



INVITATION FOR BIDS
OFFICE OF PROCUREMENT & CONTRACTS

1. INSTRUCTIONS FOR BIDDERS

- a. Sealed bids will be received in the Office of Procurement & Contracts, Mississippi State University, for the purchase of the items listed herein.
- b. All bids must be received in the Office of Procurement & Contracts on or before the bid opening time and date listed herein. Delivery of bids must be during normal working hours, 8:00 a.m. to 5:00 p.m. CST, except on weekends and holidays when no delivery is possible.
- c. Bidders shall submit their bids either electronically or in a sealed envelope. To submit electronically, follow the instructions below. Bids CANNOT be emailed.
 - i. Sealed bids should include the bid number on the face of the envelope as well as the bidders' name and address. Bids should be sent to: 245 Barr Avenue, 610 McArthur Hall, Mississippi State, MS 39762.
 - ii. At this time we only accept non-ITS bids electronically. For electronic submission of bids, go to: portal.magic.ms.gov and use the RFX number on the next page as your reference number.
- d. All questions regarding this bid should be directed to the Office of Procurement & Contracts at 662-325-2550.

2. TERMS AND CONDITIONS

- a. All bids should be bid "FOB Destination"
- b. Bidders must comply with all rules, regulations, and statutes relating to purchasing in the State of Mississippi, in addition to the requirements on this form. General Bid Terms and Conditions can be found here:
https://www.procurement.msstate.edu/procurement/bids/Bid_General_Terms_May_2019_V2.pdf
- c. Any contract resulting from this Invitation for Bid shall be in substantial compliance with Mississippi State University's Standard Contract Addendum:
<https://www.procurement.msstate.edu/contracts/standardaddendum.pdf>

Bid Number/RFX Number: 23-19/RFX#3160005700

Opening Date: March 7,2023 at 2:00 p.m.

Description: Composite Cure Oven

Vendor Name: _____

Vendor Address: _____

Telephone Number: _____

Days the Offer is Firm: _____

Authorized Signature: _____

Name: _____

Title: _____

Item	Quantity	Description	Unit Price	Total Price
1	1	Composite Cure Oven		

1.0 Scope

This requirements description covers an electrically heated box type oven intended for use in curing of carbon fiber-reinforced plastic (CFRP) composite and similar materials utilizing a natural atmosphere with forced air convection. The oven is comprised of an insulated chamber with an external reinforced steel shell, a chamber heating system and one or more access doors. The oven shall be designed to be repeatedly heated from room temperature to a maximum temperature, at a controlled rate, held at a temperature, and then cooled at a controlled rate or as required by aerospace material specifications typically associated with the intended material systems. Thermal cycles shall be executed by a programmable controller and be capable of being operated by shop Operations technicians. A data acquisition system shall be incorporated in the oven system, providing a secure record of the thermal and vacuum cycle as objective evidence of the specification parameters for the material system under processing.

2.0 Applicable Documents

ACI Documents

Customer Documents

Industry Specifications, Standards and Handbooks

AMS2750 Pyrometry

Society of Automotive Engineers [SAE]

Abbreviations, Acronyms and Terms used in this document are in accordance with ASME Y14.38M, Abbreviations and Acronyms.

3.0 Requirements

3.1 General Requirements

The Oven shall be designed and manufactured with a primary objective application in curing of aerospace application carbon fiber composites and associated thermoset resin components. The overall system, structure, electrical and control elements for both thermal and vacuum features shall support a demonstrated capability of meeting the requirements of SAE AMS 2750 Pyrometry for certification within the Customer's facility to this specification operating under an AS9100 controlled facility environment. To this end, the design phase of the oven shall be supported by computational fluid dynamics [CFD] and there shall be a legacy heritage available as delivered examples of similar product to the Customer upon request displaying successful installations into National Aerospace and Defense Contractors Accreditation Program [NADCAP] approved applications.

3.2 Envelope and Structure

The unit's interior single chamber working envelope shall be 10 ft width, 10 ft depth and 8 ft height with tolerances per the Supplier's best commercial practices. External dimensions shall be 12 ft width, 12 ft depth and 13 ft height with Suppliers best commercial practices tolerances.

Oven loading doors shall be of swing type with hinge mounted construction capable of unassisted single Operator opening and closure. An interlock switch shall be present to disable oven operation of heating elements, at minimum, when the doors are not properly closed.

The oven structure shall be capable of repeatedly withstanding temperature variations encountered during operation to its maximum rating and capacity without permanent distortion. Structure panels shall be, unless otherwise dictated by design function of 14 ga. steel plate / sheet at minimum, reinforced by steel welded, bolted or riveted joined frame stiffeners. The oven shall have a structural frame that shall provide stable support for the chamber, hearth, and maximum rated load. Suitable lag points for floor mounting shall be provided.

The hearth shall be constructed of heat conducting material capable of supporting repeated rated loads at the oven maximum operating temperature without permanent distortion. If required, rollers or slide rails shall be provided for moving the load in and out of the chamber. Definition of Customer provided cavity required to establish the oven floor to be level with the shop floor shall be provided to the Customer upon selection / order placement. Estimates of the excavation shall be provided upon request in advance of an order as a ROM for installation cost estimation.

The oven chamber and door lining shall be rated for the oven maximum operating temperature and shall have insulating properties that maintain the furnace exterior surface temperature no greater than 160 °F.

All parts subject to wear, breakage or distortion shall be readily accessible for adjustment, replacement, and/or repair.

All edges shall be either rounded or contain an edge break suitable for Operator contact without inherent risk to personnel in contact with the equipment required for standard operation and repair unless otherwise required for a necessary function.

The external finish shall be industrial, at minimum, grade paint, powder coat or other finish suitable to prevent corrosion in an unconditioned interior shop environment. Color may be the manufacturer's standard color scheme or a color agreed upon by Customer.

3.3 Electrical System

The electrical system design and construction shall conform to current National Fire Protection Association (NFPA) standards NFPA 70 National Electrical Code and NFPA 79 Electrical Standard for Industrial Machinery. The design of the overall safety features and sequence of operation will be in accordance with NFPA 86 Standard for Ovens and Furnaces.

The oven power system shall be designed for operation with a 480 VAC, 3 Phase, 60 Hz supply unless otherwise agreed to by the Customer.

Control voltages shall be 120 VAC for computer systems and 24 VDC for all other components.

3.4 Thermal Operational Envelop and Associated Controls

The oven shall be capable of achieving and sustaining a temperature of 650 degrees F.

Heating rate shall be adjustable 0.1 - 3°F / min based on average air temperature from ambient to maximum working temperature and oven loaded with 500 lbs. equivalent steel.

A single heater zone shall be rated for 69 KW or as determined from CFD analysis; forced air recirculation shall be via ceiling mounted fans with a minimum of 18,000 CFM capability or as determined by CFD analysis and approved by the customer.

Provision shall be made for a minimum of ten [10] type J thermocouple for monitoring the part[s] in a cure cycle. A minimum of one [1] each thermocouples shall be applied for oven zone control and high limit monitoring.

The thermal control system shall incorporate a quality function related capable of performing analysis of designated key performance parameters from the composite curing cycle against user designated boundary envelope[s] to identify and flag for review any potential deviations without requiring manual point by point data analysis by operational personnel.

The control system shall allow for remote control and viewing of the cure cycle process concurrently by up to twenty [20] individual interface users. This system shall support e-mail delivery of reports and alarms as well as a capability to query the system for data via e-mail or to address control actions in the same user input method. The same bi-directional user capabilities for data reporting / queries / control actions shall be available, as an option, by cellular modem texting.

User media interfaces shall be custom configurable at no charge upon user requests at installation for screens in addition to those available in the standard delivery configuration. The system shall provide multi-media features facilitating maintenance and troubleshooting that include, at minimum, video maintenance training, drill-down maintenance images, component / assembly part pictures, part diagrams and video chat

and email with OEM support. Online tutorials shall be available as a supplement to manuals delivered with the oven system.

3.5 Vacuum System

A minimum of ten [10] PC controlled vacuum source lines and PC monitored vacuum probe lines shall be installed. Both lines and valves shall be of corrosion resistant steel construction and comparable to aerospace level autoclave equipment used for composite material processing.

The vacuum monitoring system, under the system's computer control, shall be capable of performing automatic leak tests prior to initiation of the cure cycle and also during the cure run.

3.6 Oven Uniformity Certification

The oven shall demonstrate a temperature uniformity per AMS 2750 Class 2, certified prior to delivery.