



*GE Nuclear Energy*



*V a l l e c i t o s   N u c l e a r   C e n t e r*

*L i n k i n g   E x p e r i e n c e   a n d   T e c h n o l o g y*

# GE Vallecitos Nuclear Center

*GE's Vallecitos Nuclear Center (VNC) has been a leading nuclear research facility since 1957 when it became the site of the first licensed nuclear generating plant in the United States.*

*Today, VNC ranks among the nation's largest privately-financed nuclear research facilities. VNC also provides a broad range of products and services for clients throughout the world in the aerospace, medical, and nuclear industries.*

## **Hot Cell Services Support Many Post-Irradiation Examination Services and Programs**

*Through research conducted on highly radioactive materials such as boiling water reactor (BWR) fuel, VNC and its Radioactive Materials Laboratory provide support to the BWR fleet. Highly-trained, experienced personnel and adaptable, proven facilities are the basis of our long-standing leadership in post-irradiation examination (PIE) services.*

*VNC offers numerous PIE services and programs. Examination programs include reactor fuel up to full length in size. Other examination capabilities include leak tests, dimensional examination, materials characterization, and corrosion testing of irradiated materials.*



## **We Are a Major Supplier of Industrial and Medical Isotopes**

*VNC is also one of the world's foremost designers and suppliers of radioactive sources—a supplier of isotopes for industry, medicine, and research. VNC currently offers selected radioisotopes packaged as high output sealed gamma and neutron sources. These include californium-252 neutron sources, cobalt-60 sources, and xenon-133 medical isotope ampoules.*



**Quality** As a leading nuclear research facility, we provide

a broad range of quality products and services to customers throughout the world.

**Hot Cells Support Many Post-Irradiation Examination Services and Programs**

*Non-Destructive Examination*  
*Destructive Examination*  
*Metallographic/Ceramographic Examination*  
*Environmental Testing*  
*Materials Characterization*  
*Corrosion Testing of Irradiated Materials*  
*Analytical Services*  
*Reactor Fuel Including Segmented and Full Length*  
*Reactor Materials*  
*Reactor Surveillance Specimens*  
*Structural Materials*



**We Are a Leading Supplier of Industrial and Medical Isotopes**

*Californium-252 Neutron Sources*  
*Cobalt-60 Sources*  
*Xenon-133 Medical Ampoules*

**We Lease and Sell Radioactive Material Transport Containers Around the World**

*Type A and B Containers for Transport of Radioactive Materials*  
*Model 2000 Radioactive Materials Transport Package*

- Normal Form Contents
- Special Form Contents
- Multi-purpose

**VNC's Nuclear Test Reactor Makes Us a Leading Supplier of Neutron Radiography Services**

*Two Neutron Beams*  
*High Resolution Direct and Indirect Radiography*  
*Custom Handling, Setup, and Fixturing*  
*Radiography of Hazardous and Radioactive Materials*

*reliability*

# Center



## **are a Major Supplier of Industrial and Medical Isotopes**

Also one of the world's foremost designers and suppliers of  
radioisotopes—a supplier of isotopes for industry, medicine, and  
research. VNC currently offers selected radioisotopes packaged as high  
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sources, cobalt-60 sources, and xenon-133 medical isotope ampoules.



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**Erin L. Heinlein**  
Marketing Program Manager

Vallecitos and Morris Operations  
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## **We Lease and Sell Radioactive Material Transport Containers Around the World**

VNC leases and sells NRC certified shipping containers for normal and special form radioactive materials. These containers are made specifically for transport of irradiated fuel, sources, and special nuclear material.

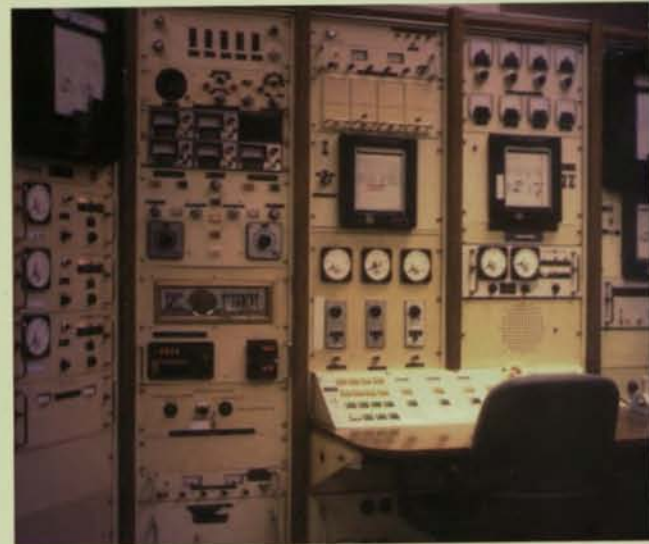
The recently designed and fabricated Model 2000 Radioactive Material Transport Package can transport normal form solid radioactive material, including reactor fuel, byproduct, source, and special nuclear material. It is available for all modes of transport.



## **VNC's Nuclear Test Reactor Makes Us a Leading Supplier of Neutron Radiography Services**

VNC offers neutron radiography services for a wide variety of applications. The Center's nuclear test reactor (NTR) is particularly well-suited for high volume or one-of-a-kind exposures, and all work conforms to the applicable ASTM and MIL standards.

Neutron radiography work has been performed at VNC for more than 30 years. Our employees were intimately involved in the early development of high quality beams, imaging techniques, image and beam quality indicators, and neutron radiography standards.



## **Our People Make the Difference**

Talented scientists, engineers, and technicians continue the pioneering efforts begun 40 years ago at the Vallecitos Nuclear Center, linking experience and emerging technology to advance commercial nuclear power around the world.

*Linking Experience and Technology*

### **VNC Is a Leading Supplier of Industrial and Medical Isotopes**

For nearly 40 years, GE's Vallecitos Nuclear Center (VNC) has been one of the largest worldwide suppliers of isotope sources used in industry, medicine, and research. Currently VNC offers selected radioisotopes packaged as high output sealed gamma and neutron sources, including californium-252 (Cf-252) and cobalt-60. VNC is also a supplier of xenon-133 medical isotope ampoules. In addition, VNC provides design, manufacture, inspection, and shipping of these isotope products.

#### **> Californium 252**

Cf-252, a man-made radioisotope, is considered to be the best neutron source for primary startup for both domestic and international reactors. It is the only known radioisotope that can be fabricated into small-sized sources that emit intense neutrons over a practical period of time. Sources with a typical output range for  $10^7$  to  $10^{10}$  neutrons per second can be supplied by VNC.

Cf-252 sources can be used in remote environments as well as in hospitals and industrial plants. A wide spectrum of industrial applications of these neutron sources includes fuel rod scanning, activation analysis, and neutron radiography. These sources also have educational and medical uses, including dosimetry, instrument calibration, and industrial gauging. Like other isotopic neutron sources, Cf-252 requires no maintenance, no elaborate control system, and no power supply.



*Cobalt-60 and californium-252 sealed components have wide application in industry, medicine, and various research fields.*



### ➤ **Cobalt-60**

VNC designs, fabricates, and supplies cobalt-60 sealed sources. As medical therapy sources, they are used for the irradiation of tumors and in blood irradiators to kill pathogens. As industrial sources, they are used for radiography of welds and pipelines. As process radiation sources, they are used for the sterilization of medical supplies using gamma radiation.



### ➤ **Analytical Services for Hospitals and Medical Centers**

VNC provides xenon-133 medical isotope ampoules to hospitals and medical centers for diagnostic use. Xenon-133 is used for evaluation of pulmonary function, for lung imaging, and for assessment of cerebral blood flow. Xenon-133 is available in three types of 5-cc heat-sealed glass ampoules—crush, breakseal, and saline, each containing up to 2.5 Ci under partial vacuum. Larger quantities are available upon request.

Xenon-133 packaging complies with all requirements for Type A radioactive material containers as described in U.S. Department of Transportation regulations.

#### **For Further Information, Please Contact**

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**GE Nuclear Energy**

*The Nuclear Test Reactor's primary application is neutron radiography. More than 100,000 neutron radiographs of various objects have been produced.*



### **VNC's Nuclear Test Reactor Makes Us a Leading Supplier of Neutron Radiography Services**

*GE's Nuclear Test Reactor (NTR) at the Vallecitos Nuclear Center (VNC) offers neutron radiography for a wide variety of applications. The reactor is suited for high volume or one-of-a-kind exposures, with all work conforming to the applicable ASTM and MIL standards.*

#### **> Customers Benefit from Our Valuable Experience**

*Neutron radiography work has been performed at VNC for more than 30 years. Our employees were intimately involved in the early development of high quality beams, imaging techniques, image and beam quality indicators, and neutron radiography standards.*

*More than 100,000 neutron radiographs of pyrotechnic devices, composite materials, high performance jet engine turbine blades, electrical*

*relays and capacitors, rocket motor injectors, diffusers and nozzles, Space Shuttle hardware, and other defense and commercial industry components have been produced.*

#### **> Our Technology Lends Itself to a Wide Variety of Applications**

*Neutron radiography is a non-destructive technique similar to X-radiography (X-ray), except that a beam of neutrons is used to produce the image. Since neutrons interact with materials differently than X-rays, the image produced on film is also distinctly different. Neutron radiography is particularly well-suited for imaging light elemental material such as pyrotechnics, O-rings and other hydrogenous materials, epoxy and other adhesives, and foreign materials such as rubber or plastic contained within a metallic or other dense material.*





### > We Provide a Variety of Services

- High volume neutron radiography using two neutron beams
- High resolution direct radiography
- Specialized indirect radiography
- Neutron radiography of highly radioactive material
- Custom handling, setup, and fixturing
- Handling of most hazardous materials
- Special flexible film for complex shaped objects
- Development of unique specifications, procedures, and technique cards

### > Neutron Irradiation

VNC's NTR contains several facilities for the neutron short-term irradiation/activation of materials. The exposure rates can be up to  $2 \times 10^3$  nv with long or short-term irradiations. Various sample sizes can be accommodated. Special techniques are available such as cadmium filters to eliminate thermal neutrons and rotational facilities to ensure uniform exposure.

Neutron irradiation/activation services have been provided at VNC since 1957. These services have been used in research and development, instrument calibration, radioactive sources, materials effects, and activation analysis.

### > Radioactivity Worth Measurements

Radioactivity worth measurements (boron equivalency testing) detect variations in impurity content of small samples, particularly reactor and fuel cladding materials. The reactivity worth of a substance is a measure of the effect of its neutron absorption, which is easily detectable

when inserted into the NTR. The reactivity worth may then be related to ppm boron equivalent. Reactivity worth measurements are performed in a high flux portion of the reactor core which is extremely sensitive to small changes in neutron absorbers. Variations in neutron absorption are compared with standards to determine the equivalent boron absorption.

Our facility has more than 15 years of experience in reactivity worth measurements with structural material. Many standards are available with zirconium, zirconium alloys, Inconel, and stainless steel.

### > We Train Others

**Training courses are offered at VNC in the following areas:**

**Reactor Operator:** We provide prepared lesson plans in radiation protection, inverse multiplication, source critical rod banking and shadowing, reactor period and doubling times, and hands-on reactor startup/shutdown.

**Neutron Radiography:** Training in neutron radiography includes a balance of theory and practical application. The course introduces the student to radiation safety, physics, industrial X-ray films, film processing, film quality evaluation in accordance with applicable national standards, and film image evaluation and interpretation.

**Sensor Calibrations:** The NTR has several locations ideally suited for the calibration of sensors. These facilities may accommodate a variety of sensor sizes and provide a flux up to  $2 \times 10^3$  nv. The flux may be constant or changed for multipoint calibrations. NTR personnel are available to assist with all phases of the calibration.

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## Hot Cell Services Support Many Post-Irradiation Examination Services and Programs

GE's Vallecitos Nuclear Center (VNC) is ranked among the nation's largest privately financed nuclear research facilities. Licensed to possess nuclear fuel and by-product materials for testing and evaluation purposes, VNC performs a variety of services in its highly sophisticated Radioactive Materials Laboratory. All services are tailored to meet each customer's requirements and specifications.

VNC's hot cells are housed in a 21,000 square-foot facility that contains four large mega-curie cells, three smaller kilo-curie cells, and a special metallography cell. Work on highly radioactive materials, including receipt of full length reactor fuel, is performed in the main cells; smaller cells are reserved for examination of materials and for various materials and mechanical tests performed under simulated reactor conditions. Using state-of-the-art equipment, VNC hot cells offer many post-irradiation examination (PIE) services and programs. These include:

VNC's hot cells have the capability for examination and processing of a variety of highly radioactive materials.



### > Nuclear Reactor Components

- Segmented or full length fuel rods
- Control blades
- Irradiated materials
- Cladding
- Structural materials
- Reactor components

### > Non-Destructive Examination

- Visual (photo and video) examinations
- Axial gamma scanning
- Leak test
- Dye penetrant examinations
- Dimensional examination
- Profilometry measurements
- Laser measurements

### > Destructive Examination

- Fission gas collection and analysis
- Radial sectioning
- Fuel burn-up analysis
- Cladding analysis
- Uranium oxidation state measurements
- Micro gamma scan
- Fuel immersion density
- Charpy testing

### > Metallographic/Ceramographic Examination

- Macroscopic
- Microscopic
- Optical measurements
- Precision specimen grinding
- Autoradiography
- Microhardness measurements
- Replication

> *Environmental Testing*

*Cobalt-60 gamma aging*

> *Materials Characterization*

*Radioactivity analysis*

*Scanning/Transmission electron microscopy*

> *Microscopy*

*X-ray diffraction*

*Image analysis*

*X-ray fluorescence*

*Metallography/Failure analysis*

*Mechanical properties testing*

> *Corrosion Testing of Irradiated Materials*

*Autoclave testing of materials*

*Constant extension rate test*

*Constant load test*

*Crack growth test*

*Computer controlled remote machining  
of irradiated materials*

> *Analytical Services*

*Hydrogen content of zirconium alloys*

*Gas analysis by gas chromatography*

*Mass spectrometry*

*Plasma spectrometry*

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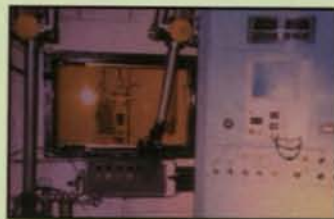
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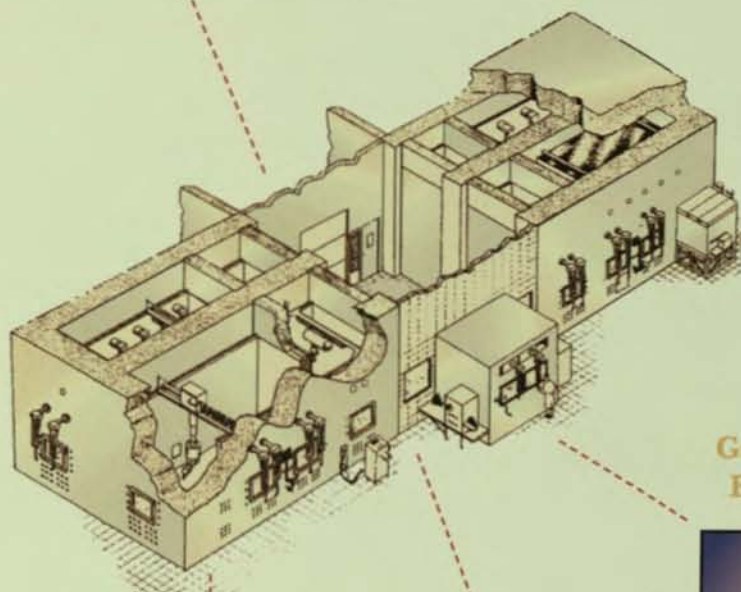


**GE Nuclear Energy**

**Combined Instrumentation  
System (COINS)**



**Remote Machining**



**Gamma Scan  
Equipment**



**Manipulator & Operator  
at Hot Cell**



**Metallograph**

## *Radioactive Material Transport Containers*

### ***We Lease and Sell Radioactive Material Transport Containers Around the World***

*GE's Vallecitos Nuclear Center (VNC) leases and sells NRC certified shipping container packages for shipping normal and special form radioactive materials. These containers can transport irradiated fuel, sources, and special nuclear material between foreign nuclear institutes, domestic reactor sites, and various other installations.*

*The Model 2000 Radioactive Materials Transport Package, shown on its trailer, is certified by the U.S. Nuclear Regulatory Commission and the Department of Transportation for transport of a variety of highly radioactive materials, including irradiated nuclear reactor fuel.*



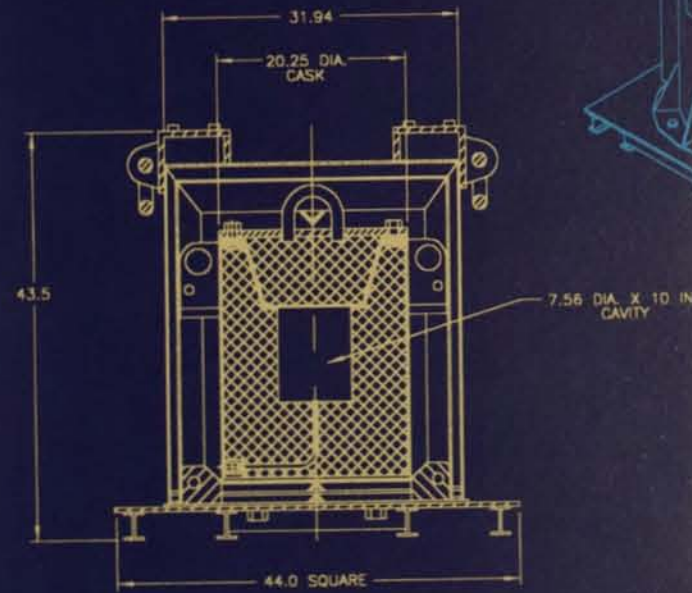
#### **> Model 2000 Radioactive Materials Transport Package**

*The Model 2000 was developed at VNC and can transport solid radioactive material in normal form, including reactor fuel, byproduct, source, and special nuclear material. This transport package is available for all modes of transportation—road, rail, sea, and air.*

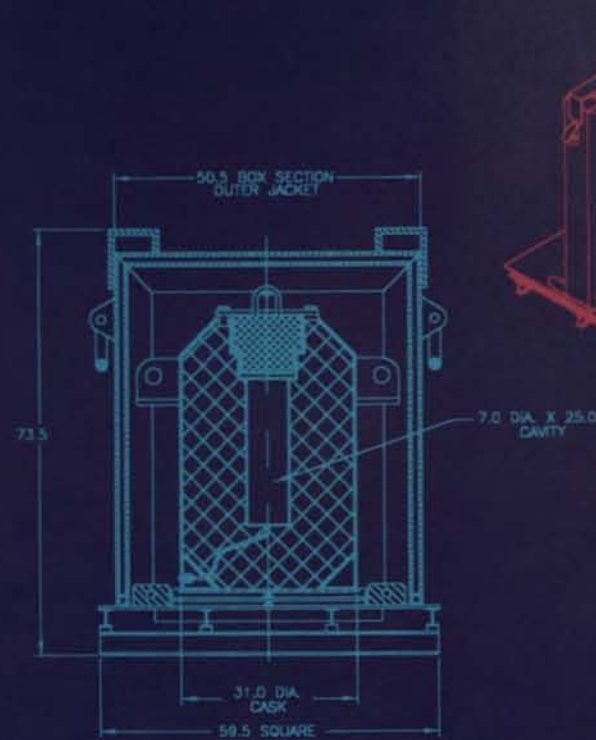


➤ **Radioactive Material Transport Packages**

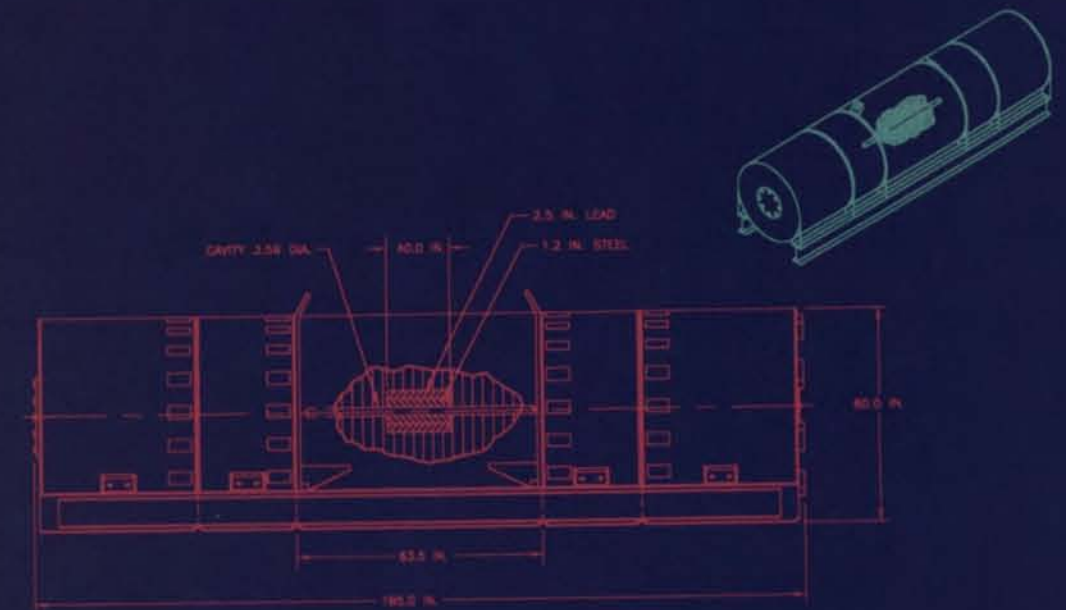
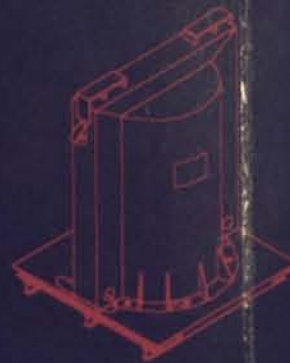
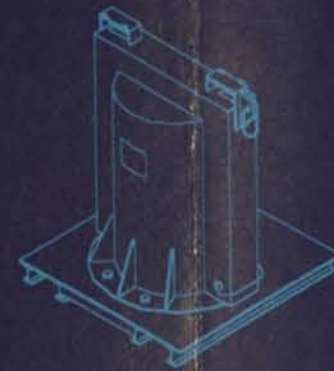
VNC has additional shipping containers available for lease. As shown in the diagrams, they can be used for shipping Type A and Type B quantities of radioactive materials.



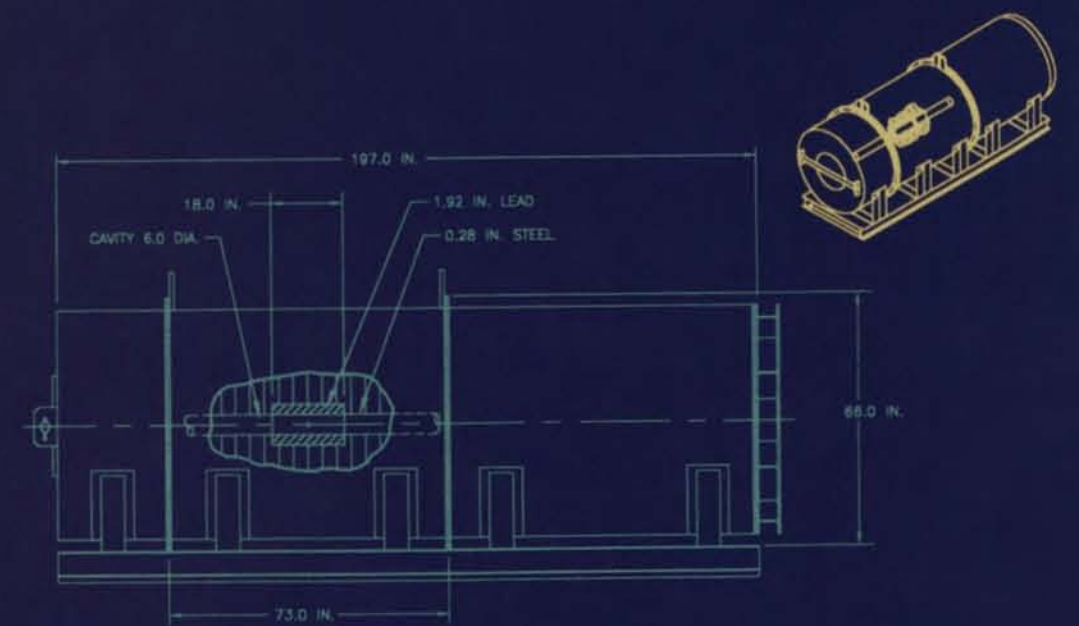
**Model 100 Shielded Container**  
 Assembly Weight: 4800 Lbs. / 2177 Kgs.  
 D.O.T. Type-B



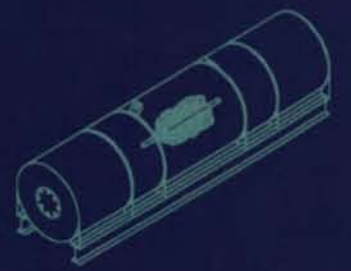
**Model 1500 Shielded Container**  
 Assembly Weight: 15,500 Lbs. / 7031 Kgs.  
 D.O.T. Type-B



**2501 Series**  
 Assembly Weight: 17,500 Lbs. / 7938 Kgs.  
 D.O.T. Type-A



**2511 Series**  
 Assembly Weight: 24,000 Lbs. / 10,886 Kgs.  
 D.O.T. Type-A



## ➤ Model 2000 Package

The Model 2000 Package consists of a cylindrical cask transported in an upright position inside an overpack structure. The overpack has toroidal shell impact limiters at each end. This package, including the transport trailer, is available on a rental basis or is manufactured for sale.

The overall package is approximately 131.5 inches high and 72 inches in diameter. Its gross weight is approximately 33,500 pounds. The cask has a height of 71 inches and an outer diameter of 38.5 inches. The cask cavity is 26.5 inches in diameter and 54 inches deep. A liner adding two inches of lead is available for additional shielding.

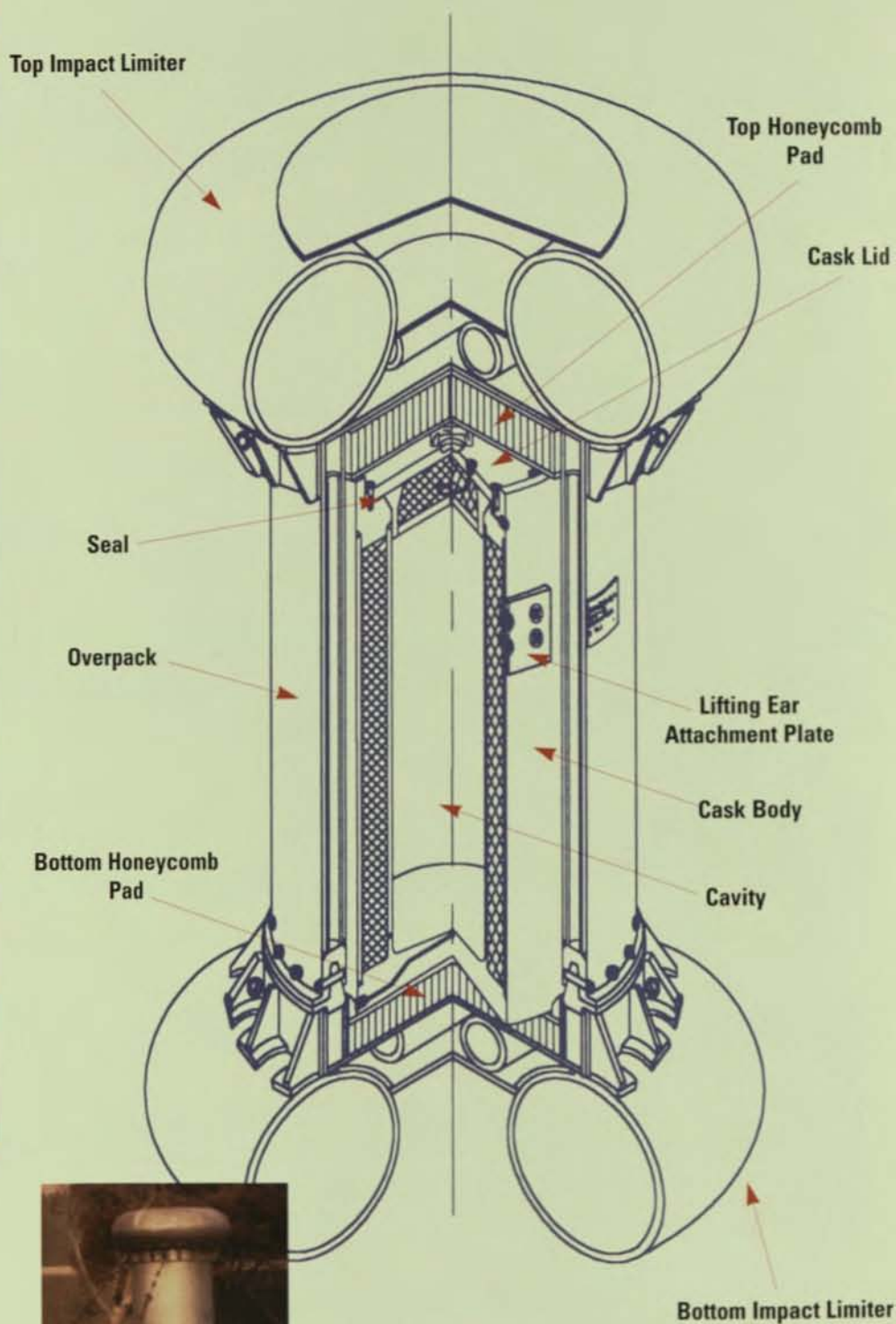
All cask surfaces are electropolished stainless steel to facilitate decontamination. Contents cannot exceed 5,450 pounds, including carrier or rack.

### For Further Information, Please Contact

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### Regulatory Agency-Certified

The Model 2000 Package has been certified by the United States Nuclear Regulatory Commission (NSNRC), receiving Certificate of Compliance No. 9228. This package is also certified by the U.S. Department of Transportation as meeting International Atomic Energy Agency (IAEA) criteria (USA/9228/BIU/F-85).



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## eASICore™ Overview

The eASICore is a high performance configurable logic core that encompasses programmable RAM-base logic with 1-3 masks customizable routing. The eASICore is composed of 2048 basic cells, called eCells. Each eCell is an LUT (Look-Up-Table) based logic feeding a D-F/F. The interconnections between eCells are performed by mask customization of the top metal layers.

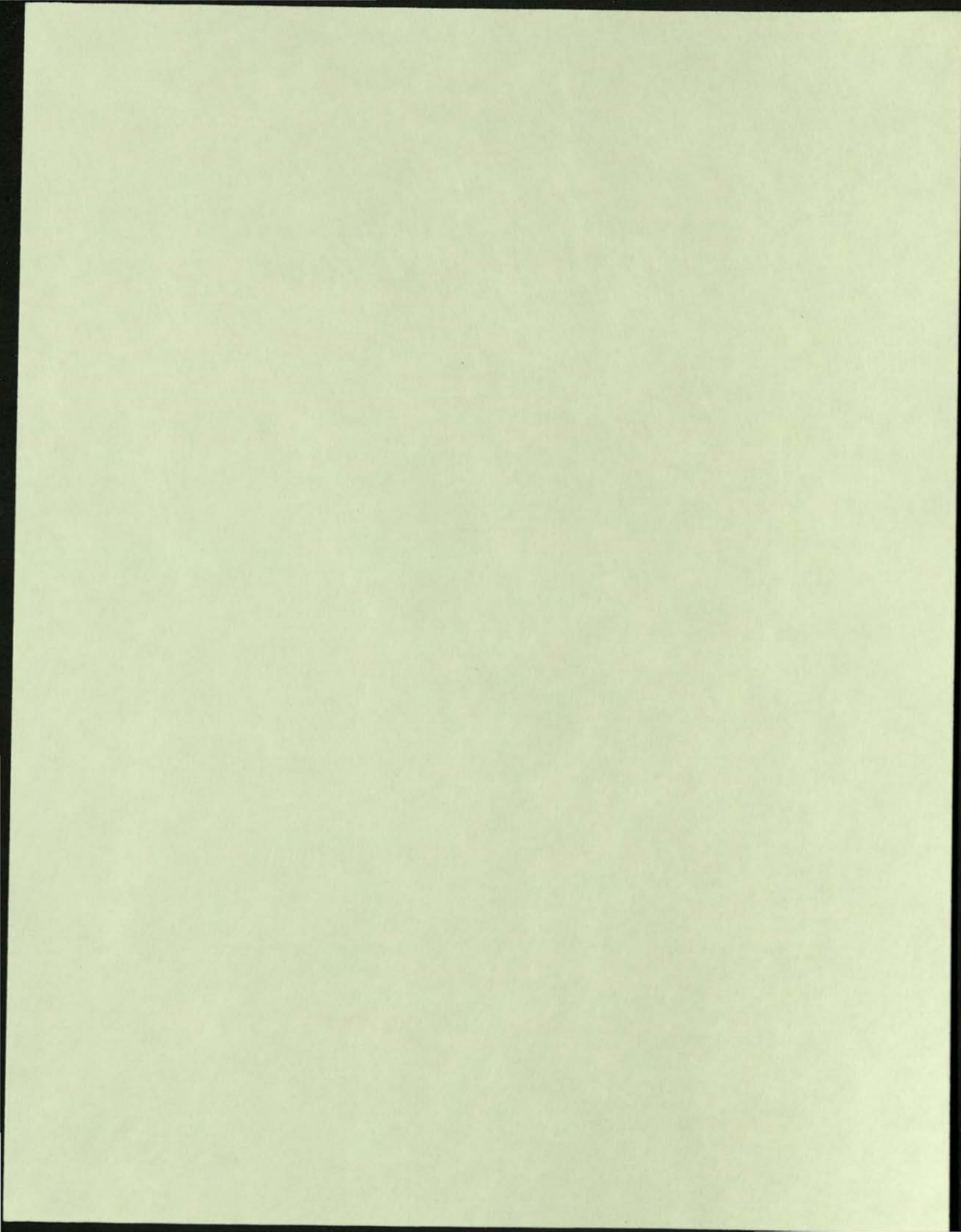
The eASICore is initially designed for 6 metal layers process technology and the customized connections between the eCells are made through metal 5 and metal 6. This customization technique positions the eASICore in between the FPGA and the Standard Cell.

| 0.18μm      | FPGA                         | eASIC                       | STD CELL                    |
|-------------|------------------------------|-----------------------------|-----------------------------|
| Density     | 1.5(k Gate/mm <sup>2</sup> ) | 30(k Gate/mm <sup>2</sup> ) | 60(k Gate/mm <sup>2</sup> ) |
| Performance | 100(MHz)                     | 400(MHz)                    | 600(MHz)                    |
| Power       | 1000(nW/Gate/MHz)            | 40(nW/Gate/MHz)             | 20-30(nW/Gate/MHz)          |
| NRE         | No                           | Low                         | Very High                   |
| TAT         | 0(Days)                      | 5-10(Days)                  | 30-60(Days)                 |
| Debug       | Easy                         | Easy                        | Tough                       |

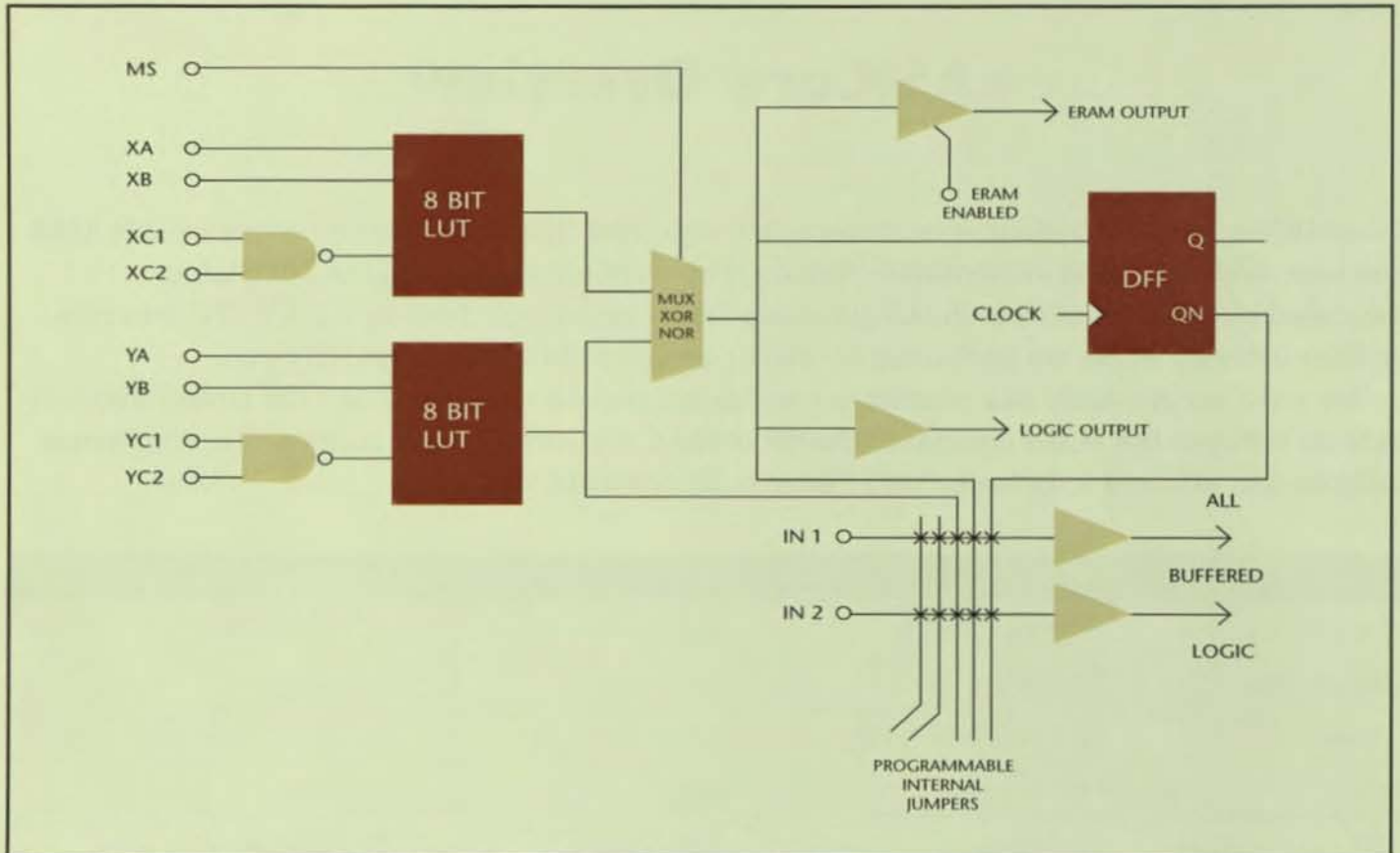
### Features

- 0.18μm 6 metal-layer CMOS process
- 0.9mm<sup>2</sup> with 25K gate equivalence
- Power consumption (single eASICore) of about 150mW at 500 MHz
- The logic is fully configurable with the top two metal layers and bit-stream
- The LUTs (Look-Up-Tables) can be used as Dual-Port RAM
- RAM can be placed anywhere and in any size
- The wiring is fixed, but the LUTs are re-programmable for limited logic edits and for help in debug
- Optimized internal structures include:
  - Clock tree
  - Scan chain
  - RAM decoding
  - Power bussing
- Design software (eTool) available for Solaris, Linux, and Windows platforms.

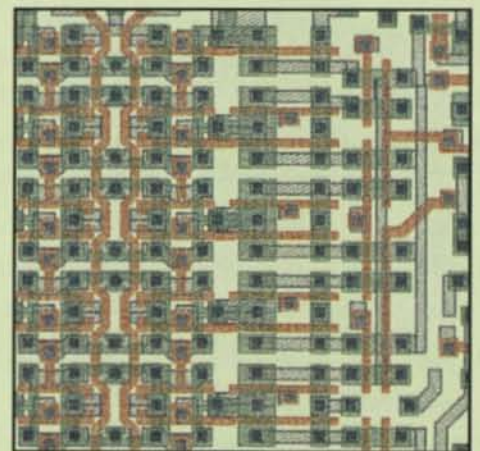




## eCell Block Diagram

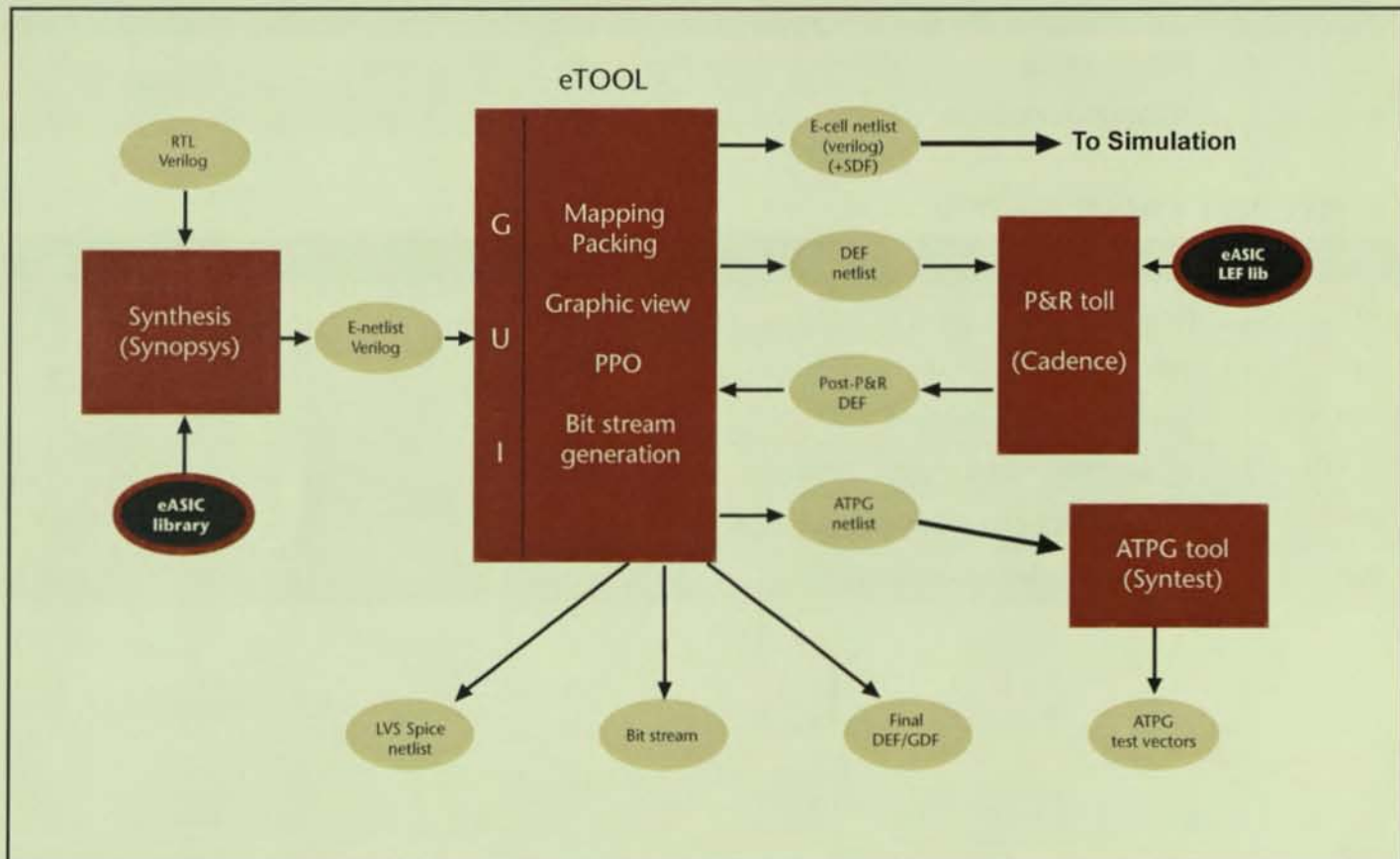


The eASICore is made of 8 eUNITs and each eUNIT consists in an array with 16\*16 eCells. There are additional decoders that enable external access to the RAM blocks.



eCell Layout-0.18µm

## eASIC CAE Flow Environment



### Design Flow Steps

- Synthesis of design using target library provided by eASIC for SYNOPSIS Design Compiler
- Using eTool to map and pack the synthesized design.
- Place and route with Cadence Silicon Ensemble, using DEF generated by eTool.
- Finalize the routed design using eTool for bit stream and GDSII
- Verilog timing simulation with post-routing timing annotation
- SYNTTEST Automatic Test Pattern Generation utilizing the built-in scan chain
- eTool available on Solaris, Linux, and Windows platforms

## DC OPERATING CONDITIONS

| Symbol | Parameter           | Min | Typ | Max | Unit |
|--------|---------------------|-----|-----|-----|------|
| VCC    | Supply voltage      | 1.6 | 1.8 | 2.0 | V    |
| T      | Ambient temperature | 0   | 25  | 70  | °C   |

## DC ELECTRICAL CHARACTERISTICS

| Symbol | Parameter                                 | Min  | Typ | Max | Unit |
|--------|-------------------------------------------|------|-----|-----|------|
| ILI    | Input Leakage Current                     | -0.1 | -   | 0.1 | µA   |
| ILO    | Output Leakage Current                    | -10  | -   | 10  | µA   |
| VOL    | Output Low Voltage $I_{out}=0.5mA$        | -    | -   | 0.2 | V    |
| VOH    | Output High Voltage $I_{out}=0.5mA$       | 1.4  | -   | -   | V    |
| ICC    | Operating Current $I_{out}=0mA, f=500MHz$ | -    | -   | 80  | mA   |
| ISB    | Standby Current $I_{out}=0mA, f=0$        | -    | -   | 100 | µA   |



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A large, curved horizon line of the Earth, with a bright sun rising behind it, creating a lens flare effect against the black background of space.

**Advent**

SYSTEMS INC

## Technical Excellence

Q U A L I T Y

s e r v i c e

I N N O V A T I O N

### **Integrity**

Advent Systems staff members usually function as independent expert scientific advisors and program support assistants for our customers. As an employee-owned small business, our interactions with our clients are characterized by professional integrity, ethical conduct, trust, and unbiased technical and programmatic support.

### **Quality**

Advent Systems is known for producing high-quality products, responsive to customer needs, in a timely manner. Our expertise, innovation, and dedication to teamwork have produced a strong, sustained record of superior performance, and a national reputation for excellence.

### **Flexibility**

Our streamlined management structure supports a self-motivated and energetic staff in delivering solutions with creative vision to the pressing problems

our customers face, while encouraging personal growth and the acceptance of increased responsibility. This environment enhances our flexibility to respond to dynamic customer requirements.

### **Stability**

Advent Systems was incorporated in 1978 to serve government and other organizations, by providing expert systems engineering and technical advisory services. We attract and retain highly-competent employees, and focus on controlled business expansion, leading to long-term relationships with diverse clients. As the corporation has grown, the depth and breadth of our expertise have also increased, allowing us to offer customers a wide range of services utilizing dedicated staff at each of our locations throughout the country.

We invite you to explore the substantial contributions Advent Systems can make as a member of your program team. To learn more about how we deliver solutions to the challenges you face, contact one of the offices listed on this brochure.

**Advent**

SYSTEMS INC

# Scientific and Engineering Support Today

Advent Systems, Inc., is an innovative technical services company furnishing expert engineering and scientific support to a variety of customers. Core business areas provide systems engineering, technical assistance, and contractor advisory and assistance support to the U.S. Department of Defense and other government agencies. We also offer consulting support to commercial clients.

We perform technical studies which complement a comprehensive systems engineering capability. Our end-to-end systems engineering support efforts often encompass the entire life cycle of system design, development, deployment, operation, and upgrade or transition.

## Expertise

Advent Systems has a reputation for technical excellence, quality, service, innovation, and creative vision. Our customers benefit from outstanding expertise and capabilities in a wide variety of service areas. Our talented staff provides exceptional systems engineering, study and analysis, and technical and program management support in a broad spectrum of disciplines.

## Responsiveness

Customers draw upon our consulting services to quickly resolve issues related to products, processes, or systems under development or in use. To provide responsive support, the corporation fosters an atmosphere of creative scientific exploration and dedication to solving problems for our customers. The expertise, experience, and responsiveness of our staff play crucial roles in guiding important system development efforts to successful completion.

## Teamwork

The corporation is dedicated to maintaining an organizational environment that supports teamwork and communications at all levels. Our staff members work in a collaborative and collegial environment, solving challenging scientific, engineering, and program management problems for our clients. We often collaborate with customers and other contractors as members of integrated product development teams.

# Solutions for Tomorrow



### SYSTEMS ENGINEERING

- Concept Development
- Requirements Analysis
- System Architectures
- Feasibility Studies
- Trade-Off Studies
- Design Engineering
- Performance Analysis
- Modeling and Simulation
- Development Oversight
- Integration and Test Support
- Configuration Management
- Upgrade and Transition Planning
- Process Improvement

Our outstanding systems engineering expertise is applied to crucial national defense programs.



### SPECIALIZED TRAINING

- RF Polarimetry
- Signal Processing
- Spectral Estimation

Training in advanced technologies by experienced professionals leads to superior design solutions.



### ACQUISITION SUPPORT

- Acquisition Streamlining
- Integrated Product Teams
- Procurement Documentation
- System Specifications
- Award Fee Plans
- Source Selection
- Technical Advisors
- Proposal Evaluation
- Development Monitoring
- Design Review Support
- Risk-Reduction Activities
- System Test Planning

Advent's extensive experience providing acquisition support for large, complex systems, provides timely risk-reduction approaches.



### TECHNICAL STUDY AND ANALYSIS

- Strategic Planning
- Electrical Engineering
- Mechanical Engineering
- Aerospace Engineering
- System Analysis
- Scientific Data Processing
- Emitter Database Analysis
- Electromagnetics
- Technology Assessment/Projection
- Technology Insertion Roadmaps
- Life-Cycle Costs

Study and analysis results produce breakthroughs enabling advanced system implementations.



### OPERATIONAL SUPPORT

- Program Management
- Program Administration
- Program Support Technicians
- Sustaining Engineering
- Logistics Management
- Process Improvement
- Anomaly Resolution
- Upgrade Support
- Working Groups
- On-Site Support

Advent Systems operational support helps sustain the effective utilization of advanced systems.



### RAPID PROTOTYPING

- Electronics and RF Hardware
- Signal Processing Software
- Feasibility Demonstrations
- Brassboard Models
- Real-Time Processing
- Special Test Equipment
- Signal Simulators

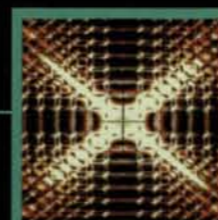
Our prototype development laboratory enables rapid proof-of-concept demonstrations.



### RF AND ELECTRO-OPTIC SYSTEMS

- Antennas
- RF Polarimetry
- Channelized Receivers
- Compressive Receivers
- Digital IFM Receivers
- RF Signal Propagation Effects
- Radar and ESM Systems
- Signal Collection Systems
- Electro-Optic Systems
- Optical Signal Processing

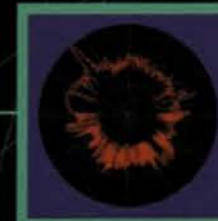
Advent's portable polarimeter system rapidly measures RF signal polarization parameters.



### SIGNAL PROCESSING

- Algorithm Development
- Analog Signal Processing
- Digital Signal Processing
- Direction Finding and Geolocation
- High-Resolution Spectral Estimation
- Classification and Identification
- Parameter Estimation
- Pattern Recognition
- Signal Detection
- Neural Networks
- Wavelet Processing
- Modulation on Pulse
- Multipath Processing
- Wideband Processing
- Spread Spectrum Signals
- Pulse-Train Deinterleaving
- Co-Channel Interference Mitigation

Advanced signal processing algorithms improve pattern recognition and emitter geolocation.



### SIGNAL COLLECTION PROGRAMS

- Field Signal Collection
- Radar Signal Analysis
- Communications Signal Analysis
- Portable RF Polarimeter
- Unique Polarimetry Databases
- Threat Signal Environments

Innovative signal collection and analysis techniques provide valuable technical insight.



### INFORMATION TECHNOLOGY

- Communications Systems
- Data Storage Technology
- Database Management
- Network Management
- Distributed Systems
- Information Security
- Information Warfare

Expert technical support for wideband communications networks and information security is critical to many programs.



### SOFTWARE ENGINEERING

- CASE Analysis
- Software Development
- Software Re-Engineering
- Embedded DSP
- Data Analysis
- Data Visualization
- System Modeling and Simulation

Advanced data analysis and visualization tools improve system modeling and simulation.

Our vision is to consistently exceed the expectations of our customers and associates. As a valuable member of your team, we help ensure your success.

To learn more about Advent Systems, visit us on the Internet at <http://www.adventsys.com>



# Solutions for Tomorrow

expert, independent  
Systems Engineering

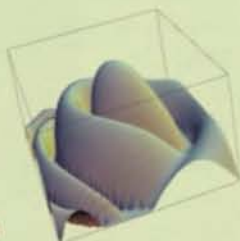
T E C H N I C A L  
A S S I S T A N C E S E R V I C E S

Advent Systems was incorporated in 1978 to serve the Government by providing expert, independent, systems engineering and technical assistance services. The company has a reputation for technical excellence, quality, service, and innovation. As we have grown, the depth and breadth of our expertise and skills have also expanded, allowing us to offer a wide range of services and dedicated staff at office locations throughout the country. We invite you to explore the substantial contributions Advent Systems can make as a member of your FAST MAX team.

## SYSTEMS ENGINEERING AND TECHNICAL ASSISTANCE

- Feasibility Studies
- Trade-Off Studies
- Design Engineering
- Performance Analysis
- Modeling and Simulation
- System Analysis
- System Architectures
- Signal Processing Software
- Electromagnetic Environment
- Information Warfare
- Parameter Estimation
- Pattern Recognition
- Neural Networks
- Wavelet Processing
- Modulation on Pulse
- Multipath Processing
- Spread Spectrum Signals
- Pulse-Train Deinterleaving
- Co-Channel Interference Mitigation
- High-Resolution Spectral Estimation

Study and analysis of antenna patterns significantly improves system implementation.



## OPERATIONAL SUPPORT

- Strategic Planning
- Advanced Concept Development
- Technology Insertion Roadmaps
- Upgrade and Transition Planning
- Technology Assessment/Projection
- Life-Cycle Costs
- Program Management
- Program Administration
- Process Improvement
- On-Site Support

Modeling of TDOA/FDOA surfaces enhances operational support of advanced systems.



## SOURCE SELECTION AND ACQUISITION SUPPORT

- Concept Development
- Requirements Analysis
- Acquisition Streamlining
- Integrated Product Teams
- Procurement Documentation
- System Specifications
- Award Fee Plans
- Source Selection
- Technical Advisors
- Proposal Evaluation
- Design Review Support
- Development Monitoring
- Integration and Test Support
- Configuration Management
- Risk-Reduction Activities
- System Test Planning

Advent's expert acquisition support helps ensure successful programs.



Explore the substantial contributions Advent Systems can make to the FAST MAX team.



**Advent**  
SYSTEMS INC

**FAST MAX Support**

RAPID PROTOTYPING  
AND SUPPORT

- Feasibility Demonstrations
- Brassboard Models
- Special Test Equipment
- Signal Simulators
- Antennas
- RF Receivers
- RF Polarimetry
- Software Re-Engineering
- Embedded DSP
- Data Visualization
- System Modeling and Simulation
- Algorithm Development
- Wideband Processing



Advent Systems' portable polarimeter rapidly measures RF signal polarization parameters.

technical excellence

QUALITY

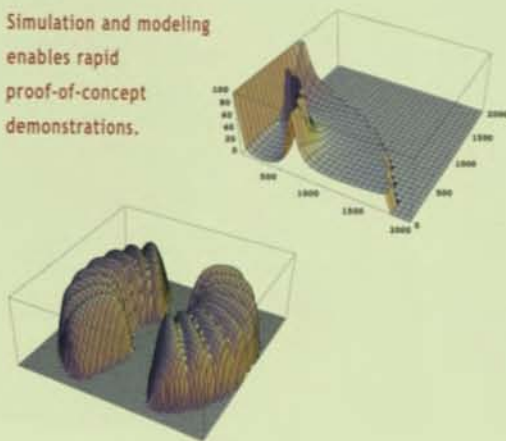
service

INNOVATION

## FAST MAX Support

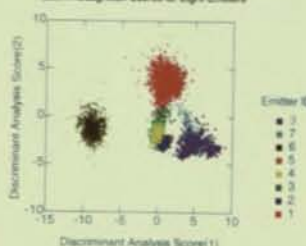
Advent Systems is a full-service, independent, CAAS/SETA company dedicated to providing FAST MAX customers expert technical support from a responsive organization. We provide our customers outstanding services in a wide variety of scientific, engineering, and program support areas. For information on how these skills can be applied to your problems, contact our Chantilly, VA or Mountain View, CA offices.

Simulation and modeling enables rapid proof-of-concept demonstrations.



### Complex Radar Scenario

Pattern Recognition Scores for Eight Emitters



Advanced signal processing techniques support customer requirements.

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**Advent**  
SYSTEMS INC

## Advanced Packaging Solutions

Complete design flow for component IC Packaging and Advanced Technology Board Designs

As tomorrow's electronics devices become increasingly more complex, electronics designers are asked to shrink products, increase functionality and meet higher performance expectations. Lead count requirement, reduced pitch, reduced footprint area and significant overall volume reduction place unprecedented demands on the skills of package designers and the tools they use.

Zuken-Redac's Advanced Packaging Solutions provide an intuitive, integrated environment for designing single or multiple chip packages like BGAs, CSPs and MCMs as well as advanced technology boards. In the process they deliver increased speed, higher performance and manufacturability. They can even shorten new product design time by as much as 50%.

Our industry-leading Advanced Packaging Solutions include:

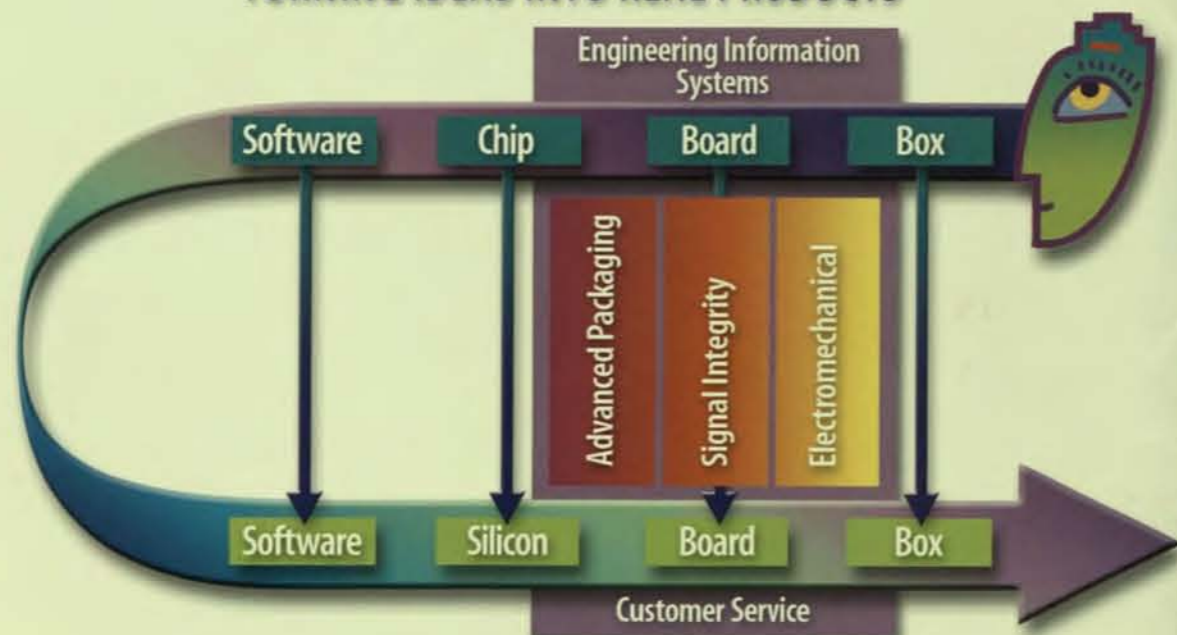
- Design technology kits
- Integrated tool flows
- Automated advisors
- Rules-based Package Wizard
- All-angle auto routing
- 3D interactive viewing
- Automatic build-up vias
- Automatic mesh-plane insertion

A common database structure throughout the design flow enables true dynamic linking of data for analysis, interconnect and design trade-offs. An intuitive, customizable user interface, coupled with the most powerful rules-driven tools in the industry, improves total throughput from design through to manufacturing and test.

By letting our Advanced Packaging Solutions define the design process up front, you can cut design time, design for higher performance and guarantee manufacturability. Practical? Yes. Pure magic in your hands? For sure.

*Design a complete IC package in minutes? It's possible with our Advanced Packaging Solutions.*

### TURNING IDEAS INTO REAL PRODUCTS



## Signal Integrity Solutions

Upfront engineering lets you design faster while avoiding disaster

- High-speed concurrent design
- Virtual prototyping for right-first-time products
- Accurate on-line multiple-net simulation
- True IP re-use with fully integrated design flows and databases
- True DFM through consistent rules and databases
- Automatic optimization of designs for different manufacturing processes

If you want them, we've got them. And, if you're doing high-speed design, you'll need them to cut through design bottlenecks.

They're all part of our Signal Integrity Solutions, signal integrity and EMI focused prototyping solutions that give you creative freedom to experiment and investigate signal performance during the design process. You can quickly investigate and constrain design parameters, such as cross-talk, interconnect delay, overshoot limits and characteristic impedance to selected nets or signals. And, because our Signal Integrity Solutions link the logical and physical domains, analysis takes place early in the design process, warning you of pitfalls prior to physical implementation.

Design data, design rules and design constraints help you eliminate problems through the entire design flow, long before they happen. You'll avoid time consuming re-design that way. Errors and inconsistencies simply won't exist. Quality is assured. Our Signal Integrity Solutions meet all challenges, especially when speed is of the essence.

*Whether you are designing products and systems for the internet, telecommunications or satellite communications, design at the speed of light with real Signal Integrity solutions from Zuken-Redac.*

## Electromechanical Solutions

Virtually eliminate multiple 2D to 3D transfers with the world's only 3D design solutions

Keeping up with the future means finding quick, workable solutions for electrical and mechanical co-design. It means looking at both in a real, three-dimensional environment. When you do, things work right the first time.

Whether you're designing PCBs, MIDs (Molded Interconnect Devices) or Flex PCBs, we'll help you get the best design efficiency across these separate, conflicting environments. By providing a complete, integrated 3D mechanical and electrical solution, Zuken-Redac has simplified the design of 3D electrical systems and eliminated the costly need for multiple transfers of design data between 3D mechanical and 2D PCB worlds. With one view, you'll experience a single, clear design process that offers:

- Correct first-time electrical design of MIDs, Flex and tight-enclosure PCBs
- True 3D analysis of substrate, components and obstacles
- Co-design for mechanical and electrical rules using a single design and analysis database
- Improved ROI for 3D mechanical systems

If your goal is to create smaller, lighter, "function-shaped" products or assemblies, the new design flow, using our Electromechanical Solutions is a fast, simple, reliable process. It saves time. It saves money. It makes sense.

*A major design challenge of the future is understanding and managing the 3D impact an electronic design. Not anymore.*

## Engineering Information Solutions

Manage component and design data across divisions, continents and time

Imagine:

- Having all of your design resources integrated in one common library
- Having common rules for varied manufacturing processes
- Being able to find and reuse designs quickly
- Having common part specifications available
- Being able to do concurrent design development globally

Just think of the management and efficiency gains!

The power of our EIS Solutions to help you design new products or manage the ECO process is at your fingertips. That's because we've placed the most complete database infrastructure in your hands.

The EIS Solutions' centralized and local library management system enables products to be designed and realized anywhere. These solutions offer long-term continuity and greater management efficiency during the design process by managing both the data library and making the information you need easily available when and where you need it.

Zuken-Redac's EIS Solutions let you:

- Reduce library management cycles with Internet component data solutions
- Reduce design errors with local and centralized library management
- Realize design control and flexibility with design data management
- Achieve enterprise-wide programs with links to ERP/MRP systems
- Eliminate errors with comprehensive design process management.

With our EIS Solutions, you'll be able to manage all the physical data inherent in complex electronic designs quickly and easily. Workflow and document management in one system. It frees you to focus on what you do best—creating next generation products.

*Zuken-Redac's EIS Solutions offer greater long-term continuity and greater management efficiency during the design process by managing vast amounts of data that is then turned into information easily available anywhere it is needed. This can cut the cost of managing data significantly.*

## Customer Service Solutions

Get the most out of your EDA tools; access help and updates whenever you need them

Zuken-Redac provides the most comprehensive support and best professional consulting service in the EDA industry. Our Customer Service Solutions are also the most cost-effective ways to ensure your design team has access to technical assistance wherever and whenever it's needed.

Our Customer Service Solutions include:

- Experienced technical support
- Regular software updates and technical bulletins
- Access to our technical Extranet on-line service
- On-line discussion forums
- User group support and involvement
- Input into product enhancements

Getting quality products to market on time is more than just purchasing EDA tools. It's also making sure all of our Customer Service Information Systems are in place to safeguard your EDA investment.

Let our team of highly skilled, industry-experienced engineers and consultants show you how to realize the full power of your design capabilities. That way, we can help you stay way out front in the race to make smaller, more complex, higher performing electronic products.

*Consultancy and service will grow at a rate well above the EDA industry average in years to come, and you want to make sure you're with the best. Working with Zuken-Redac can add significant value to organizations that have invested in PCB/MCM design tools.*

*—John Rich, Principle PCB Designer Hewlett-Packard, Ltd*

## About Zuken-Redac

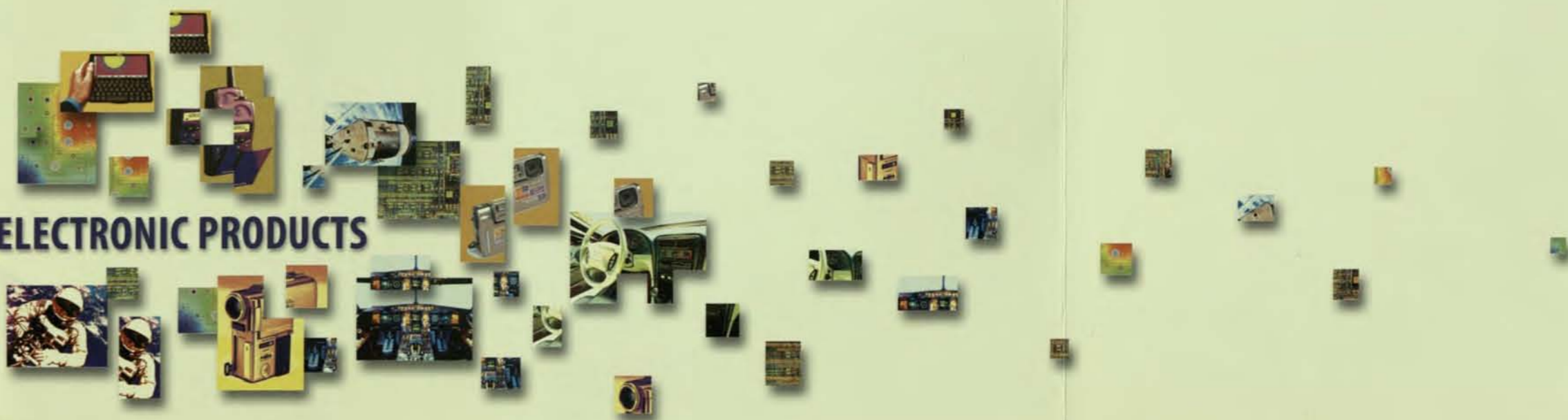
With more than 25 years' experience in CAD/CAE Automation, Zuken-Redac is a world leader in the PCB/MCM/ Physical Design markets and in Electronic Product Design Automation. We help customers produce entire systems, including boards, chips and boxes. We specialize in professional software solutions that deliver manufacturable boards and systems. Our Technology-First™ Solutions offer a wide range of advanced tool sets from schematic capture, placement, routing and analysis through to manufacture and test. These solutions are provided under both UNIX and Windows NT.

*Many companies are looking for complete solutions to problems of design process, integration and methodology, rather than buying individual tools to solve problems themselves.*

*Zuken-Redac is well positioned to offer these services in view of its long experience in the international system design market.*

*—Jim Tully, Senior Analyst, Dataquest Europe*

## ELECTRONIC PRODUCTS





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