

Challenges of an Extended Upgrade Project

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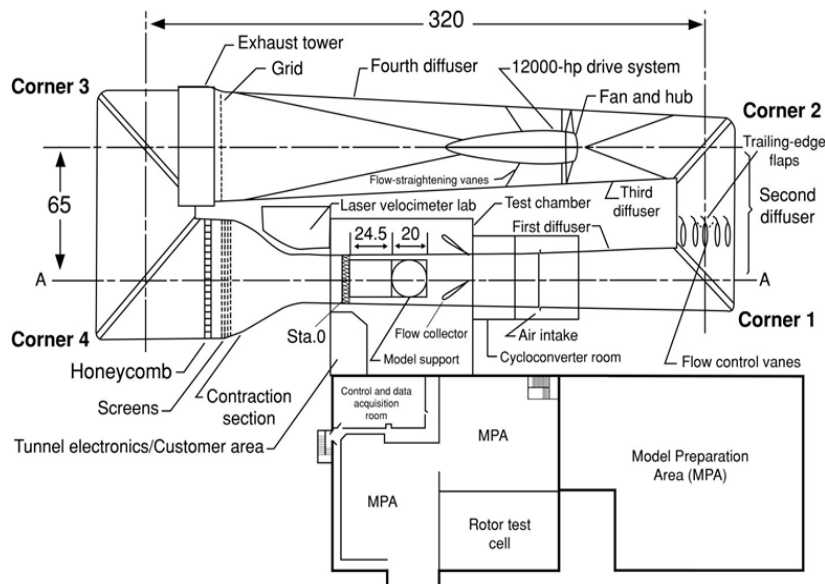
Agenda

- 14x22 Description
- Overview of Recent Upgrade Project
- Managing the Project
- Personnel Activity
- Scheduled Maintenance
- Assessing Flow Quality Effects
- Return to Service

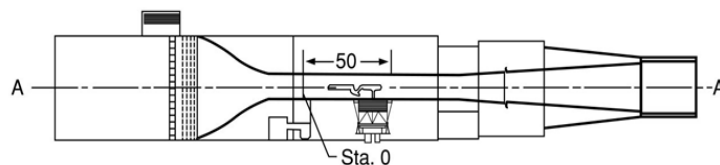


14x22 Description

Test Section	14.5 x 21.75 x 50 Feet (4.4 x 6.6 x 15.2 meters)	
	Closed Jet	Semi Open Jet
Speed	348 ft/sec (106 m/sec)	275 ft/sec (84 m/sec)
Reynolds No. Max	2.2×10^6 / ft (7.2×10^6 / m)	1.7×10^6 / ft (5.6×10^6 / m)



14-by 22-Foot Subsonic Tunnel



Schematic of 14-by 22-Foot Tunnel (dimensions in feet)

Overview of Recent Upgrade Project



HWB Model

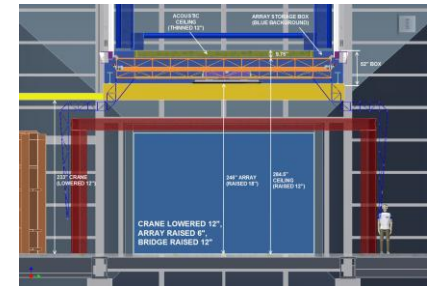
Propane Fuel System



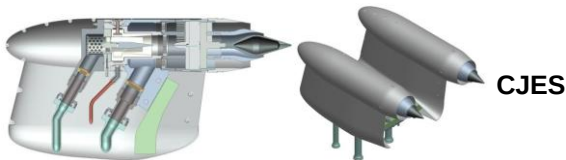
Microphone Array



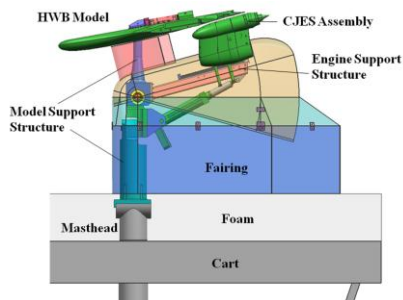
Traverse Mechanism



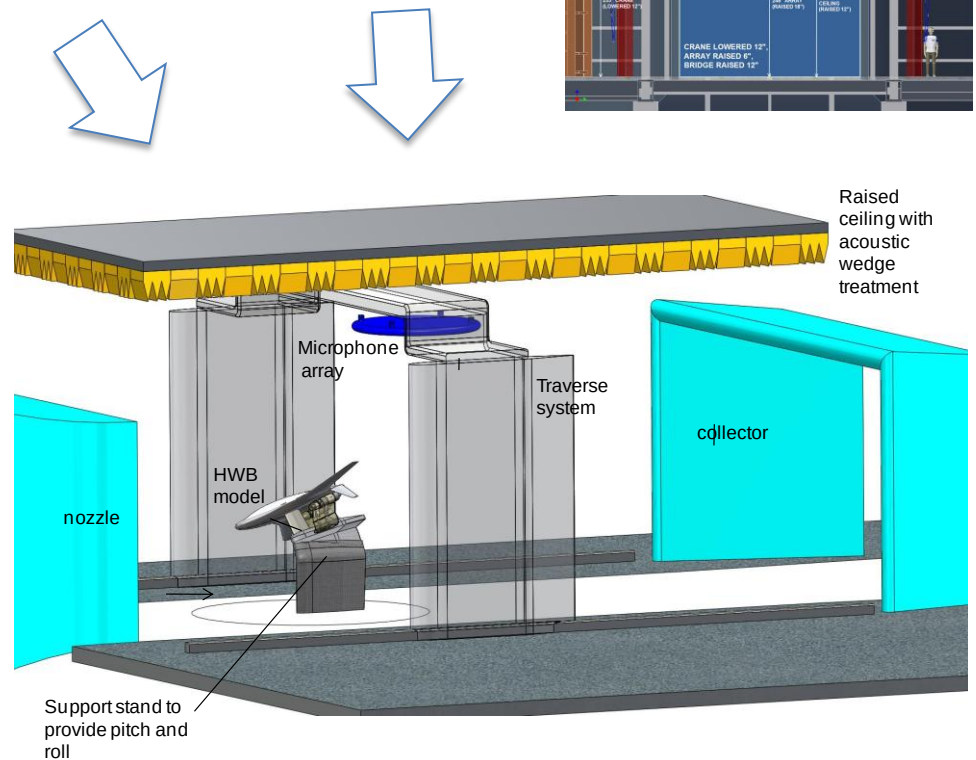
Aerodynamic Model Support



CJES



Aeroacoustic Model Support



Managing the Project

- Multiple Organizations
 - NASA: Research, Engineering, Operations, Safety, Fire/Security
 - ROME: Engineering (offsite & local), Operations, Maintenance, Safety
 - Subcontractors: Mechanical, Electrical, Quality Assurance
- Weekly Status / Daily Planning Meetings with Key Personnel
 - Program Manager (W) – Responsible for Overall Schedule
 - Project Manager (W/D) – Responsible for Major Installations
 - Construction Manager (W/D) – Responsible for onsite construction
 - Facility Coordinator* (W/D) – Responsible for 14x22 plant / equipment
 - Facility Manager* (W) – Responsible for 14x22
 - Facility Operations Manager* (W/D) – Responsible for day-to-day operations of 14x22
 - Technical Lead* (W/D) – Responsible for 14x22 Technician staff
 - Systems Engineers* (W/D) – Responsible for integration of new systems

*14x22 Resident Staff

Personnel Activity

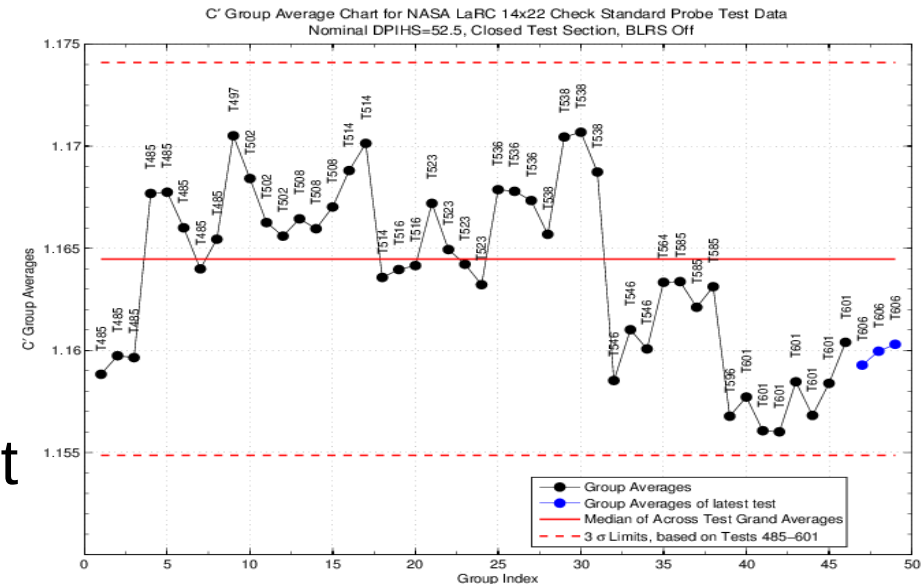
- Shadow / Assist construction personnel
- Training
 - Gain operating experience with new systems
 - Develop operating procedures for new systems
 - Cross-train each other on existing systems
 - Mandatory training (timekeeping, security, etc.)
- Scheduled maintenance
- Housekeeping
 - Storage of test articles
 - Organization (tools, fasteners, equipment, etc.)
- Redeployment to other facilities
- Annual leave

Scheduled Maintenance

- Maintained PM schedules for all accessible systems
- Deferred inaccessible systems
 - Changed system status codes to “deferred” in PM management s/w
 - Finished PM’s as part of Return-to-Service activities
- Developed maintenance procedures and schedules for new systems
 - Collaboration with manufacturers and Engineering
 - Entered all new assets into PM management s/w
 - Set clock to “zero time” at completion of Acceptance Testing

Assessing Flow Quality Effects

- Check Standard Probe Test
 - First test post-construction
 - Q-calibration check
 - Conducted with traverse at 9 positions
- F&M Repeatability
 - First three tests are “second entry” tests
 - Primarily aeroacoustics
- Check Standard Model Test
 - Scheduled
 - Flow distribution (wing span)
 - Flow angularity
- Static Pressure Distribution Test
 - Scheduled



Return to Service

- Hardware / Software
 - Drawings digitized and placed in drawing file
 - Manuals / User's Guides placed in Facility Archives
 - Critical spares inventoried and placed in storage
 - Software backed up and loaded onto controlled archive servers
- Personnel Certifications
 - Each Operator reviewed by “mini-panel”
 - Refresher cross-training conducted by technicians
- Productivity
 - Scheduled “productivity ramp” – customer given discounted rate
- Followed NASA Return-to-Service Procedure

- Project Schedule Maintained
 - Construction
 - Checkout
 - Documentation
- All Systems Functioning as Designed
- 100% Productivity Achieved Ahead of Schedule
- No Mishaps!