Advanced Energy

BATTLE CARD

MILITARY AND AEROSPACE

RF POWER SENSOR CALIBRATION

BOND METERS

THERMAL SENSING

SOLUTION OVERVIEW

Military and Aerospace are two large markets often grouped together because there are overlapping sectors within the two. Government agencies, domestic and international, contract with commercial manufacturers to supply fighter jets, bombers, cargo planes, helicopters, spacecraft, communications systems, and other equipment necessary to support and maintain these fleets. Therefore, the supporting products required are often the same or very similar for both markets.

Advanced Energy offers a range of products used in various applications, including bond meters, pyrometers, thermal imagers, thermometers and temperature calibrators, blackbodies, fiber Bragg grating, RF power sensor calibration systems, high power RF power meters, calorimeters, RF transfer standards, and AC ratio transformer calibrators. These product lines offer advanced measurement capabilities, high performance in tough conditions, and long-lasting durability – characteristics demanded in military and aerospace applications.

720A Bond Meter

Target Applications and Products

Metrology/Calibration Lab

- RF-Low Power Sensor Calibration
- RF-High Power Sensor Calibration
- AC Ratio Transformer Calibration
- Pyrometer Calibration/Blackbodies
- Thermocouple Calibration

Aircraft Manufacturing & Maintenance/MRO Suppliers/Military GPETE

- Bond Meters
- Pyrometers
- Thermal Imagers
- Fiber Bragg Grating
- Temperature Calibrators
- Thermocouple Thermometers
- Ground, Insulation & RTD Measurement
- RF Wattmeters

Where to Avoid/ Market Cautions

Be sure to understand any Federal Acquisition Regulations (FAR) and International Traffic in Arms Regulations (ITAR) expectations. FARs are the responsibility of the prime government contractor, and ideally will not “flow-down” to AE. Any FAR clauses included in the PO to AE will need legal review, so these should be clearly understood early in the opportunity evaluation. ITAR requirements protect the movement, sale, or transfer of defense -related technology. These rules can affect the quoting, design, and production processes by limiting our ability to share with non-US persons. Any projects with ITAR requirements will require scrutiny and approval from AE Legal/Compliance. Note: Defense Federal Acquisition Regulations (DFAR) need to be treated the same as above for other FAR.

Audience – who to engage and when

- Decision makers and Influencers responsible for critical measurements in manufacture and maintenance of airframe and communications equipment
- Test Engineer, maintenance technicians, QA Managers, plant/process engineers, program managers
- Calibration lab supervisors and technicians
- Ideal time to engage is during development of a new program where AE instruments can be designed into the product or part of the build/test/maintenance process.

Business Benefits

- Accurate and traceable measurements
- High reliability
- Innovative solutions
- Purpose built products
- Responsive business partner

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MILITARY-AEROSPACE

METROLOGY/CALIBRATION LAB

INTERNAL CONTACTS

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Qualifying Questions

- What level of accuracy is needed?
- For what application will the equipment be used?
- Will the product be used at primary, secondary, or lower-level labs (military specific)?
- Will an off the shelf solution work or is customization needed?
- Will the equipment be used by the facility or in support of an external program?
- Is the purchase domestic or foreign (military - FMS)?
- Is the program funded or budgetary?
- Is this a GSA purchase, contract buy, solicitation process buy, or is an unsolicited proposal required?

Customer Challenges

Aerospace and military markets require accurate, repeatable, and reliable equipment for calibration and traceability (to a National Standard) of their electronic test and measurement equipment and standards.

1. Military Primary Standards Labs are often top-level labs with accuracies comparable to NMIs. It is important to understand what level military/aerospace labs you are selling which equipment.
2. Calibration standards need to be versatile to calibrate a wide range of equipment in military and aerospace inventories.
3. Changes to offered equipment and specifications can cause in-depth changes to mil-aero equipment maintenance plans.
4. Traceability within the military is usually tiered from their primary labs down to their transfer/field labs. Inaccurate results or unreliable performance can have a big impact.

Key Features & Specs (high-level differentiators)

Low Power Sensor Calibration

- Reference standards availability for high-level traceability to NMI or transferring from NMI methods when self-calibration capability is needed.
- High accuracy with transfer standards being calibrated from reference standards sent to NMI.
- Proprietary software calibration package enables calibration of multiple sensors from multiple manufacturers.
- Software automation eases the process and enables consistency between facilities.
- Long-term experience in power sensor calibration.
- Fully integrated turn-key systems available.

High Power Sensor Calibration

- Calorimeters available for highest level of accuracy when calibrating high power sensors and watt meters.
- Transfer standards available for faster calibration of less accurate watt meters.
- Software package included for calibration of calorimeter, easing the calibration process.
- Filter networks available for harmonic filter up to 100W across a wide frequency range.
- Fully configured systems available to simplify buying and configuring system components.

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COMPETITIVE ANALYSIS- RF LOW POWER SENSOR CALIBRATION

Competitor	Their Positioning & Selling Points	Our Differentiation	Comparative Strategy
Keysight	▪ Biggest manufacturer of power sensors. ▪ Manufacturer method is often recognized as best method to meet mfg specs	▪ Our power sensor calibration system calibrates power sensors from a variety of manufacturers instead of just one. Our solution is automated with COTS software. Our transfer standards are configured and calibrated to calibrate sensors for the duration of the calibration cycle without regular re-referencing	▪ Most military and aerospace facilities have a variety of sensors from a variety of manufacturers, making our product the ideal choice. We have a complete solution and offer turn-key configured systems that are ideal in this industry. Our market penetration is great with systems in military and aerospace facilities throughout the world
Rohde & Schwarz R&S NRPC calibration kit	▪ Significant manufacturer of power sensors. ▪ Manufacturer method is often recognized as best method to meet mfg specs	▪ Our power sensor calibration system calibrates power sensors from a variety of manufacturers instead of just one. Our solution is well known in the market and recognized as a leading solution	▪ Most military and aerospace facilities have a variety of sensors from a variety of manufacturers, making our product the ideal choice. We have a complete solution and offer turn-key configured systems that are ideal in this industry. Our market penetration is great with systems in military and aerospace facilities throughout the world.

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METROLOGY/CALIBRATION LAB

COMPETITIVE ANALYSIS - RF HIGH POWER SENSOR CALIBRATION (CALORIMETERS)

Competitor	Their Positioning & Selling Points	Our Differentiation	Comparative Strategy
Bird Technologies Inc	▪ Bird has historical presence in metrology labs, but does not currently offer a commercial system	▪ We offer a commercially available calorimeter as the primary component for calibrating RF high power sensors and watt-meters. A calorimeter is the most accurate method for calibration	▪ We appear to be the only company currently offering a commercial solution

COMPETITIVE ANALYSIS - AC RATIO TRANSFORMER CALIBRATION SYSTEM

Competitor	Their Positioning & Selling Points	Our Differentiation	Comparative Strategy
No known competitors	▪ Customer would need to purchase miscellaneous equipment and develop internal calibration procedures or send ratio transformers to 3rd party calibration lab.	▪ We offer a modernized solution specific to the application ▪ Software automation eases the process and creates consistency between facilities ▪ Equipment has been adopted by other military labs	▪ Modernized equipment and process for calibrating AC ratio standards ▪ Transfer calibrations from highest level AC ratio reference standard in your laboratory

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AIRCRAFT MANUFACTURING & MAINTENANCE/MRO SUPPLIERS/MILITARY GPETE

INTERNAL CONTACTS

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Qualifying Questions

General

- Do you need high accuracy measurements?
- Do you need to log measurements?
- Do you want wireless flexibility?
- Is seamless data integration into departmental or QMS software important?
- Do you need to take measurements in potentially hazardous work areas?
- Do you require ISO 17025 calibration?

Bond Meters

- Do you need to measure low-resistance connections?
- Are light weight and small instrument size important?

Temperature Sensing

- Do you need contact or non-contact measurement?
- What types of thermocouples need to be supported?
- What is temperature range requirement?

Customer Challenges

Aerospace and military customers need to follow strict protocols for temperature measurement, and need accurate, reliable results, often requiring measurement traceability to a National Standard.

1. Extremely accurate temperature measurements required.
2. Traceable/accredited data.
3. Size constraints.
4. Presence of electrical interference.
5. Need to measure both temperature and pressure.
6. Need to collect data in hazardous locations.
7. Desire to automate data collection for temperature readings.
8. Military Primary Standards Labs are often top-level labs with comparable accuracies to NMIs. Need to understand what level military/aerospace labs you are selling which equipment to.
9. Calibration standards need to be versatile to calibrate a large range of equipment in military and aerospace inventory.
10. Changes to offered equipment and specifications can cause changes to in-depth mil-aero equipment maintenance plans.
11. Traceability within the military is usually tiered from their primary labs down to their transfer/field labs. Inaccurate results or unreliable performance can have a big impact.

Key Features & Specs (high-level differentiators)

BOND METERS, TEMPERATURE CALIBRATORS, and THERMOMETERS

- High accuracy across entire operating range
- Easy to read backlit display
- Fast measurements
- Ergonomic design and intuitive use
- ISO 17025 calibration option
- Intrinsically safe and wireless datalogging model available
- Wide array of sensing probes
- Long battery life
- 3-year warranty

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COMPETITIVE ANALYSIS -BOND METERS

Competitor	Their Positioning & Selling Points	Our Differentiation	Comparative Positioning
BCD Electronics M1	▪ Developed for the aviation industry. ▪ Stores 128 readings. ▪ RS-232 (optional Bluetooth upgrade)	▪ High accuracy measurements in a more ergonomic design, supported by a wide range of test probe options. ▪ Less expensive to purchase and service over product lifetime. ▪ ISO 17025 calibration option available.	▪ Superior performance in the industry's smallest, lightest package. ▪ Instruments and probe options to meet the needs of the almost any application. Intrinsically safe and advanced wireless datalogging options available.
Amptec Research	▪ 'The gold standard in ultra-safe bond testing.' ▪ Intrinsically safe. ▪ Portable but not a true handheld meter.	▪ High accuracy measurements across entire operating temperature range. ▪ Faster measurement readings (9X faster!) ▪ Less expensive to purchase.	▪ Superior performance in the industry's smallest, lightest package. ▪ Instruments and probe options to meet the needs of the almost any application. Intrinsically safe and advanced wireless datalogging options available.

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COMPETITIVE ANALYSIS - TEMPERATURE CALIBRATORS

Competitor	Their Positioning & Selling Points	Our Differentiation	Comparative Strategy
Fluke	▪ Lab-grade accuracy ▪ Supported with optional FlukeView Form for PC software	▪ Bluetooth connectivity and free IOS/Android app for seamless integration to any software vs IR port and Fluke software only. ▪ Competitively priced.	▪ Meets or exceeds on critical features: accuracy, thermocouple support, datalogging, longer battery life. ▪ Superior wireless communication and software integration.
Flir/Extech	▪ Precision source and measurement for 8 thermocouple types, mA, mV, and V devices.	▪ Superior accuracy ▪ Additional TC support ▪ Bluetooth connectivity	▪ Superior device for true temperature calibration. ▪ Does not try to be a 'multifunction' device.

COMPETITIVE ANALYSIS- INTRINSICALLY SAFE THERMOCOUPLE THERMOMETERS

Competitor	Their Positioning & Selling Points	Our Differentiation	Comparative Positioning
Fluke	▪ High Accuracy	▪ Supports 8 thermocouples types, including custom temperature probes (vs. 1 RTD ▪ Long battery life (2000 hours vs 300 hours)	▪ Meets or exceeds on critical features: accuracy, thermocouples supported, battery life. ▪ Single and dual-channel models available. ▪ ISO 17025 calibration option.
ThermoProbe	▪ High Accuracy	▪ Supports 8 thermocouples types, including custom temperature probes (vs. 1 RTD ▪ Long battery life (2000 hours vs 300 hours)	▪ Meets or exceeds on critical features: accuracy, thermocouples supported, battery life. ▪ Single and dual-channel models available. ▪ ISO 17025 calibration option.

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CROSS-SELLING OPPORTUNITIES

In addition to the products covered in this battlecard, AE also offers a wide variety of Commercial off-the-shelf (COTS) power supplies for military and aerospace programs.

- uMP Series
- iHP Series
- AIF Series
- iMP Series
- NeoPower Series

COTS are cost-effective and much faster to procure than custom-made solutions by providing standardized technologies that can be readily adapted and easily integrated into military and aerospace infrastructure. COTS programs can vary depending on the specific requirements of each program.

More information is available in a separate Military & Aerospace battlecard.

uMP Series

iHP Series

AIF Series

iMP Series

NeoPower Series