Efficient Aerodynamic Shape Optimization

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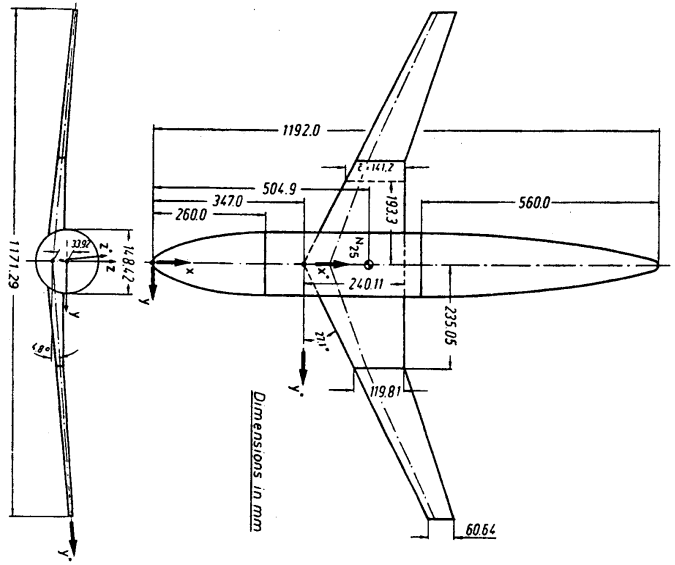
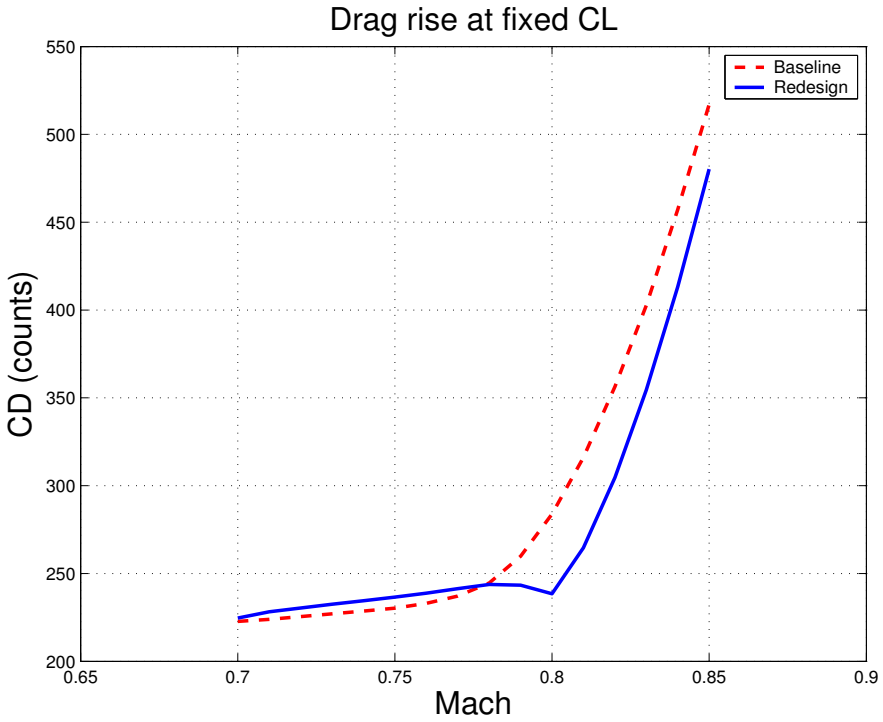
☞ DLR F4



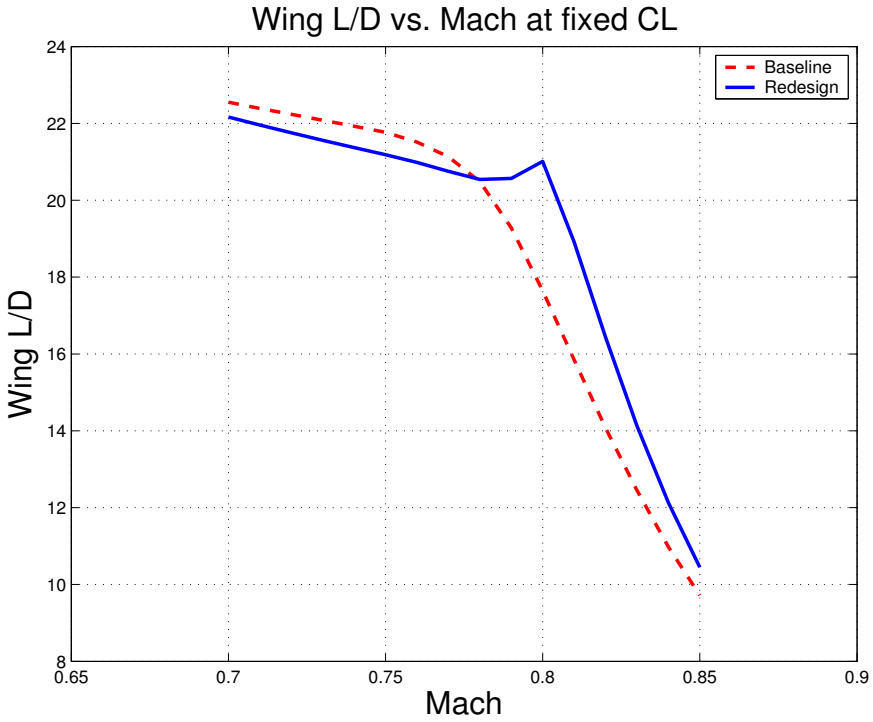
- ➢ Subsonic wing/body transport configuration.
- ➢ Extremely high drag rise starts at Mach .78
- ➢ Single point design delays drag rise to Marh .82.
- ➢ However there exists drag penalty at lower speed.
- ➢ Multipoint design can be employed but the drag reduction benefit is smaller.

☞ Drag Rise and Wing $\frac{L}{D}$ of DLR F4 optimized at Mach .80

Drag Rise



Wing $\frac{L}{D}$

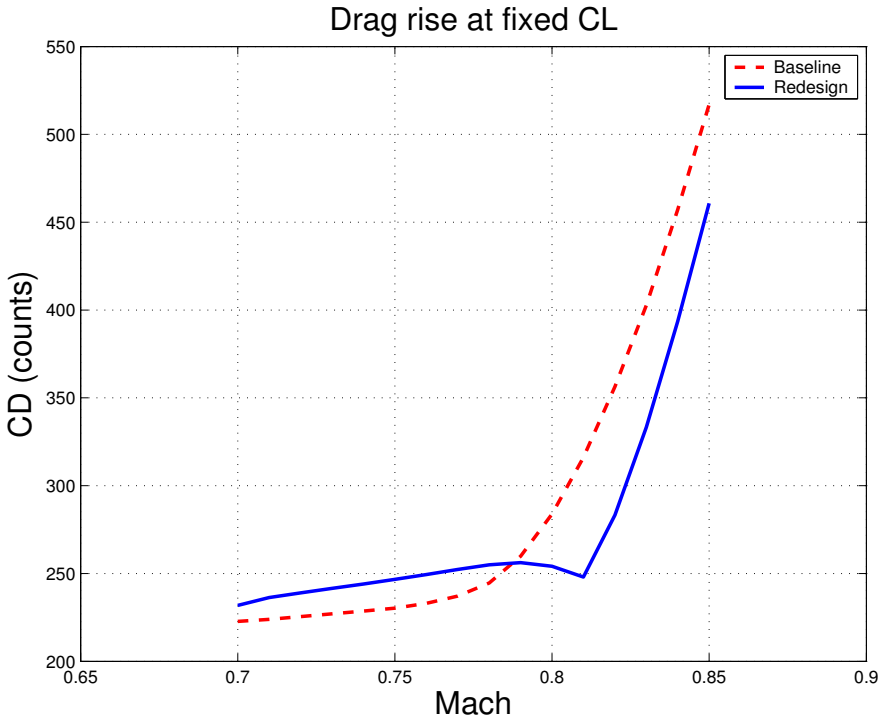


- - - : Baseline

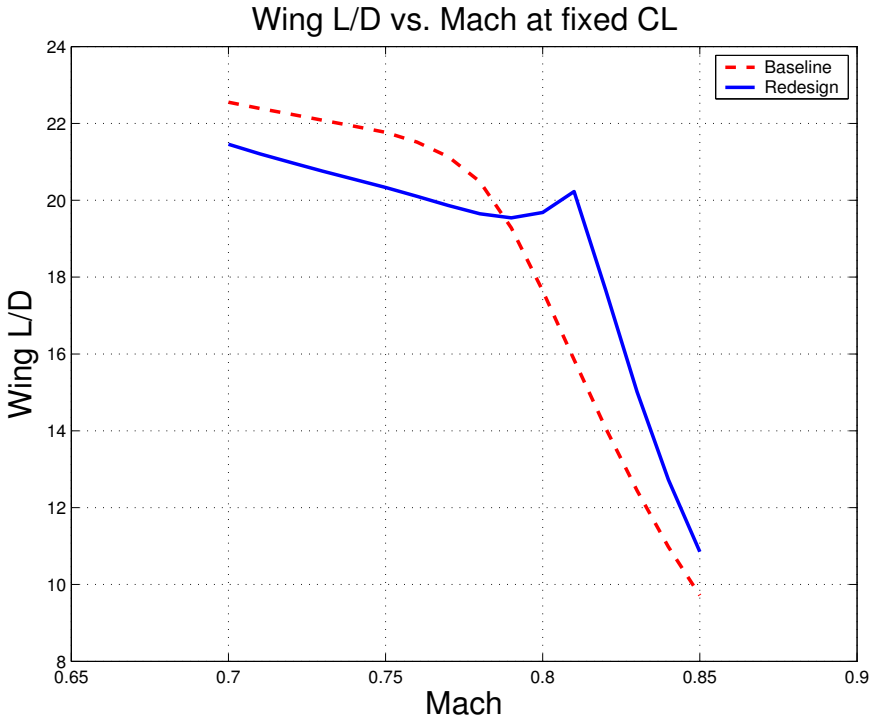
—— : Redesign

☞ Drag Rise and Wing $\frac{L}{D}$ of DLR F4 optimized at Mach .81

Drag Rise



Wing $\frac{L}{D}$

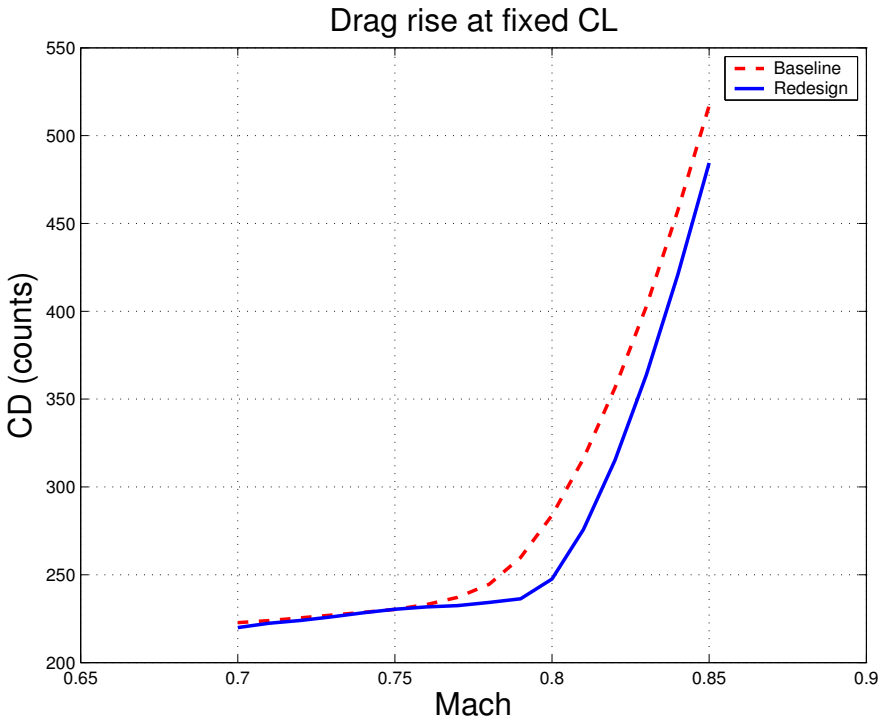


- - - : Baseline

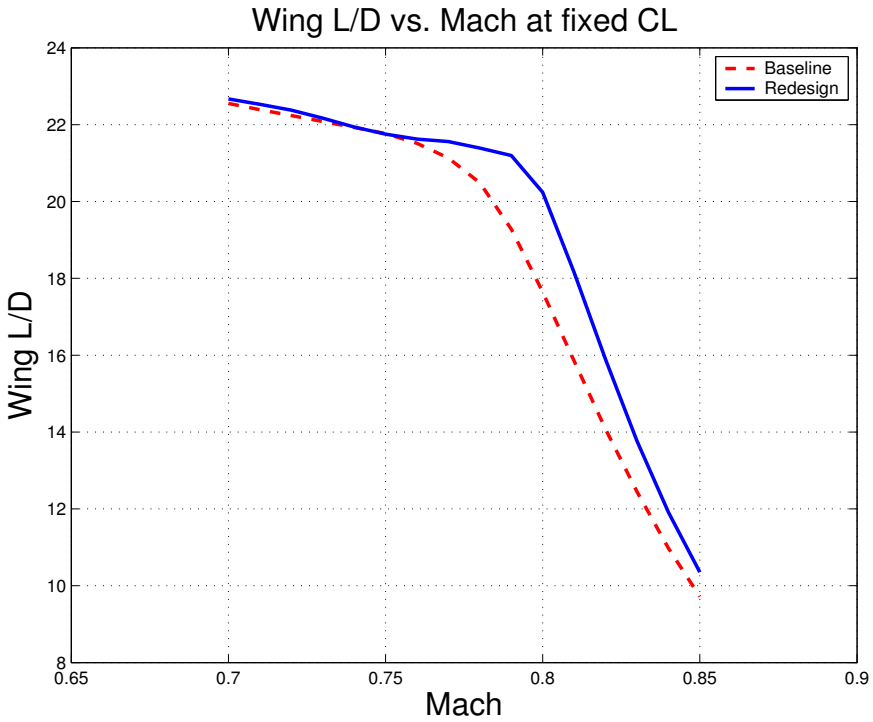
—— : Redesign

☞ Drag Rise and Wing $\frac{L}{D}$ of DLR F4 optimized at Mach .72, .77, .79, and .81

Drag Rise



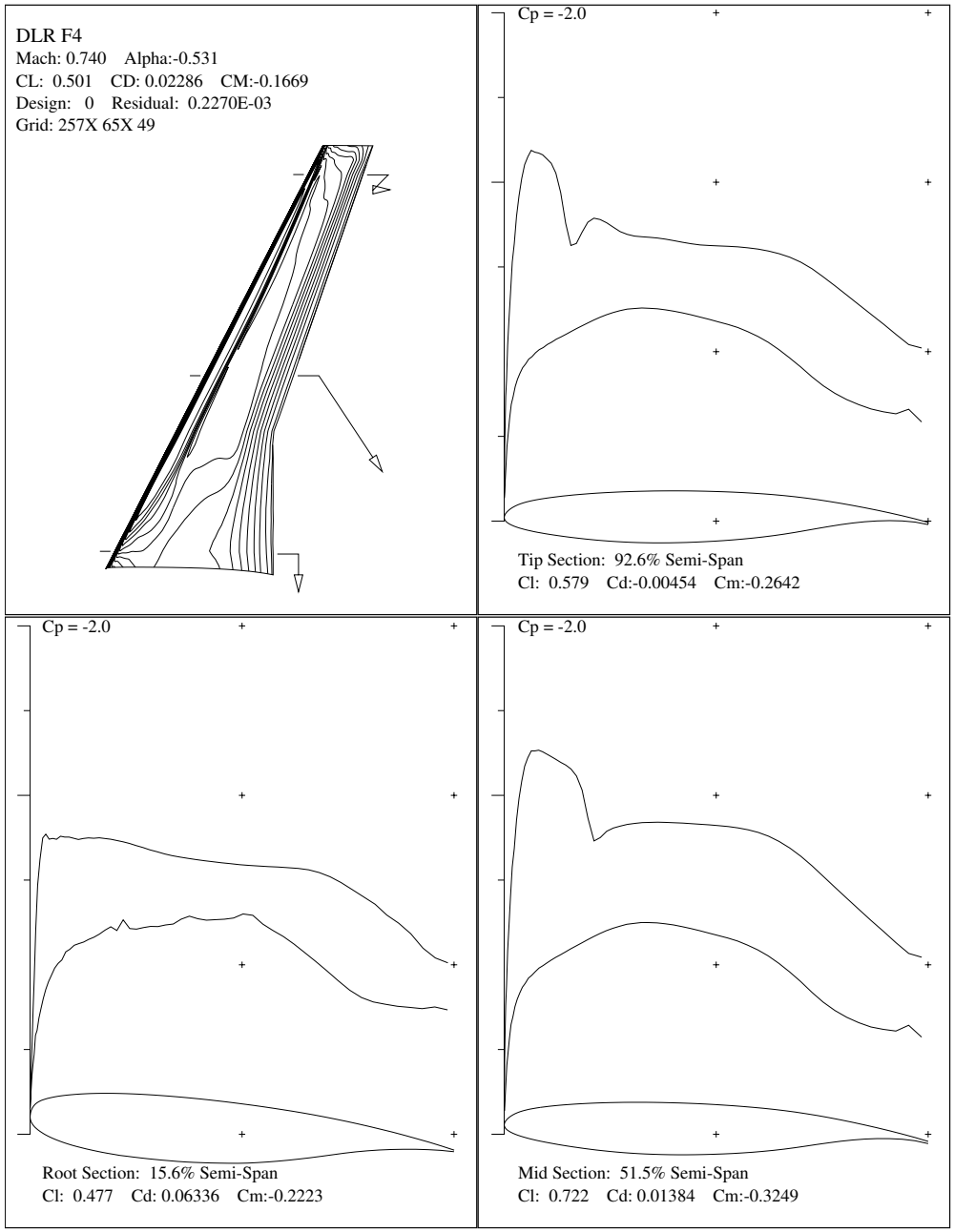
Wing $\frac{L}{D}$



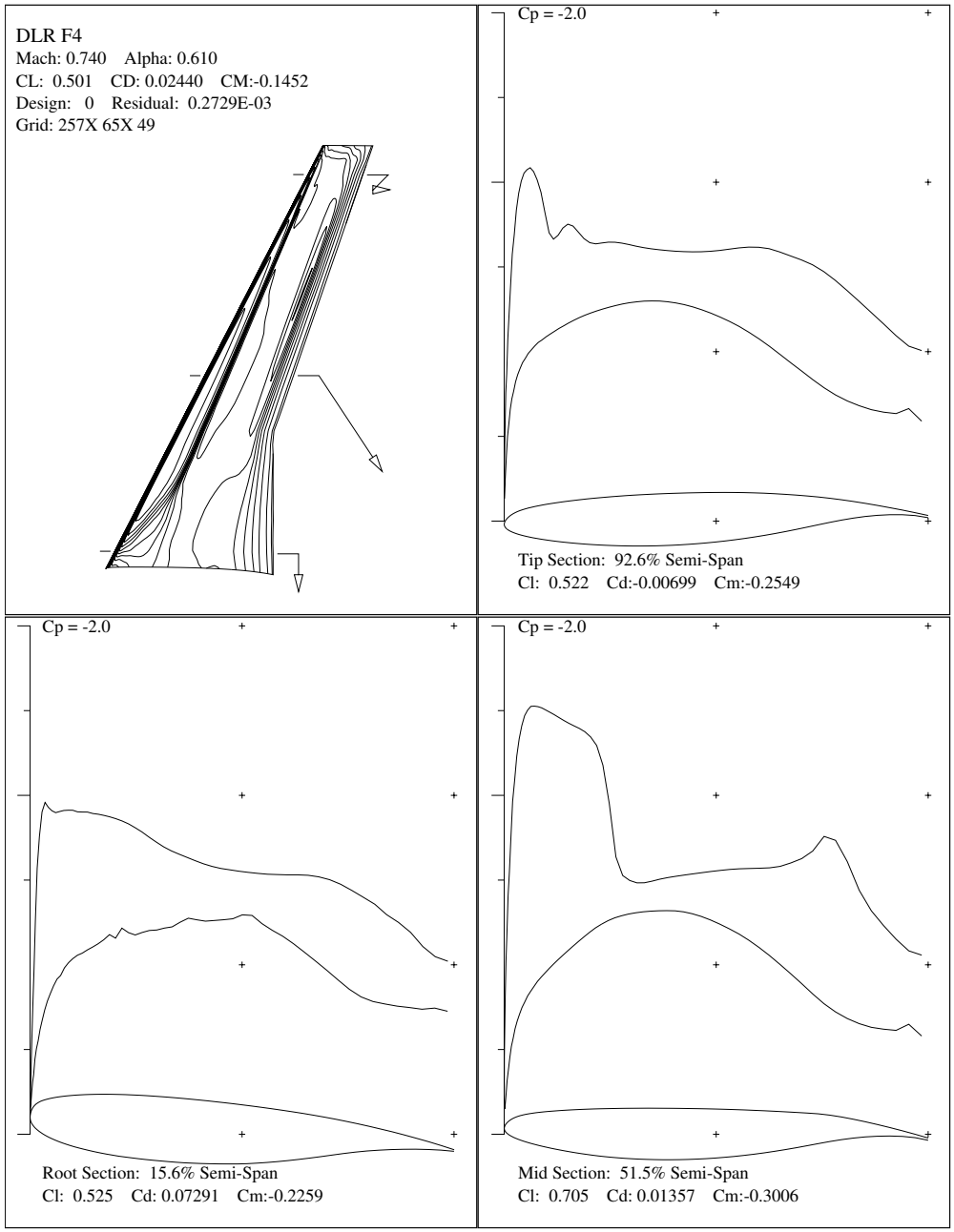
- - - : Baseline

—— : Redesign

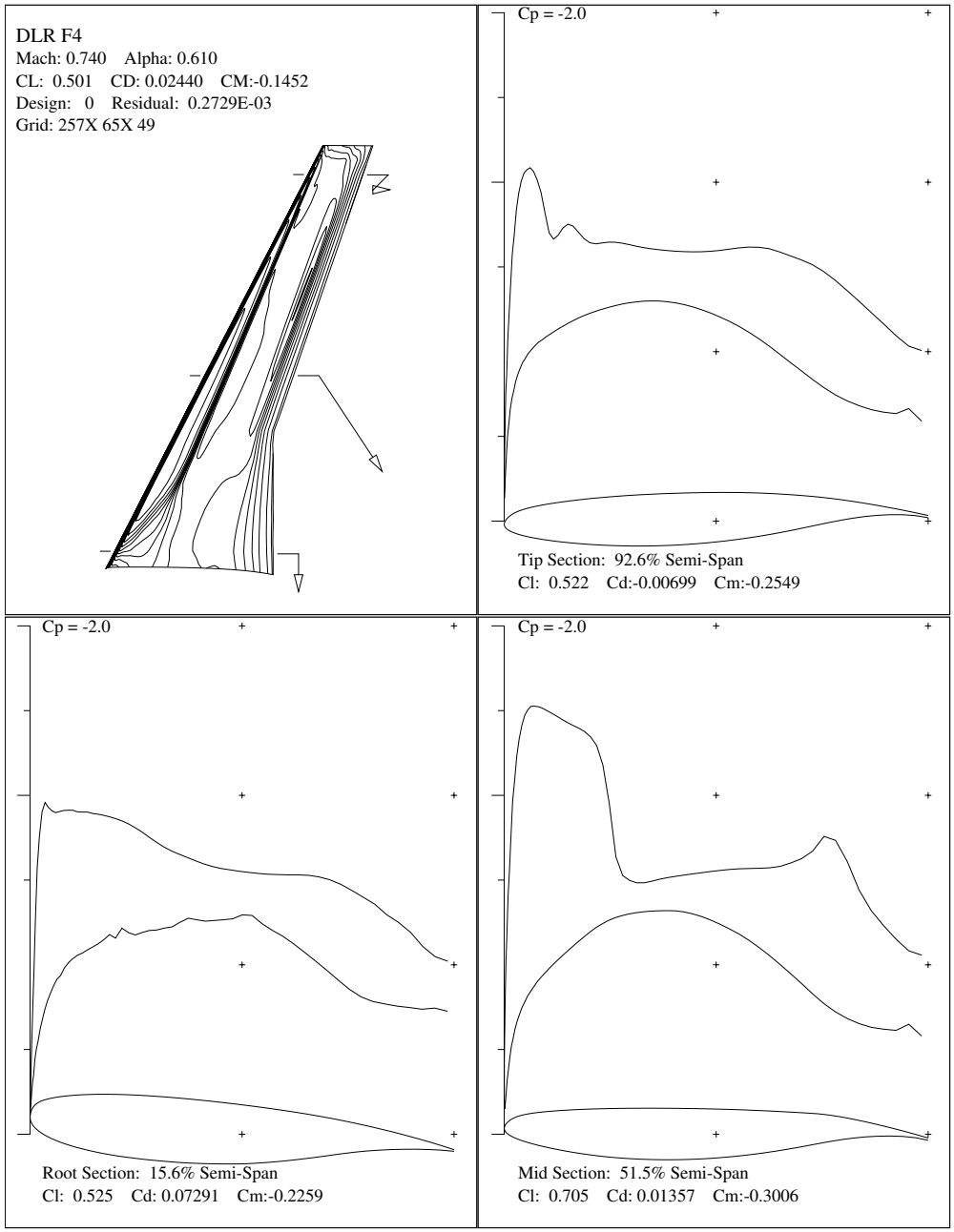
☞ Cp dirtribution at Mach .74 (Baseline)



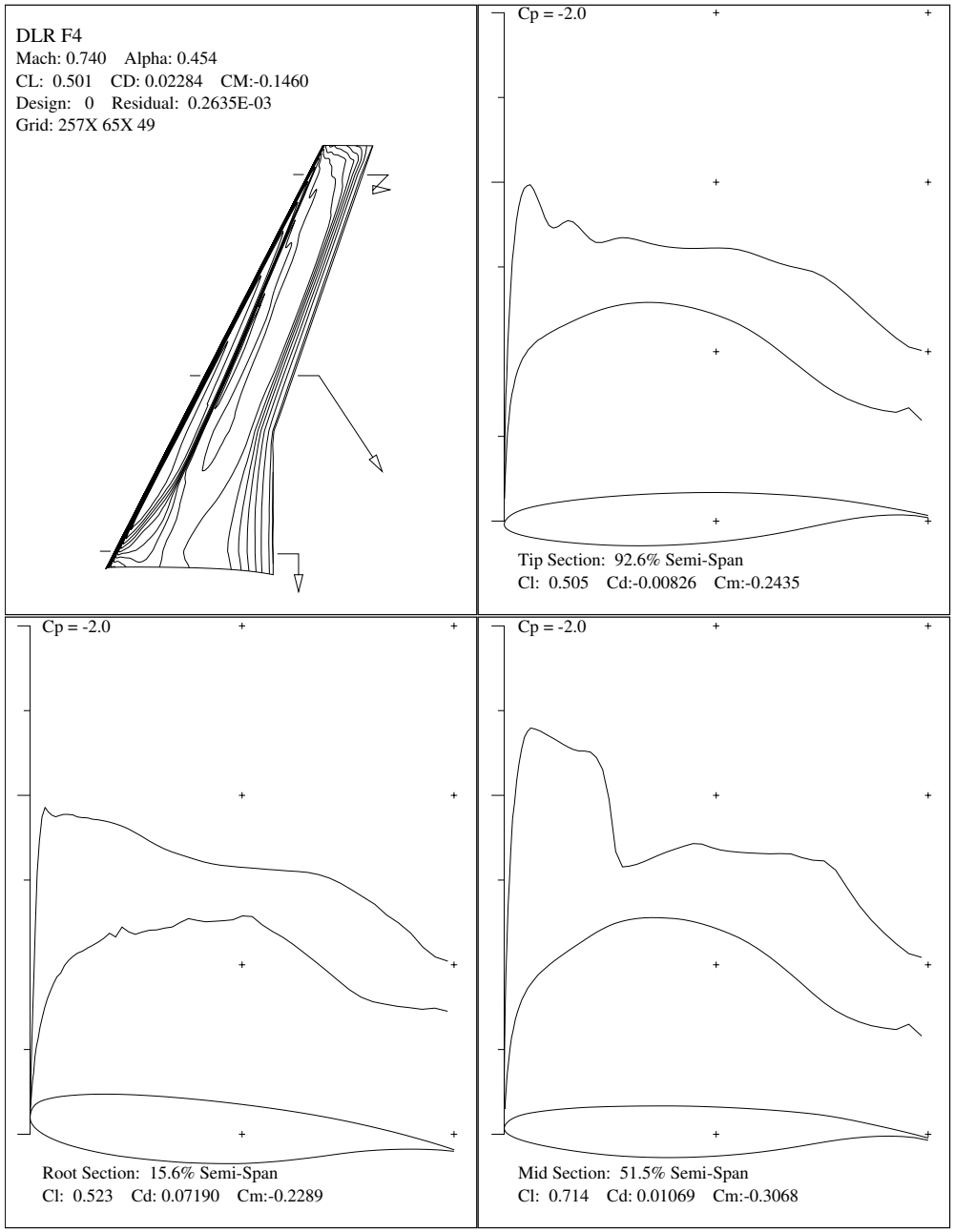
☞ Cp dirtribution at Mach .74 (Wing optimized at Mach .80)



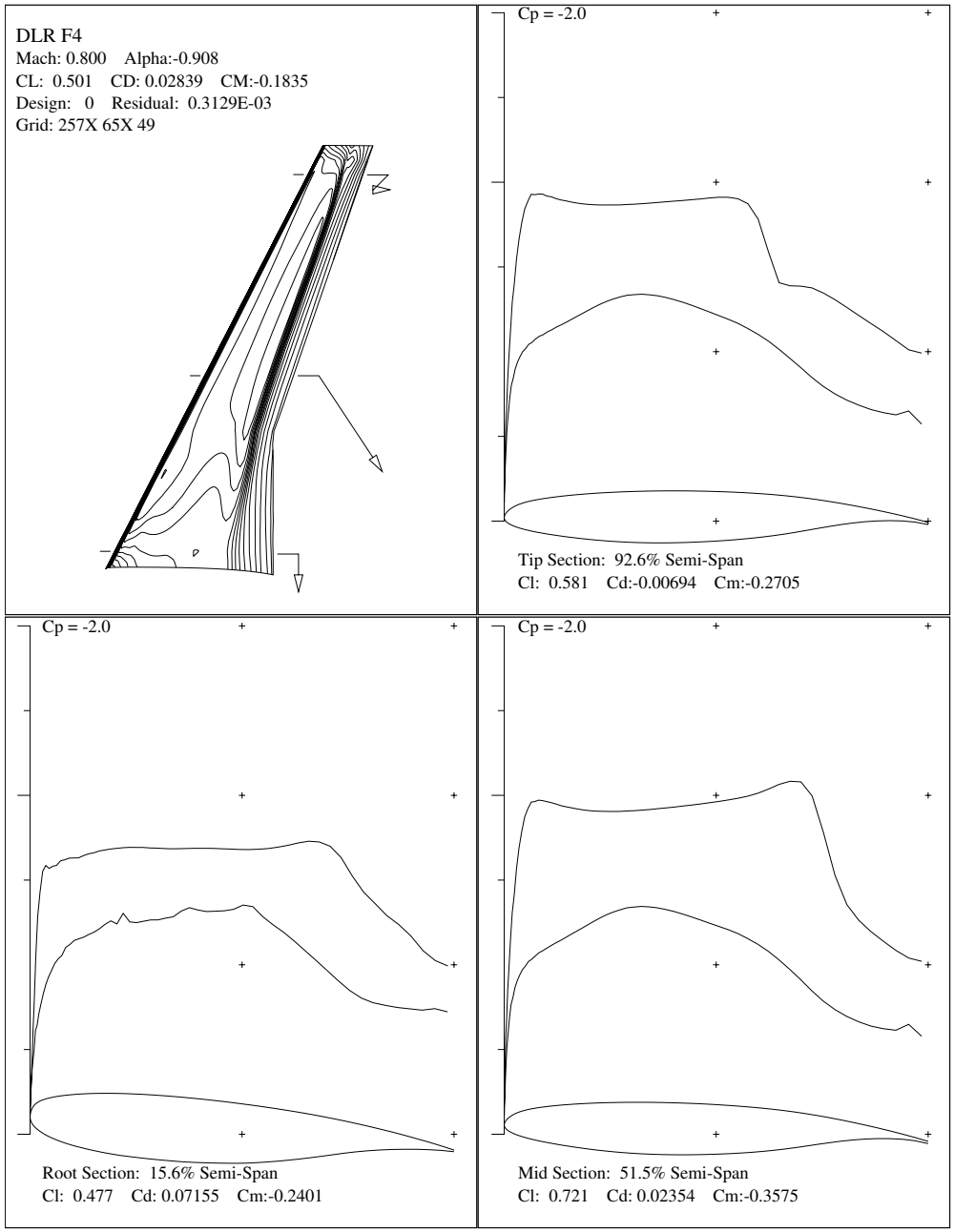
☞ Cp dirtribution at Mach .74 (Wing optimized at Mach .81)



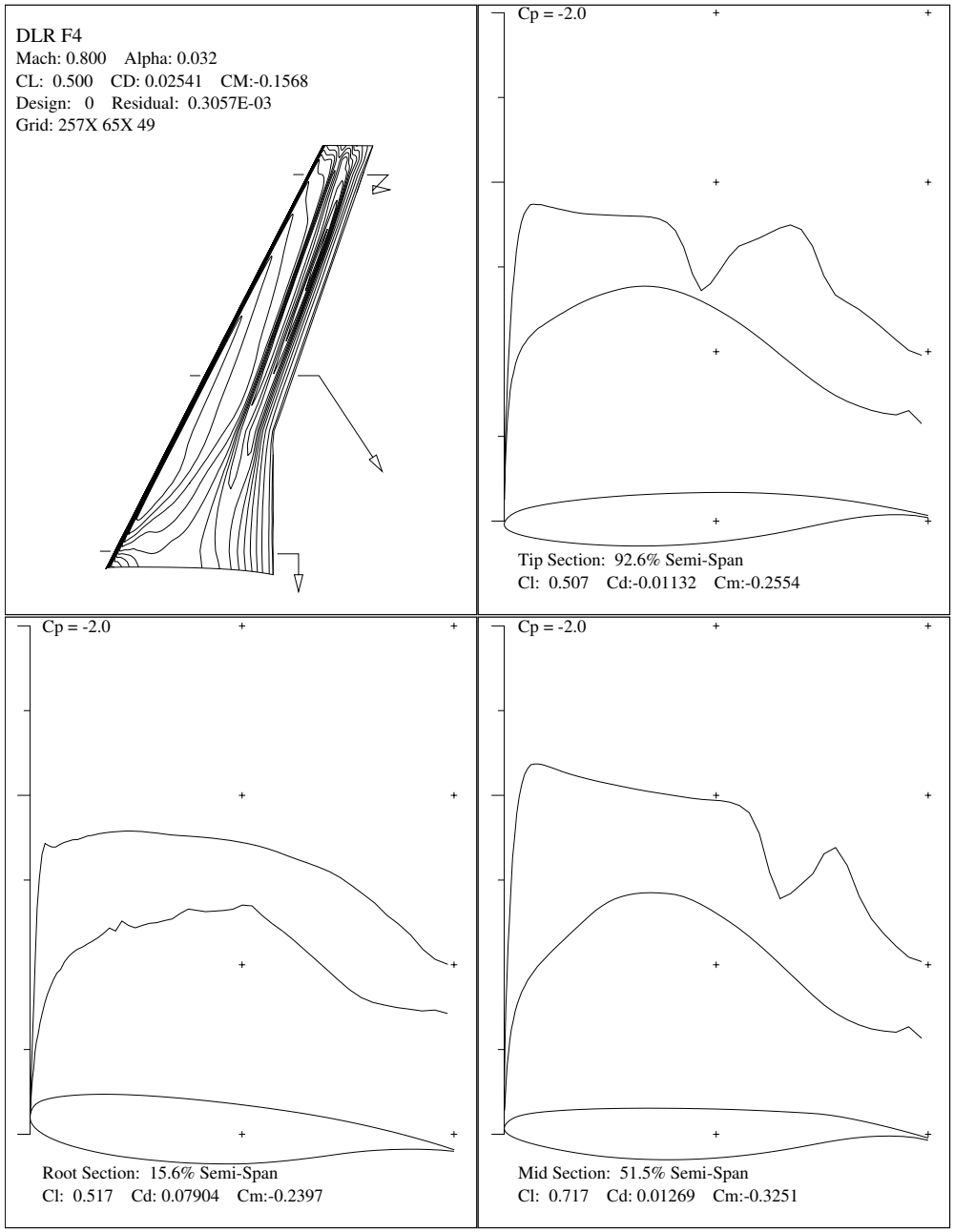
☞ Cp dirtribution at Mach .74 (Multi-point Design)



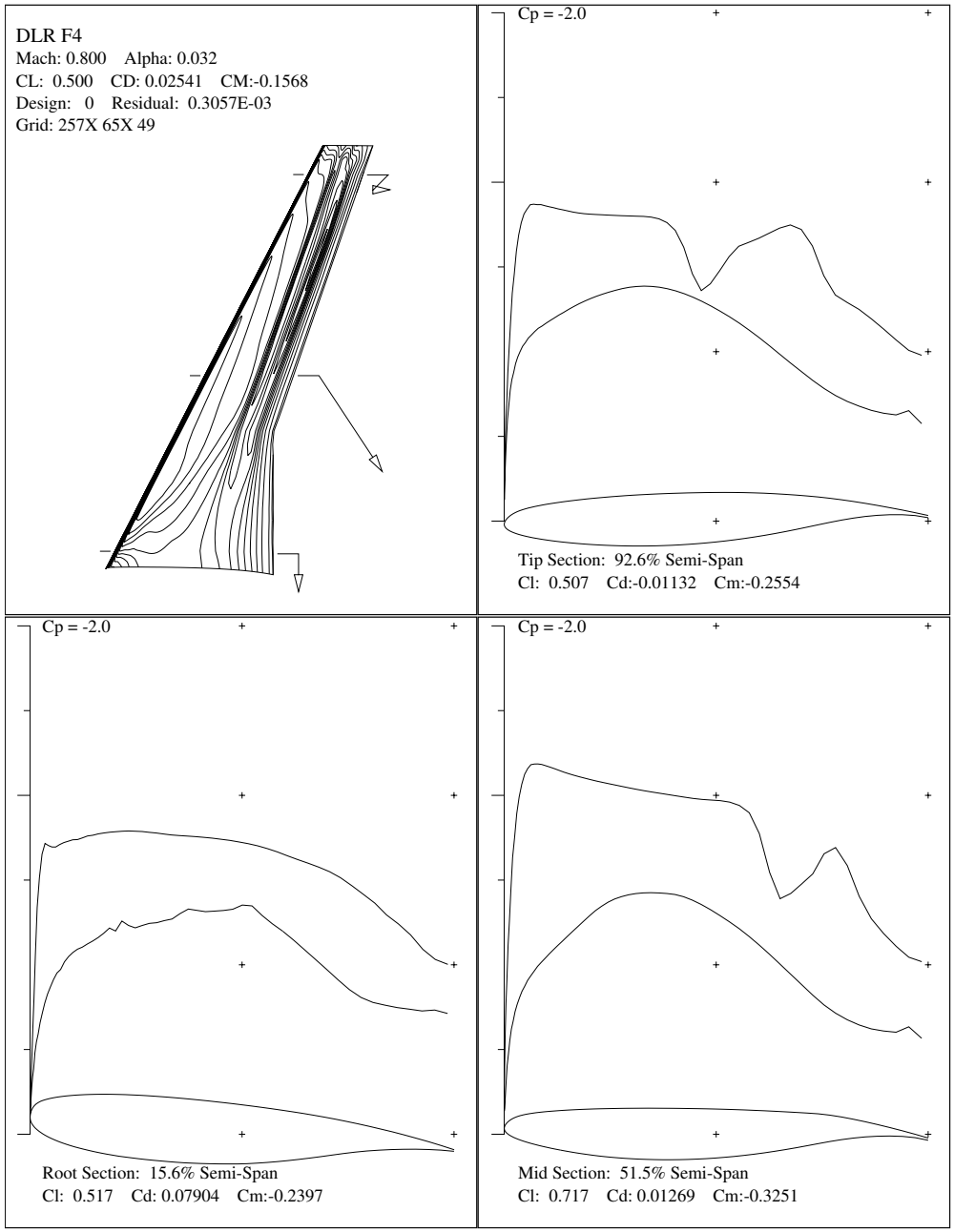
☞ Cp dirtribution at Mach .80 (Baseline)



☞ Cp dirtribution at Mach .80 (Wing optimized at Mach .80)



☞ Cp dirtribution at Mach .80 (Wing optimized at Mach .81)



☞ Cp dirtribution at Mach .80 (Multi-point Design)