

Exploring

Explorer Post 630

Aeronautics Post

Jinho (“Gin-ho”) Lee



National **Aeronautics** and **Space** Administration (**NASA**)

- NASA that everyone knows about



Aero Engineering/Sciences



1970s

1999

GRC => Propulsion Technology

Cleaner, Quieter, Affordable => Public Impact

10/12/04

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NASA Combined Cycle Engine Projects (Engine of the Future !)

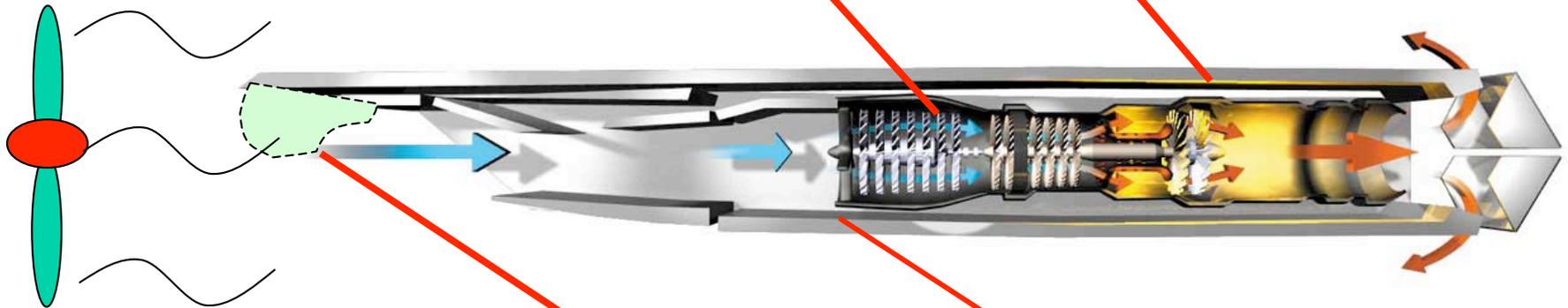


10/12/04

Who are we (advisors) ?

Jinho Lee PhD (Combustion Branch)

Dale VanZante PhD (Acoustic Branch)

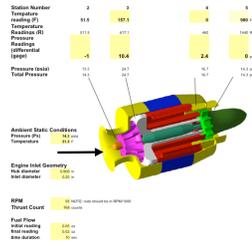
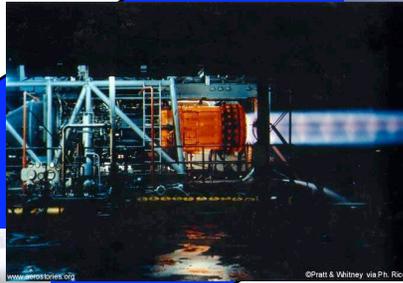
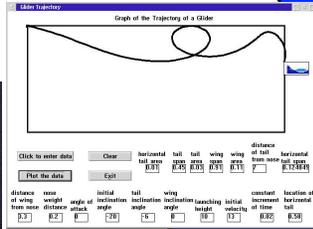


Judith VanZante PhD (Icing Branch)

Matthew.A.Kennedy(Facility Engineering)

Bruce Wendt PhD (Inlet Branch)

How Planes Fly



Engine Basics

10/12/04

UEET Educational Engine Experiment

JEBTTA Experiment

Field Lines
Turbine Engine
DME
Electronic Display
Program Control

9/1/04

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So what does the Explorers do?

- Advisors introduce physical and technical concepts.
- We introduce NASA resources/facilities related to these physical and technical concepts.
- We guide the students to work out the problems for themselves based on their current Academic experience.
- Perform small scale NASA like experiments.
- Service activities along with social
- Visit local industries
- Invited discussion on current events and technologies of interest to the Scouts (Columbia accident => Material Testing Lab, Mar Rover => PB-SPF, New Propulsion concepts => PDE discussions, etc ..)

Bridge Structure Building/Testing



Analysis and Team Work

10/12/04

Local Industry Tours/Visits

ORBIT Industries Tour

- Non Destructive Testing



Nov 13 2001

NASA-Aeronautics Pos

ATI/APS Tour

- Aircraft Engine Repair and Maintenance

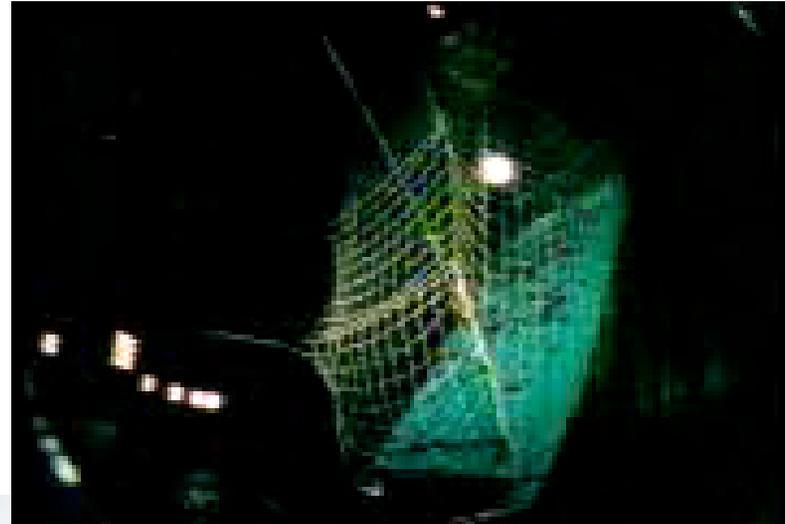


Nov 13 2001

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Plumbrook Station Visit

- Mars Rover -
Air bag
deployment
testing and
Simulation
- Space Power
Facility (SPF)
at Sandusky
OH.



10/12/04

Icing Research Aircraft Visit



10/12/04

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Airfoil Wind Tunnel Testing

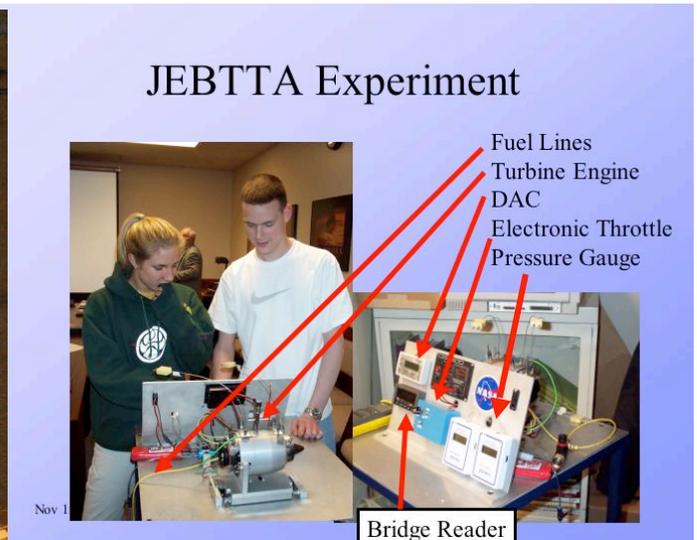


10/12/04

UEET Educational Engine Experiment

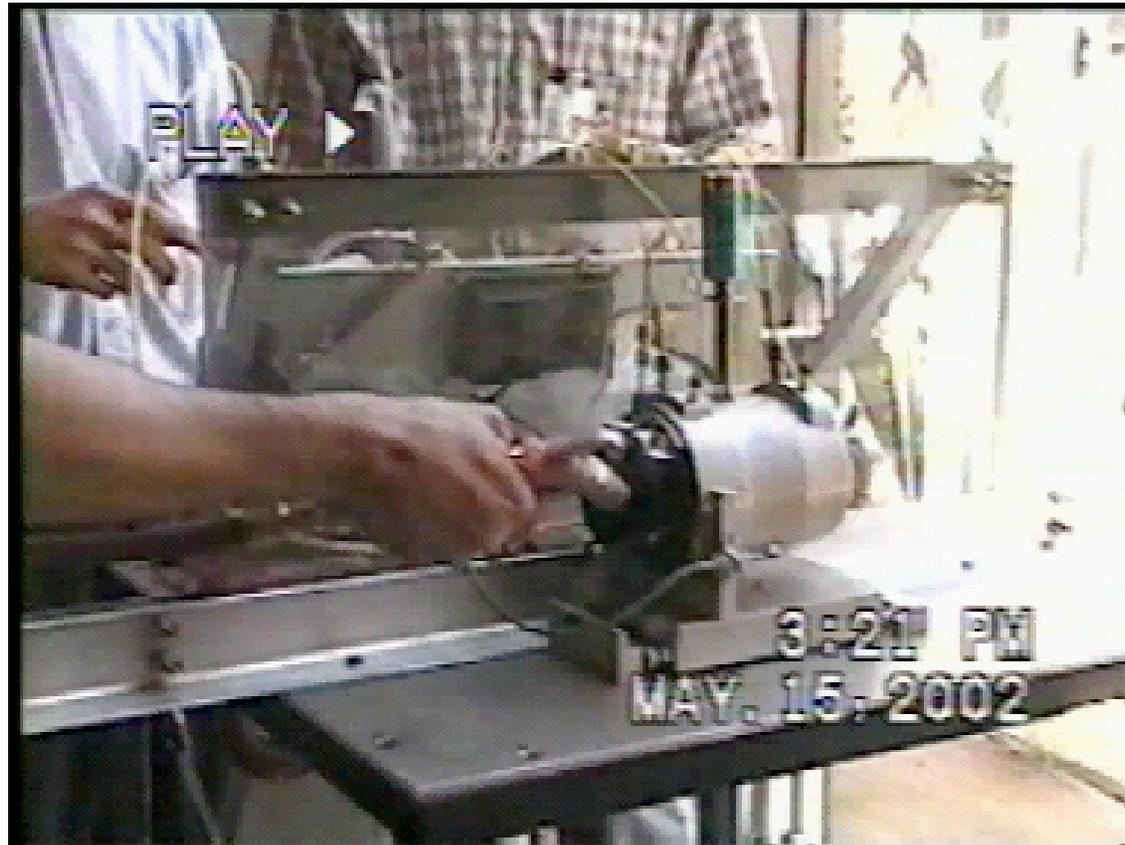


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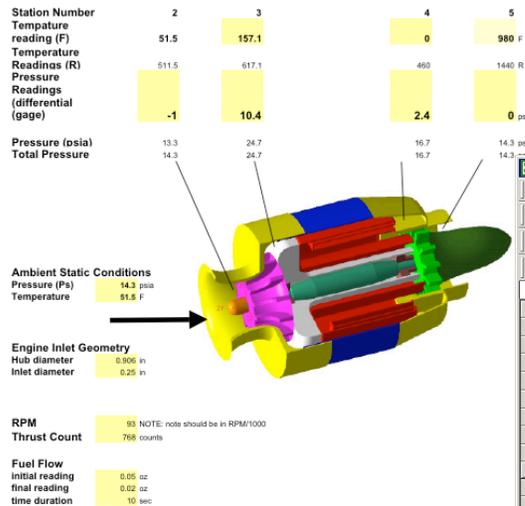


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JEBTTA Calibration Test



Engine Experimental Data and Analysis Tool (E. Summers)



Microsoft Excel - newjetcalcs 1(2).xls

File Edit View Insert Format Tools Data Window Help Acrobat

Arial 10 B I U

1	Static Conditions																	
2	Pressure (Ps)	14.3	psia															
3	Temperature		R															
4																		
5	Temperature Readings			Measured Value														
6	T(2)	518	R															
7	T(5)	1440	R															
8																		
9																		
10	Pressure Readings																	
11	P(2) static	13.3	psia															
12	P(4) static	14.3	psia															
13	P(2) Reading	-1	psig															
14	P(4) Reading	2.4	psig															
15	Distance Measurements																	
16	Hub Radius	0.02833	ft															
17	Inlet Radius	0.0755	ft															
18																		
19	Other Measurements																	
20	RPM	93																
21	Mass Flow (Fuel)	0.0052	lbm/s															
22		0.000161491	slug/s															
23	CALCULATIONS																	
24	Total Pressures																	
25	Pt(2)	14.3	psia															
26	Pt(4)	16.7	psia															
27																		
28	Pressure Ratios																	
29	Pt(2) / Pt(2) (IPR)	1.07518797																
30	Pt(4) / Pt(4) (NPR)	1.167632168																
31																		
32																		
33	Speed of Sound	$a=(g^*r_{gas}T)^{.5}$																
34	a	1115.546144	fps															
35	A	1859.96129	fps															
36																		
37	THRUST	$(mdot * U)_{exit} - (mdot * u)_{inlet}$																
38	F	6.41868576	lbf															

1 The Pretty Sheet / Sheet2 / Sheet3

Ready NUM

10/12/04

Typical Student Designed/Developed Engine Experiment



Jet Engine Basics Through Thrust Analysis



Cirse Gonzalez
SHARP Presentation
August 3, 2000

Lakewood HS Honor
Student-Duke University
AT&T intern

10/12/04

Magnificat HS Student
-Florida State University

My Summer @ NASA

"Thickness Calculations for the Jetstream 66
Containment Shield"



Mentor:
Judy Van Zante

Caitlin Feikle
University of Mian

E, Summers, R. Washburn 16

2004 Agenda

- Structural Physics (Bridge building and Testing)
- **Propulsion Physics - Combined Cycled Propulsion system**
- **Engine Testing - Project JETTA**
- **Aeronautical Physics**
- **Wind Tunnel Testing**
- **Current Events:**
 - Mar Rover : Visit to Space Power Facility (SPF) - Plum Brook Station - Air Bag Tests**
 - Visit to Glenn Aircraft Hanger - Latest ICING Research Aircraft-SA-3**

NASA Aeronautics Post #630

Tues 5-7 pm; Oct 7 – May 12

Building 5, Room 119

- Connection to Academic
- Focused Design Activities
 - Engine Experiment
 - Wind Tunnel Experiment
 - Other Engines
- Design competitions
- Team Work
- Career Choices
- Social Events
- Outdoor Activities
- **Service Activities**

Hands on Science/Engineering activities of the
NASA at Smaller levels

Questions?

- Contact the Office of Educational Programs
 - Stephanie Brown-Houston at (216) 433-XXXX
- Or Contact the advisors
 - Jinho Lee (e-mail is best) @ jinho.lee@grc.nasa.gov
 - 216-433-5877
 - Please use the header **Explorer 630**
 - Dale VanZante @ Dale..VanZante@grc.nasa.gov