HLPW-4: R-008 Submission

**R-008.FUN3D/**

**├──** R-008.1\_FUN3D\_SA\_Grid-D2.2\_BESTPRACTICE (SA, **D** Mesh, All requested data)

**│**   ├── R-008.1\_OffBodyVorticity

**│**   └── R-008.1\_SurfaceFlowVisualizations

**├──** R-008.2\_FUN3D\_SA-QCR2000\_Grid-D2.2 (SA-QCR2000, **D** Mesh, Subset of requested data)

**│**   ├── R-008.2\_OffBodyVorticity

**│**   └── R-008.2\_SurfaceFlowVisualizations

**├──** R-008.3\_FUN3D\_SA\_Grid-A1.2 (SA, **A** Mesh, Subset of requested data)

**│**   └── R-008.3\_SurfaceFlowVisualizations

**├──** R-008.4\_FUN3D\_SA\_Grid-B2.2 (SA, **B** Mesh, Subset of requested data)

**│**   └── R-008.4\_SurfaceFlowVisualizations

**├──** R-008.5\_FUN3D\_SA\_Grid-C1.2 (SA, **C** Mesh, Subset of requested data)

**│**   └── R-008.5\_SurfaceFlowVisualizations

**├──** R-008.6\_FUN3D\_Verification (SA, SA-neg, SA-neg-RC, SA-neg-QCR2000, SA-neg-RC-QCR2000)

**└──** Slides (Some sample plots)

**Date:** November 29, 2021

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**SOLVER INFORMATION:**

**Solver Name and Version:** FUN3D Version 13.7

**Basic Algorithm:** Unstructured. Node-centered Finite Volume. Second-order accurate. Computation of viscous fluxes on tetrahedral meshes is based on the Green-Gauss theorem and on nontetrahedral grids, an edge-derivative augmentation is employed to avoid odd-even decoupling. Time integration toward a steady state is based on a backward-Euler scheme with local time-stepping to accelerate convergence.

**Runs Description:** Started from freestream. No initial first-order iterations. Steady-state. Simulations are “free-air” using committee provided free-air grids. Simulations are fully-turbulent. Roe solver used with no flux limiting. Exceptions to the above description are the 20.55° runs on C and D grids which were restarted from the 19.57° solutions.

**Turbulence Models:** SA, SA-QCR2000

**Transition Method:** N/A

**Convergence Criteria:** Very small change in forces/moments.

**Miscellaneous:** <https://fun3d.larc.nasa.gov/>

Case 1a

**Name of committee-supplied grid used:**

HLPW-4\_CRM-HL\_40-37\_Nominal\_v1a\_Unstr-Tets-Prisms\_Level-D\_PW\_V2\_Q1.b8.ugrid

HLPW-4\_CRM-HL\_37-34\_v1a\_Unstr-Tets-Prisms\_Level-D\_PW\_Smoothed.b8.ugrid

HLPW-4\_CRM-HL\_43-40\_v1a\_Unstr-Tets-Prisms\_Level-D\_PW\_Smoothed.b8.ugrid

**"TYPICAL" SOLUTION PERFORMANCE INFORMATION**

**Grid size:** 202542838

**Computer Platform:** NAS (Skylakes)

**Number of Processors:** 4080

**Operating System:** Linux

**Compiler:** Intel

**Run Time CPU:** N/A

**Run Time Wall-Clock:** ~52 hours

**Memory Requirements:** Real Memory Used: 51741624kb

**Convergence Details:** Convergence data is provided

**Miscellaneous:** N/A

Case 1b

**Name of committee-supplied grid used:**

HLPW-4\_CRM-HL\_40-37\_Nominal\_v1a\_Unstr-Tets-Prisms\_Level-A\_PW\_V2.b8.ugrid

HLPW-4\_CRM-HL\_40-37\_Nominal\_v1a\_Unstr-Tets-Prisms\_Level-B\_PW\_V2\_Q1.b8.ugrid

HLPW-4\_CRM-HL\_40-37\_Nominal\_v1a\_Unstr-Tets-Prisms\_Level-C\_PW\_V2.b8.ugrid

HLPW-4\_CRM-HL\_40-37\_Nominal\_v1a\_Unstr-Tets-Prisms\_Level-D\_PW\_V2\_Q1.b8.ugrid

Case 2a

**Name of committee-supplied grid used:**

HLPW-4\_CRM-HL\_40-37\_Nominal\_v1a\_Unstr-Tets-Prisms\_Level-A\_PW\_V2.b8.ugrid

HLPW-4\_CRM-HL\_40-37\_Nominal\_v1a\_Unstr-Tets-Prisms\_Level-B\_PW\_V2\_Q1.b8.ugrid

HLPW-4\_CRM-HL\_40-37\_Nominal\_v1a\_Unstr-Tets-Prisms\_Level-C\_PW\_V2.b8.ugrid

HLPW-4\_CRM-HL\_40-37\_Nominal\_v1a\_Unstr-Tets-Prisms\_Level-D\_PW\_V2\_Q1.b8.ugrid

Case 3

**Name of committee-supplied grid used (downloaded from the TMR website):**

crmhl\_1.b8.ugrid

crmhl\_2.b8.ugrid

crmhl\_3.b8.ugrid

crmhl\_4.b8.ugrid

crmhl\_5.b8.ugrid

crmhl\_6.b8.ugrid

crmhl\_7.b8.ugrid

**Turbulence Models:**

SA, SA-neg, SA-neg-RC, SA-neg-QCR2000, SA-neg-RC-QCR2000