Blast Overpressure Measurement

Techniques for CFD Model Validation in the Development of Large Caliber Gun Systems

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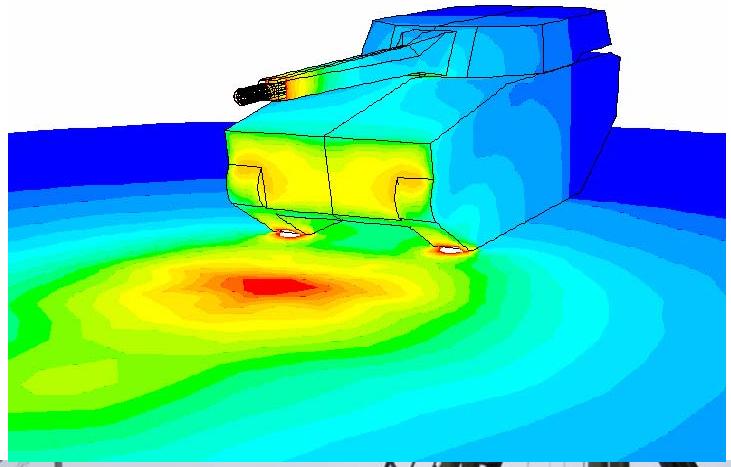
Over A Decade of Development

- Modeling & Simulation have become vital parts of a Program Manager's toolbox
- Reduction of risk through lowered cost and improved schedule

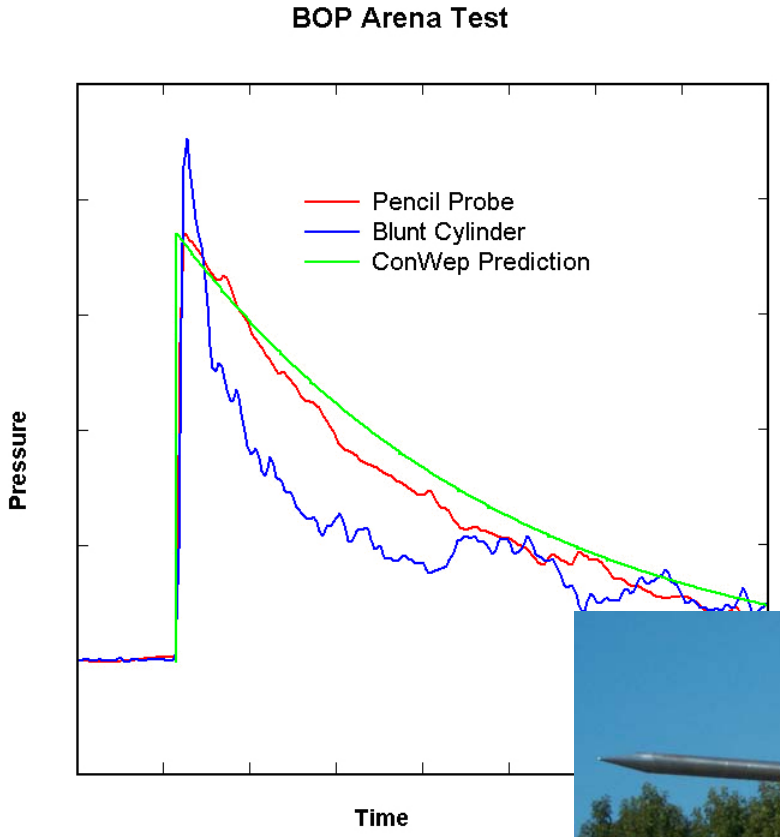
Importance of Valid Simulation

- Accurate Modeling can:
  - be used to evaluate prototype designs
  - be used to compare competing designs
  - be used to improve existing designs prior to and during test
- Accurate Testing can:
  - improve designs during development
  - improve computer models
  - speed overall development & deployment time

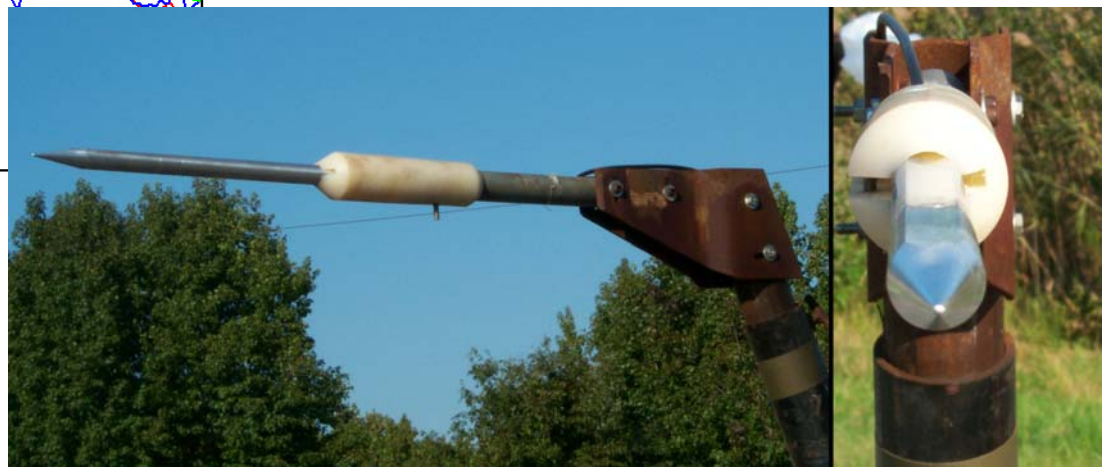


Courtesy Benet Labs

Free Field BOP Measurement I



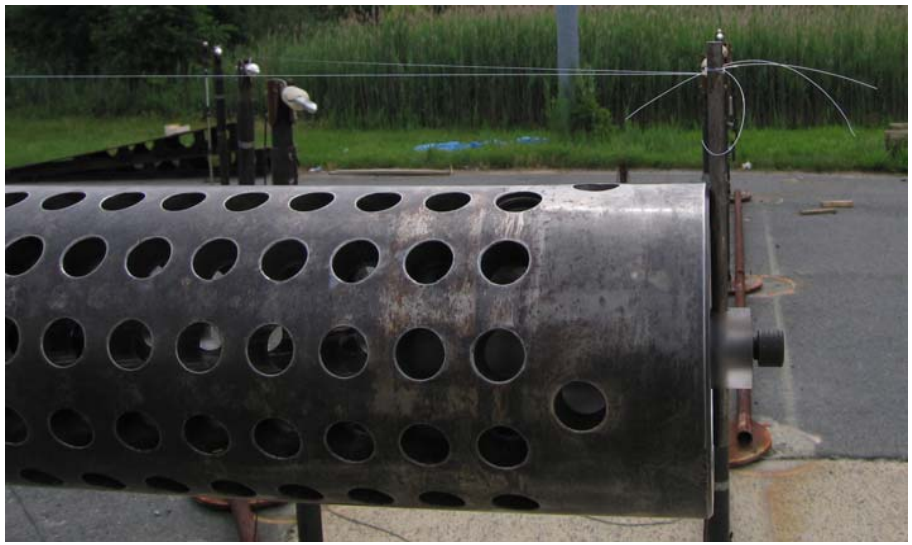
- Prior arena testing supports “pencil probe” as superior when origin of blast is known
- Blunt cylinder better suited to environments where blast wave direction is unknown



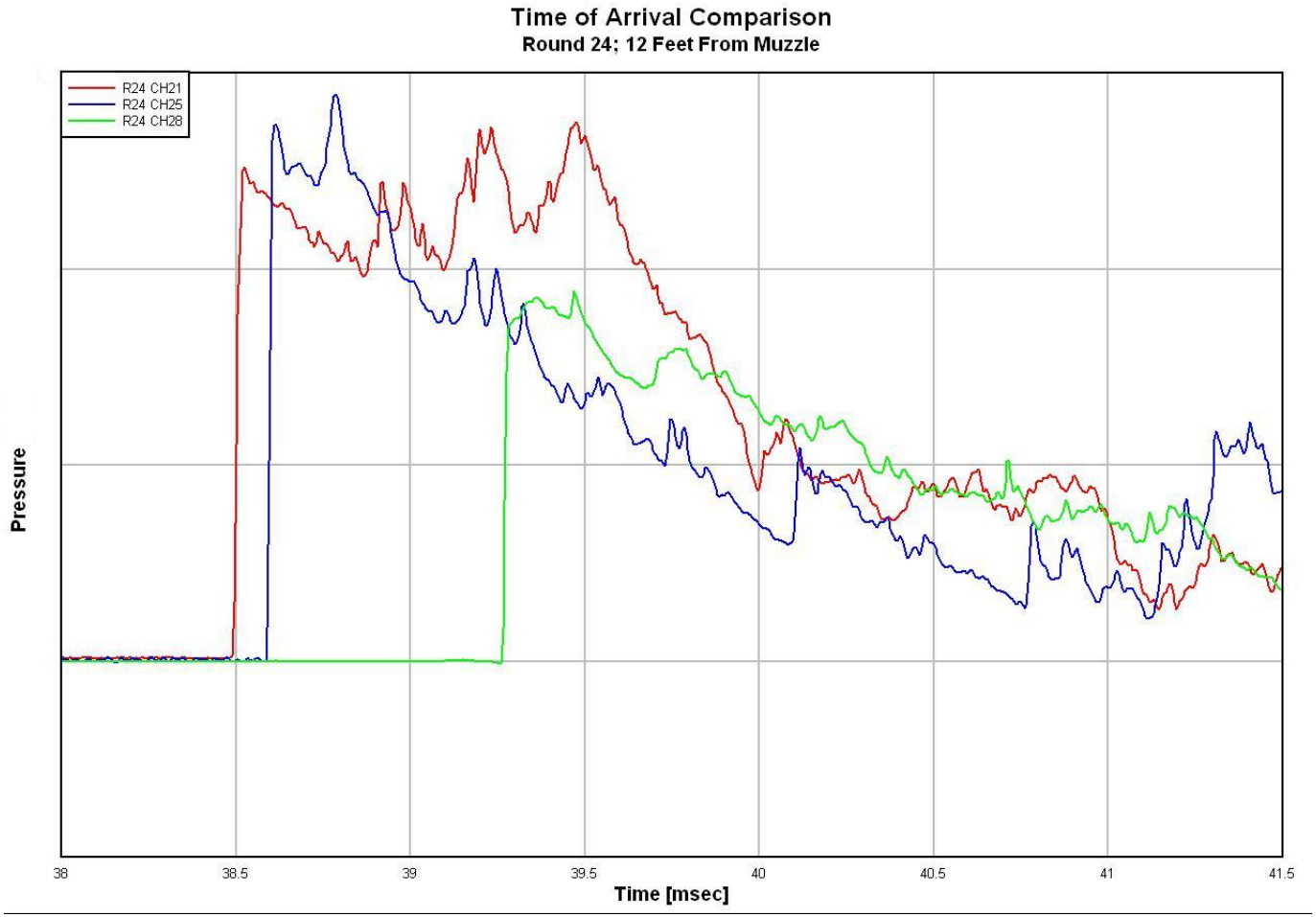
Free Field BOP Measurement II

Free Field BOP Measurement III

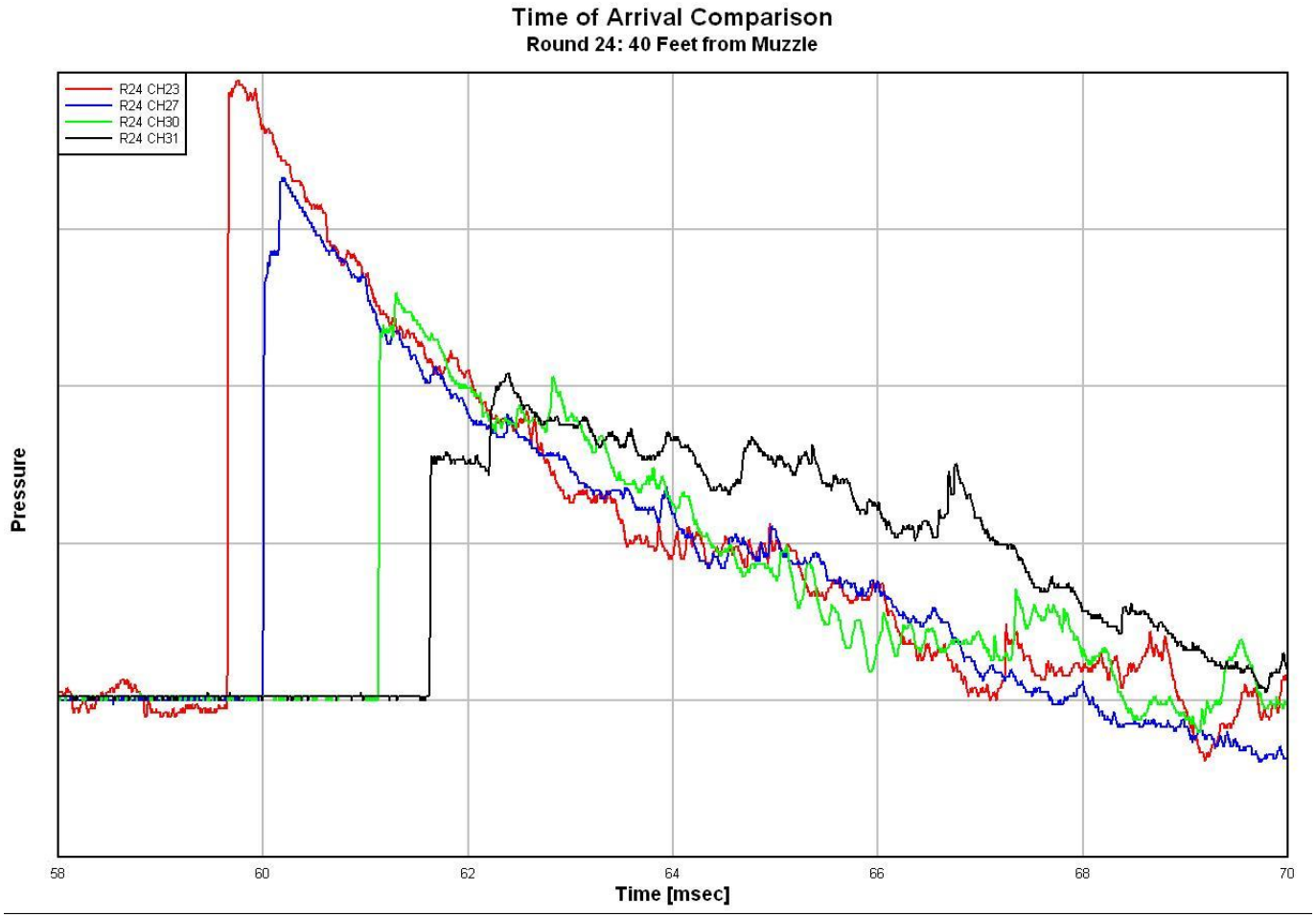
- Filament used between muzzle and sensors to aid alignment
- Survey crew records and confirms actual locations periodically while testing



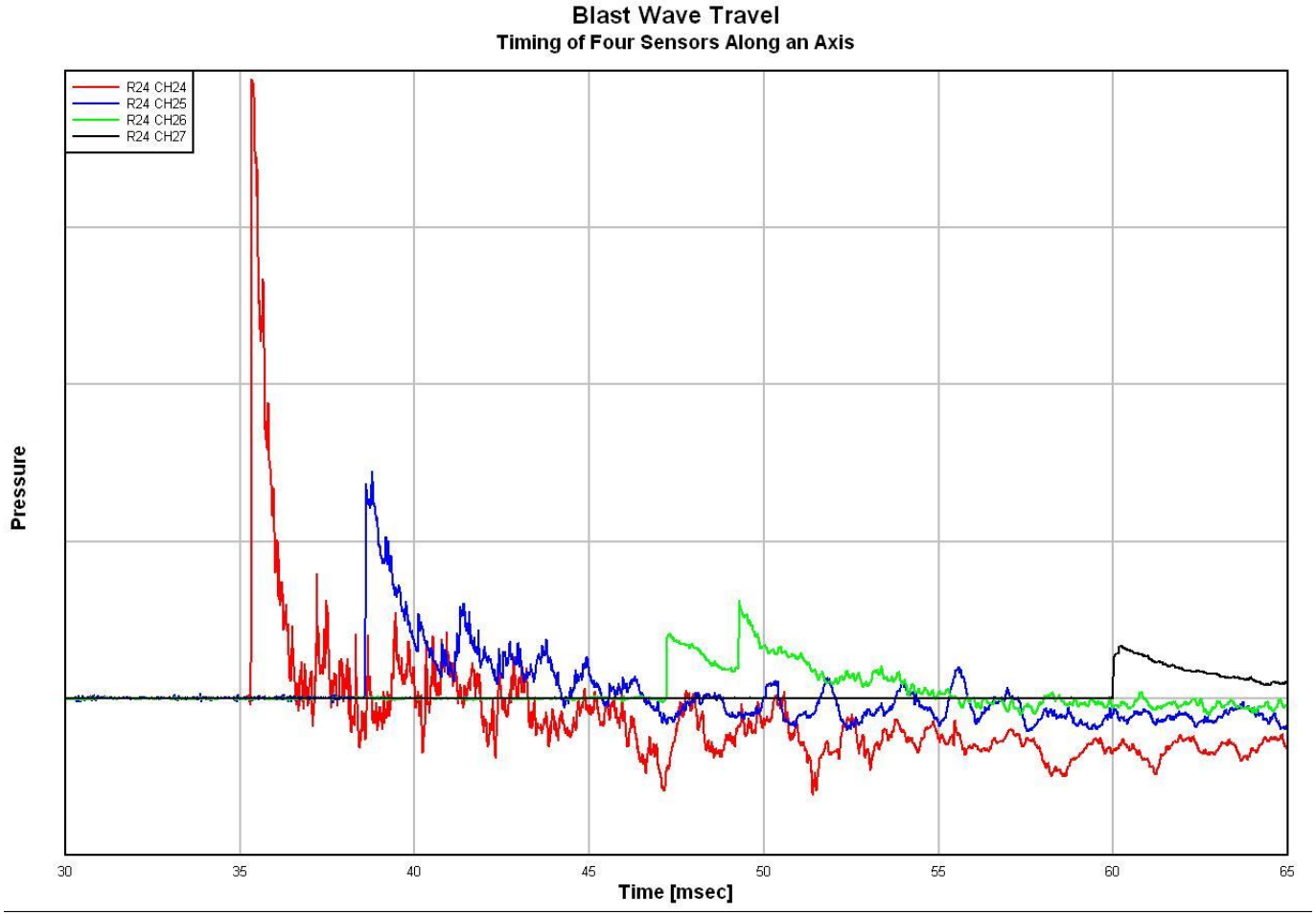
Free Field BOP Measurement IV



Free Field BOP Measurement V



Free Field BOP Measurement VI



Vehicle Hull BOP Measurement I

- Multitude of sensors (~24) placed flush with vehicle hull

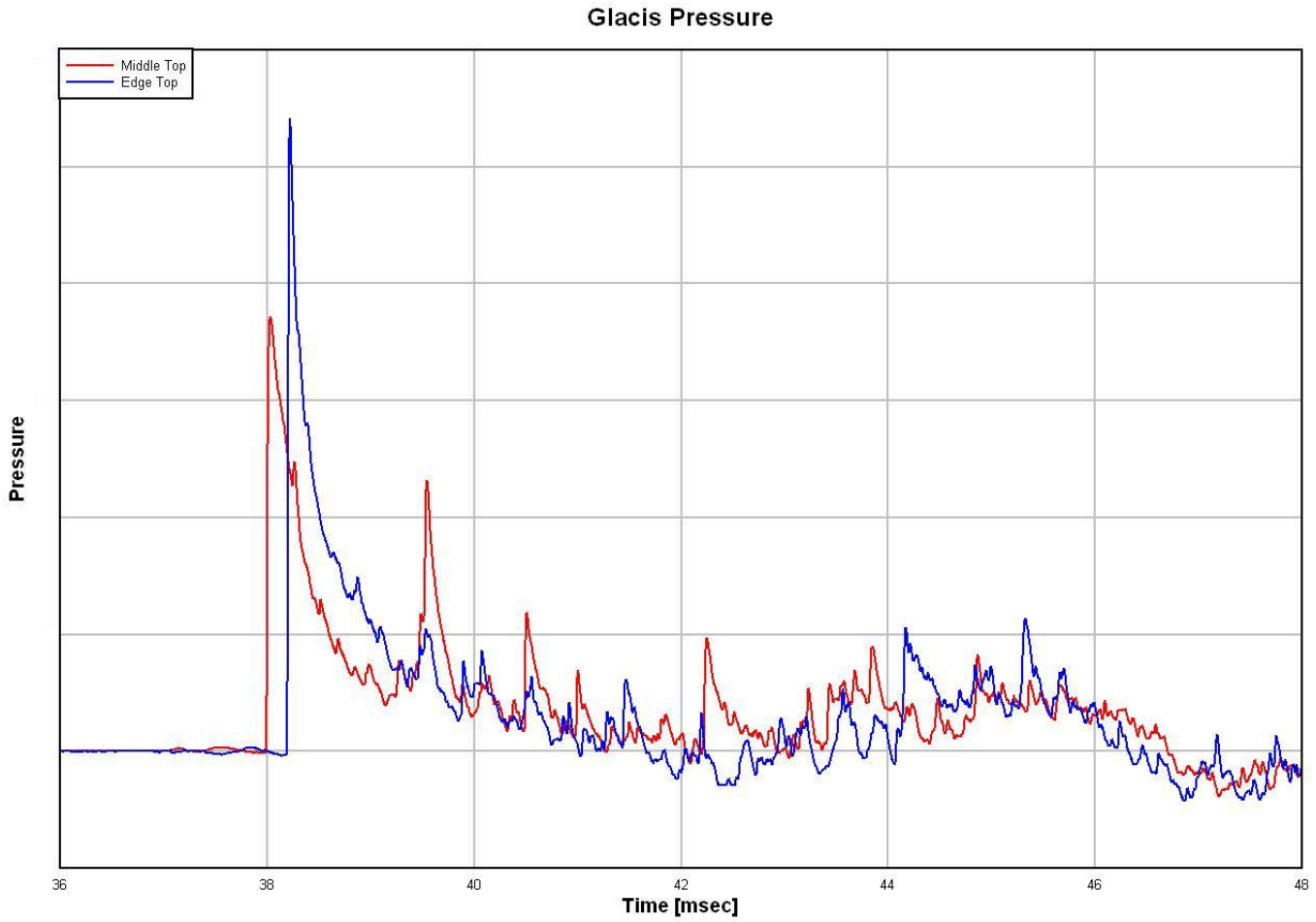
- Measurements are at an angle, somewhere between side-on and face-on

Vehicle Hull BOP Measurement II

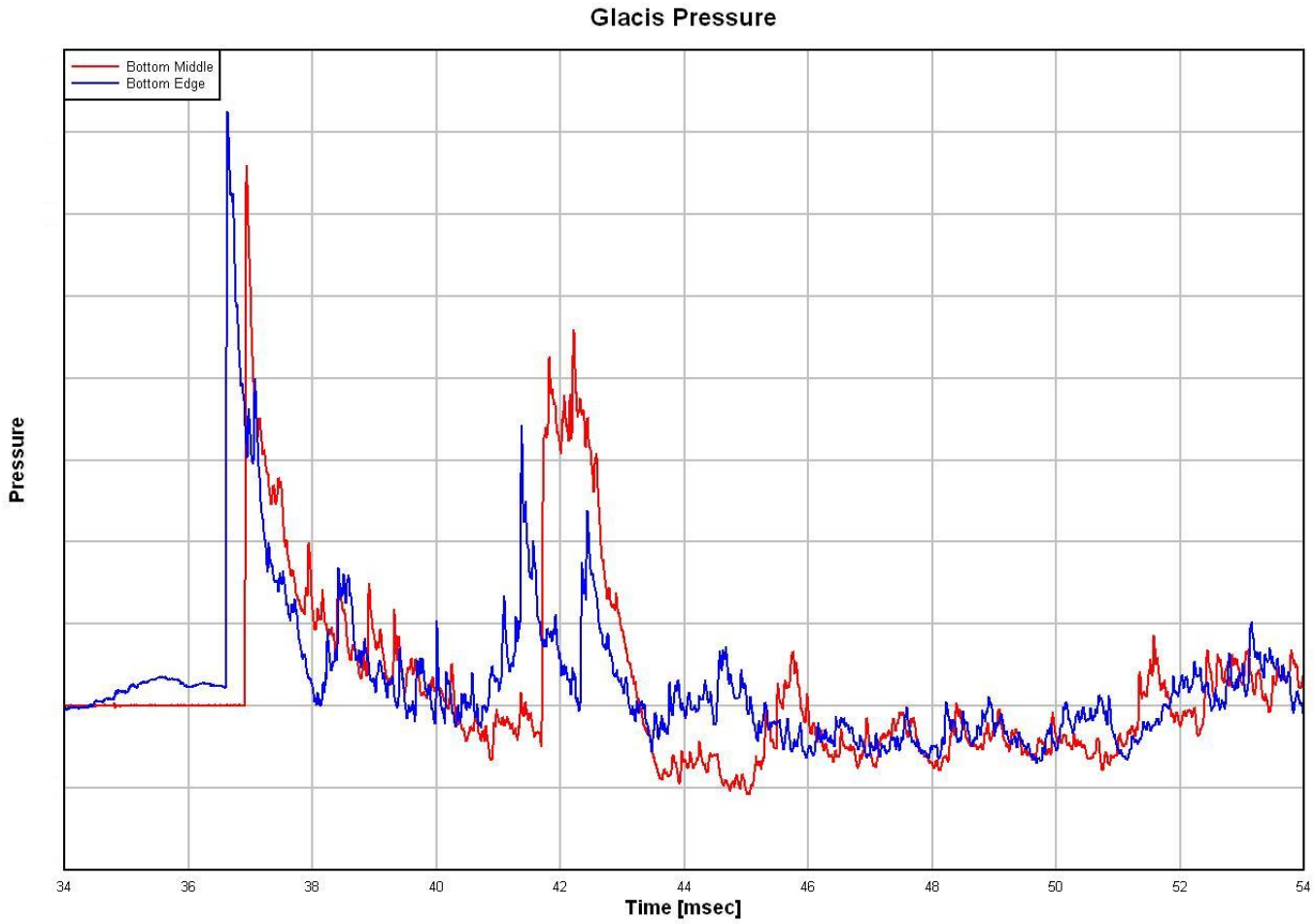
- significant pressure on the lower portion of the glacis

- advantageous to design cannon and vehicle hulls in conjunction

Vehicle Hull BOP Measurement III



Vehicle Hull BOP Measurement IV



Conclusions & Future Work

- Requirements for accuracy and reliability associated with CFD model validation mandate careful measurement techniques

- Data acquired is and will continue to be used to develop simulations and models

- Mature models and further instrumentation improvements will yield drastic reduction in cost and development time for future large caliber weapons systems

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