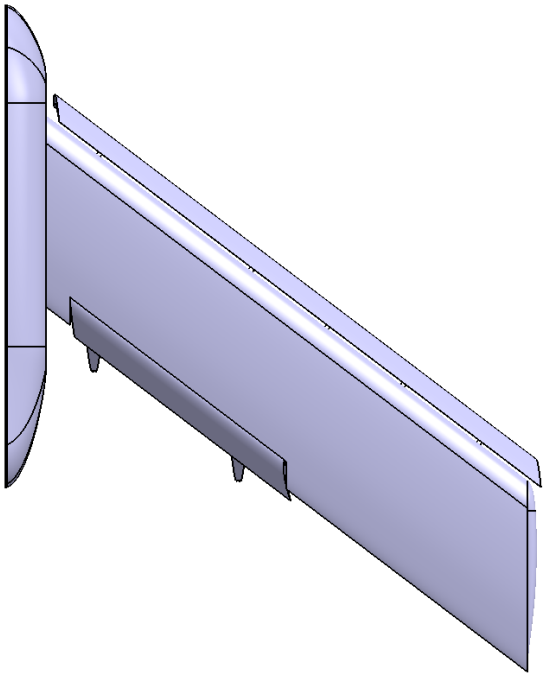
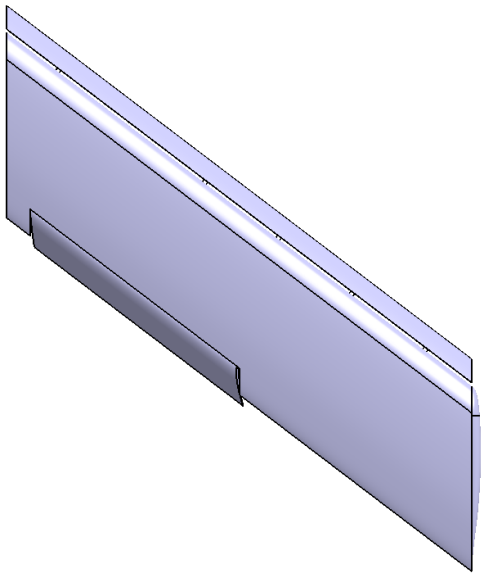
Test Case 3: CRM-HLS In-Tunnel

TC3 is representative of the University of Washington test article of the CRM-HLS configuration. There are a few key differences between TC1 and 3, considering just the model. The TC3 geometry of the model contains:

- An inboard fairing necessary to cover the wing-balance attachement hardware
- Slat trims that are skewed outboard, representative of the slat positioning after deploying
- Flap support brackets and fairings connected to the underside of the wing and flap
- Minor differences in slat bracket profile



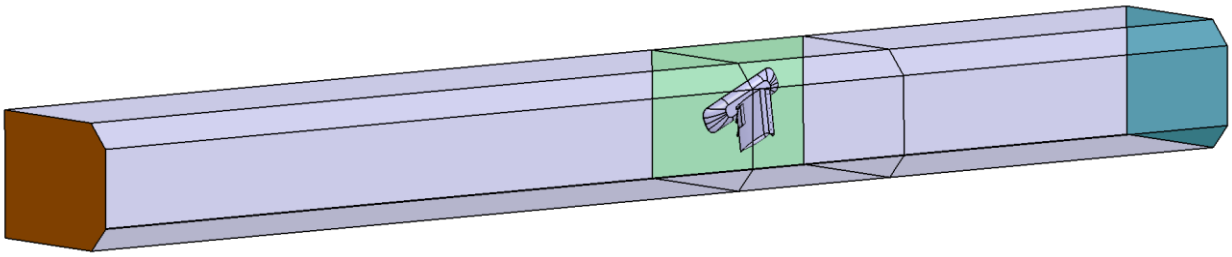
Test Case 3 (In-Tunnel)



Test Case 1 (Free-Air)

Test Case 3 in-tunnel geometry is shown below. The green boundary is representative of the splitter plate extents on which the UW model is installed, and should be treated as a viscous boundary. The wall upstream and downstream of the splitter plate should be modeled inviscid, as should the side walls, fillets, floor, and ceiling throughout the domain. In other words, only the green boundary should be viscous, aside from the model. Teal and orange boundaries represent the inlet and outlet respectively.

Additionally, the UW model features a very small gap between the model and splitter plate. This is not modeled in this geometry, and is instead represented by a solid connection between the fairing and the wall (RF_ NONMETRIC). This geometry is fictitious, not connected to the balance, and should not be included in force measurements.



TC3 In-Tunnel Geometry

Geometry

Available on HLPW6 Website: https://aiaa-hlpw.org/HLPW6/cases

Geometry Reference Quantities

Mean Aerodynamic Chord (MAC)	30 inches
Reference semi-span	72 inches
Moment Reference Center (MRC)	x = 34.8082 inches, y = 0.0 inches, z = 0 inches
Semi-span model reference area (Sref)	2,160 in^2
Leading Edge Deflection (reference)	30°
Trailing Edge Deflection (reference)	37°

Case Parameters and Requirements

Mach Number	0.142
Chord Reynolds Number	2.53×10^6
Angles of Attack	10°, 20°, 25°, 30°, 32°, 35°
Reference Static Temperature	518.67 °R
Reference Static Pressure	14.696 psi
Important Details	• Geometry is provided in full-scale inches • When using a dimensional code, it is recommended to adjust viscosity to match requested Reynolds number, this should result in reference quantities of SSL air. • All simulations are run in-tunnel, with appropriate boundary conditions for a given solver to achieve the desired conditions.

Boundary Condition Specifications

A table of Boundary Condtion names as specified in the geometry is provided below.

KWT_INVISCID	Inviscid	Inviscid upstream & downstream WT Walls
KWT_OUTLET	Characteristic	Wind-Tunnel Outlet
KWT_WALLS	Inviscid	Wind-Tunnel Walls surrounding splitter plate
KWT_SPLITTER	Viscous	Splitter Plate
KWT_INLET	Characteristic	Wind-Tunnel Inlet
WING	Viscous	CRM-HLS Geometry
FLAP_COVE	Viscous	CRM-HLS Geometry

FLAP	Viscous	CRM-HLS Geometry
SLAT	Viscous	CRM-HLS Geometry
FLAP_BRACKETS	Viscous	CRM-HLS Geometry
SLAT_BRACKETS	Viscous	CRM-HLS Geometry
ROOT_FAIRING	Viscous	CRM-HLS Geometry
RF_NONMETRIC	Viscous	Root Fairing Extension, Don't include in force measurements

Angle Of Attack Specification

Geometries are necessarily unique with Angle of Attack, as the tunnel is rotated relative to the CRM-HLS. These are initially provided in 5 degree increments, but others can be made available as needed.

If your process is easier by rotating the tunnel boundaries yourself, the rotation axis is Y-Parallel, and located at X=30", Z=0".