

General Motors High Feature Test Facility

James C. Conwell, Ph.D., P.E.

Vice President

Jacobs Technology, Inc.

Discussion Topics

- Overview of Facility
- Project Approach and Major Challenges
- Results
- Discussion

Facility Overview

- HFTF Composition
 - Two climatic wind tunnels
 - Emissions and altitude capabilities
 - Thermal soak areas
 - Test article prep rooms
 - Associated building and building renovations
- Scope of Services
 - Test facility design and commissioning
 - Building renovation and construction
 - Start-up activities
 - Maintenance planning



The GM High Feature Test Facility is the first altitude and emissions capable climatic wind tunnel cells in North America

HFTF Project Approach

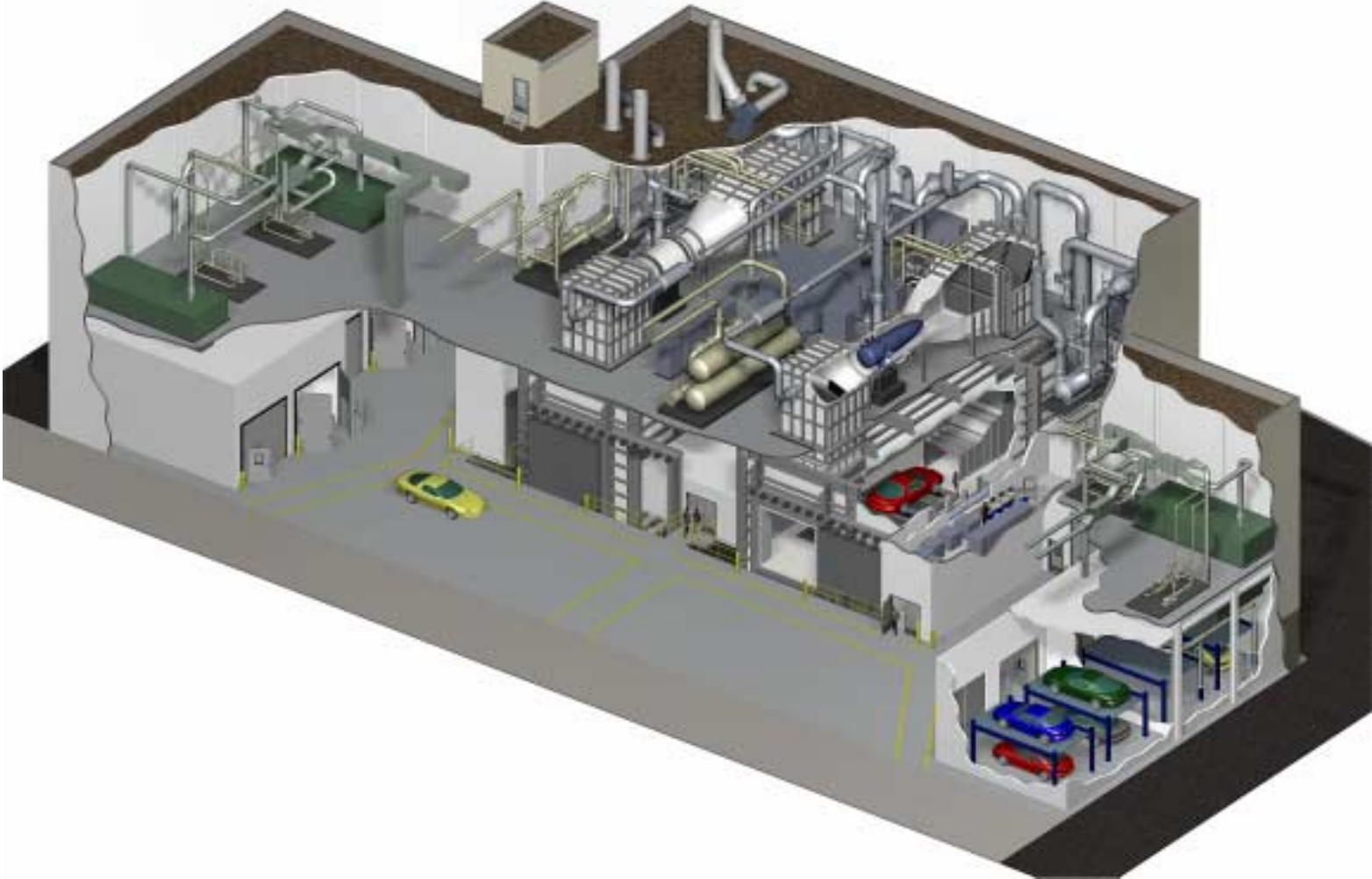
- Clear development of specifications
 - Two-year effort prior to HFTF project kick-off
 - Cost drivers and impacts identified
- Immediate recognition that HFTF was a complex project
 - Aggressive schedule
 - Tight budget
- Identification of lead partners with strong experience base
 - JM Olson, Giffels

Development of a three-dimensional model

- Set facility configurations
- Identify and control interfaces
- Set equipment locations and test article flow
- Allow early visualization of the completed facility
 - Teamwork and impediment reduction



3-D Model



HFTF Project Approach *(continued)*

- Formalize a process for developing and controlling bids/bid packages
- Implement a project-wide cost system
- Create and implement a review team
 - Involved all key members (GM, JS, JM Olson and Giffels)
 - Coordinate change orders
 - Initiate cost-containment activities



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Quality of Design and Construction Effort

- HFTF meets all technical specifications
 - Temperature simulation
 - Altitude capabilities
 - Aerodynamic performance
- HFTF provides unmatched simulation capabilities
 - Ultimately enable reduction of GM's product development cycle

HFTF project resulted in the successful creation of a test facility that is unique in North America

Quality of Design and Construction Effort - Building

- Considerations for secure vehicles
- Instrumentation areas
- Workspaces and secure data areas
- Test article flow
- Integration with existing buildings at the GM site



Innovations

- Design, selection and installation of process equipment that can withstand extreme climatic conditions
 - Both temperature and altitude
- Design and construction of a pressure shell enclosing the entire test facility
 - Altitude simulation
- Extensive safety monitoring equipment and systems
 - Personnel protection
 - Altitude
- Integration of the ancillary needs of the facility into a site with existing utilities and distribution methods



Innovations *(continued)*

- Design of facilities for operability
 - Development of ergonomic interlocks
 - Vehicle and test article flow
- Leveraging of similar elements
 - Across the two wind tunnels
 - Multiple-piece pricing
 - Sequential delivery
- Protection of existing test sites
- Building interface methodology



Miscellaneous Photos



Discussion
