

# GMGW-2

## Case 1: Exascale Meshing of the HL-CRM

Carolyn Woeber  
Pointwise, Inc.

James Masters  
Arnold Engineering Development Complex

David McDaniel  
DoD HPCMP CREATE™ / Univ of Alabama Birmingham

2<sup>nd</sup> Geometry and Mesh Generation Workshop  
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San Diego, CA

# Outline

- Case Overview
  - Organizing Committee
  - Goals
  - Requirements
  - Participant Statistics
- AIAA Special Session

# Organizing Committee

**John Chawner and Carolyn Woeber\***  
Pointwise, Inc.

**John Dannenhoffer**  
Syracuse University

**Mark Gammon**  
ITI

**Carl Ollivier-Gooch**  
University of British Columbia

**Bill Jones**  
NASA Langley

**Jim Masters\* and David McDaniel\***  
Arnold Engineering Development Complex

**Todd Michal**  
The Boeing Company

**Nigel Taylor**  
MBDA UK Ltd.

**Hugh Thornburg**  
Engility

**\*Case 1 Analysis Team**

# Case Goals

Attempt to generate an **Order 10.5** resolution mesh for the HL-CRM Rev2 geometry model.

$$\text{Order} = \text{Log}_{10} (\text{Mesh Size})$$

Year	Miniscule	Tiny	XCoarse	Coarse	Medium	Fine	XFine	Super Fine	Hero
2018	3.16M	10M	31.6M	100M	316M	1B	3.16B	10B	<b>31.6B</b>
2021	10M	31.6M	100M	316M	1B	3.16B	10B	<b>31.6B</b>	100B
2024	31.6M	100M	316M	1B	3.16B	10B	<b>31.6B</b>	100B	316B
2027	100M	316M	1B	3.16B	10B	<b>31.6B</b>	100B	316B	1T
2030	316M	1B	3.16B	10B	<b>31.6B</b>	100B	316B	1T	3.16T

Document where the mesh generation process breaks, has performance issues, or lacks functionality to support these mesh sizes.

\*C. Ollivier-Gooch, Mesh Size Naming Conventions, [www.gmgworkshop.com/resources](http://www.gmgworkshop.com/resources)

# Case Requirements

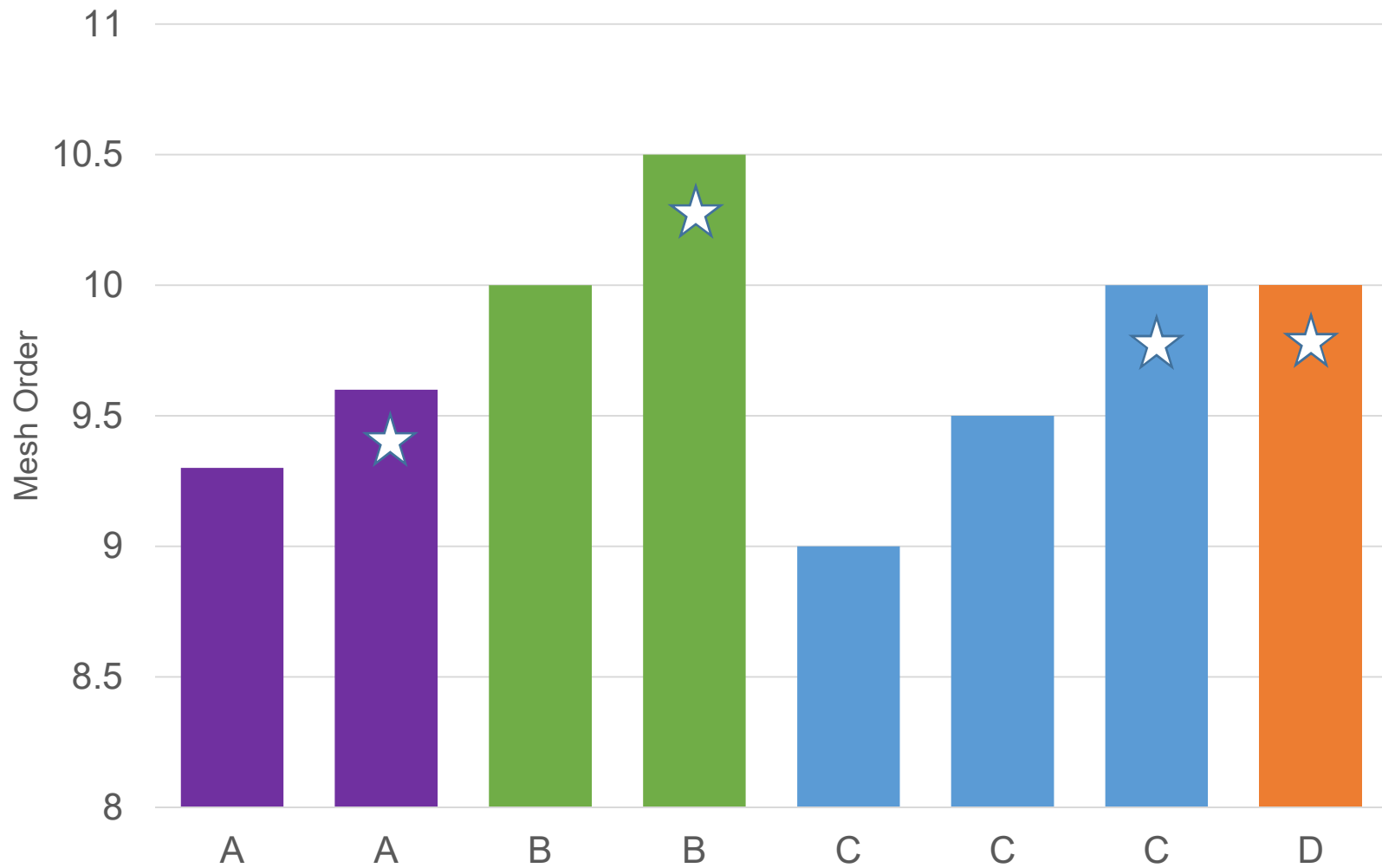
- Use HL-CRM Rev 2 geometry model
  - NX, Parasolid, STEP, IGES
- Create the largest mesh possible on provided geometry.
- Complete Participant Questionnaire during process to record data:
  - Geometry Import and Prep
  - Surface Meshing
  - Volume Meshing
  - Mesh Validity and Quality Assessment
  - Mesh Output
  - Target Mesh Size Bottlenecks
- Submit Mesh and Participant Questionnaire

# Participants

- 4 Commercial Teams Participated
- 8 Exascale Meshes Attempted/Completed

Marker	Participant ID	Name	Affiliation	Mesh Order
<b>A</b>	03	Carolyn Woeber	Pointwise	9.3
				9.6
<b>B</b>	06	Rocco Nastasia Saurabh Tendulkar Mark Beall	Simmetrix	10
				10.5
<b>C</b>	12	Michael Emory	Cascade Technologies	9
				9.5
				10
<b>D</b>	16	Richard Evans Bill Dawes	Cambridge Flow Solutions	10

# Participant Mesh Order



# AIAA Aviation Special Session

- Summary of Case 1 participant questionnaires will be presented at the end of this session.
- Special session planned for AIAA Aviation 2019 (Dallas, TX) will include an additional summary presentation.
  - Opportunity for analysis team to review participant data in more depth.
  - Additional lessons learned will be shared with the CFD community.