

REQUEST FOR INFORMATION

Counter Kinetic Energy (KE) Threat Technology for the Active Defense Systems (ADS) Program

1.0 Introduction.

BAE Systems' is Prime Contractor to TARDEC for the Active Defense System (ADS) Program. In support of this contract, BAE Systems, Advanced Development Center is conducting a technology survey and trade analysis to determine the current availability of Counter Kinetic Energy (CKE) threat technology for integration with the Army Active Defense System.

This Request For Information (RFI) is part of BAE Systems' contract with TARDEC, and is intended to identify potential Offerors that have products and capabilities to arrive at system or subsystem materiel solutions for a counter kinetic energy (KE) threat technology (hereinafter referred to as the "CKE Technology").

RFI responses are to be submitted directly to BAE Systems, and BAE Systems will be reviewing and evaluating all responses received. Respondents are requested to submit their inquiries and responses to:

Lee R. Peterson
Subcontract Specialist
BAE Systems
Advanced Development Center
328 W. Brokaw Rd.
Santa Clara, California, 95052
Ph (408) 289-3749, Fax (408) 289-3950
Email: lee.peterson@baesystems.com

Responses are requested no later than 15 September 2004. If your company is interested in replying, please contact Lee Peterson.

The CKE Technology provided under this RFI may be evaluated for future use as part of the ADS program.

BAE Systems is requesting information regarding an Offeror's design and manufacturing capabilities, Rough Order of Magnitude (ROM) development costs and schedule capabilities to meet future development of CKE Technology. The CKE Technology information sought includes designs and analyses that will be used by BAE Systems in the development of subsystem specifications.

This is not a request for proposal and there will be no subcontract award as a result of responding to this RFI. Proprietary data, if submitted, should be marked as such. BAE Systems is prepared to enter into proprietary information Non-Disclosure Agreements (NDA) with respondents. If any portion of the survey response is classified, contact the BAE Systems Point of Contact listed above for instructions. Documentation provided in response to this RFI will not be returned.

The preferred response format is Portable Document Format (PDF), with concepts and design models in an electronic format compatible with ProENGINEER. Please contact BAE Systems for file conversion capabilities for purposes of this RFI.

2.0 CKE Technology General Description.

BAE Systems, Advanced Development Center is under contract with TARDEC to identify and evaluate any and all technical approaches that may provide CKE capability to the Active Defense System counter kinetic energy threat technology for integration with the current Integrated Army Active Protection System. The current active defense system program incorporates both hard kill and soft kill countermeasures for Chemical Energy (CE) threat defeat. For the purpose of this survey, an active defense system is a system that physically interacts with a threat munition, munition delivery system, or munition guidance system in such a manner as to prevent the threat from destroying the protected vehicle. Examples of counter KE active defense technologies include integrated flyout interceptors incorporating blast and focused warheads as well as laser dazzlers. A typical hard kill active protection system detects and tracks incoming threat projectiles, then uses that threat information to compute a fire control solution. This fire control solution is used to direct the initiation of an integrated interceptor subsystem (interceptor). This interceptor flies out to an optimized intercept point, deploys a countermeasure payload, and interacts with the incoming threat in such a way that it is no longer sufficiently lethal to destroy the protected the vehicle. The vehicle will typically have 360 degree machine gun armor protection with frontal medium cannon protection. Any proposed integrated interceptor shall be propelled by a recoilless propulsion system, shall incorporate all sensors and controls necessary to achieve the desired threat/countermeasure interaction, and shall incorporate all necessary safety and control systems. Alternately, the active defense system may detect the presence of a Kinetic Energy Projectile(KEP) capable shooter and disrupt its ability to acquire a fire control solution through the employment of a soft kill countermeasure (e.g. laser dazzler). The purpose of the survey is to determine what technology is available for near term incorporation of a counter KE capability within the existing ADS program.

The system proposed for this application should provide the required functional capabilities in the lightest weight, lowest volume and most efficient arrangement that will provide the best value for the ADS program in accordance with the parameters as set forth herein.

3.0 Company Information (See Attachment A)

Please complete Attachment A by filling in the blanks electronically and attaching Attachment A to your response to this RFI.

4.0 RFI Response Requirements.

Your response must include a completed Section 3.0 and a Technical Paper, which addresses the technical elements below and in Attachment B, Technical Information. You must also include a ROM Pricing and Schedule section as detailed in Section 6 below.

Your technical response must include the following as a minimum: **(please answer in the same numbering order).**

- 4.1. Technical solution(s) for CKE Technology. Briefly describe how your product meets, or how it could be modified or adapted to meet, all requirements listed in Attachment B.

Response data must include, but should not be limited to, the following:

- 4.1.1. All critical assumptions.
- 4.1.2. Technical exceptions to the information requirements in the RFI and any suggested solutions.
- 4.1.3. Space claim for each subsystem or component.
- 4.1.4. Dry weight breakdown for each subsystem or component.

- 4.2. Durability, Reliability and Maintainability data, Mean Time Between Failure (MTBF) and Mean Time to Repair (MTTR), for similar or production equipment.

Identify any historical or expected reliability data for your product. As a minimum, data should include failure rates, MTBSA (Mean Time Between System Abort), testability, life cycle, (maintainability, replacement, repair).

- 4.3. Effects of extreme environmental conditions (demagnetizing, short circuit, radiation, shock, temperature, loss of controller function, etc) on the hardware.

- 4.4. Susceptibility to Electromagnetic Interference (EMI) and radiation of EMI.

- 4.5. Outline existing applications of the same or similar CKE Technology including design maturity as defined in IAW DOD-5000 Technology Readiness Levels (TRL).

5.0 CKE Technology Component Technical Requirements.

The technical requirements are detailed in Attachment B and should be used to prepare your response to this RFI. These requirements are subject to revision prior to the subsequent release of a formal Request for Proposal. **(Please use the same numbering order and headings within your response to this RFI.)**

6.0 ROM Pricing.

Rough Order of Magnitude (ROM) pricing (using 3rd quarter 2004 economics) for non-recurring engineering.

7.0 Response Submission.

By your company accepting this RFI, your company agrees that the information contained herein shall be used only for the purpose of responding to BAE Systems for this Request for Information.

Your response to this RFI, whether positive or negative, is requested by the date as specified in the cover letter.

Please send your responses to this RFI to:

Lee R. Peterson
Advanced Development Center, Subcontract Specialist
lee.peterson@baesystems.com
Phone: 408-289-3749
Fax: 408-289-3950

Mailing Address:

BAE Systems
Advanced Development Center
328 W. Brokaw Rd., MD – N19
Santa Clara, CA 95052

For any questions regarding this RFI, please contact:

Pete Peterson
BAE Systems -ADC Subcontract Specialist
Phone: 408-289-3749

Thank you for your interest in the ADS program.

[End of RFI]

Attachment A

(Please fill out this Section 3.0 and return the pages with your RFI response.)

3.0 Company Information.

3.1 General Company Information :

3.1.1 Company Information:

Company Name:

Address:

Company Web Site:

3.1.2 Individual completing this questionnaire and point of contact:

Name:

Title/Position:

Telephone Number:

Mobile Number:

Fax Number:

E-Mail Address:

3.1.3 What business type is your company (Small, Large, Women-Owned, etc.)?

3.1.4 How long has your company existed?

3.1.5 What is your company's role in products similar to CKE Technology? (Select all that apply.)

a. Design and Engineering: Your company designs and develops the FCS Component.

Comments:

b. Manufacturer: Your company makes the CKE Technology.

Comments:

c. Follow-On Manufacturer: Your company doesn't make the CKE Technology but it takes another company's base products and modifies or changes them to become a final product.

Comments:

d. Dealer: Your company supplies, rather than manufactures, another company's base or final product.

Comments:

e. Other: Please describe.

3.1.6 What experience has your company had supplying the U.S. Government or other Governments products similar to the CKE Technology?

3.1.7 What experience has your company had supplying engineering services related to the CKE Technology to Government and commercial companies?

3.2 General Company Technical Capabilities:

3.2.1 Describe your on-site facilities (e.g. test facilities, types of inspection equipment, prototype part manufacturing equipment, off-site engineering, off-site test support, other pertinent facilities) that could be employed to provide CKE Technology development support.

3.2.2 Foreign suppliers, please describe any facilities incorporated in the USA including location, capabilities and relationship to the parent company.

3.2.3 Describe your research, design, and developmental experience with the CKE Technology or similar products and any associated components.

a. Describe your design and prototype capabilities.

b. Does your company have the capability to submit data/drawings via electronic/digital data media including 3D solid models or envelope of components?

If yes, what computer hardware and software do you use?

c. Does your company have any experience working in an electronic collaborative CAD design environment?

If so, please include a description of the software used.

Attachment B

Technical Information

1. Product Description

A modular lightweight, high reliability active defense system (e.g. integrated interceptor or laser dazzler) that can be integrated into the existing Active Defense Systems (ADS) architecture is desired. The ADS architecture consists of a passive warning suite, a directable multifunction gimbaled soft kill countermeasure, a tracking radar, a gimbaled four (4) tube interceptor launcher, Chemical Energy capable hard kill interceptors, and all processing and controls necessary to support threat warning, soft kill countermeasure, threat tracking, fire control, system safe and arm, and launcher pointing. Provide a detailed description of the configuration of your counter KE technology, which addresses the following integration issues (for integrated interceptor solutions, include a description of the propulsion means, sensors, warhead, fuzing, safe and arm, controls, etc.):

- Weights
- Sizes
- Power requirements
- Operating frequencies
- System and component reliability estimates
- Minimum integration space required

Provide a description of any modifications required to the existing ADS architecture to accommodate your system.

2. Product Performance

An APS works with the following series of events required to successfully counter threat munitions (note that this equation is valid for dazzlers as well as flyout interceptors):

$P(\text{protect}) = P(\text{detect}) \times P(\text{track}) \times P(\text{fire control solution}) \times P(\text{CM initiation}) \times P(\text{CM intercept}) \times P(\text{threat defeat})$ where:

P means "Probability"

$P(\text{protect}) =$ Probability of protection

$P(\text{detect}) =$ Probability of threat detection

$P(\text{track}) =$ Probability of threat tracking (i.e. get enough information to calculate a fire control solution)

$P(\text{fire control solution}) =$ Probability of calculating the correct fire control solution to the threat or threat launcher

$P(\text{CM initiation}) =$ Probability that the countermeasure initiates properly

$P(\text{CM intercept}) =$ Probability that the countermeasure intercepts the threat munition (or for a dazzler, interacts with the threat optics)

$P(\text{threat defeat}) =$ threat is defeated and no longer threatening to the protected vehicle

2.1. Performance in a static environment.

Describe the probability that your system will protect a vehicle, which is not moving (static), against a tank-fired kinetic energy penetrator (KEP) threat. Include the following:

- A description of the countermeasure engagement and reload/rearm operation.
- A description of the threat engagement timeline.

- The rationale for probability of protecting the vehicle and all of the contributing probabilities as described in the formula above. For integrated interceptor approaches, assume that $P(\text{protect}) = P(\text{detect}) = P(\text{track}) = P(\text{fire control solution}) = 1$ (BAE Systems will insert the appropriate probabilities for these functions from our existing database).

2.2. Performance in a dynamic (i.e. vehicle moving) environment.

Describe the probability that your system will protect a vehicle, which is moving at 20 mph/32 kph, against a single tank-fired kinetic energy penetrator (KEP) threat. Include the following:

- A description of the countermeasure engagement and reload/rearm operation.
- A description of the threat engagement timeline.
- The rationale for probability of protecting the vehicle and all of the contributing probabilities as described in the formula above. For integrated interceptor approaches, assume that $P(\text{protect}) = P(\text{detect}) = P(\text{track}) = P(\text{fire control solution}) = 1$ (BAE Systems will insert the appropriate probabilities for these functions from our existing database).

2.3. Performance in a dynamic, multiple threat environment.

Describe the probability that your system will protect a vehicle, which is moving at 20 mph/32 kph, against two simultaneous tank-fired kinetic energy penetrator (KEP) threats (scenario of your choice). Include the following:

- A description of the scenario chosen.
- A description of the countermeasure engagement and reload/rearm operation.
- A description of the threat engagement timeline.
- The rationale for probability of protecting the vehicle and all of the contributing probabilities as described in the formula above. For integrated interceptor approaches, assume that $P(\text{protect}) = P(\text{detect}) = P(\text{track}) = P(\text{fire control solution}) = 1$ (BAE Systems will insert the appropriate probabilities for these functions from our existing database).

3. Development Capability

Discuss the current and near-term capability for your organization to produce prototype active protection systems and components. Use the areas listed below to define the current and near-term prototype production capability of your organization.

- How many of these systems and/or components exist today?
- What is the fabrication lead-time?

4. Company Experience with this Product

Discuss your organization's past and current experience and contracts related to the research, development, and evaluation of your system. Use the areas below to provide the detail required for analysis of your organization's knowledge and experience with this technology and your current product.

- Sub-contractor Lists.
- Countries or Organizations to whom the technology was successfully marketed.
- Provide any formal government and/or other independent technical assessments of the product.
- What are, if any, government, proprietary, or other restrictions on releasing technical information on this product?

5. Product Risk Assessment

Provide an internally generated risk assessment of your organization's capability to provide a product that will meet the U.S. government's near-term requirement for a counter KEP capable ADS.

- Identify any hazardous materials (production, operation, and disposal) in connection with the use of this product?
- Does the CKE Technology operation produce residual debris from the countermeasure or threat that could damage the protected vehicle? Provide reports, documentation, test results to support your answer.
- Does the CKE Technology operation damage adjacent friendly vehicles? Provide reports, documentation, test results to support your answer.
- What capabilities does your system employ to minimize the ballistic threat to personnel and vehicles around the ADS vehicle?
- What capabilities does your system employ to minimize false countermeasure deployment and maintain a high probability of threat defeat?
- What capabilities does your system employ to minimize Electro-magnetic Interference (Radiated/Conducted Emissions)? What is the radiated and conducted emissions signature for your system? Please provide profiles for each mode of operation.
- What capabilities does your system employ to reduce the likelihood of the vehicle being detected?
- Has a safety/health assessment or documentation been developed for this product? Provide reports, documents to support your answer.

6. Component Testing

During the period of September 2004 through July 2005 BAE Systems will conduct a series of component tests and evaluations at a facility to be determined. BAE Systems and/or the Government will conduct the evaluations at no cost to the offeror and will provide copies of all test data and reports generated to the offeror. If offerors provide hardware/components for evaluation/testing, neither BAE Systems or the U.S. Government will be responsible for any damage or destruction to the hardware/components caused during handling/testing of the equipment. We will employ due diligence in handling all hardware/components provided for consideration. The offerors are responsible for all expenses associated with shipping the hardware/components they want considered/evaluated to and from the testing location. Please provide the following information for any components and/or subsystems you would offer for evaluation.

- What component and/or subsystem will be delivered for evaluation?
- What is the nature of the test? How does the test demonstrate the maturity of your system?
- What manpower, power, interface (Control and Data Collection) requirements are needed to demonstrate your component and/or subsystem?
- What are the existing safety provisions?
- What, if any, are your additional Government Furnished Information (GFI) or Contractor Furnished Information (CFI) requirements to support the evaluation?

BAE Systems and the U.S. Gov ADS program office will determine how and to what extent the offered hardware/components will be evaluated or tested. There are limits (in time and cost) to the amount of evaluation or testing that could be performed. It is not the intent of either BAE Systems or the U.S. Government to permit these efforts to be used to further develop an offeror's hardware or component.