

An example of Air Force supported SBIR/STTR technology that has been transitioned into an Air Force or other DoD system or subsystem or used by Air Force test ranges and facilities or maintenance depots.

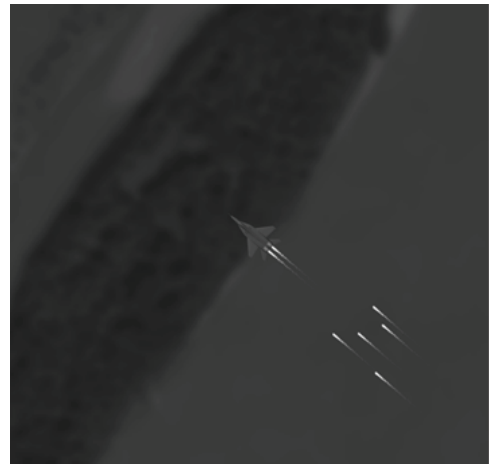
**SBIR Topic Number:**  
AF03-264

**SBIR Title:**  
Personal Computer (PC)  
Based Dynamic Real-  
Time Infrared Image  
Generation Capability

**Contract Number:**  
FA9300-04-C-0027

**SBIR Company Name:**  
Kinetics, Inc.  
Stevenson, WA

**Technical Project Office:**  
Air Force Flight Test  
Center, Edwards AFB, CA



## Dynamic Real-Time Infrared Image Generation Capability

- The Air Force has a requirement to simulate dynamic, detailed scenes of short range targets to test pseudoimaging and imaging seekers
- Kinetics, Inc. developed infrared scene generation (IRSG) using only commercial, off-the-shelf, high-volume, commodity-based personal computer (PC) components
- This SBIR effort has significantly advanced the utilization of low-cost commodity-based graphics hardware to support radiometrically accurate generation of infrared images in real time
- Kinetics, Inc. has delivered copies of this IRSG capability to the Air Force Flight Test Center and other DoD units, and has also sold copies to prime defense contractors

Commercialization Pilot  
Program Series

08002SS

**A**

DISTRIBUTION A:  
Approved for public  
release; distribution  
unlimited.

## Air Force Requirement

The Air Force has a requirement to simulate dynamic, detailed scenes of short range targets to test pseudoimaging and imaging seekers. The scenes will be presented to the seeker using infrared (IR) scene projectors (IRSP), which are 512 by 512 element resistive arrays with 16 bits of grayscale resolution. The images in the scene need to be updated at frame rates high enough to support closed loop guided missile testing.

## SBIR Technology

The infrared scene generation (IRSG) hardware developed by Kinetics, Inc., uses only commercial, off-the-shelf, high-volume, commodity-based personal computer (PC) components. This approach reduces initial system cost while allowing the scene generator to be cost effectively updated as newer computational technologies emerge.

The principal innovation was combining both advanced scene generation software and computational hardware into an integrated package and delivering a turnkey resource to the customer. Traditionally, hardware and software resources are obtained from separate vendors and considerable work is required by the end user to install, configure, and understand the various nuances associated with the advanced technologies needed to support real-time scene generation. Kinetics has streamlined this process by combining the knowledge of subject matter experts in both the infrared scene generation and computational hardware fields to produce a highly optimized product that can be quickly and effectively utilized by the end user.

## Transition Impact

This SBIR effort has significantly advanced the use of low-cost commodity-based graphic hardware to support radiometrically accurate generation of infrared images in real time. Innovative algorithms were developed to produce high-dynamic range images with pixel-level accurate radiance to support testing and evaluation of airborne countermeasure effectiveness as well as the performance of advanced DoD seeker systems. Efficient synthetic scene generation software was engineered to maximize the processing performance of commodity graphics hardware with minimal processing latency and jitter to support real-time closed-loop testing applications.

Often, SBIR project participants include only the SBIR contractor, the SBIR technical point of contact (TPOC), and sometimes a representative from the SBIR office. However, early on in

this SBIR project, the sponsoring organization developed partnerships with other Department of Defense (DoD) organizations sharing a common desire to have cost-effective standardized tools and techniques for scene generation and projection.

Significant achievements are now being realized across DoD because of the involvement of other organizations. In addition to delivering copies of this SBIR developed technology to the Air Force Flight Test Center, Kinetics has sold over 20 IRSG systems to other DoD units and prime defense contractors.

## Company Impact

Dennis Crow, President of Kinetics, Inc. states: "The success of this SBIR effort has had a significant impact on the stability and growth of our company as a result of increased marketing opportunities and technology collaboration with related efforts. As a direct result of this SBIR project, Kinetics' IRSG systems are not only being used for real-time short-range IR target modeling but also for:

- Advanced Countermeasure Modeling
- Signal Injection Testing
- UV Scene Generation
- Missile Warning System Scene Generation
- Maritime Scene Generation
- Semi-Active Laser Sensors
- Visualization Applications
- Targeting Algorithm Testing and Analysis
- High-Level "Systems of Systems" Simulation Integration

"These applications have provided Kinetics with considerable insight concerning government/industry needs and requirements for cost-effective scene generation applications. This collaboration has impacted our company by providing a technology focus to address the industry's needs and to develop 'productized' solutions that can be readily marketed to the end user."

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# SBIR/STTR

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