UNIVERSITY OF ALABAMA SYSTEM
BOARD RULE 415
BOARD SUBMITTAL CHECKLIST CRITERIA

BOARD SUBMITTAL CHECKLIST NO. 9
EQUIPMENT PURCHASE/SOLE SOURCE ACQUISITION /1

CAMPUS: The University of Alabama, Tuscaloosa Alabama

PROJECT NAME: Hardaway Wind Tunnel Replacement and Upgrade

MEETING DATE: February 2-3, 2023

- ☑ 1. Board Submittal Checklist No. 9
- ☑ 2. Transmittal Letter to Chancellor from Campus President requesting project be placed on the agendas for the forthcoming Physical Properties Committee and Board of Trustees (or Executive Committee) Meetings
- ☑ 3. Proposed Board Resolution requesting approval of equipment purchase with equipment purchase price and total project costs (if renovations/associated work is required) by the Board of Trustees
- ☑ 4. Executive Summary, listing the following:
  a. Type of Equipment Request
  b. Location of Proposed Equipment
  c. Estimated total cost
  d. Method of financing
  e. Estimated additional operating costs
  f. Relationship of new equipment to current programs and/or to programs at the institution and alternatives to proposed equipment
- ☑ 5. Executed approval for sole source purchase through campus administration
- ☑ 6. Campus map(s) showing location of equipment

Prepared by: Tim Leopard TAL

Approved by:

/1 Reference Tab 3C - Board Rule 415 Instructional Guide

THE UNIVERSITY OF ALABAMA® | Office of the President

January 5, 2023

Chancellor Finis E. St. John IV
The University of Alabama System
500 University Boulevard East
Tuscaloosa, Alabama 35401

Dear Chancellor St. John:

I am pleased to send to you for approval under Board Rule 415 the attached documents for a Sole Source Equipment Purchase for the Hardaway Wind Tunnel Replacement and Upgrade project.

The resolution requests authorization to purchase the equipment sole source at the total project budget.

The item has been thoroughly reviewed and has my endorsement. With your concurrence, I ask that it be added to the agenda for The Board of Trustees of The University of Alabama at their regular meeting on February 2-3, 2023.

Sincerely,

Stuart R. Bell
President

Enclosure

203 Rose Administration Building | Box 870100 | Tuscaloosa, AL 35487-0100 | 205-348-5100 | Fax 205-348-7238
president@ua.edu | http://www.ua.edu

THE UNIVERSITY OF ALABAMA

RESOLUTION

APPROVAL OF THE PROCUREMENT AND INSTALLATION OF A SUPERSONIC WIND TUNNEL

WHEREAS, in accordance with Board Rule 415, The University of Alabama ("University") is requesting approval of a Sole Source Equipment Purchase for the Hardaway Wind Tunnel Replacement and Upgrade project ("Project") to be located at 401 7th Avenue in Hardaway Hall; and

WHEREAS, the wind tunnel facilities are employed not only for research activities, but integrated into educational programs through such mechanisms as Senior Design, Experimental Aerodynamics, independent undergraduate and graduate research, honors projects, and student projects through the American Institute of Aeronautics and Astronautics; and

WHEREAS, the supersonic wind tunnel will provide experiential learning opportunities that are highly relevant in national defense and provide many of our students with increased internship opportunities because of experience with this equipment; and

WHEREAS, the Project will also enable the University to be more competitive with its peer institutions in proposing and winning research grants and contracts and will support the state's growing workforce needs in aerospace and defense employers; and

WHEREAS, the current 6" supersonic wind tunnel is approximately 60 years old and is no longer operational, inhibiting the University from meeting its educational objectives by providing its students the highest quality of opportunities for training and education and to update the existing equipment to meet the University's needs is significantly cost prohibitive and not recommended by the manufacturer; and

WHEREAS, Aerolab, LLC is the only vendor that can provide a variable Mach number wind tunnel that can meet the specific requirements and current needs; and

WHEREAS, the University is requesting the purchase of sole source equipment totaling $1,847,370 from Aerolab, LLC to ensure the performance and operational capability requirements; and

WHEREAS, the Project will be grant funded in the amount of $2,293,306; and

WHEREAS, the Total Project budget for the Project is as stipulated below:

BUDGET:		PRELIMINARY
Variable Mach 8x8 Supersonic Wind Tunnel System and Components	$	1,847,370
Demolition and Infrastructure	$	250,000
Contingency* (5%)	$	104,869
UA Project Management Fee** (3%)	$	66,067
Architect/Engineer Fee*** (10%)	$	25,000
TOTAL PROJECT COST	**$**	**2,293,306**

*Contingency is based on 5% of the costs of Equipment and Demolition and Infrastructure.
**UA Project Management Fee is based on 3% of the costs of Equipment, Demolition and Infrastructure, and Contingency.
***Architect/Engineer Fee is based on 8% of the costs of Demolition and Infrastructure plus a 1.25 renovation factor.

NOW, THEREFORE, BE IT RESOLVED by The Board of Trustees of The University of Alabama that Stuart R. Bell, President; Matthew M. Fajack, Vice President for Finance and Operations and Treasurer; or those officers named in the most recent Board resolutions granting signature authority for the University be, and hereby are, authorized to act for and on behalf of the Board in proceeding with acquisition and installation of the Variable Mach 8x8 Supersonic Wind Tunnel from Aerolab, LLC for a Total Project Cost not to exceed $2,293,306.

Hardaway Wind Tunnel Replacement and Upgrade

University of Alabama

Executive Summary

The University has a long history of aerospace and combustion engineering studies, offering cutting edge classroom and laboratory instruction. Supersonic wind tunnels are used to support the instruction and education of undergraduate and graduate students in aerospace engineering using modern instruments as well as to support research into combustion processes at supersonic air speeds. This instruction and research help affirm the University as a leading education destination worldwide in the area of combustion research in high velocity flows and undergraduate and graduate education and research in supersonic flow for aerospace applications.

The wind tunnel facilities are employed not only for research activities, but integrated into our educational programs through such mechanisms as Senior Design, our course in Experimental Aerodynamics, independent undergraduate and graduate research, honors projects, and student projects through AIAA targeting publication in national meeting venues. The supersonic wind tunnel will provide experiential learning opportunities that are highly relevant in national defense. In fact, many of our students will have increased internship opportunities because of experience with this equipment.

The current 6" supersonic wind tunnel is approximately 60 years old and is no longer operational, inhibiting the University from meeting its educational objectives for providing its students the highest quality of opportunities for training and education. To update the existing equipment to meet the University's needs is significantly cost prohibitive and not recommended by the manufacturer.

The new 8" supersonic wind tunnel will usher in the next generation of aerospace education and research for energy, defense, and transportation, aligning with the state of Alabama's Science and Technology Roadmap and positioning the University to be at the forefront of hypersonic, air-breathing fuel studies. This will also enable the University to be more competitive with its peer institutions in proposing and winning research grants and contracts and will support the state's growing workforce needs in aerospace and defense employers.

As Aerolab, LLC is the only vendor with variable Mach number wind tunnels for academia and is the leading manufacturer of academic wind tunnels, the University is requesting to move

forward with the purchase of the equipment from Aerolab, LLC. The new wind tunnel will use the existing facility space in Hardaway Hall with minor modifications.

BUDGET	Preliminary	
Variable Mach 8x8 Supersonic Wind Tunnel System and Components	**$**	**1,847,370**
Demolition and Infrastructure	**$**	**250,000**
Contingency* (5%)	**$**	**104,869**
UA Project Management Fee (3%)**	**$**	**66,067**
Architect/Engineer Fee* (10%)**	**$**	**25,000**
TOTAL PROJECT COST	**$**	**2,293,306**

*Contingency is based on 5% of the costs of Equipment and Demolition and Infrastructure.
**UA Project Management Fee is based on 3% of the costs of Equipment, Demolition and Infrastructure and Contingency.
***Architect/Engineer Fee is based on 8% of the costs of Demolition and Infrastructure plus a 1.25 renovation factor.

The Project will be Grant funded in the amount of $2,293,306.

There are no anticipated additional O&M costs resulting from this purchase.

8291 Patuxent Range Rd, Jessup, MD 20794 USA PHONE: +1 301-776-6585 FAX: +1 301-776-2892

October 31,2022

The University of Alabama
Department of Chemistry & Biology
2014 Shelby Hall
Box 870336
Tuscaloosa, AL 35487

Re: Wind Tunnel Project Sole Source Justification

To Whom It May Concern:

This letter serves to justify a sole source procurement of The University of Alabama 8-inch Supersonic Wind Tunnel Project.

Aerolab is a specialty wind tunnel designer and wind tunnel manufacturer with over 70 years of experience in producing tunnels and associated system for various academic, research, commercial, and industrial applications.

The proposed wind tunnel project requires a supersonic wind tunnel with an infinitely adjustable Mach number between the 1.3 and 3.8 range. Aerolab is the only manufacturer that has the technology to provide this capability. We do so by utilizing a movable lower nozzle block controlled by a linear actuator and servo motor. The wind tunnel user interface allows the end user to input a set point of the desired Mach number, and then it adjusts the stagnation pressure and lower nozzle block position required to achieve the desired Mach number.

The Aerolab supersonic wind tunnel is a one of a kind product which has essential unique design and performance features providing superior utility not obtainable from other products.

Havya Patel
Aerolab Research Wind Tunnel Inc.

QUOTATION
HQ2022-064 REV B
Supersonic 8x8 inch

8291 PATUXENT RANGE RD, SUITE 1200
JESSUP, MARYLAND 20794-8607
PHONE 301.776.6585 FAX 301.776.2892
aerolab@aerolab.com www.aerolab.com

TO Dr. David A. Dixon
Robert Ramsay Chair
Department of Chemistry & Biochemistry
The University of Alabama
2014 Shelby hall
Box 870336
Tuscaloosa, AL 35487
Office 205-348-8441
dadixon@ua.edu

December 27, 2022

PREPARED BY	SHIPPING TERMS	PAYMENT TERMS	QUOTE VALID THROUGH
Havya Patel	DAP	Net30 with Milestone Payments (See Notes)	03/01/2023

ITEM	DESCRIPTION	UNIT PRICE	LINE TOTAL
01	**Wind Tunnel Design, Engineering and Project Management**	$ 134,838	$ 134,838
02	**Variable Mach Number 8in x 8in Supersonic Wind Tunnel System** • L x W x H = 29ft x 5ft x 8ft (Tunnel components only. Air Tanks, compressor, dryer, and exhaust baffle system not included) • Electro-mechanically activated stagnation pressure control valve • ASME Code stagnation tank including pressure distribution plate, three (3) turbulence-reducing screens and high-ratio inlet bellmouth. • Variable Mach Number supersonic wind tunnel (M 1.3 to 3.8) with optical quality test section windows • Electro-mechanically activated sliding nozzle block (Mach number setting) • Rail-mounted supersonic and subsonic diffusers • Wind Tunnel PLC System and instrumentation including high accuracy absolute pressure transducers and temperature sensors • Operations Manual • **One-year warranty**	$ 806,960	$ 806,960
03	**Storage Tank, Compressor, Dryer, and Piping** **Includes:** • 1600 ft^3 Storage tank, rated for up to 230 PSIG, ASME Certified • Single stage, rotary screw compressor rated for 234 CFM @ 200-210 PSI • Desiccant Dryer with filter D package rated for 250 PSI: ISO quality 1.2.1 • All piping from storage tank to stagnation tank	$ 318,729	$318,729
04	**10-inch (25.4cm) Complete Schlieren System** **System includes:** • Two (2) stand-mounted telescope-grade parabolic mirrors [80 inch (2.03m) focal length] with fine adjustment mounts • Stand-mounted knife edge assembly on fine-adjustment mount and flat mirror • Stand-mounted all-in-one high-intensity LED light source with lenses and track-mounted adjustable aperture • Digital camera and lens with software for capturing images	$ 32,648	$ 32,648

05	**Model Positioning System and Balance** • 2 axis programmable MPS with sting balance • Load Limits shown in the table below	$ 320,303	$320,303
06	**Computerized Data Acquisition and User Interface system** • System includes Desktop computer with keyboard, mouse and flat screen monitor, PC Based User Interface application (MATLAB or LabVIEW based) • System measures, displays and records: storage tank pressure, stagnation pressure, stagnation temperature, test section static pressure, model pitch angle, calculated Mach number, additional pressure measurements. • System Controls: stagnation pressure, nozzle geometry • Operations Manual • One-year warranty	$ 39,710	$ 39,710
07	**Professional Installation** **Includes:** • Travel, accommodation, per diem and labor charges for all Aerolab personnel onsite • General conditions and Equipment rental charges to facilitate the installation • Rigging charges for large equipment	$ 111,648	$ 111,548
08	**Commissioning & Training** **Includes:** • Travel, accommodation, per diem and labor charges for all Aerolab personnel onsite	$ 52,498	$ 52,498
09	**Shipping** Includes: • Cost of freight and insurance from Aerolab to customer's facility • Rigging and loading at Aerolab • Cost of all associated shipping paperwork and logistics	$30,000	$30,000

Payment Terms include Milestone Payments as follows:

	Milestone	Timeline	% Value	$ Value
1	Project Kick Off	PO Date	20.00%	$ 369,474.00
2	Design Review	PO Date + 2 Months	30.00%	$ 554,211.00
3	Factory Assessment Test	PO Date + 7 Months	35.00%	$ 646,579.50
4	Installation and Commissioning	PO Date + 9 Months	15.00%	$ 277,105.50
		9 Months	**100.00%**	**$ 1,847,370.00**

TOTAL $1,847,370

THE UNIVERSITY OF ALABAMA | College of Arts & Sciences
Department of Chemistry and Biochemistry

October 31, 2022

Sole Source Justification for Supersonic 8” x 8” Wind Tunnel

We require a wind tunnel to perform fuel combustion testing in hypersonic flows to meet the objectives of the Sentient subcontract. The wind tunnel will replace the current one, a 6” x 6” tunnel, that is approximately 60 years old from Aerolab. The current wind tunnel is too old to be easily upgraded and does not have as large a viewing/testing region. A larger testing region than 6” x 6” is needed for the planned combustion tests.

Vendor

Aerolab, 8291 Patuxent Range Rd, Suite 120, Jessup, MD, 20794, USA

Sole Source Reason for this Vendor

This is the only vendor that provides a variable Mach number wind tunnel that can meet the specific requirements to meet the mission needs. They built the current UA wind tunnel.

This wind tunnel is only available directly from the manufacturer.

Specific requirements

The project requires a supersonic wind tunnel with an infinitely adjustable Mach number in the 1.3 to 3.8 Mach number range.

The variable Mach number needs to be software controlled.

The vendor should provide a turnkey solution

The wind tunnel must allow for the insertion of the combustion system into the viewing/testing region of the tunnel.

The wind tunnel user interface will allow the end user to input a set point of the desired Mach number, and then adjust the stagnation pressure and lower the nozzle block position required to achieve the desired Mach number.

The software will set up the necessary calibrations, set up the stagnation pressure, and maintain the pressure over the measurement time.

Run times up to 45 seconds are needed.

2014 Shelby Hall | Box 870336 | Tuscaloosa, AL 35487-0336 | 205-348-8441 | dadixon@ua.edu

Location

135 Hardaway Hall. Location of current 6” x 6” tunnel.

Training

Onsite training will be provided by the vendor.

Other vendors

The company is the leading manufacturer of academic wind tunnels. In our experience, their product is of high quality. This is a US manufacturer for Buy America.

There are no other vendors with variable Mach number wind tunnels for academia.

Prior experience with this manufacturer

They are the vendor that provided the current 6” x 6” wind tunnel at UA that was purchased in the 1960s. Aerolab is a leader in the custom wind tunnel industry and has built many wind tunnels for academic installations. They have close to 70 years of experience in constructing wind tunnels for academic institutions. They have 100s of installations in the United States and many more world-wide. They have constructed at least 4 wind tunnels in Alabama for academic institutions including UA.

Unique characteristics critical for the mission

The supersonic wind tunnel has an infinitely adjustable Mach number in the 1.3 to 3.8 range.

The wind tunnel has run times up to 45 s.

The wind tunnel will use a movable lower nozzle block controlled by a linear actuator and servo motor to achieve the variable Mach number.

The vendor will install the system including the pressure tank so that the system will be up and running quickly.

The system has unique software to set up and control the variable Mach number over the measurement period.

These unique characteristics, which are critical for our mission, are not available from any other vendors.

How will this purchase or failure to purchase impact the associated research?

We will not be able to perform the research outlined in our recently funded Sentient subcontract for ~$9M over 4 years without this piece of equipment. It is needed for testing fuel combustion at high Mach number flow to enable optimization of the combustion at hypersonic speeds.

Dr. David A. Dixon
Robert Ramsay Chair
Phone: 205-348-8441
Email: dadixon@ua.edu

Procurement Services Review:

The above justification has been reviewed and, to the best of my knowledge, is true and accurate. I approve this sole source purchase on behalf of Procurement Services pending any other approvals that may be required by the University including, but not limited to, approval by The Board of Trustees of The University of Alabama.

DocuSigned by:
D55B606D8DE8466...
Nov-03-2022

Kevin R. Stevens Date
Executive Director of Procurement Services

HARDAWAY WIND TUNNEL REPLACEMENT AND UPGRADE

LOCATION MAP