

# NASA-Ames Unitary Plan Wind Tunnel

Don Nickison
Chief, Wind Tunnel Division
Ames Research Center

# ATOM Presolicitation Conference

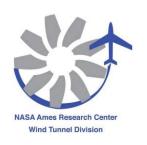
**December 9, 2008** 





### **Outline**

- Overview of NASA-Ames and Facilities
- Ames Unitary Plan Wind Tunnel Overview
  - Mission
  - Organizational Structure
  - Branch Functions/Needs



## **Ames Research Center**

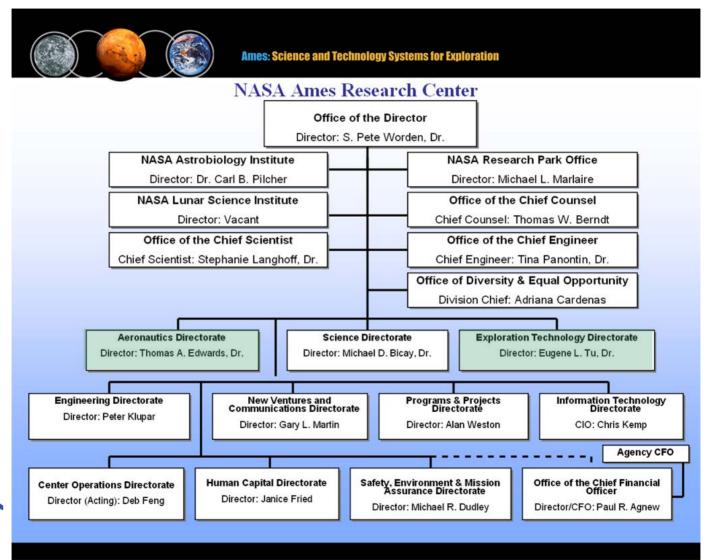








# Ames Organizational Structure

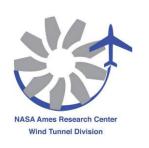






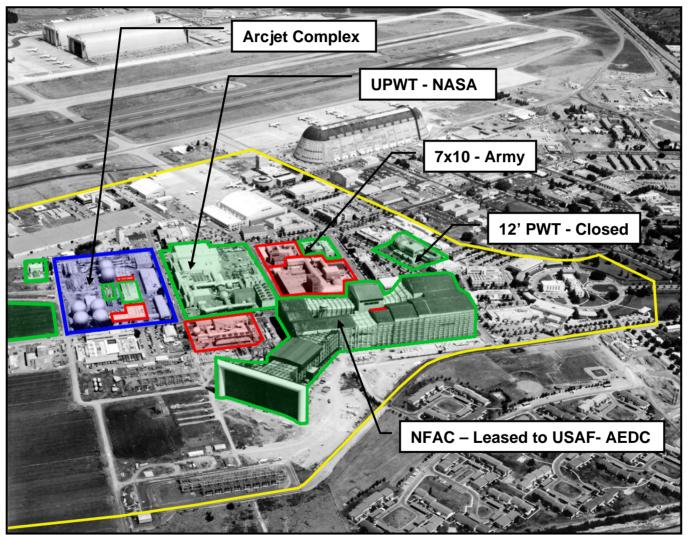
# Wind Tunnel Division Organization

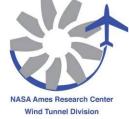
- Wind Tunnel Division, Code AO
  - Don Nickison, Chief
- Wind Tunnel Operations Branch, Code AOO
  - Frank Kmak, Chief
- Wind Tunnel Systems Branch, Code AOI
  - Jon Bader, Chief
- Experimental Aero-Physics Branch, Code AOX
  - Rabi Mehta, Chief



## **Ames Ground Testing Facilities**



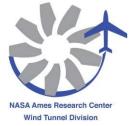




# **ARC Unitary Plan Wind Tunnel**









#### Ames' Wind Tunnel Mission

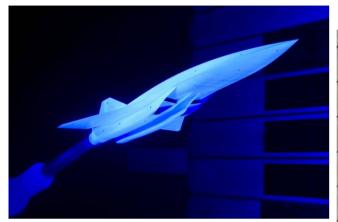
- Meet Customer Testing Needs
- Safely Operate and Maintain the Tunnels and Support Systems
- Maximize Use of Facilities
  - Improve Testing Capability
    - Test Techniques
    - Facility Enhancements
    - Surpass Customer Expectations (Costs/Capabilities)
  - Expand Customer Breadth
  - Improve Cost Competitiveness





# **Ames Unitary Wind Tunnel Testing**





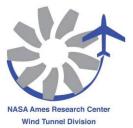






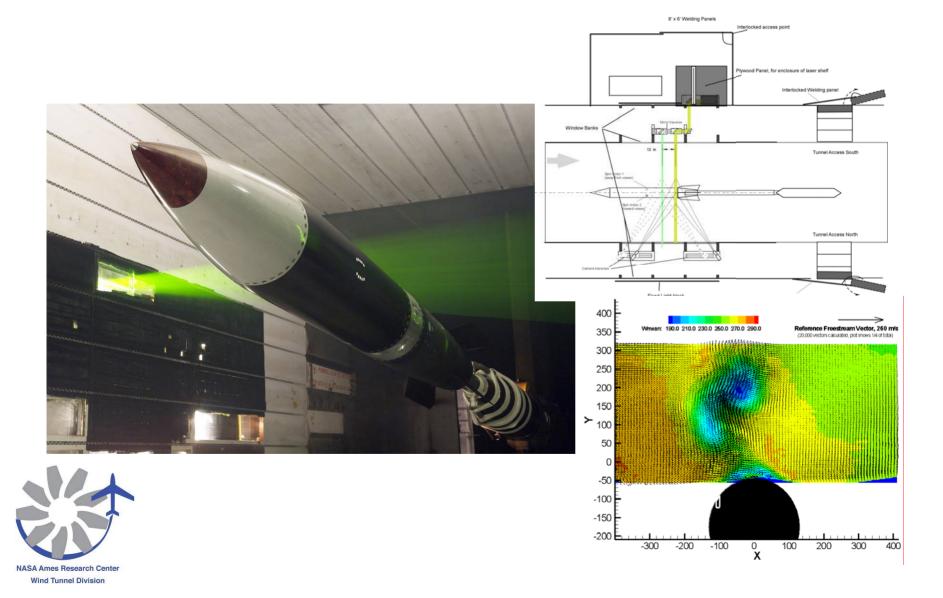






#### PIV in the 11' x 11' Transonic Test Section







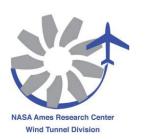
# Wind Tunnel Testing at Ames













# **Unitary Wind Tunnel Testing**





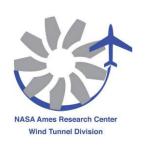






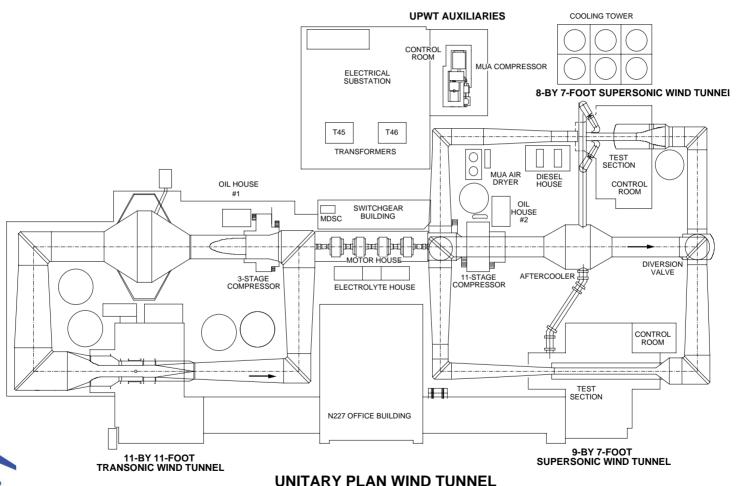
# Unitary WT Major Stakeholders

- Wind Tunnel Users
  - NASA Programs/Missions such as Constellation, Fundamental Aeronautics
  - Department of Defense
  - Commercial
- NASA's Aeronautics Test Program (ATP)





# Unitary Plan Wind Tunnel



**NASA Ames Research Center** Wind Tunnel Division

#### AOO Branch Mission



#### Plan, Direct, Lead, & Operate

- Plan, Coordinate, and lead all test activities from test justification through data transmittal
- Ensure that data quality meets customer requirements
- Oversee day-to-day operation of all wind tunnels
- Operate the tunnel and model control systems
- Responsible for model integrity, system safety, and safe operating procedures
- Develop and maintain test crew assignments
- Develop advanced test techniques and procedures
- Calibrate wind tunnel facilities
- Develop test process and test planning guidelines

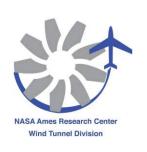


# AOO Branch Mission (Cont.)



#### Plan, Direct, Lead, & Operate

- Develop safety guidelines and procedures
- Develop facility maintenance procedures and schedules
- Manage the MAXIMO maintenance productivity software tool
- Maintain wind tunnel facilities at a high state of readiness and productivity through active maintenance
- Propose, develop, and coordinate major Construction of Facilities projects
- Provide Configuration Management services to manage the change of documents, drawings, and software
- Provide engineering support for development and repair of wind tunnel facilities



## AOO Skill Categories



- Wind Tunnel Test Engineers
  - Test Managers
  - Shift Engineers
- Tunnel System Operators and Technicians
  - Tunnel and Model Support Operators
  - Auxiliaries Facility and HPA System Operators
- High Voltage Electricians
- Wind Tunnel Model Stress Analysts
- Mechanical & Electrical Engineers
- Control System Engineers
- Aerodynamics Research Analysts
- Configuration Management Specialists
  - Drafting
  - Technical Writing MIS Support









#### AOO Branch Structure

## WIND TUNNEL OPERATIONS BRANCH ORGANIZATION CHART

**Branch Management** 

## Mechanical & Electrical Operations

Mechanical operators Electricians

#### **Test Engineering**

Test Managers Shift Engineers

#### **Engineering Support**

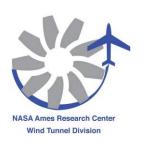
Blade shop technician WT MIS support Configuration Management Drafting

#### **Engineering Analysis**

Data Engineering Aerodynamicists

#### **Facility Engineering**

Mechanical Engineering Control Systems Engineering Electrical Engineering

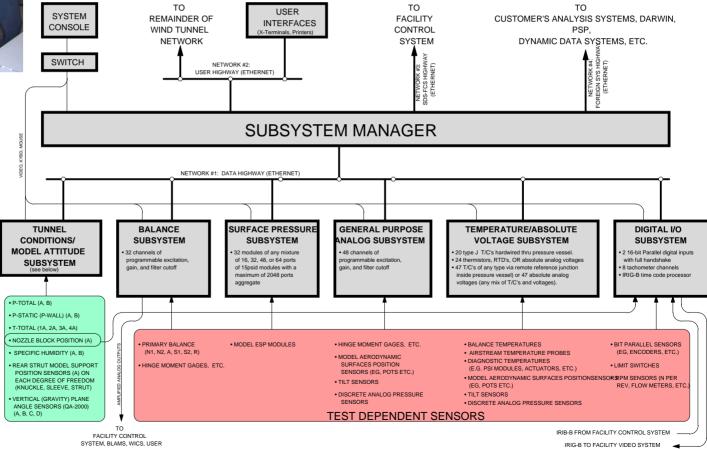


## Unitary Standard Data System





# SDS SIMPLIFIED BLOCK DIAGRAM OF 9x7 DATA SYSTEM



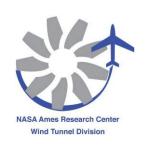


#### **AOI Branch Mission**



## Collect Data!!!

- Provide, configure, operate, and support (1) sensors,
  (2) instrumentation, (3) data systems and (4) related systems used to gather test data for customers
- Develop hardware, software, and processes to enhance and improve the quality of the data and the efficiency of the data gathering process
- Assist the customers and the AOO test team members in viewing/reviewing the data during and after a wind tunnel test

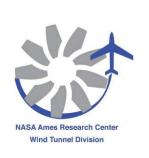




#### **AOI Job Classifications**

- Instrumentation Engineers
- Instrumentation Technicians
- Applications Programmers
- Computer Systems Technicians
- Systems Administrators
- Systems Engineers
- Instrumentation Development Engineers
- Software Development Programmers









#### AOI Branch Structure

#### WIND TUNNEL SYSTEMS BRANCH

#### DIRECT TEST SUPPORT (Shift Work)

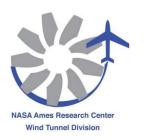
- Instrumentation Engineers
- Instrumentation Technicians
- Computer Systems Technicians
- Test Dependent System Operators

#### INDIRECT TEST SUPPORT (System Deployment, Calibration, Maintenance)

- Applications Programming
- Balance Calibrations
- Pressure Systems Support
- Angle Measurement Systems Support
- Temperature Measurement Systems Support
- Signal Conditioning / Digitizing Systems Support
- Data Systems Computer Hardware Support
- Video Systems Support
- Wind Tunnel Fiber Plant Support
- Wind Tunnel Networks Support
- Computer System Administration
- Intercom Systems Support

#### SYSTEMS DEVELOPMENT & **CONTINUOUS IMPOVEMENT**

- (SDS) STANDARD DATA SYSTEM
  - Software
  - Hardware
  - Sensors
- Dynamic Data Systems
- Network Security Systems
- Balance Calibration Processes
- Optical Systems
  - Optical Angle of Attack
  - Pressure Sensitive Paint
  - Laser Vapor Screen
  - Schlieren Systems



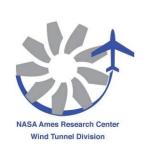


#### Ames' Wind Tunnel Direction

- Past
  - High Demand for Wind Tunnel Testing
- Present
  - Good Diversity of Testing
  - Viewed as a National Asset



- Remains Unclear
  - NASA's role/mission in Aeronautics and Space Exploration
  - Very Competitive Wind Tunnel Industry
- Valid Business Model Must Be Maintained







# **Partnership**

- NASA and Contractor Must Partner to Succeed
  - Equally Share in Wind Tunnel Mission/Vision
    - Management
      - Business Model Stakeholder
      - Expanding Customer Base
    - Workforce
      - Watch Out for Each Other and Customers
        - Improve Safety, Productivity and Overall Customer Experience
      - Part of the Ames Community

