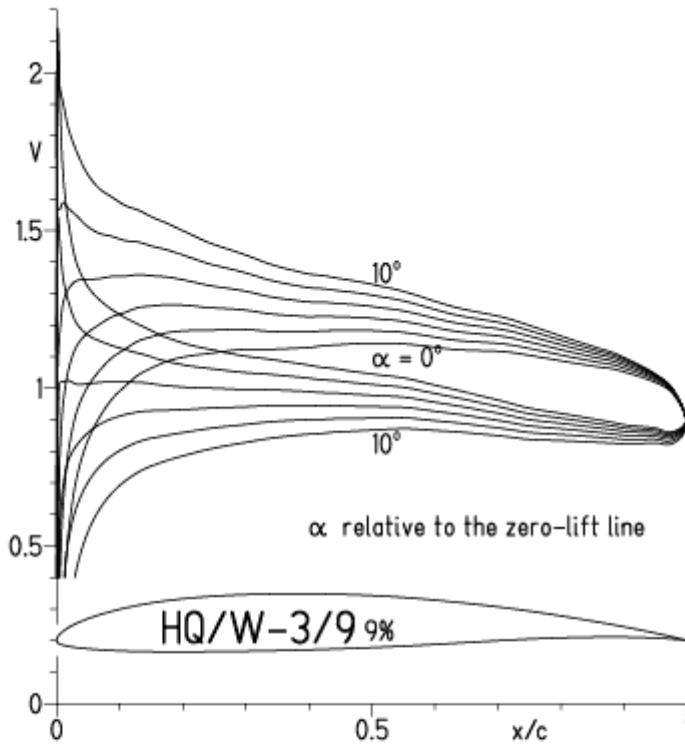
HQ/W-3/9 9%

- $Re = 75\ 000 e^N, N=11$
- - - $0.1 \times 10^6 e^N, N=11$
- · - $0.2 \times 10^6 e^N, N=11$
- · · - $0.4 \times 10^6 e^N, N=11$
- · · · - $0.8 \times 10^6 e^N, N=11$



HQ-3/9, N=9, Turbulatoreffekt (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

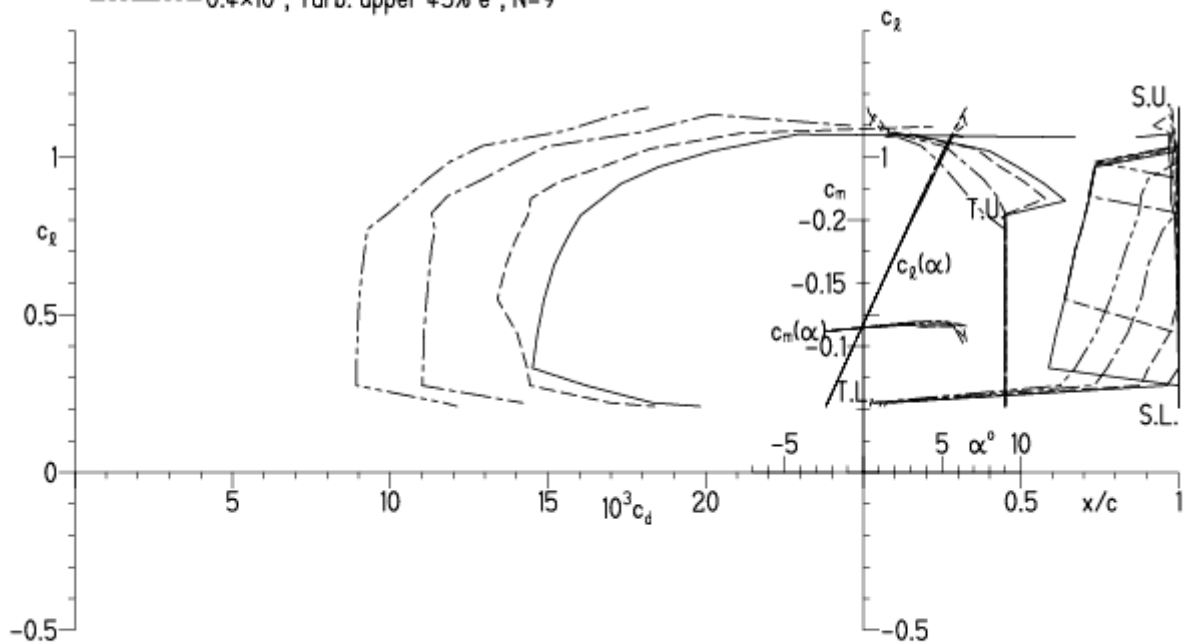
EPPLER 2005 V. 8.5.07 RUN 20.3.13 18:03



EPPLER 2005 V. 8.5.07 RUN 20.3.13 18:03

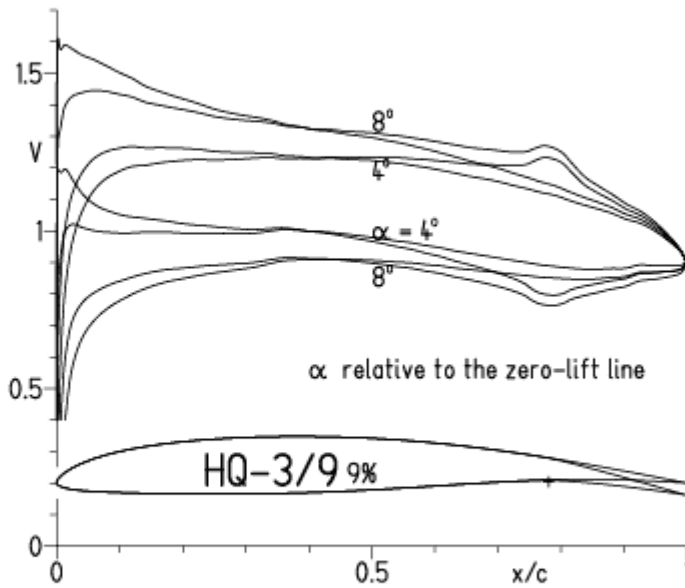
HQ/W-3/9 9%

- $Re = 75\,000$, Turb. upper 45% e^N , $N=9$
- - - 0.1×10^6 , Turb. upper 45% e^N , $N=9$
- · - 0.2×10^6 , Turb. upper 45% e^N , $N=9$
- - - 0.4×10^6 , Turb. upper 45% e^N , $N=9$



HQ-3/9, N=9, mit +5° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 20.3.13 18:26

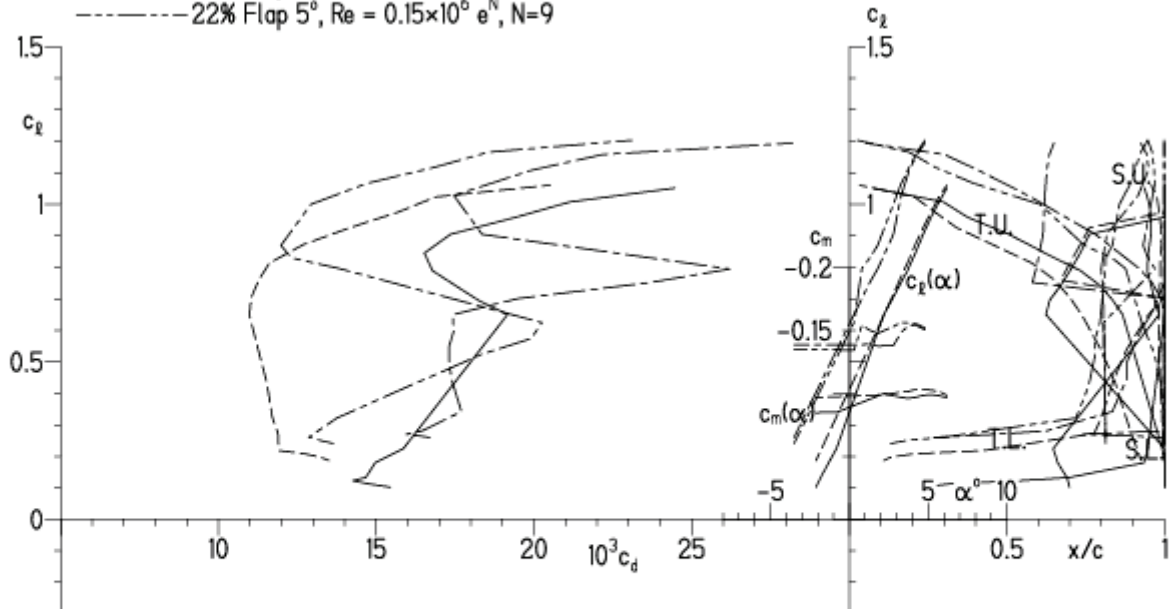


EPPLER 2005 V. 8.5.07 RUN 20.3.13 18:26

HQ-3/9 9%

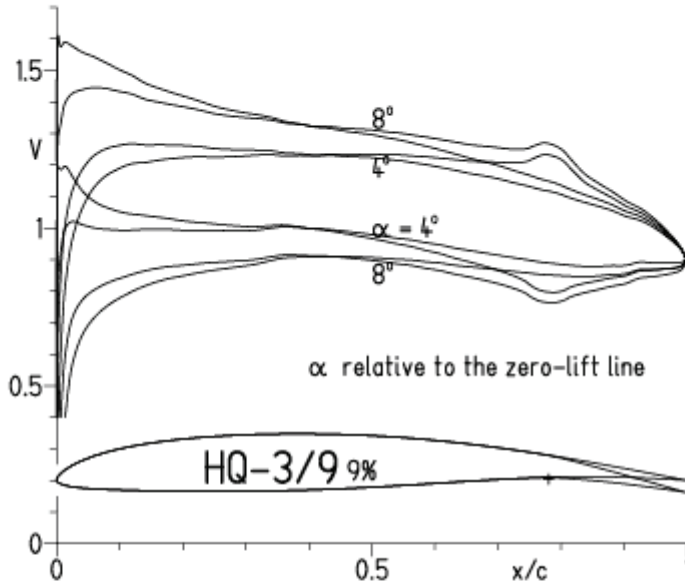
- $Re = 75\,000 e^N, N=9$
- - - $0.15 \times 10^6 e^N, N=9$
- · - · 22% Flap 5°, $Re = 75\,000 e^N, N=9$
- · - · 22% Flap 5°, $Re = 0.15 \times 10^6 e^N, N=9$

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-3/9, N=9, mit +5° Wölbklappenausschlag, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

EPPLER 2005 V. 8.5.07 RUN 20.3.13 18:28

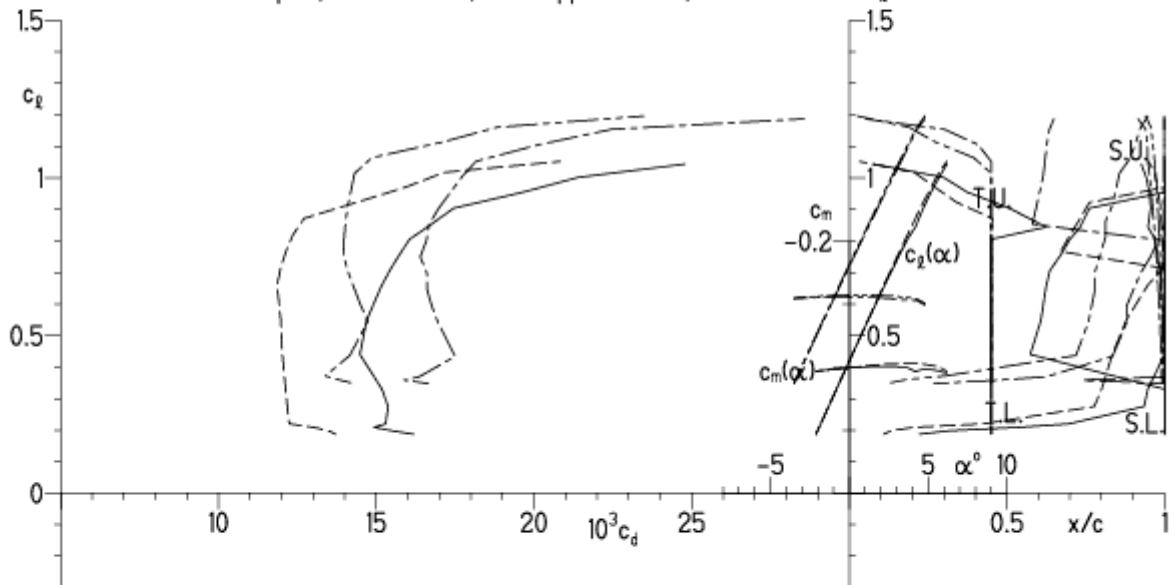


EPPLER 2005 V. 8.5.07 RUN 20.3

HQ-3/9 9%

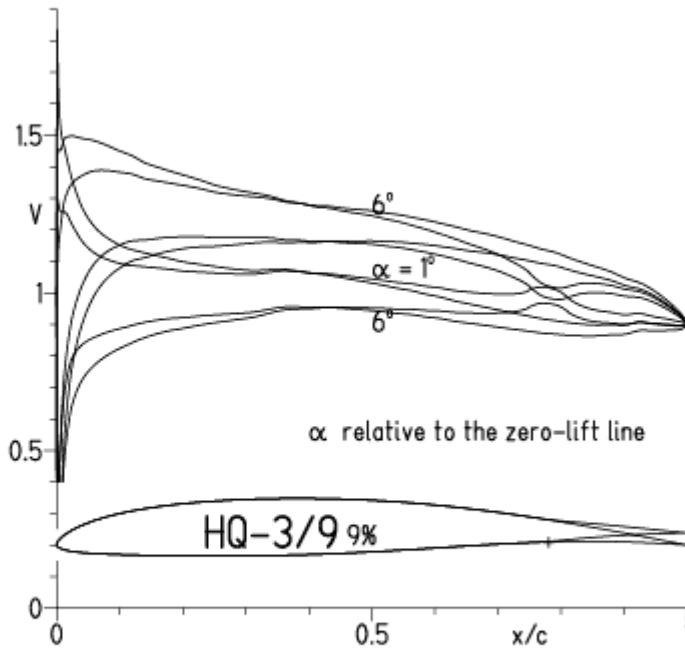
- Re = 75 000, Turb. upper 45% e^N, N=9
- - - 0.15x10⁶, Turb. upper 45% e^N, N=9
- · - 22% Flap 5°, Re = 75 000, Turb. upper 45% e^N, N=9
- · - 22% Flap 5°, Re = 0.15x10⁶, Turb. upper 45% e^N, N=9

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-3/9, N=9, mit -5° Wölbklappenausschlag

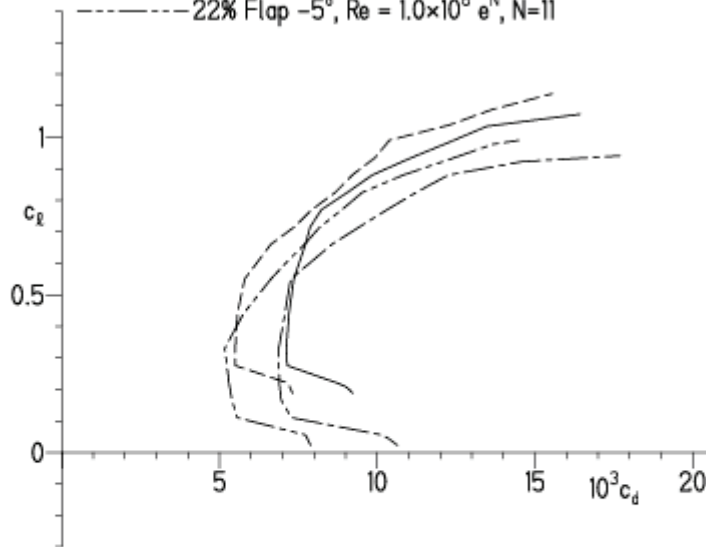
EPPLER 2005 V. 8.5.07 RUN 20.3.13 18:39



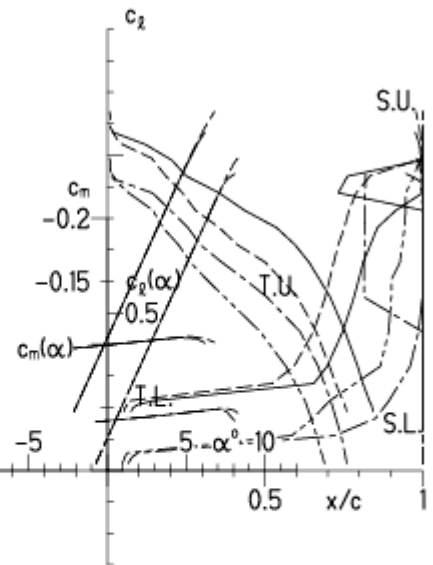
EPPLER 2005 V. 8.5.07 RUN 20.3.13 18:39

HQ-3/9 9%

- $Re = 0.4 \times 10^6 e^N, N=11$
- - - $1.0 \times 10^6 e^N, N=11$
- · - · 22% Flap -5°, $Re = 0.4 \times 10^6 e^N, N=11$
- · - · 22% Flap -5°, $Re = 1.0 \times 10^6 e^N, N=11$

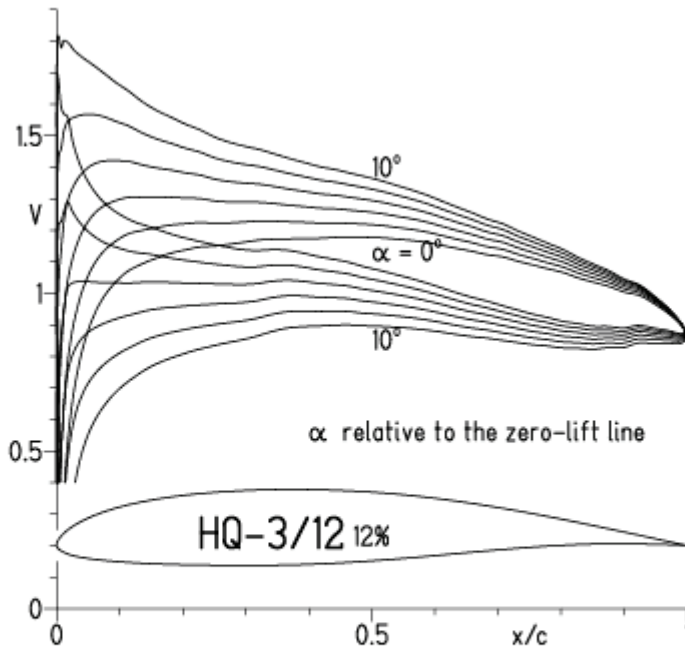


- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-3/12, N=11

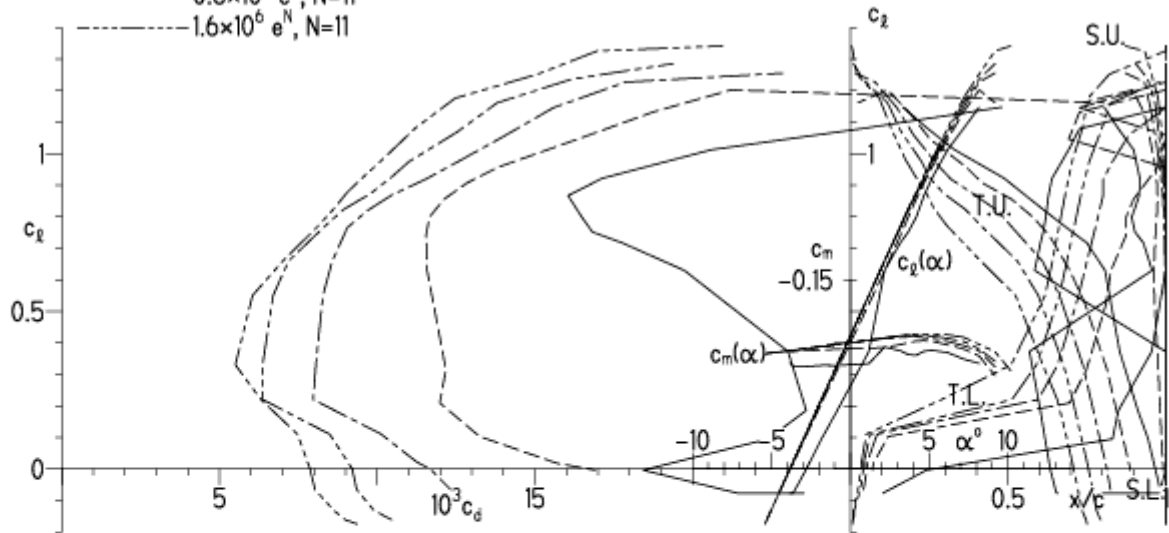
EPPLER 2005 V. 8.5.07 RUN 21.3.13 11:04



EPPLER 2005 V. 8.5.07 RUN 21.3.13 11:04

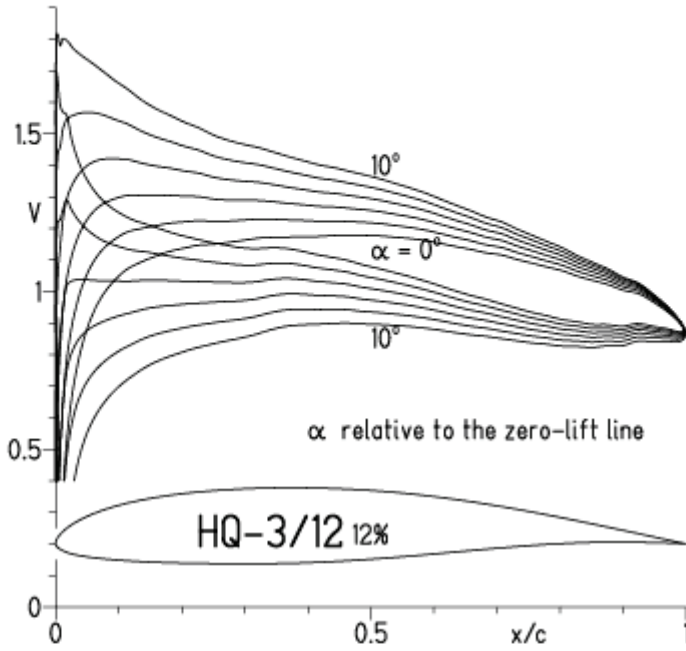
HQ-3/12 12%

- $Re = 0.1 \times 10^6 e^N, N=11$
- - - $0.2 \times 10^6 e^N, N=11$
- · - $0.4 \times 10^6 e^N, N=11$
- · - · $0.8 \times 10^6 e^N, N=11$
- · - · - $1.6 \times 10^6 e^N, N=11$



HQ-3/12, N=9

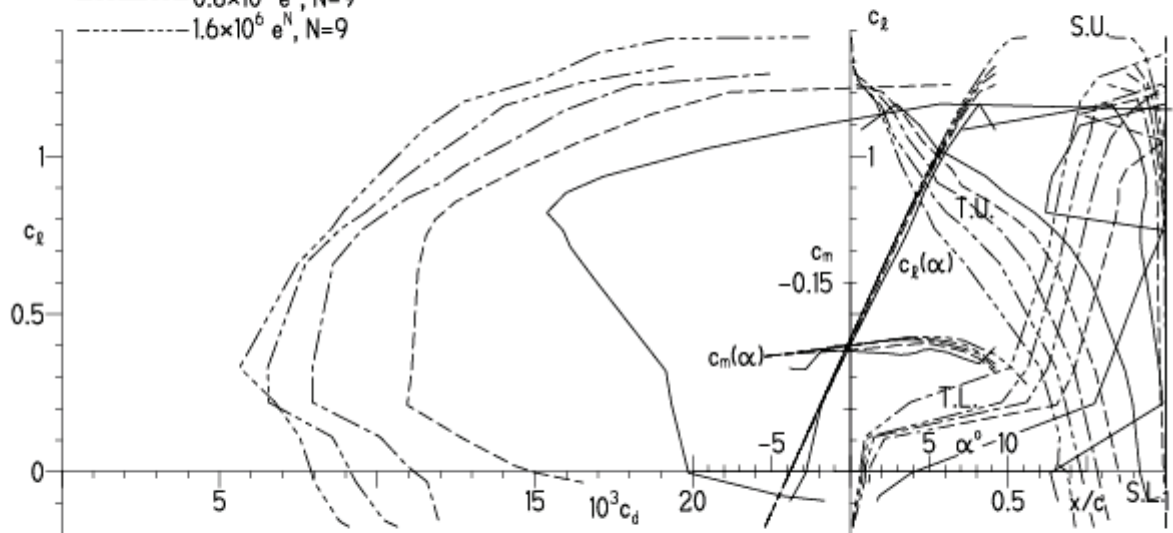
EPPLER 2005 V. 8.5.07 RUN 21.3.13 11:16



EPPLER 2005 V. 8.5.07 RUN 21.3.13 11:16

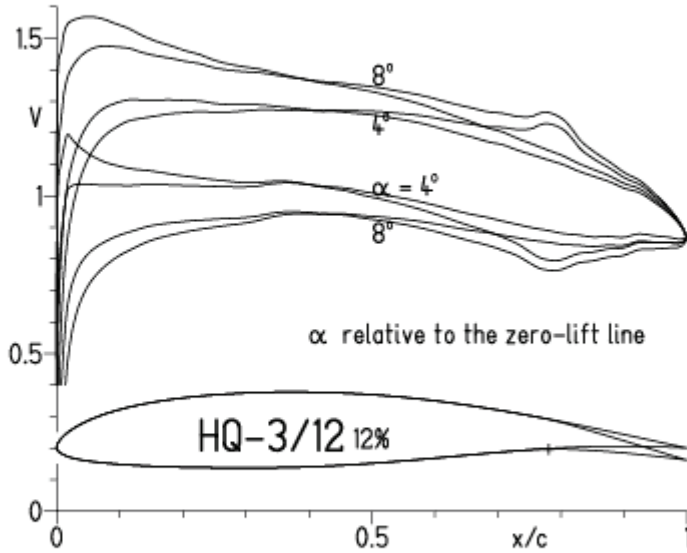
HQ-3/12 12%

- $Re = 0.1 \times 10^6 e^N, N=9$
- - - $0.2 \times 10^6 e^N, N=9$
- · - $0.4 \times 10^6 e^N, N=9$
- · · - $0.8 \times 10^6 e^N, N=9$
- · · · - $1.6 \times 10^6 e^N, N=9$



HQ -3/12, N=9, mit 5° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 21.3.13 11:34

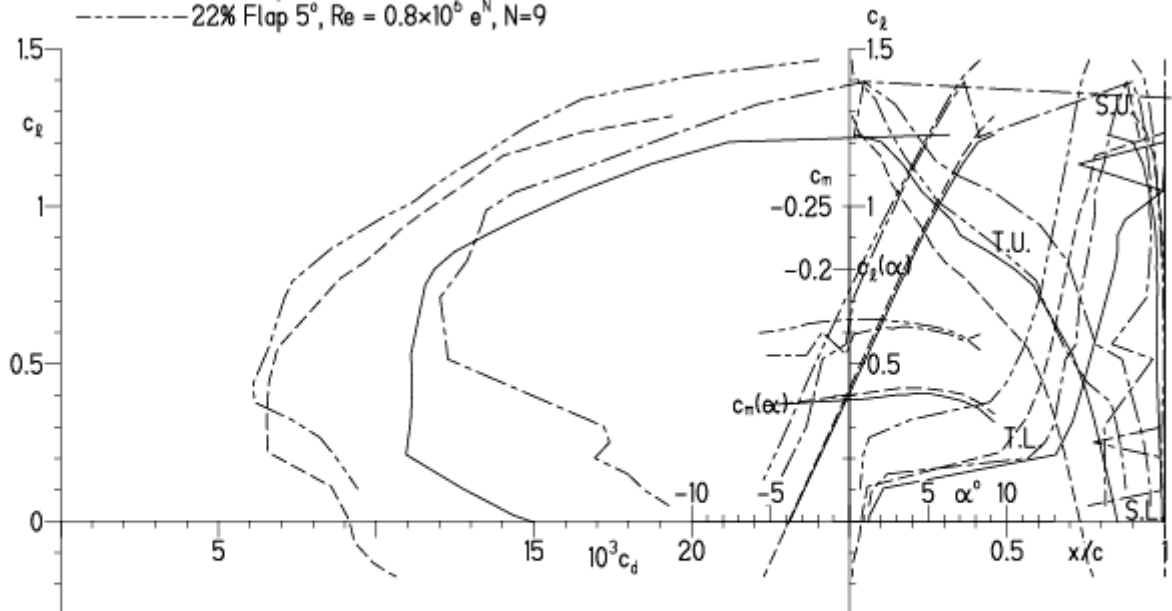


EPPLER 2

HQ-3/12 12%

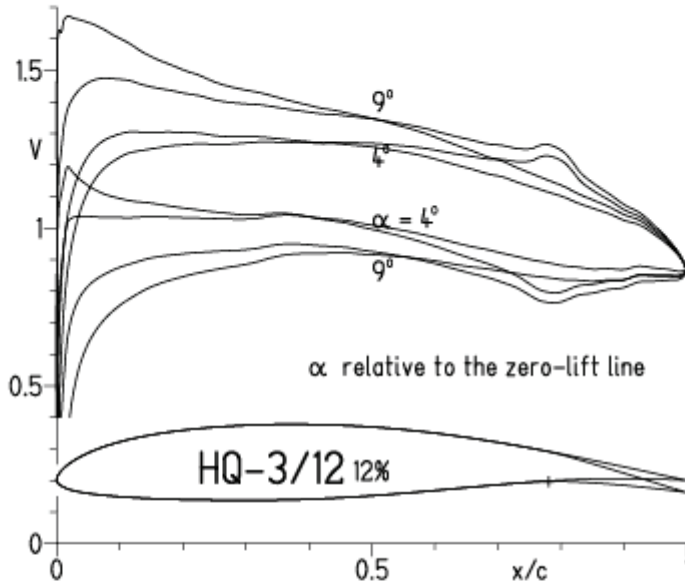
- $Re = 0.2 \times 10^6 e^N, N=9$
- - - $0.8 \times 10^6 e^N, N=9$
- · - · 22% Flap 5°, $Re = 0.2 \times 10^6 e^N, N=9$
- · - · 22% Flap 5°, $Re = 0.8 \times 10^6 e^N, N=9$

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ -3/12, N=9, mit 5° Wölbklappenausschlag, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

EPPLER 2005 V. 8.5.07 RUN 21.3.13 11:47

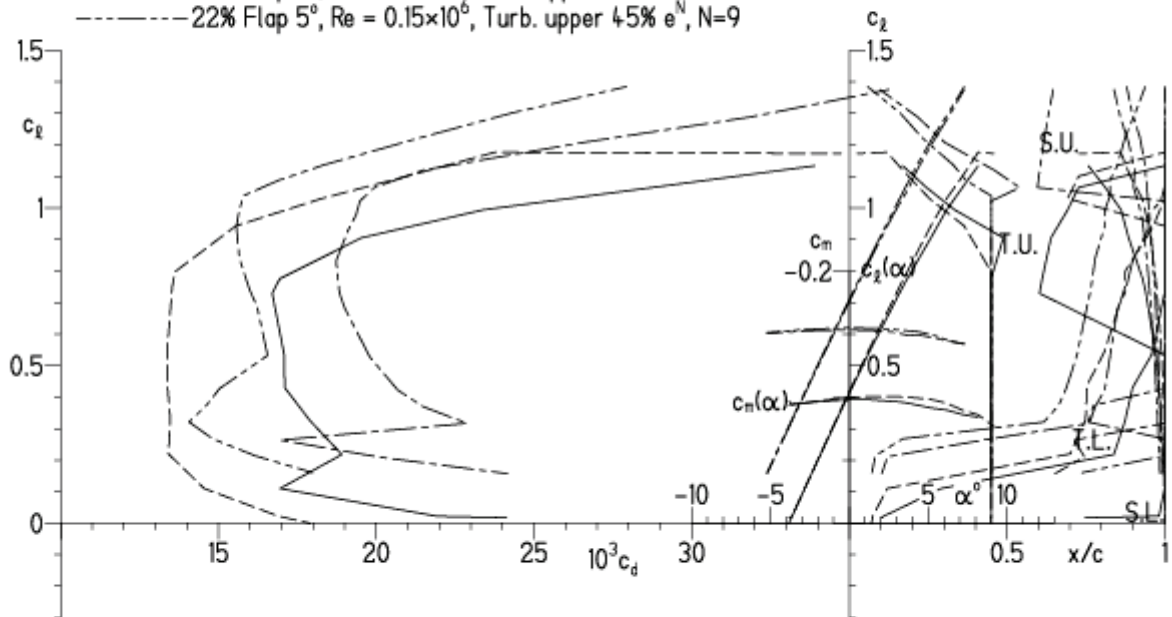


EPPLER 2005 V. 8.5.07 RUN 21.3.13 11:47

HQ-3/12 12%

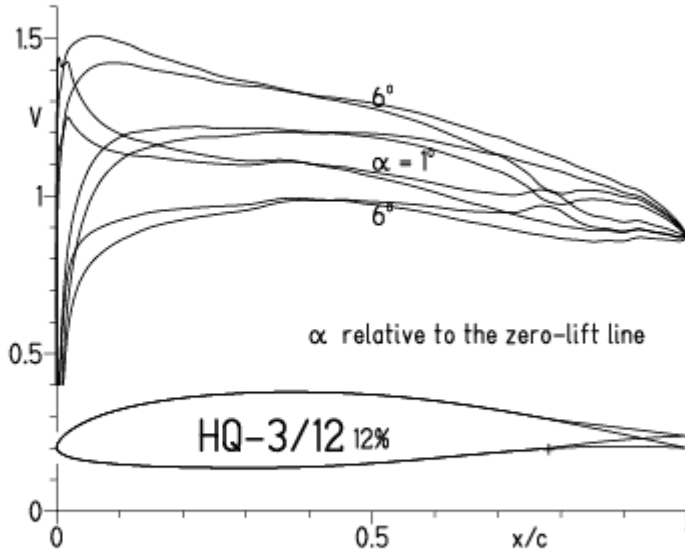
- $Re = 75\,000$, Turb. upper 45% e^N , $N=9$
- - - 0.15×10^6 , Turb. upper 45% e^N , $N=9$
- · - · 22% Flap 5° , $Re = 75\,000$, Turb. upper 45% e^N , $N=9$
- · - · 22% Flap 5° , $Re = 0.15 \times 10^6$, Turb. upper 45% e^N , $N=9$

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface

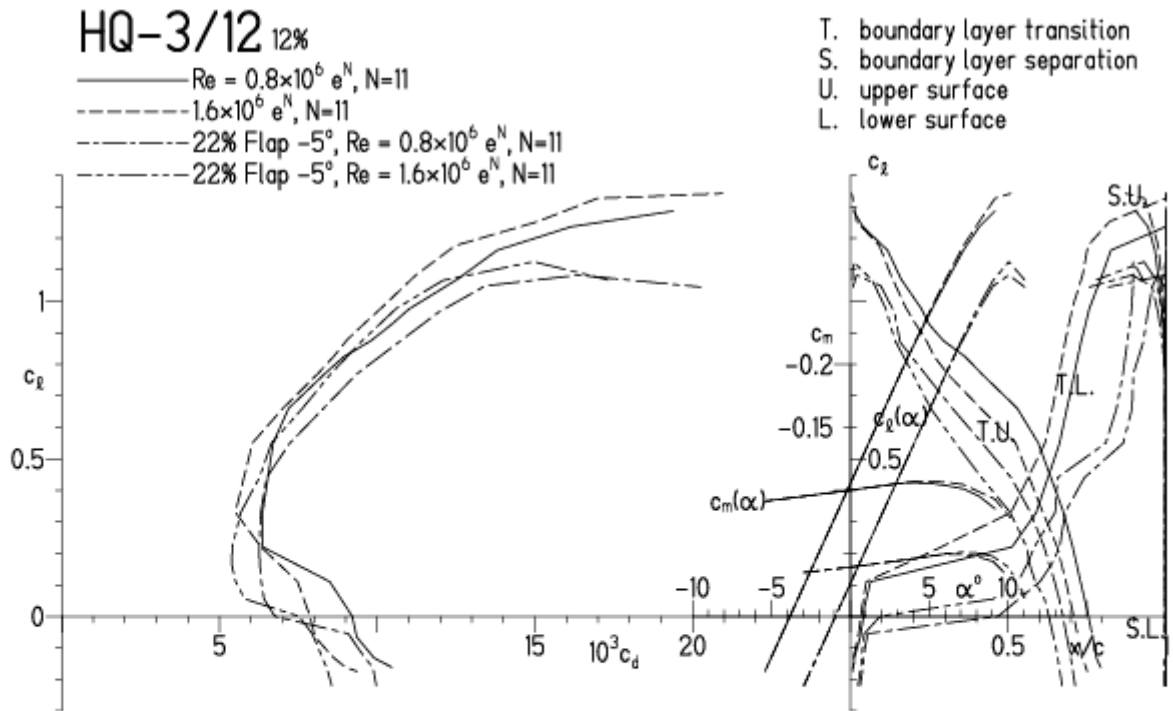


HQ -3/12, N=11, mit -5° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 21.3.13 11:55

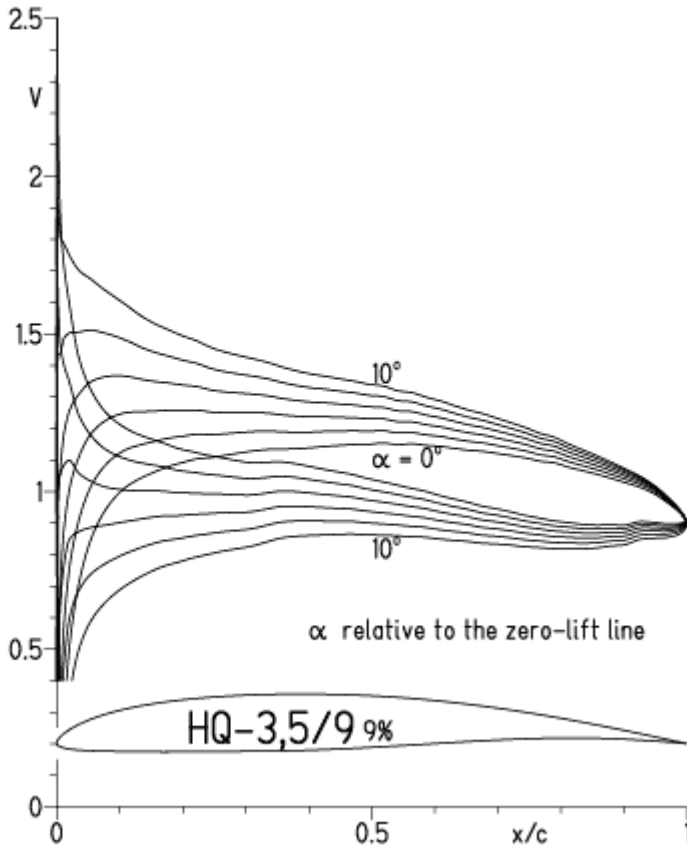


EPPLER 2005 V. 8.5.07 RUN 21.3.13 11:55



HQ -3,5/12, N=11

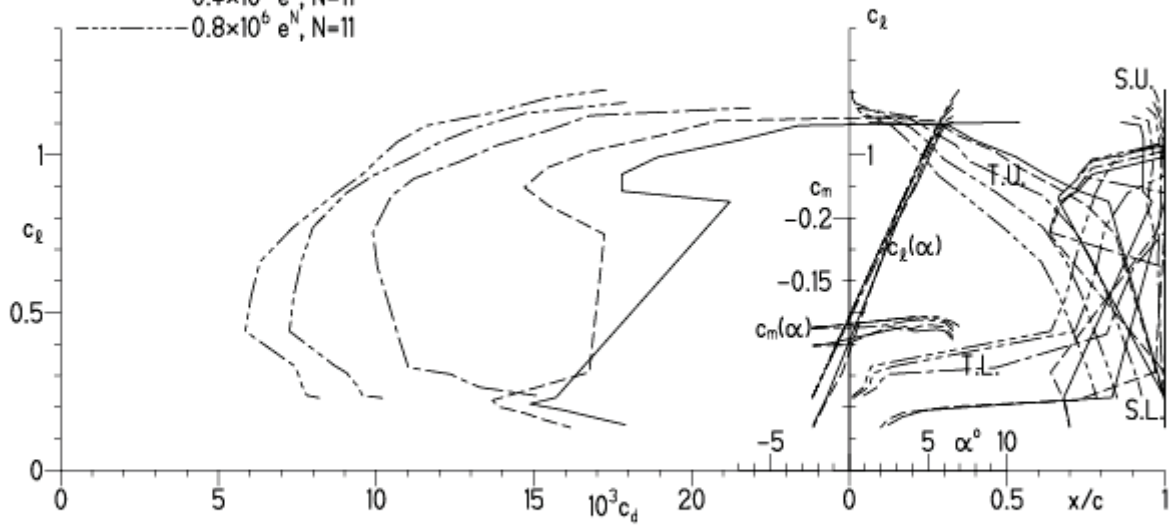
EPPLER 2005 V. 8.5.07 RUN 21.3.13 12:42



EPPLER 2005 V. 8

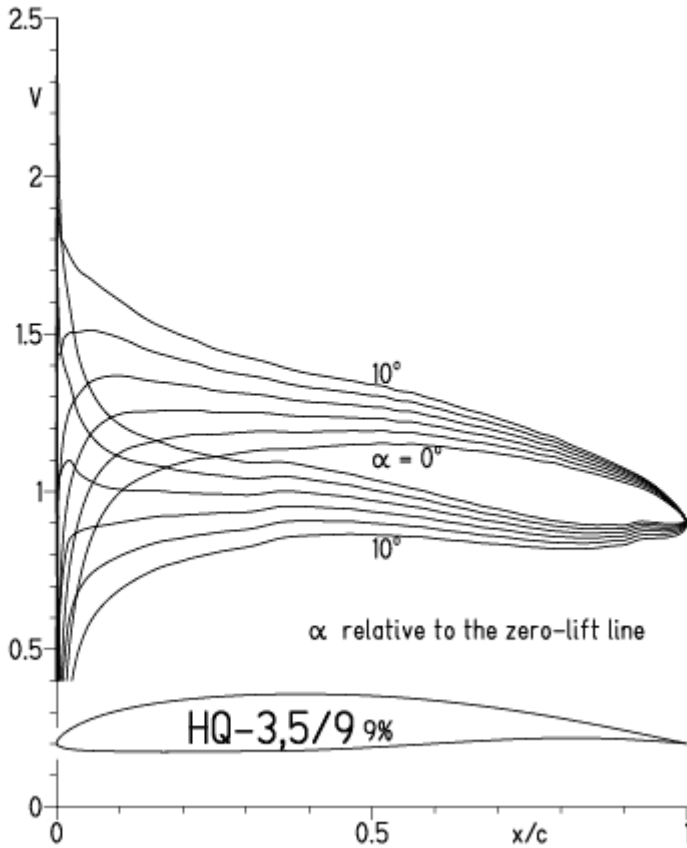
HQ-3,5/9 9%

- $Re = 75\,000 e^N, N=11$
- - - $0.1 \times 10^6 e^N, N=11$
- - - $0.2 \times 10^6 e^N, N=11$
- - - $0.4 \times 10^6 e^N, N=11$
- - - $0.8 \times 10^6 e^N, N=11$



HQ -3,5/12, N=9

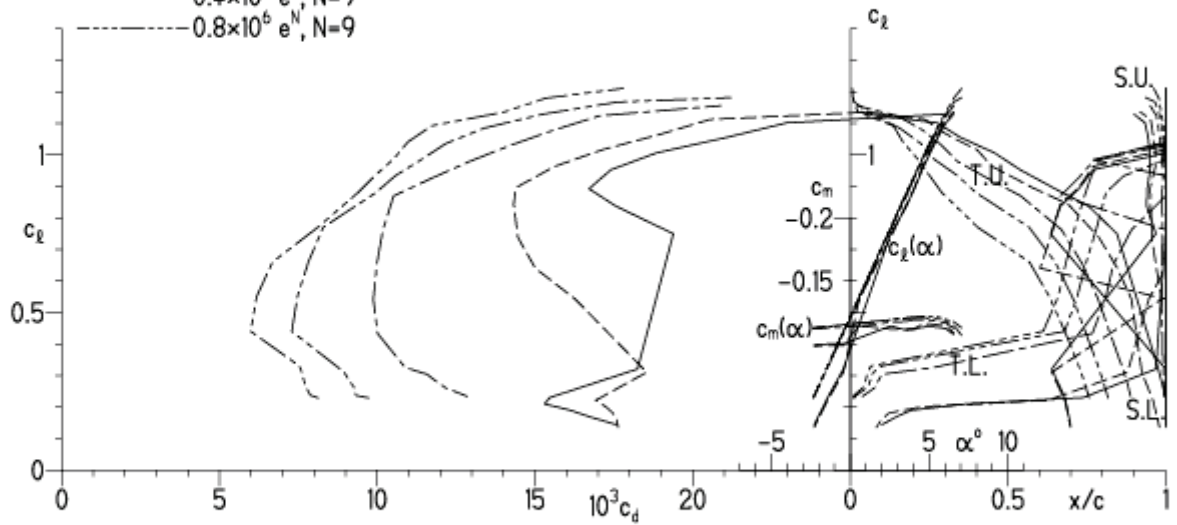
EPPLER 2005 V. 8.5.07 RUN 21.3.13 12:39



EPPLER 2005 V. 8.5.07 RUN 21.3.1

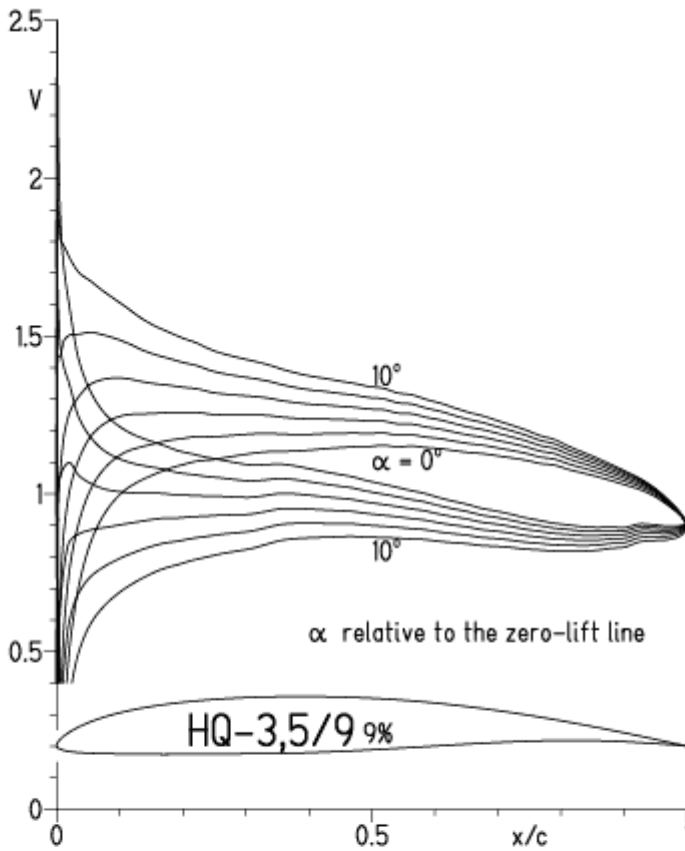
HQ-3,5/9 9%

- $Re = 75\,000 e^N, N=9$
- - - $0.1 \times 10^6 e^N, N=9$
- - - $0.2 \times 10^6 e^N, N=9$
- - - $0.4 \times 10^6 e^N, N=9$
- - - $0.8 \times 10^6 e^N, N=9$



HQ-3,5/9, N=9, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

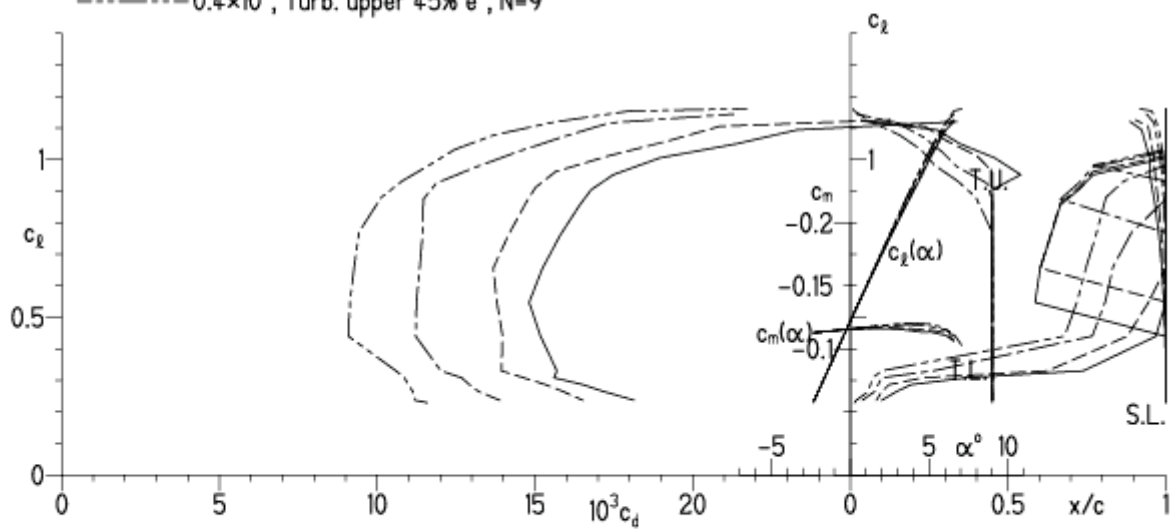
EPPLER 2005 V. 8.5.07 RUN 21.3.13 12:45



EPPLER 2005 V. 8.5.07 RUN 21.3.13 12:45

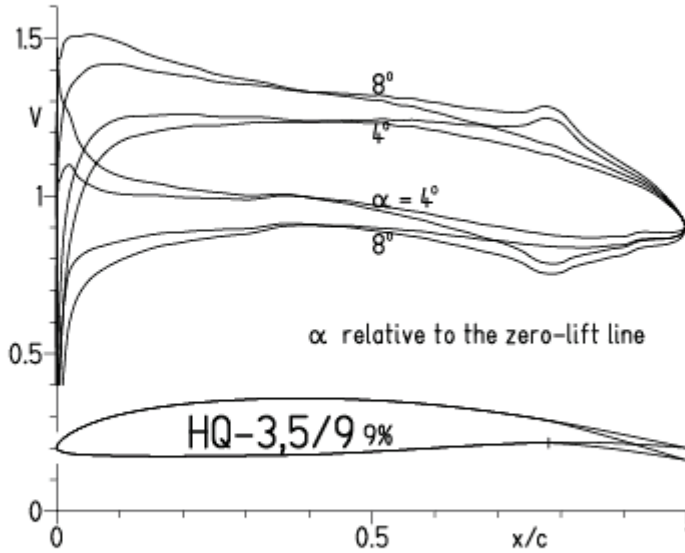
HQ-3,5/9 9%

- $Re = 75\,000$, Turb. upper 45% e^N , $N=9$
- - - 0.1×10^6 , Turb. upper 45% e^N , $N=9$
- · - 0.2×10^6 , Turb. upper 45% e^N , $N=9$
- - - 0.4×10^6 , Turb. upper 45% e^N , $N=9$



HQ-3,5/9, N=9, mit +4° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 21.3.13 13:07

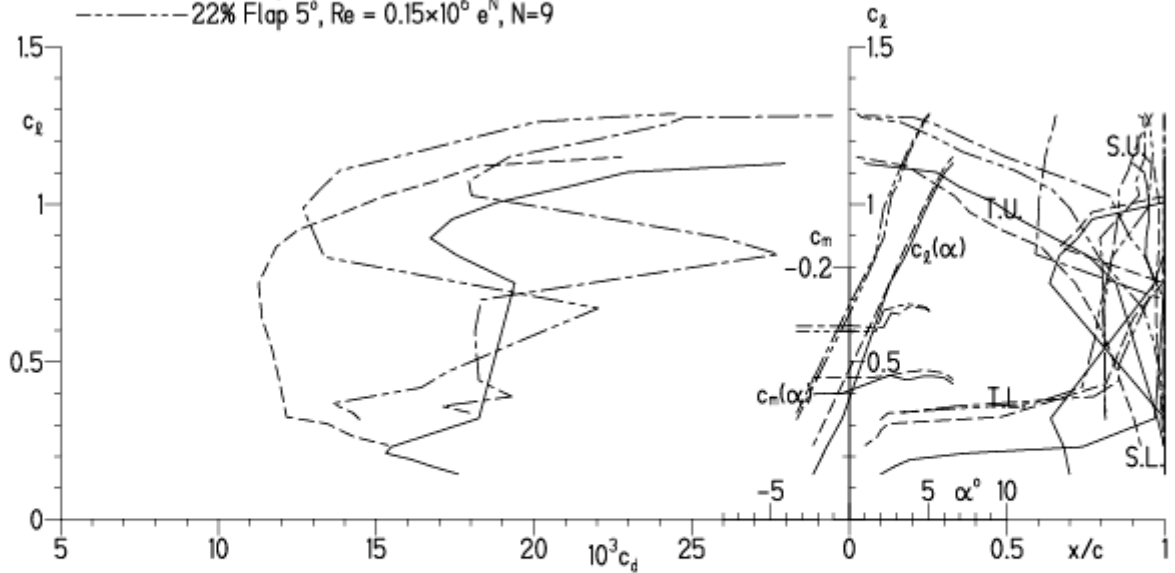


EPPLER 2005 V. 8.5.07 RUN 21.3.1

HQ-3,5/9 9%

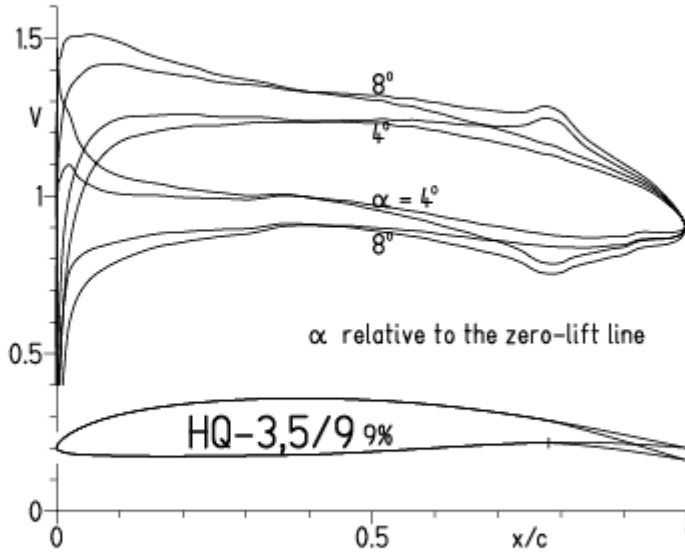
- $Re = 75\,000 e^N, N=9$
- - - $0.15 \times 10^6 e^N, N=9$
- · - · - 22% Flap 5°, $Re = 75\,000 e^N, N=9$
- · - · - 22% Flap 5°, $Re = 0.15 \times 10^6 e^N, N=9$

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-3,5/9, N=9, mit +5° Wölbklappenausschlag, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

EPPLER 2005 V. 8.5.07 RUN 21.3.13 13:10

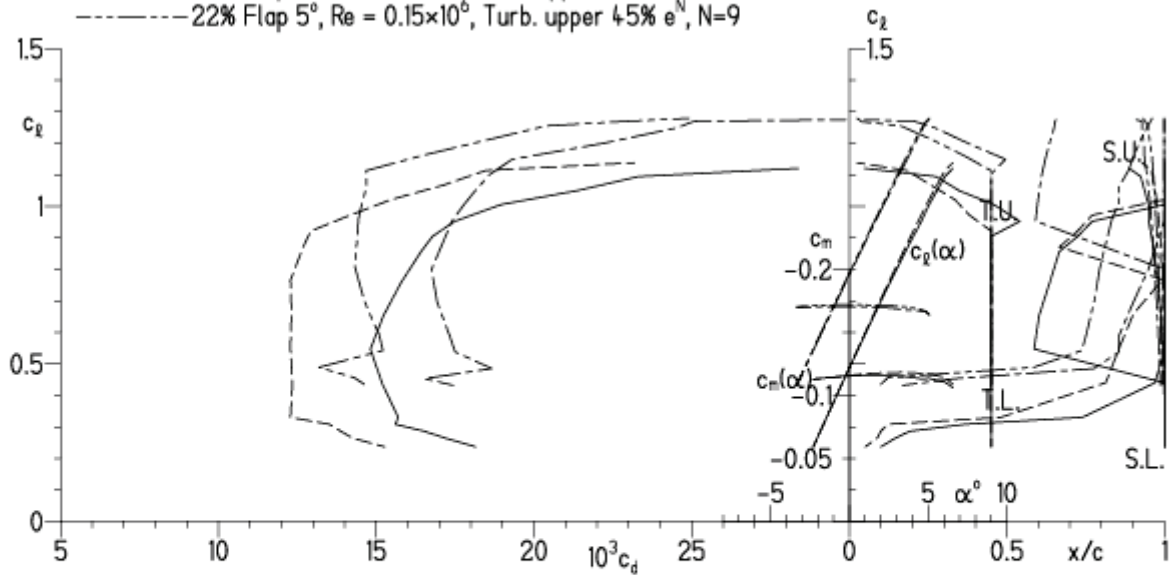


EPPLER 2005 V. 8.5.07 RUN 21.3.13 13:10

HQ-3,5/9 9%

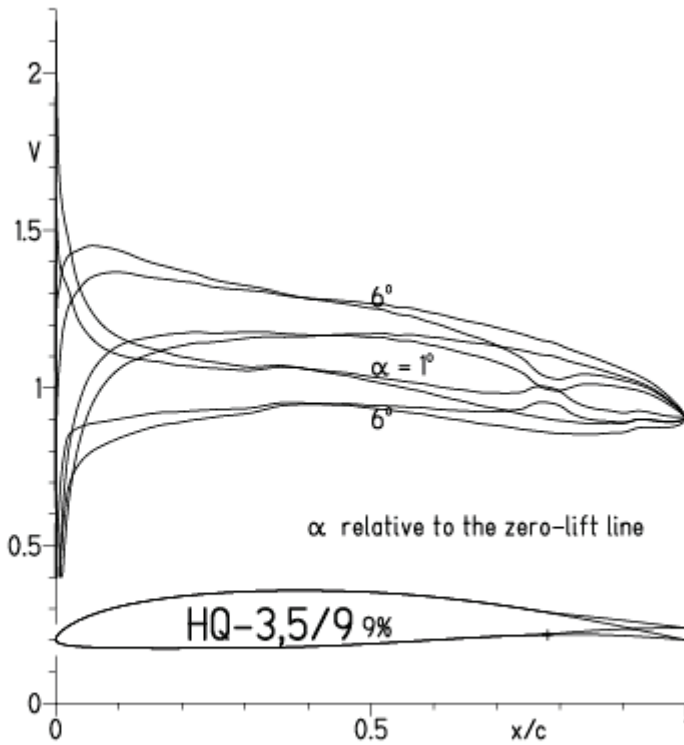
- Re = 75 000, Turb. upper 45% e^N, N=9
- - - 0.15x10⁶, Turb. upper 45% e^N, N=9
- · - 22% Flap 5°, Re = 75 000, Turb. upper 45% e^N, N=9
- · - 22% Flap 5°, Re = 0.15x10⁶, Turb. upper 45% e^N, N=9

- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-3,5/9, N=9, mit -4° Wölbklappenausschlag

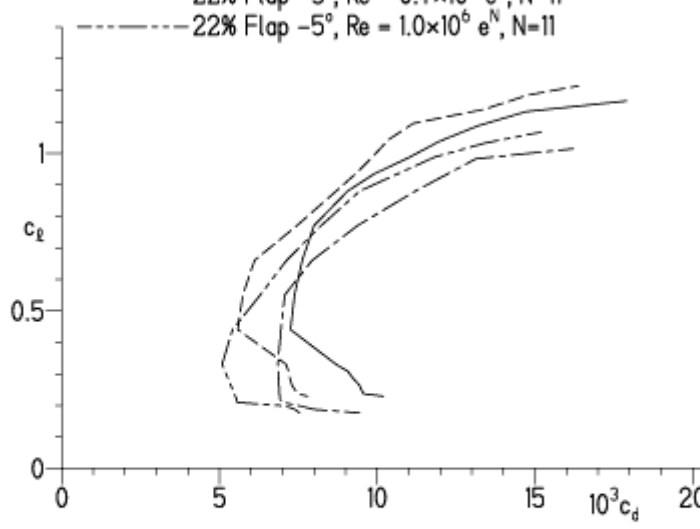
EPPLER 2005 V. 8.5.07 RUN 21.3.13 13:20



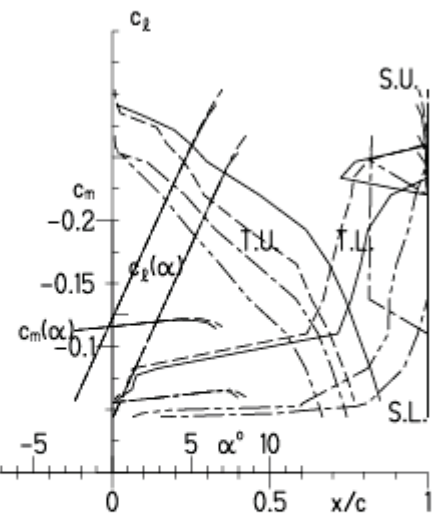
EPPLER 2005 V. 8.5.07 RUN 21.3.13 13:20

HQ-3,5/9 9%

- $Re = 0.4 \times 10^6 e^N, N=11$
- - - $1.0 \times 10^6 e^N, N=11$
- · - $22\% \text{ Flap } -5^\circ, Re = 0.4 \times 10^6 e^N, N=11$
- · - $22\% \text{ Flap } -5^\circ, Re = 1.0 \times 10^6 e^N, N=11$

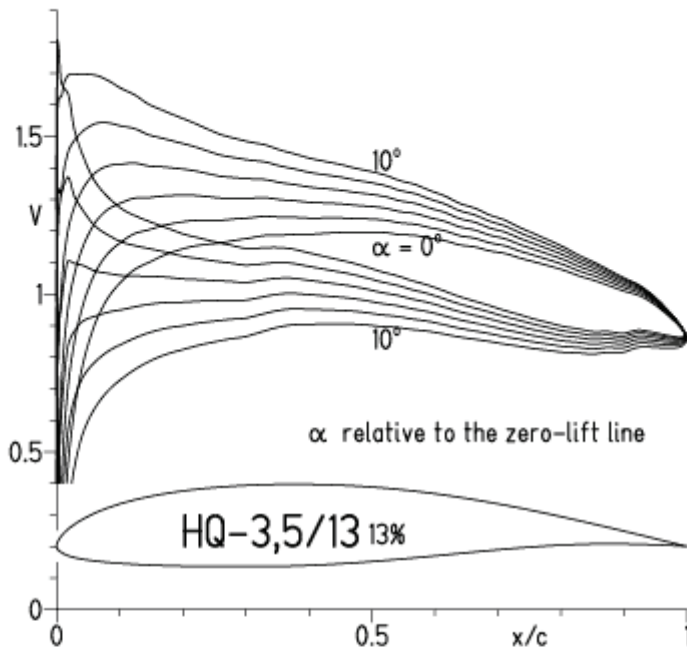


- T. boundary layer transition
- S. boundary layer separation
- U. upper surface
- L. lower surface



HQ-3,5/13, N=11

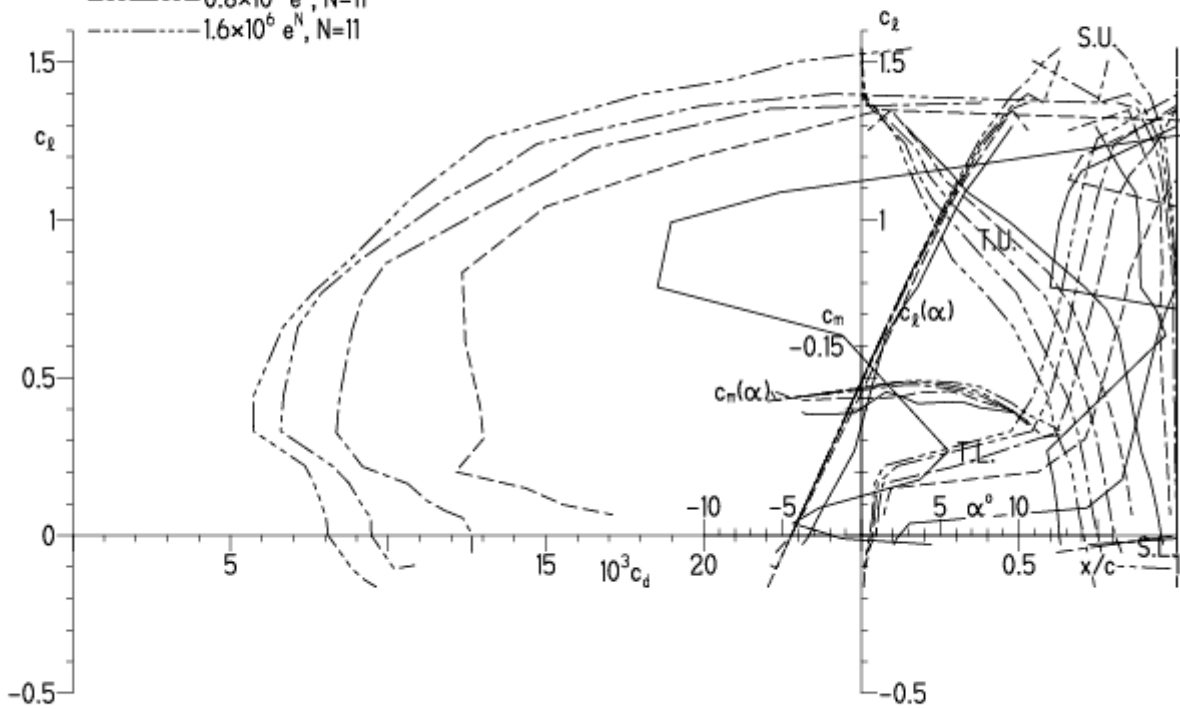
EPPLER 2005 V. 8.5.07 RUN 21.3.13 16:16



EPPLER 20

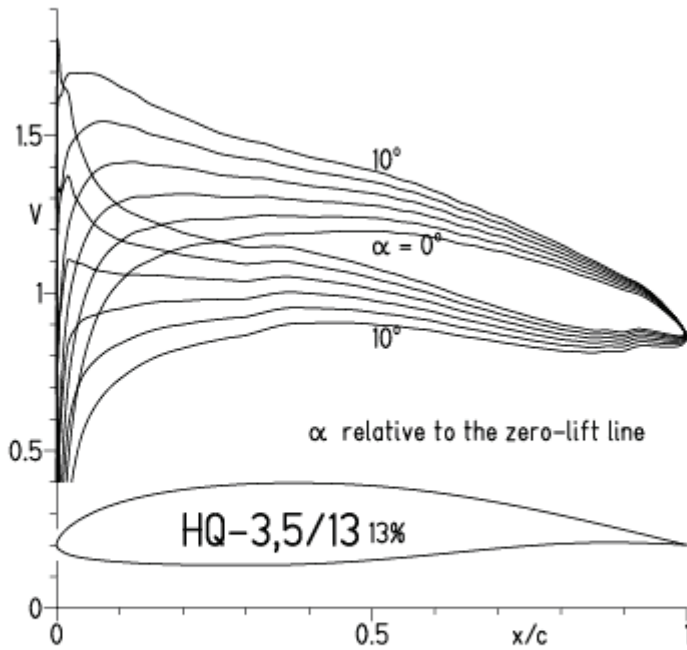
HQ-3,5/13 13%

- $Re = 0.1 \times 10^6 e^N, N=11$
- - - $0.2 \times 10^6 e^N, N=11$
- · - $0.4 \times 10^6 e^N, N=11$
- · - · $0.8 \times 10^6 e^N, N=11$
- · - · - $1.6 \times 10^6 e^N, N=11$



HQ-3,5/13, N=9

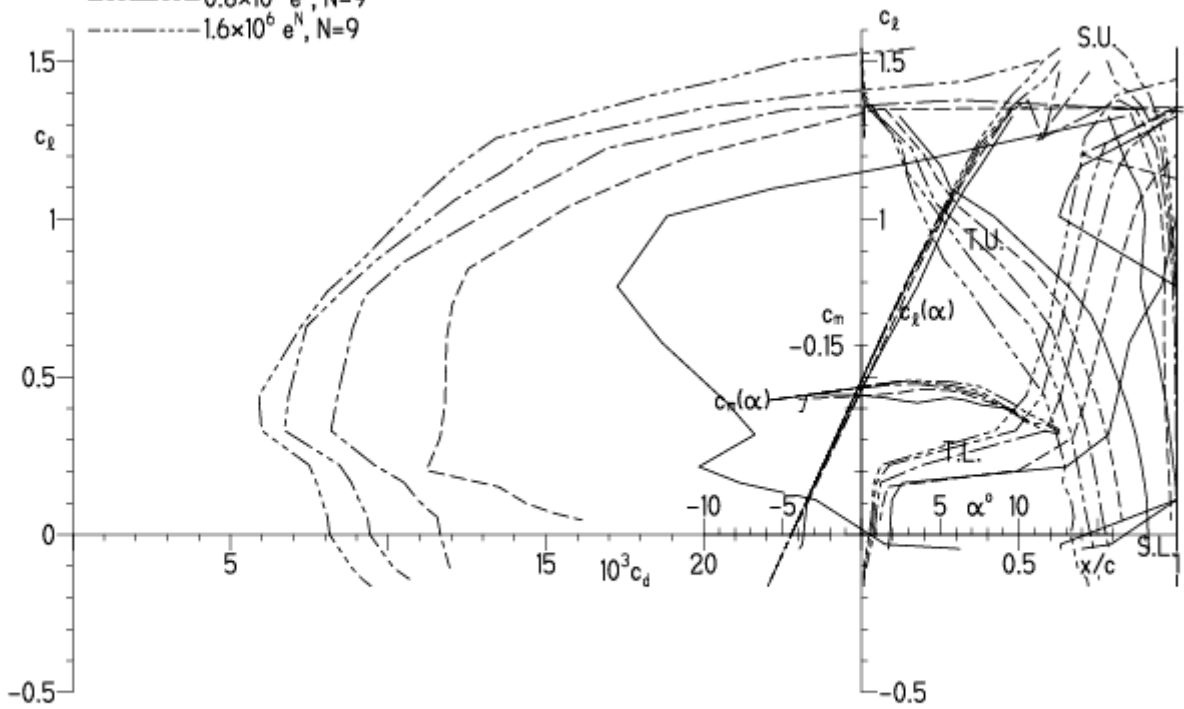
EPPLER 2005 V. 8.5.07 RUN 21.3.13 16:18



EPPLER 2005 V. 8.5.07 RUN

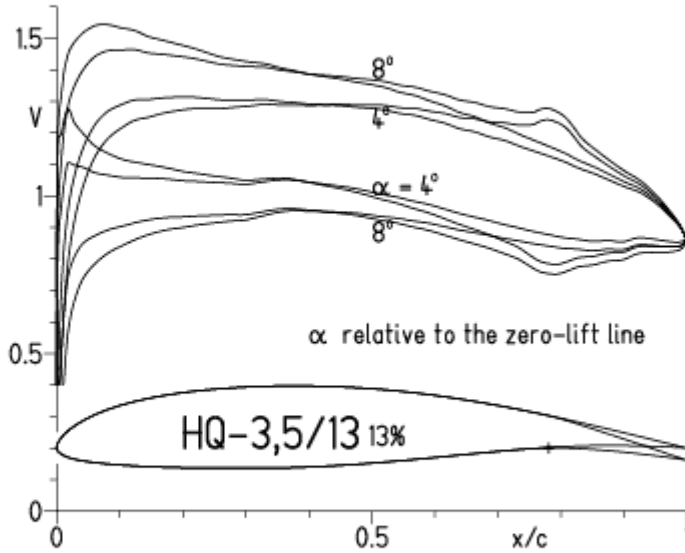
HQ-3,5/13 13%

- $Re = 0.1 \times 10^6 e^N, N=9$
- - - $0.2 \times 10^6 e^N, N=9$
- · - $0.4 \times 10^6 e^N, N=9$
- · - · $0.8 \times 10^6 e^N, N=9$
- · - · - $1.6 \times 10^6 e^N, N=9$

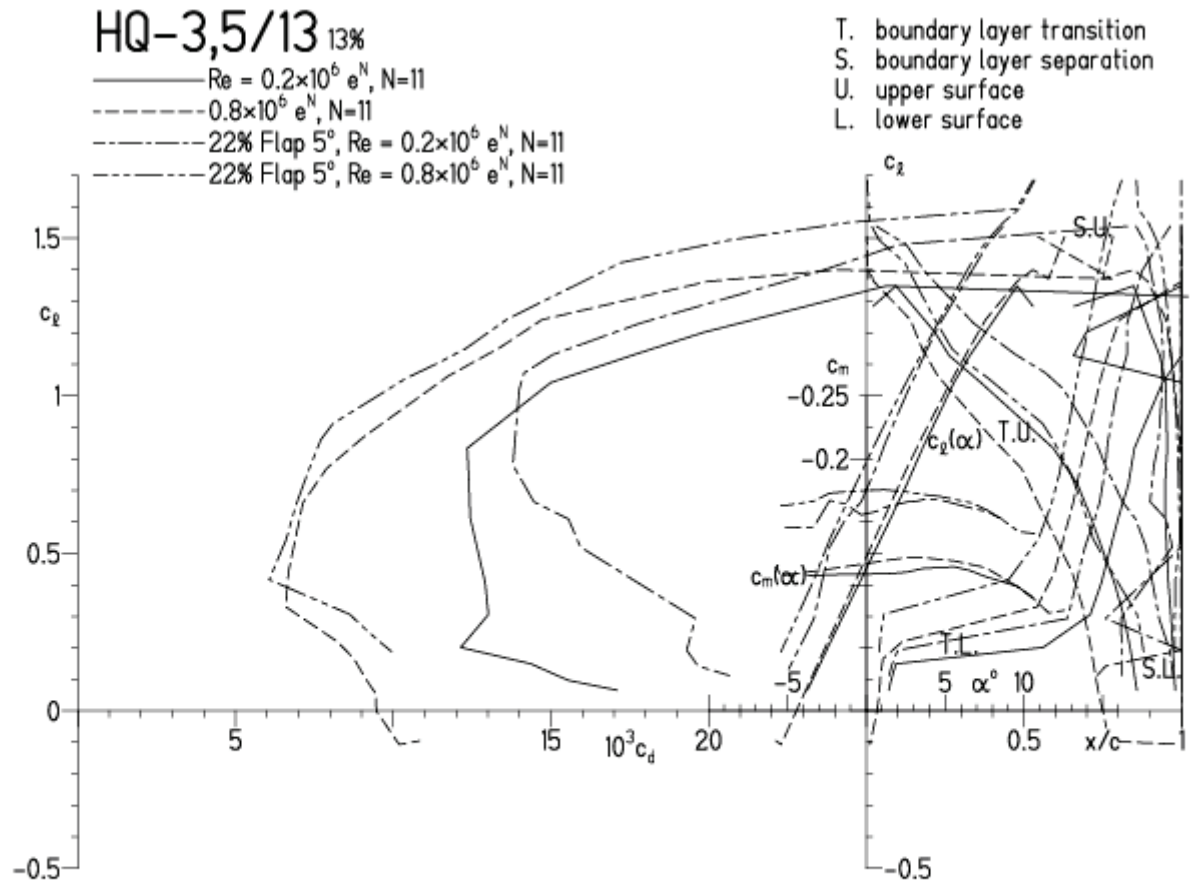


HQ -3,5/13, N=9, mit 5° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 21.3.13 16:30

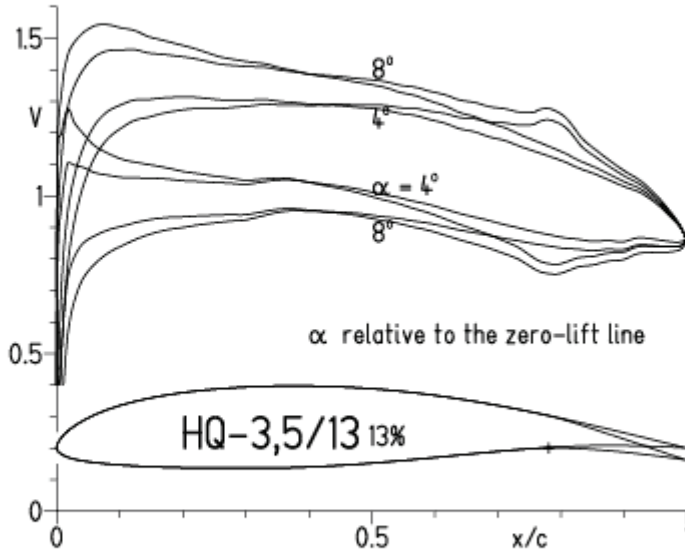


EPPLER 2005 V. 8.5.07

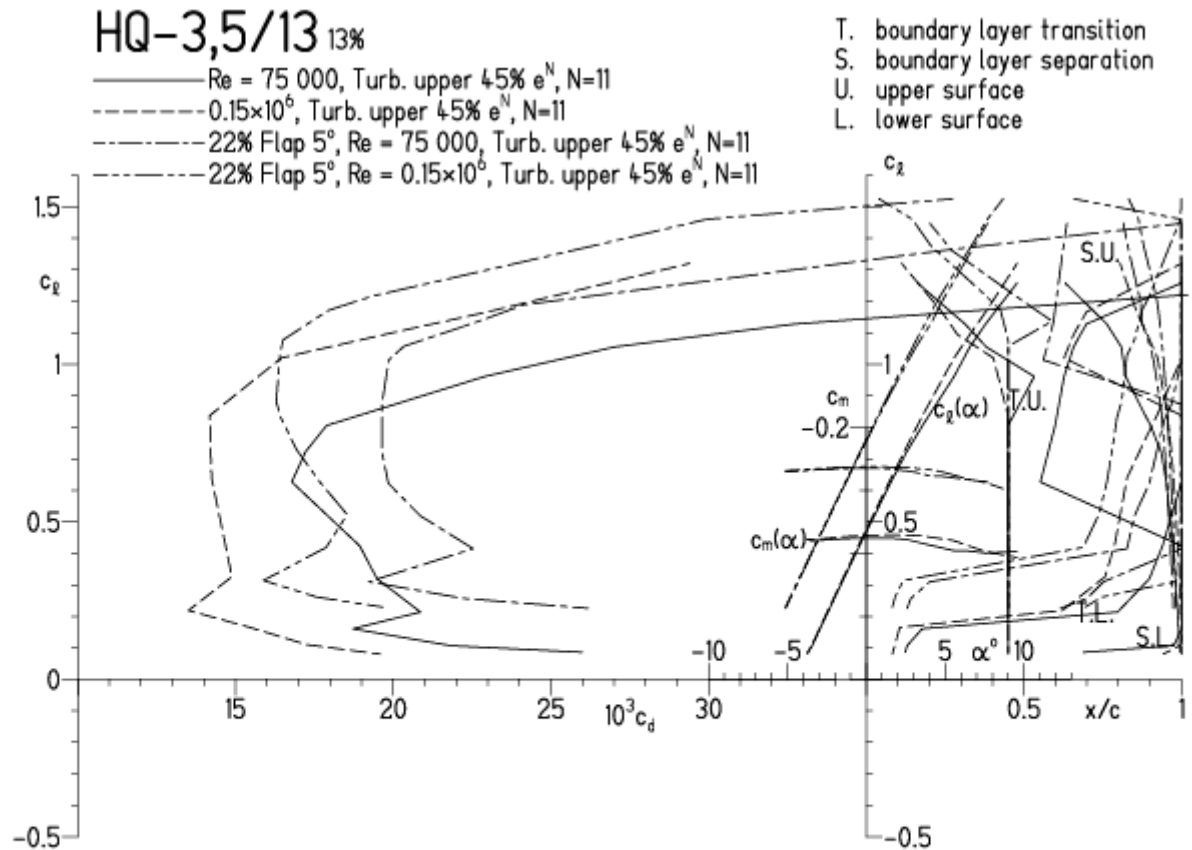


HQ -3,5/13, N=9, mit 5° Wölbklappenausschlag, Turbulatoreffekt
 (Verbesserungen für niedrige Geschwindigkeiten und Profiltiefen an Flügelenden)

EPPLER 2005 V. 8.5.07 RUN 21.3.13 16:39

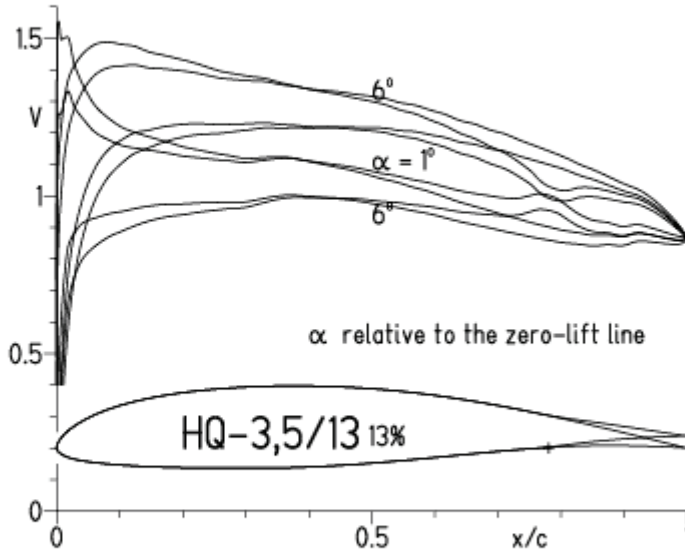


EPPLER 2005 V. 8.5.07 RUN 21.3.13 16:39



HQ -3,5/13, N=11, mit -5° Wölbklappenausschlag

EPPLER 2005 V. 8.5.07 RUN 21.3.13 16:52



EPPLER 2005 V. 8.5.07 RUN 21.3.13 16:52

