

Packing & Crating Dynamics

Current Standards and Future Trends

November 6-7 at Carnegie Museum of Art in Pittsburgh, Pennsylvania



FOAM MATERIAL TYPES

Brian McGinnis

Foam Products Corporation



"We do more than just foam peanuts!"



- Foam Products is one of the most diverse foam fabricators in the Midwest.
- Being diverse put us in many different markets including packaging in several fields
 - Museums
 - Automotive
 - Electronics
 - Industrial and Specialty
 - Refrigeration
 - High rise and general construction,
 - Gymnastics padding



















Specialty Foams

Sealed Air Corporation

Specialty Foams Overview

The Specialty Foams team is focused on providing our polyethylene foam products to various industries including a variety of packaging and non-packaging applications:

- Automotive
- Aerospace
- Construction
- Electronics
- Military
- Sports and leisure

Specialty Foams Overview

Types of Foam

- Ethafoam[®] extruded foam
- Stratocell[®] laminated plank
- Stratocell[®] Plus laminated plank
- Cellu-Cushion[®] rollstock foam

Services

- Packaging Design & Development Centers

Fabricator Network

- We work with a dedicated network of fabricators who add value to our foam products

Ethafoam® PE Foam Plank

- Premium foam plank
- Excellent dimensional stability and recovery
- Optimal cushioning protection against repeated impacts
- Outstanding appearance



Ethafoam® PE Foam Plank

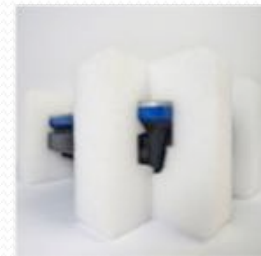
- Medium Density

	Ethafoam® Synergy MP	Ethafoam® Synergy HP	Ethafoam® FR	Ethafoam® FR-AS	Ethafoam® 150	Ethafoam® 180	Ethafoam® HRC	Ethafoam® MRC	Ethafoam® 220
Colors	Natural, Black	Natural, Black	Natural	Blue gray	Ethafoam® Synergy MP	Natural, Black, Pink, Dark Blue	Black	Black	Natural, Black, Pink
Sizes	2"x24"x108"	2"x48"x108"	2"x24"x108"	2"x48"x108"	2"x24"x108"	2"x48"x108"	1.5"x48"x108" 2"x48"x108"	1.5"x48"x108" 2"x48"x108"	1.5"x48"x108" 2"x48"x108" 3"x48"x108" 4"x48"x108"

Note: Ethafoam 150-400 extruded foams can be laminated to make 3" and 4" product

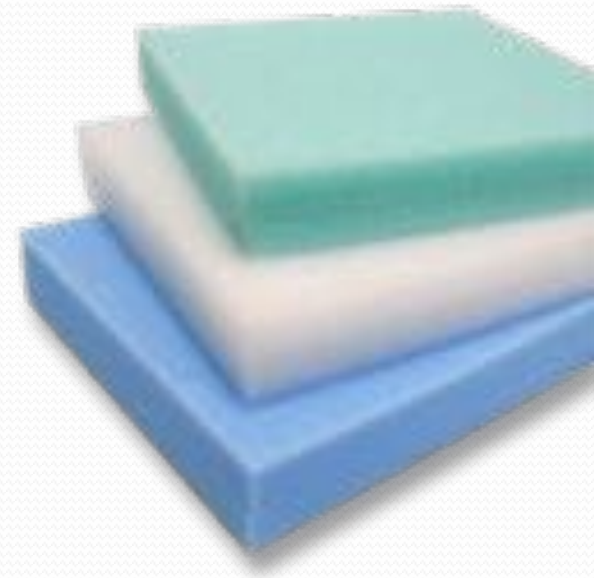
- High Density

	Ethafoam® 400	Ethafoam® 600	Ethafoam® 900
Colors	Natural (no 4"), Black (no 3"), Pink (2"x24" only)	Natural	Natural
Sizes	2"x24"x108" 3"x24"x108" 4"x24"x108" 2"x48"x108"	2"x24"x108"	2"x24"x108"



Stratocell[®] Laminated PE Foam

- Laminated foam plank
- Cushioning protection using less material
- Softer surface allows for easier fabrication and heat bonds without skiving
- Versatile thickness offering
- Laminated film or high density foam layer can be added to provide extra strength and durability



Stratocell® Laminated PE Foam

- Stratocell®

	Stratocell® E	Stratocell® S	Stratocell® H
Colors	Mint Green, Pink	Natural, Black, Pink	Natural
Sizes	2"x48"x108"	2"x48"x108"	2"x48"x108"



Note: Stratocell® S produced on the West Coast is a blue as well as natural

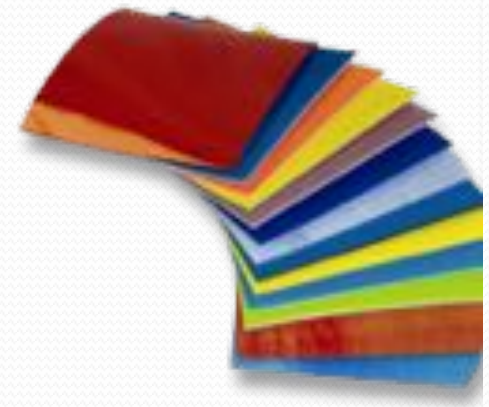
- Stratocell® Plus

	Stratocell® E Plus	Stratocell® S Plus	Stratocell® H Plus
Sizes	2"x48"x108"	2"x48"x108"	2"x48"x108"
Outside Lamination	3.5 mil film, 1/8" high density Cellu-Cushion – white or blue	3.5 mil film, 1/8" high density Cellu-Cushion – white or blue	3.5 mil film, 1/8" high density Cellu-Cushion – white or blue



Cellu-Cushion® Rollstock/Sheet PE Foam

- Thin sheet foams
- Surface protection or light cushioning applications
- Large selection of thicknesses and colors
- Available in either sheets or rollstock



Cellu-Cushion® Rollstock/Sheet PE Foam

- Medium Density

	Cellu-Cushion® 120	Cellu-Cushion® 170	Cellu-Cushion® 220
Colors	Various	Various	Various
Sizes	1/2" x 48" x 125'	1/8" x 48" x 500' 1/4" x 48" x 250' 3/8" x 48" x 200' 1/2" x 48" x 125'	1/4" x 48" x 250' 1/2" x 48" x 125'

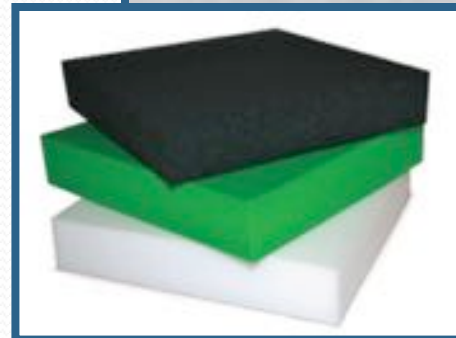


- High Density

	Cellu-Cushion® 400	Cellu-Cushion® 500	Cellu-Cushion® 600	Cellu-Cushion® 800
Colors	Various	Various	Various	Various
Sizes	Thicknesses range between 3/16" to 1/2" and are typically available in 48" widths. Availability of products vary by location, contact your local representative for more details on products in your area.			

Ethafoam® Synergy® Fine Cell PE Foam

- Low abrasion solution when presentation and performance matter
- Easy to fabricate
- Applications
 - Custom case inserts
 - Automotive returnable and expandable dunnage
 - Tool control
- Recyclable as part of our Closed Loop Recycling system



Dolphin Pad™ Foam Laminate Wrap

Superior Protection for the Moving & Storage Industry



Sealed Air's Dolphin Pad™ foam laminate is a tough resilient cushioning blanket with recycled content designed to provide superior protection for furniture and household goods during moving and storage.

One Wrap Does the Job

- **Material savings due to no double wrapping**
- **Stronger, superior protection with better crush resistance**
- **Cost-effective**
- **Replaces bulkier, heavier packaging materials**
- **Ventilated to prevent condensation**
- **Reusable**

Ethafoam® Whisper™ Sound Absorbing PE Foam

- Highly efficient in absorbing sound
 - Sound energy is lost as soon as it hits the foam membrane
 - Engineered perforations allow for viscous energy loss
 - Air cavities effectively trap sound vibrations inside the cell walls
- Resistant to water and humidity
- Applications
 - Road and rail traffic
 - Industrial machinery
 - Offices and recreational facilities



Technical Information

Oddy Test Results

Sealed Air Product	Corrosion/Oxidation Tests			Sodium Azide Test	Test Completion Date	Overall Result
	Silver Coupon	Copper Coupon	Lead Coupon	Reactive Sulfur Present?		
Ethafoam [®] 150	P	P	P	No	9/21/2011	PASS
Ethafoam [®] 180	P	P	P	No	9/21/2011	PASS
Ethafoam [®] 220	P	P	P	No	9/21/2011	PASS
Ethafoam [®] 400	P	P	P	No	9/21/2011	PASS
Ethafoam [®] 600	P	P	P	No	9/21/2011	PASS
Ethafoam [®] 900	P	P	P	No	9/21/2011	PASS
Ethafoam [®] Synergy [®] M	P	P	P	No	9/21/2011	PASS
Ethafoam [®] Synergy [®] H	P	P	P	No	9/21/2011	PASS

P = No Corrosion and/or Oxidation was observed; F = Evidence of Corrosion and/or Oxidation observed

Procedures: The material was tested for volatile compounds which create corrosion in display or storage using the standard "Oddy Test". The production of volatile compounds was tested by isolating each sample to be tested in an air tight glass vessel with polished metal coupons of lead, copper and silver. Distilled water was included in each vial to provide high relative humidity and accelerate any chemical reactions. A control set of coupons was also included. All coupons were exposed to temperatures of 40°C for a period of forty-eight days. After this time period the coupons were removed and examined using a bench stereomicroscope to assess the extent of corrosion present on each compared with the controls. This procedure was augmented by use of the sodium azide test employing cut fragments of the fabric exposed under glass to the sodium azide test reagent for 3-4 minutes under the polarizing light microscope while examining the extent of the reaction under a glass cover slip.

Conclusions: Tested products showing an overall result of "PASS" show that on the basis of the test carried out that the product is safe for direct contact with art objects for use in display, packaging, transportation and storage.

Test Authority: Tests were conducted and results certified by Dr. David A. Scott, 2054 Waipole Avenue, Los Angeles, CA 90037

Recycle Content Foams

Ethafoam® MRC: 95% Recycled Content Plank
100% of the Resin is from recycled sources
Made since March 2010

Ethafoam® HRC: 65% Recycled Content Plank
Made since March 2009

SCS Third Party Certification

Scientific Certification Systems (SCS) is a leading Globally positioned independent environmental claims verification organization.

Certification Dates:

- Grand Prairie, TX - (HRC/MRC)
- QingPu, China - (HRC/MRC)
- Louisville, KY - Q2 2013 (HRC/MRC)

Sealed Air chose SCS for third party verification of our products after extensive research and listening to recommendations from our customers. SCS requires review of the products and processes including a site inspection and audit at each location to be certified. SCS requires re-certification annually.



MINIMUM 95% RECYCLED CONTENT
PRE-CONSUMER

MINIMUM 65% RECYCLED CONTENT
PRE-CONSUMER

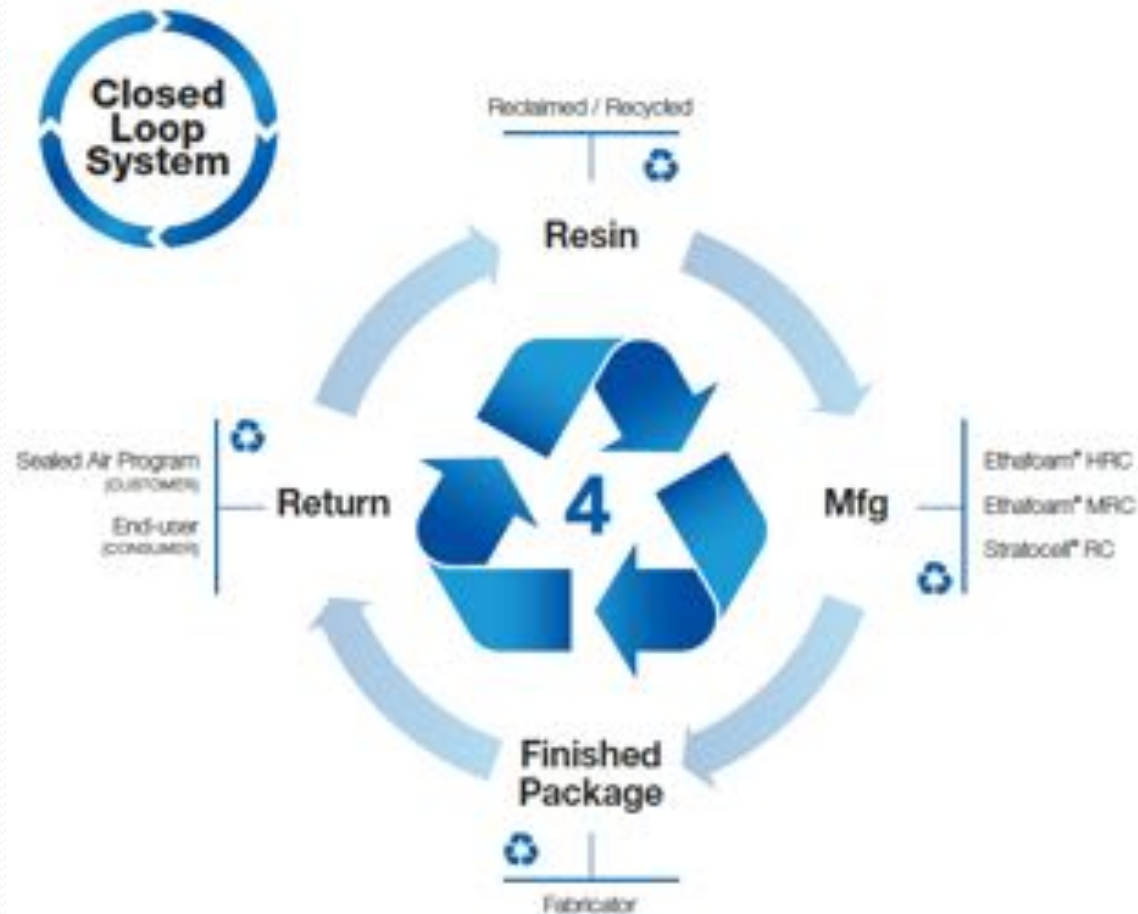




Closed Loop Recycling System

- Sealed Air is currently working with several fabricators and end users to return LDPE
 - Fabricators or end users collect clean, dry LDPE foam scrap
 - Collected scrap is packaged per guidelines or pelletized by the fabricators and end users
- Sealed Air accepts the scrap then reprocesses according to the type of scrap or resin
- Once in a clean & pelletized form, it is used in Sealed Air's various sustainable products
- Supplier and Sealed Air maintain relationship to insure most effective means of handling and using the scrap or pellets

Closed Loop Recycling System











Specialty Foams

Foam Applications

Code 3

- Emergency/Warning Vehicle Lighting and Sirens
- St. Louis, Missouri







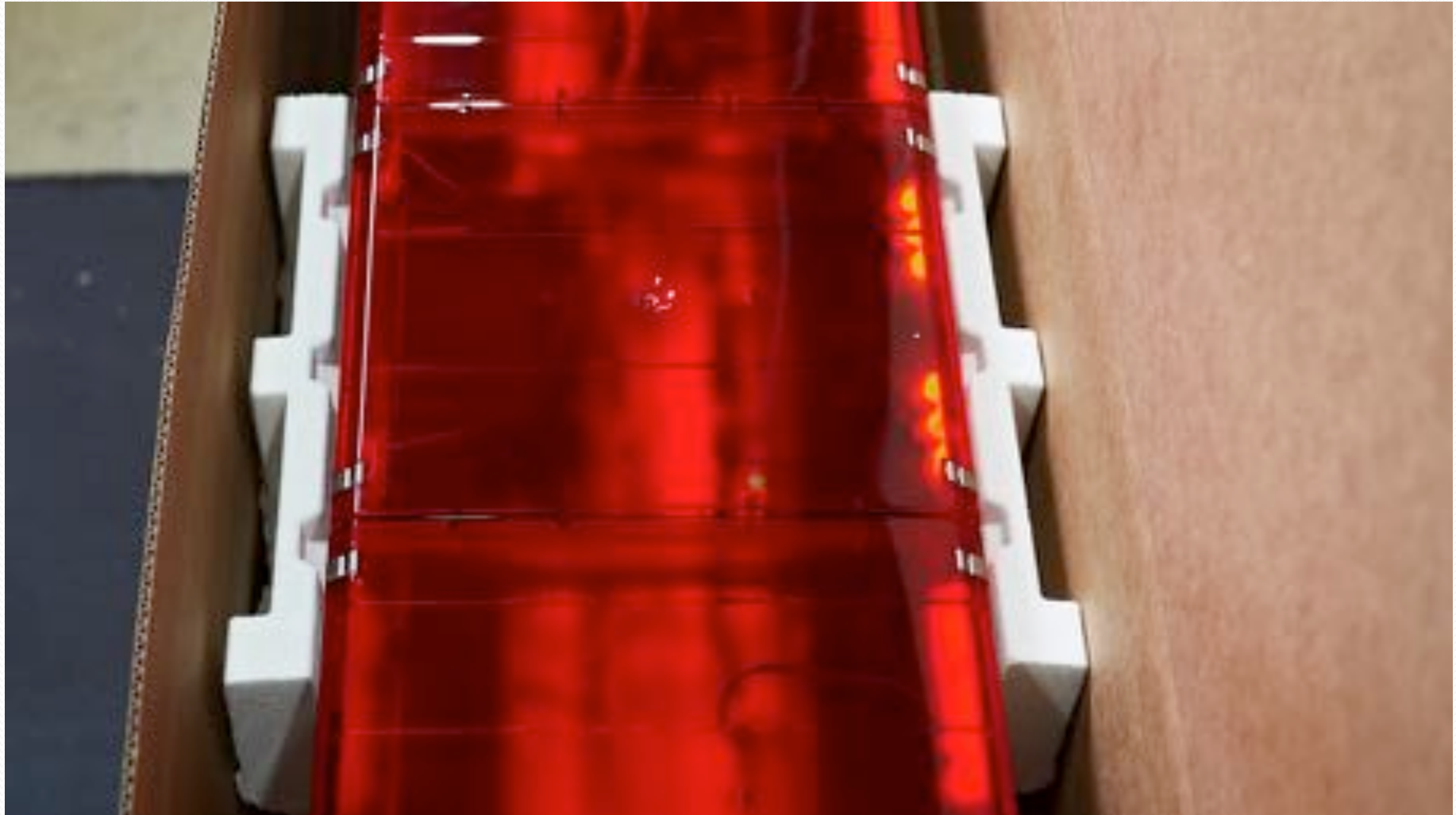


















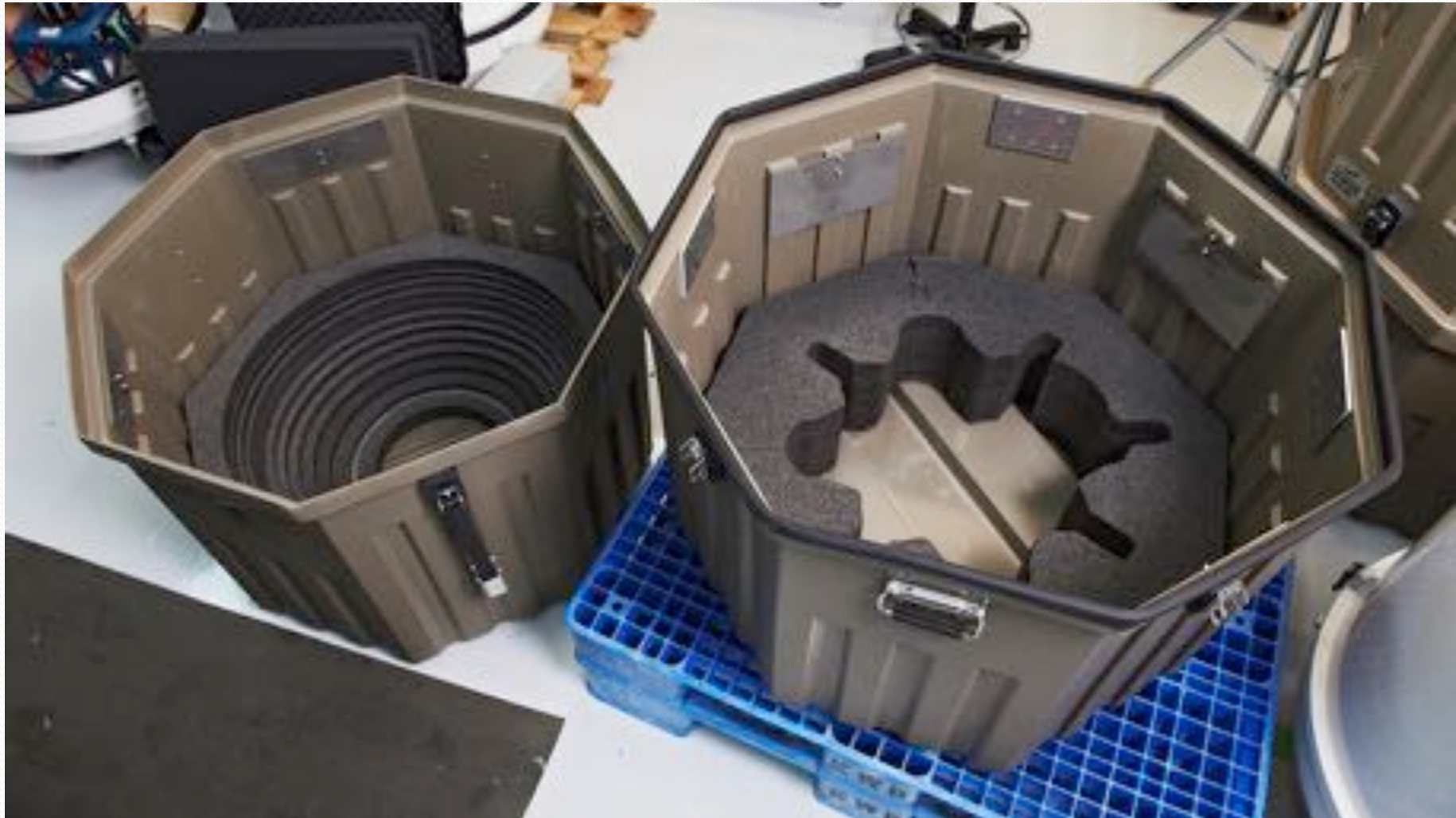






EWR Weather Radar

- The worldwide leader in portable weather radar systems
- St. Louis, Missouri













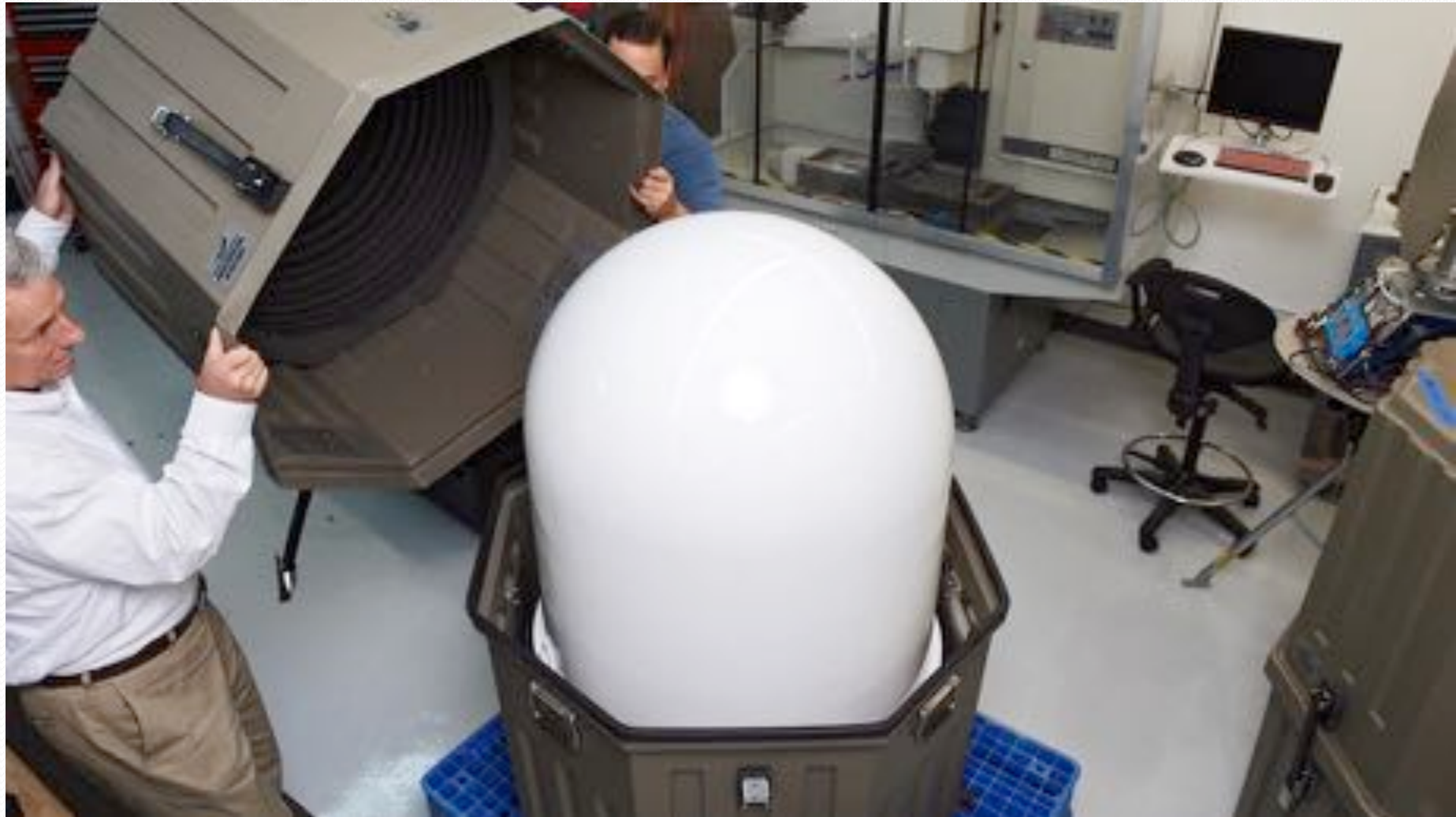








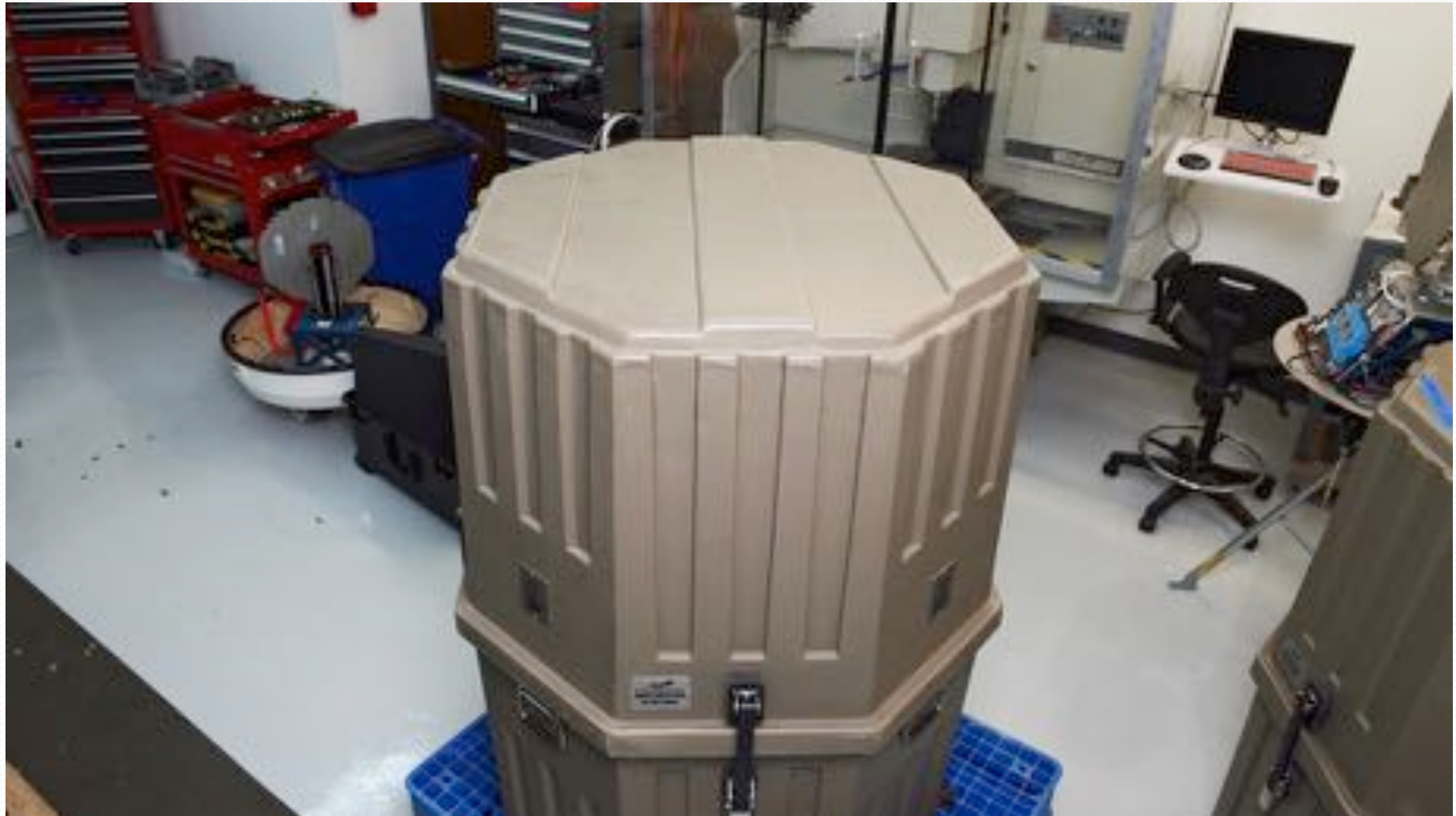












Hitchcock-Butterfield

- American Made Mirrors
- St. Louis, Missouri















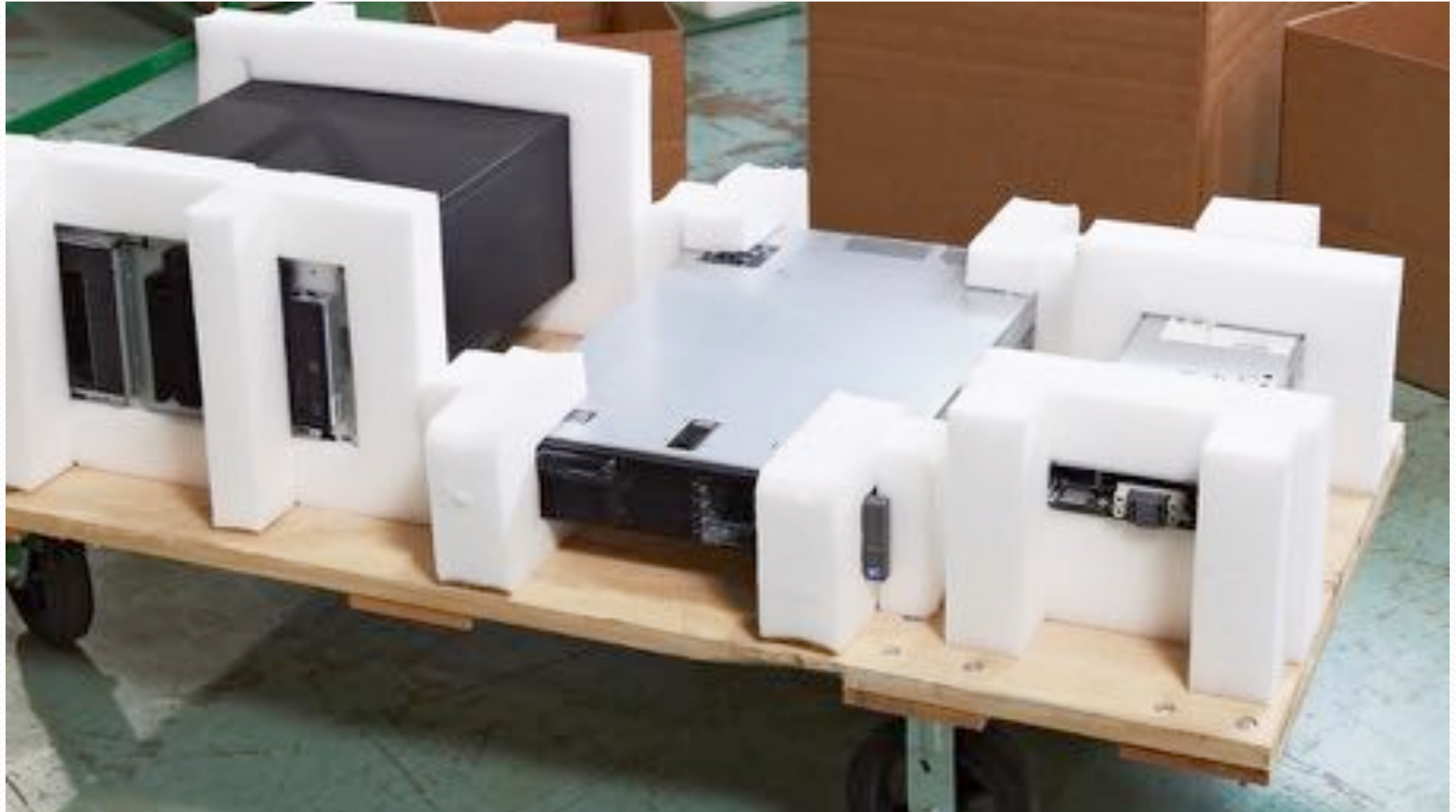




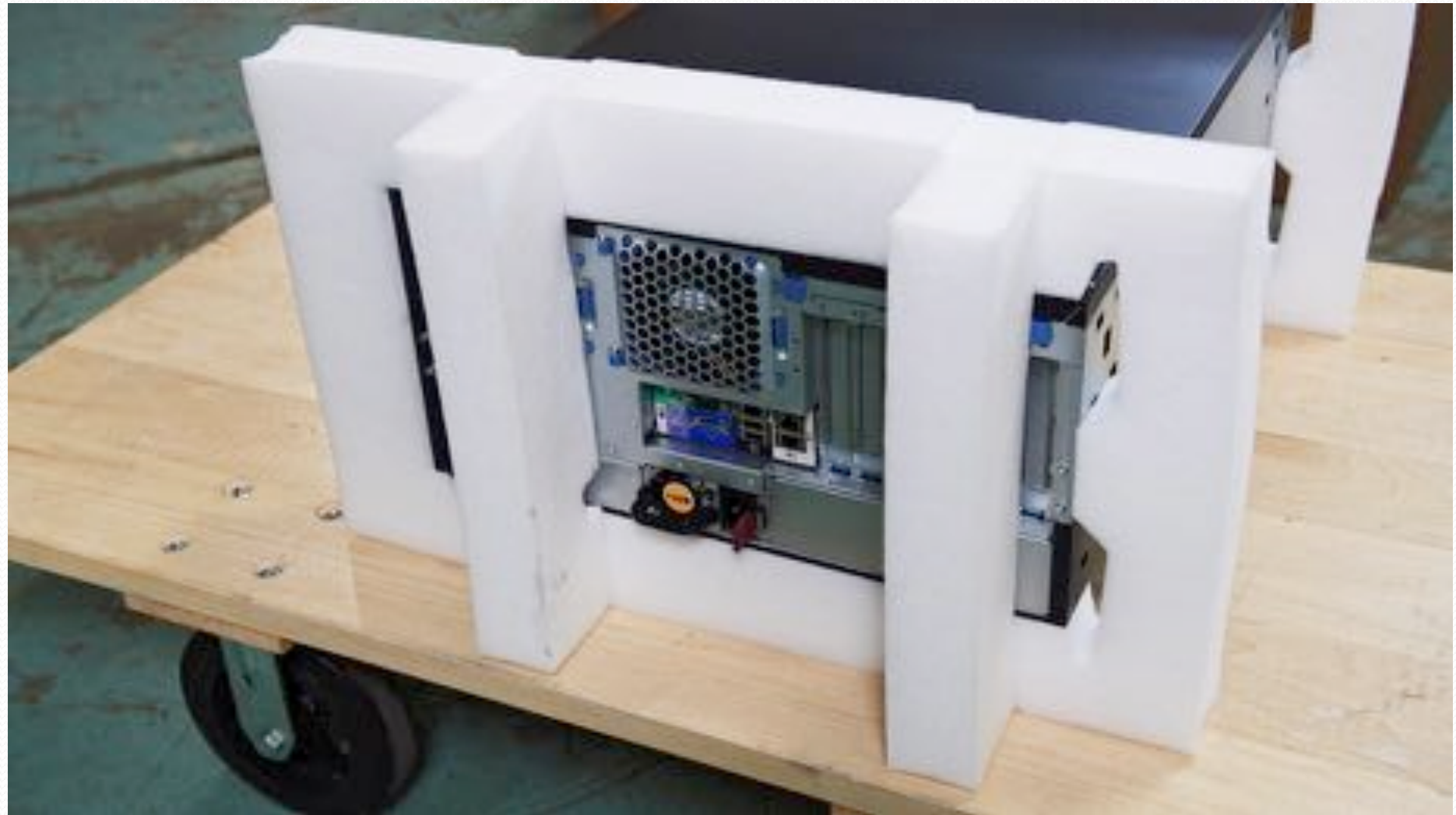
Orange Computers

- Custom built computers and peripherals with online system configuration
- St. Louis, Missouri

























































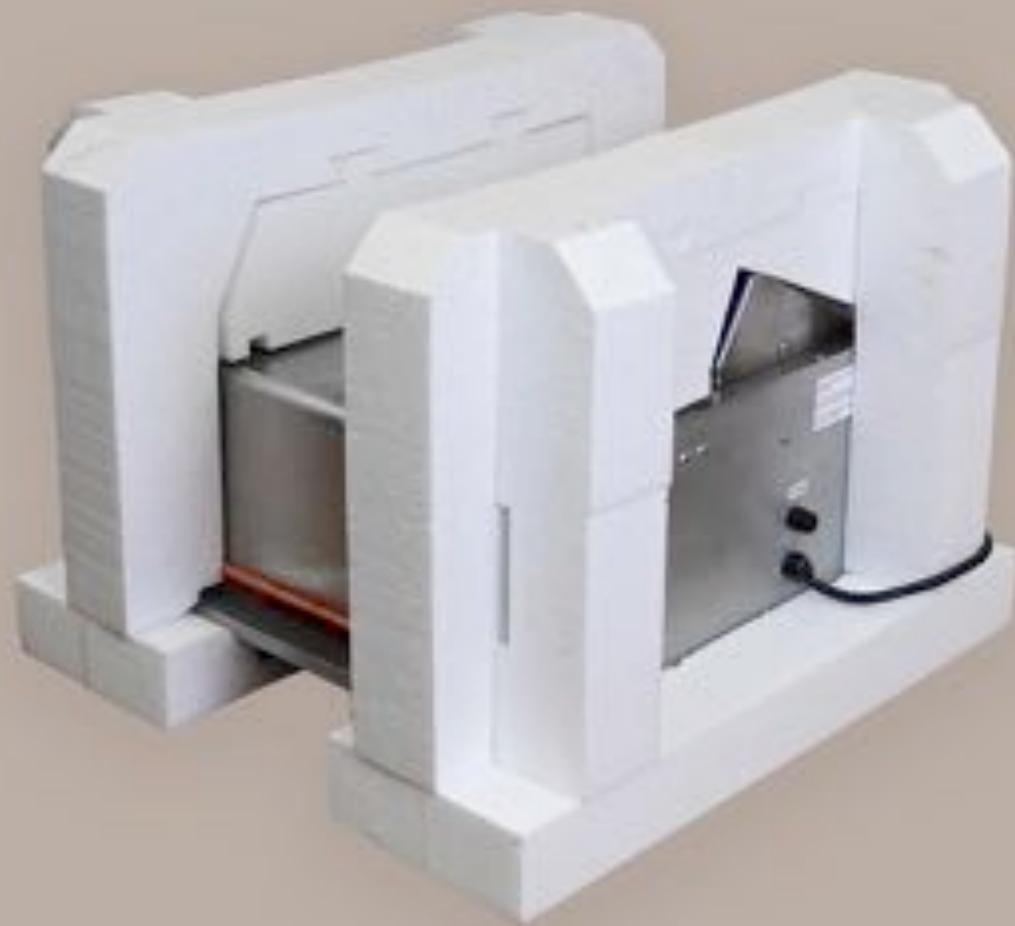


Rx Systems, Inc.

- A full service provider of pharmacy packaging and supplies.
- St. Louis, Missouri



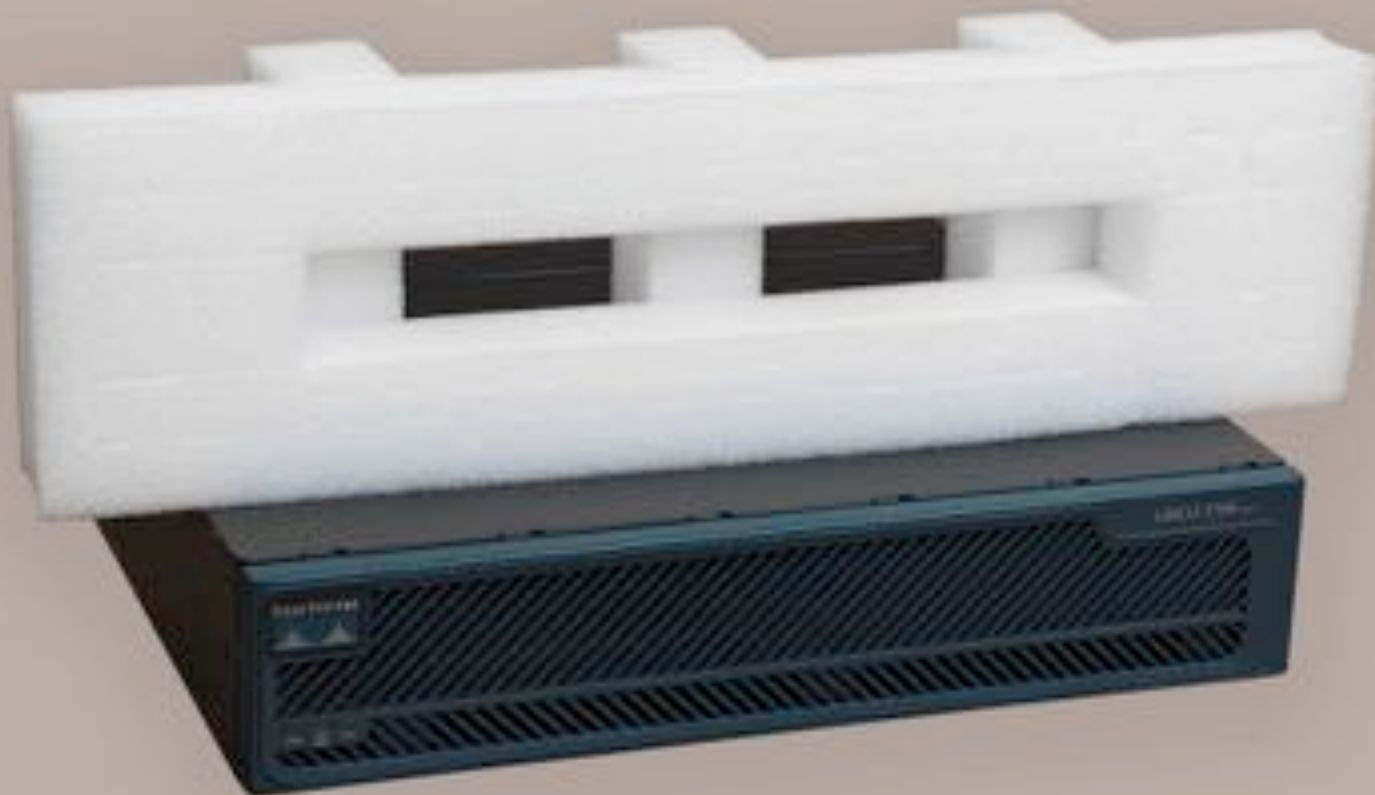






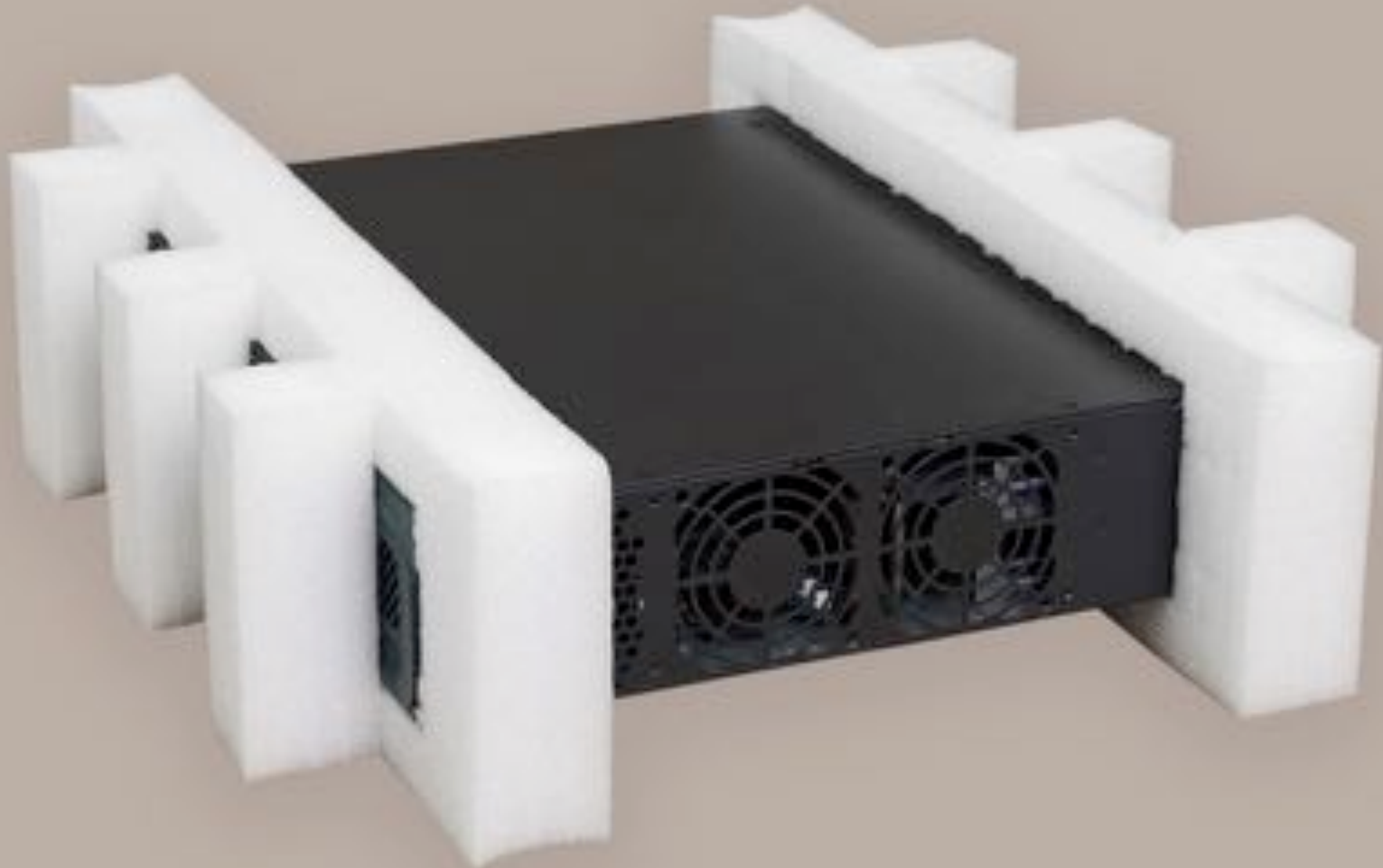
Sotel Systems

- Telecom and Networking Systems
- St. Louis, Missouri









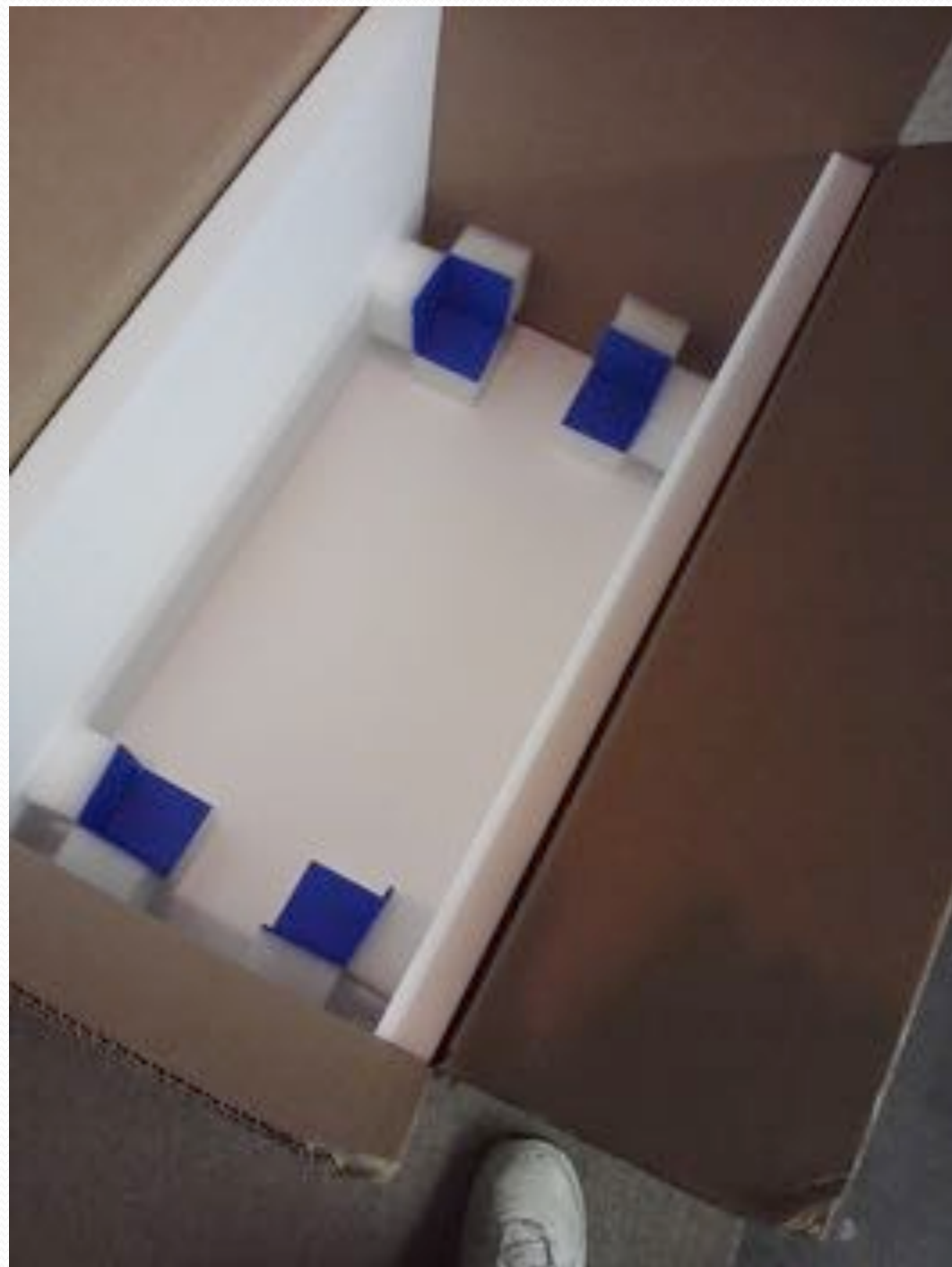
Innovative Timing

- The absolute leader in race timing technology
- St. Louis, Missouri



Landry Sound, LLC

- Speaker cabinets and enclosures
- St. Louis, Missouri







Specialty Foams

Alternative Materials

Crosslink Polyethylene

- Unaffected by Most Chemicals
- Thermoformable
- Resilient
- Low Abrasiveness
- Soft, fine cell size
- More costly than most Polyethylene materials

Cross-Linked Polyethylene

-One type of closed cell polyethylene foam is chemically cross linked polyethylene. It combines a smooth aesthetic feel with superior physical and chemical properties than standard polyethylene foam.

-This foam is available in a wide range of densities and is available in over 40 different colors. It is available in anti-static, conductive, and fire retardant formulations.

-This foam can be water-jet cut, cnc routed, laminated, thermoformed, and pressure-formed.

VOLTEK Cross-Linked Foams

-Volara is a fine-celled, irradiation cross-linked foam that offers aesthetic appeal as well as an outstanding range of performance characteristics.

-Its smooth surface, excellent consistency, gauge control, superior physical and chemical properties, low water absorption and vapor transmission make Volara a versatile, dependable solution for a host of demanding applications.

Expanded Polystyrene

- Rigid board stock (“Bead Board”)
- Lightweight
- CFC Free
- Low Cost
- CAD/CAM Fabricating Capability
- Available with Anti-Static and Fire Retardant Additives
- Single impact cushioning

-Expanded Polystyrene (EPS) is a low-cost rigid foam insulation which has a R-value of 3.85 @ 75° F. It is often referred to as “Bead Board”.

-EPS insulation is typically molded in blocks that measure 40" x 48" x 96" uncut. These blocks are then cut to the customer's specified sizes.

-EPS can be shape molded very economically (High initial tooling costs)



Flexible Polyurethane

- Lightweight
- Flexible
- Resilient
- Provides Multiple Impact Protection
- Available with Anti-Static and Fire Retardant Additives
- Available Convuluted
- Ether vs. Ester



Ether and Ester Based Polyurethane Foam: Characteristics, Differences and Uses

On a basic level, both Ether & Ester foams are considered urethane polymers, which is why their appearance, feel, and many of their applications are similar. The main difference between the two polyurethanes are their bases; Polyether triol for ether-types and polyester for ester-types. Through chemical reactions, these mixes expand and eventually form types of the polyurethane foam materials we are familiar with today.



Ester Traits:

- Less prevalently used (over all)
- Rigid & Supportive/Excellent for safely securely items in transit & protecting in storage.
- Greater Tensile Strength & Durability (mops & sponges)
- Slightly smaller cells/Better shock absorbing
- Susceptible to hydrolysis or moisture absorption
- Costlier to manufacture
- Color fade resistant

Ether Traits:

- More prevalently used (over all)
- Softer & more flexible
- Larger Cells (Greater Airflow & Moisture Permeability)
- Wider range of applications (Bedding, speaker foam, air filters & packaging)
- Resistant to Hydrolysis (keeps from retaining moisture)---Marine cushions & Outdoor patio cushions
- More affordable

Molded EPE & EPP

- Expanded Polyethylene and Expanded Polypropylene has been widely used in the Automotive Industry for years.
- Its strength, light weight and consistent nature have added to its growing use in many other markets as well.
- It can just as easily be molded as fabricated from bun stock, helping its growing demand in such areas as packaging, cushioning, marine, construction, and case inserts

Ideal for diverse applications

- Box packaging
- Sensitive military equipment and optics
- Returnable, reuseable containers
- Thermal insulation
- Protection from water, oil, chemicals
- Athletic and recreational products
- Floatation, cushioning, energy management
- Signage, exhibit and theatre





DOW Styrofoam (Blue Board)

- “KLEENEX” of the Foam World.
- Extruded vs. Expanded (“Bead Board”)
- Introduced in 1948, Styrofoam brand insulation, the Blue extruded polystyrene foam, has been a proven performer in millions of installations worldwide.
- Its unique, tight closed cell structure leaves no voids between the cells
- The result is high compressive strength and unequalled resistance to water penetration



Proof in Numbers

STYROFOAM™ Brand XPS insulation is built on sound scientific principles and the proof is in the test results. Insulation facts show outstanding white bead board in the following categories based on ASTM C578.

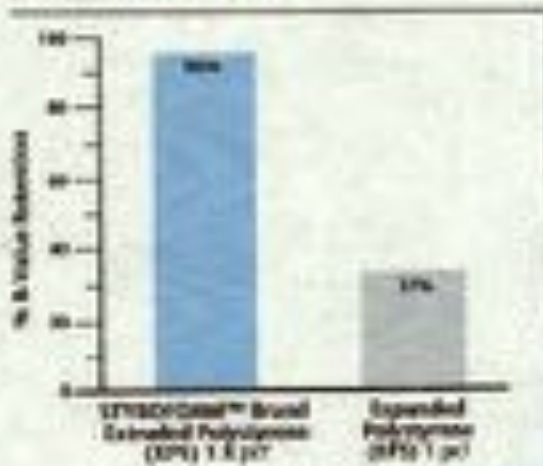
Physical Properties of STYROFOAM™ Brand XPS Insulation and Typical Bead Board		
Property and Test Method	Value	
	BLUE™ STYROFOAM™ (ASTM C578 Type II)	White Bead Board (ASTM C578 Type II)
Thermal Resistance ⁽¹⁾ at 75°, ASTM C518 @ 75°F mean temp., R-value/inch, in./in.	5.0	3.6
Compressive Strength ⁽²⁾ , ASTM D1621, psi, min.	15	30
Density, ASTM D1622, lb/ft ³ , min.	1.5	0.9
Water Absorption, ASTM C272, % by volume, max.	0.3	4.0
Water Vapor Permeability ⁽³⁾ , ASTM D1631, perms, max.	1.5	5.0
Flexural Strength, ASTM C260, psi, min.	40	25

(1) R-values compare to test from the higher R-value to the greater the insulating power. R-values are consistent with values of STYROFOAM™ for applications in 1", 4" and 6" (ASTM C578 Type II).

(2) Actual compressive strength is measured at 10 percent deformation in psi, which may exceed that

(3) Based on 1" thickness.

R-VALUE RETENTION



In a freeze/thaw cycle test of 494 cycles, STYROFOAM™ Brand XPS insulation retained 96% of its R-value, while the EPS insulation decreased to 12%.

The actual difference in R-value is that at higher temperatures, the EPS insulation will lose its ability to insulate in the same manner. STYROFOAM™ will be able to stand up to increased temperatures better than EPS insulation.



PROFLEX® PROFILES STYLE GUIDE

Pregis ProFlex polyethylene profiles provide surface and edge protection to limitless packaging applications.

-Able to conform to just about any product contour, ProFlex profiles are easy to use and withstand multiple impacts as well as constant vibration.

-They feature a chemically inert, odorless, clean, closed-cell structure with excellent resiliency, flexibility and shape memory.

-ProFlex profiles are an excellent method of protecting delicate parts for a variety of end markets and applications.


















-ProFlex profiles are available in an assortment of standard formulations, shapes and colors.

-They can be manufactured to meet your specific requirements, including fire retardancy, UV inhibition, static dissipation and enhanced malleability.



PROFLEX® PROFILES STYLE GUIDE

Pregis Proflex polyethylene profiles provide surface and edge protection to limitless packaging applications. Able to conform to just about any product contour, Proflex profiles are easy to use and withstand multiple impacts as well as constant vibration. They feature a chemically inert, odorless, clear, closed-cell structure with excellent resiliency, flexibility and shape memory. Proflex profiles are an excellent method of protecting delicate parts for a variety of end markets and applications. Proflex profiles are available in an assortment of standard formulations, shapes and colors. They can be manufactured to meet your specific requirements, including fire retardancy, UV inhibition, static dissipation and enhanced malleability.

Tube Style		Round Style	"L" Style	
				
43431	43488	43581	43434	43580
				
43487	43480	43486	43435	43588
				
41490	43617	43485	47250	
				
41489		43484	47627	



PROFLEX® PROFILES STYLE GUIDE

1/2" Style



43221



43426



471189



470910



49300



49422



49418



49520



471192



49413



49419



49410



49710



49629



49421



49417



49423

1/2" Style



471259



Packing & Crating Dynamics

Current Standards and Future Trends

November 6-7 at Carnegie Museum of Art in Pittsburgh, Pennsylvania



FOAM MATERIAL TYPES

Brian McGinnis

Foam Products Corporation



"We do more than just foam peanuts!"



THANK YOU