

90,000 TONS OF U.S. DIPLOMACY



Texas Research Institute Austin, Inc.
9063 Bee Caves Road
Austin, TX 78733



**POLYUREA DEVELOPMENT ASSOCIATION
THIRD ANNUAL CONFERENCE**

Specifying Versatility

**The Role of Independent Testing Labs
for Development, Analysis and
Product Qualifications**

Al Perez

Texas Research Institute Austin, Inc.

December 9-11, 2002

San Antonio, Texas



PRESENTATION OUTLINE

- **Independent Testing Labs**
- **Benefits to the Coating Industry**
- **Partial Listing of Established Labs**
- **Contracting, Non-Disclosure Agreements**
- **Certifications**
- **Unique Specialties of Each Lab**
- **Test Development**
- **Polyurea Related Issues**
- **Developments and Applications**



INDEPENDENT TESTING LABS

- Established, accredited materials testing labs with expertise in material verification, corrosion studies failure analysis, expert testimony, etc.
- Provide a resource for an extensive array of tests
- Uphold strict confidentiality of results.
- Understand that building trust and confidence with the customer is critical to continued business relationships.
- Furnish valuable technical support and pre-production services designed to prevent mishaps by addressing potential problems during the development stage.
- Increasingly important as prime contractors and manufactures increasingly demand accreditation and more emphasis on quality.



INDEPENDENT TESTING LABS

- Undertake internal audits required for accreditation.
- Maintain accreditation from various reporting agencies by keeping up-to-date with regulations and activities associated with the company.
- Staff with personnel that have specific areas of expertise.
- Replace lost experience, the disturbing by-product of downsizing.
- Provide outside consultation expertise that may be absent at the client's operations.
- Compliment client's in-house quality control through verification.
- Accredited labs can provide numbers, *and certify* products.



BENEFITS TO THE COATING INDUSTRY

- Provides a competent, unbiased, independent resource that can provide relevant, meaningful and reliable information on the use and performance of finished products as well as their raw materials.
- Source of legal and expert assistance in cases of product liability.
- Provide studies on products intended for use in coatings, caulks, sealants and waterproofing, both from a raw material and finished product perspective.
- Active participants in professional organizations related to industries that are served.



BENEFITS TO THE COATING INDUSTRY

- Reliable Source for Specification Testing - ASTM, DOT, MIL SPEC, Federal Standards, etc.
- Forensics Analysis - Identify VOCs, combustion studies, materials failure, overspray identification, microbial growth analysis, etc.
- Expert testimony and litigation support.
- Product de formulation for suspected patent infringement, competitor product matching, quality control of batch and continuous process products, etc.
- Raw material evaluation.
- Formulation development and testing.
- Product improvement.
- Provide training and educational seminars.
- Research and publication of papers.



PARTIAL LISTING OF ESTABLISHED LABS

- D/L Laboratories New York, New York, www.dllabs.com
- CalCoast Laboratories www.calcoastlabs.com
- Matco Associates, Inc. Pittsburgh, PA, www.paintanalysis.com
- Paint Research Associates Laboratories Ypsilanti, Michigan, www.pralabs.com
- The Coatings Laboratory Houston, Texas, www.paintlab.com
- Texas Research Institute Austin, Inc, Austin, Texas, www.tri-austin.com
- Detroit Testing Labs, Warren, Michigan, www.dtl-inc.com



SAMPLE LISTING OF UNIQUE SPECIALTIES OF INDEPENDENT TESTING LABS

- The Coatings Laboratory - Dedicated to paints and coatings.
- Detroit Testing Laboratory - A2LA (American Association for Laboratory Accreditation) accredited lab with a specialty in automotive specification testing.
- MATCO Associates, Inc. - Coatings analysis, can have a specialist on-site within 48 hours of notification.
- D/L and CalCoast Laboratories - Serving the coatings, sealants and waterproofing industries. Fully equipped and approved under ISO/IEC Guide 25 and ISO 9002.
- TRI/Austin, Inc. - Specializes in polymer development with an emphasis on high-performance military applications.



TRI/AUSTIN

SPECIALTIES AND CAPABILITIES

- POLYMER DEVELOPMENT
- POLYMER ANALYSIS
- SMALL BUSINESS INNOVATION RESEARCH PROGRAM (SBIR)
- NOVEL TEST DEVELOPMENT



POLYMER ANALYSIS



DSC AND TGA



TMA



DYNAMIC MECHANICAL ANALYSIS (DMA)



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DYNAMIC MECHANICAL ANALYSIS

- Measures modulus (stiffness) and damping (energy dissipation) of a material as the material is deformed under periodic stress.
- Particularly useful for evaluation of viscoelastic materials such as polymers which exhibit time, frequency, and temperature dependent behavior.
- Information Provided

Modulus

Primary and secondary transition temperatures

Rate and degree of cure, gelation and vitrification

Viscosity

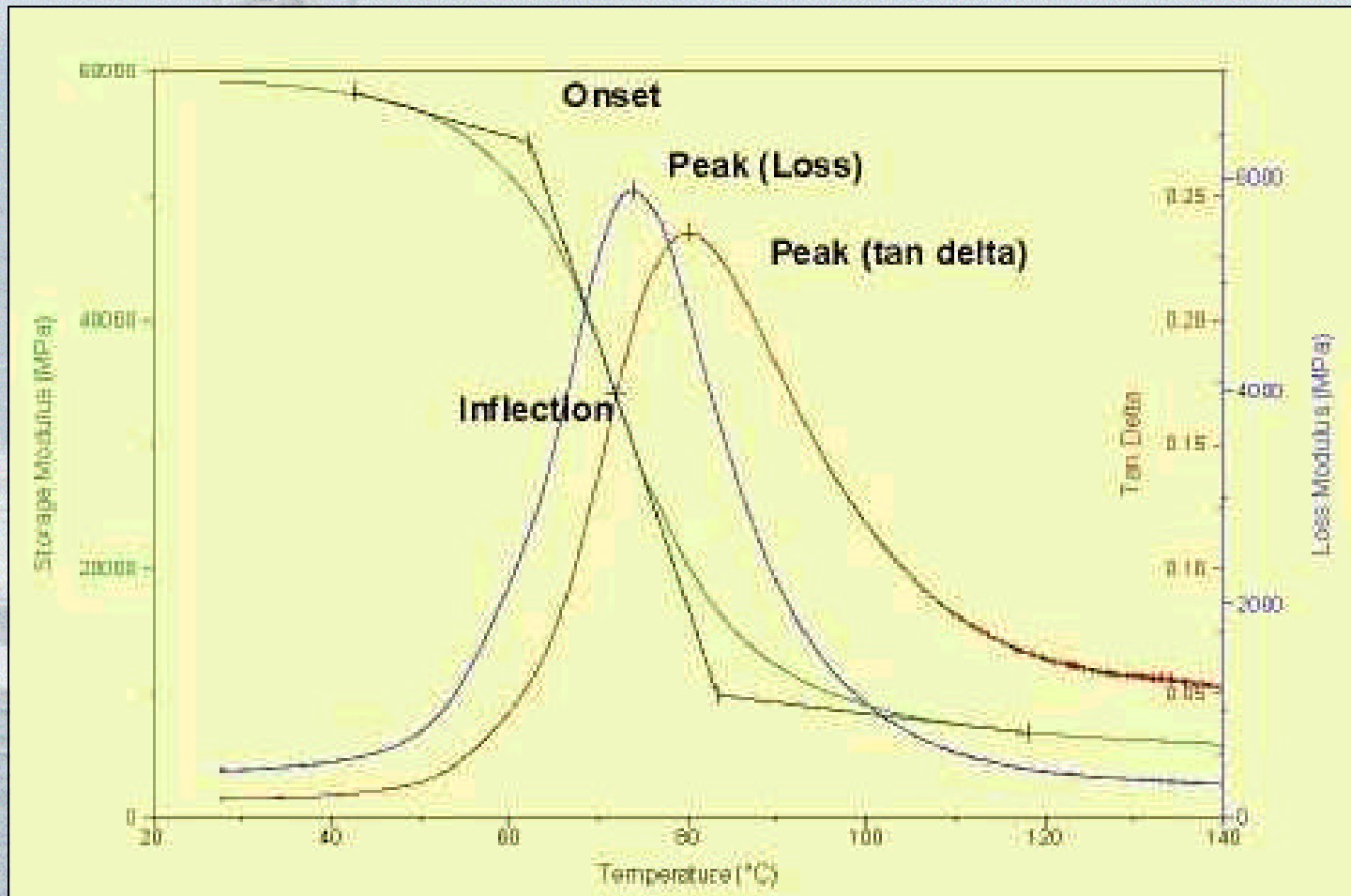
Damping characteristics

(impact resistance, sound absorption properties

Polymer morphology



TYPICAL DMA SPECTRUM



THERMAL MECHANICAL ANALYSIS (TMA)



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THERMAL MECHANICAL ANALYSIS (TMA)

ASTM E831, D696 and D3386

- Determines dimensional changes of a polymer as a function of temperature or time.
- Used for measurements of glass transition temperature, expansion, shrinkage, dimensional stability, softening/curing behavior and volumetric expansion.



ANALYTICAL SERVICES

FT-IR AND GPC

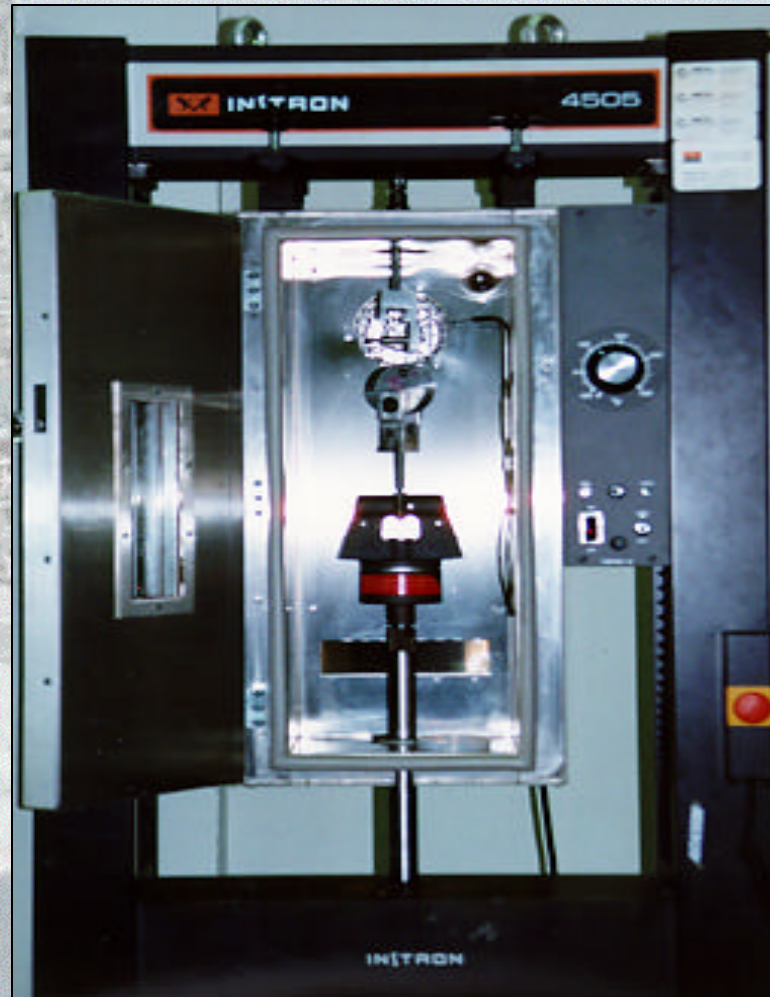


ACCELERATED AGING QUV WEATHEROMETER



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Environmentally Controlled Material Testing



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FT-IR SMOKE GENERATION ANALYSIS



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FEDERAL STANDARD 501 METHOD 6011

Brooklyn Tunnel Fire Test



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FEDERAL STANDARD 501 METHOD 6011



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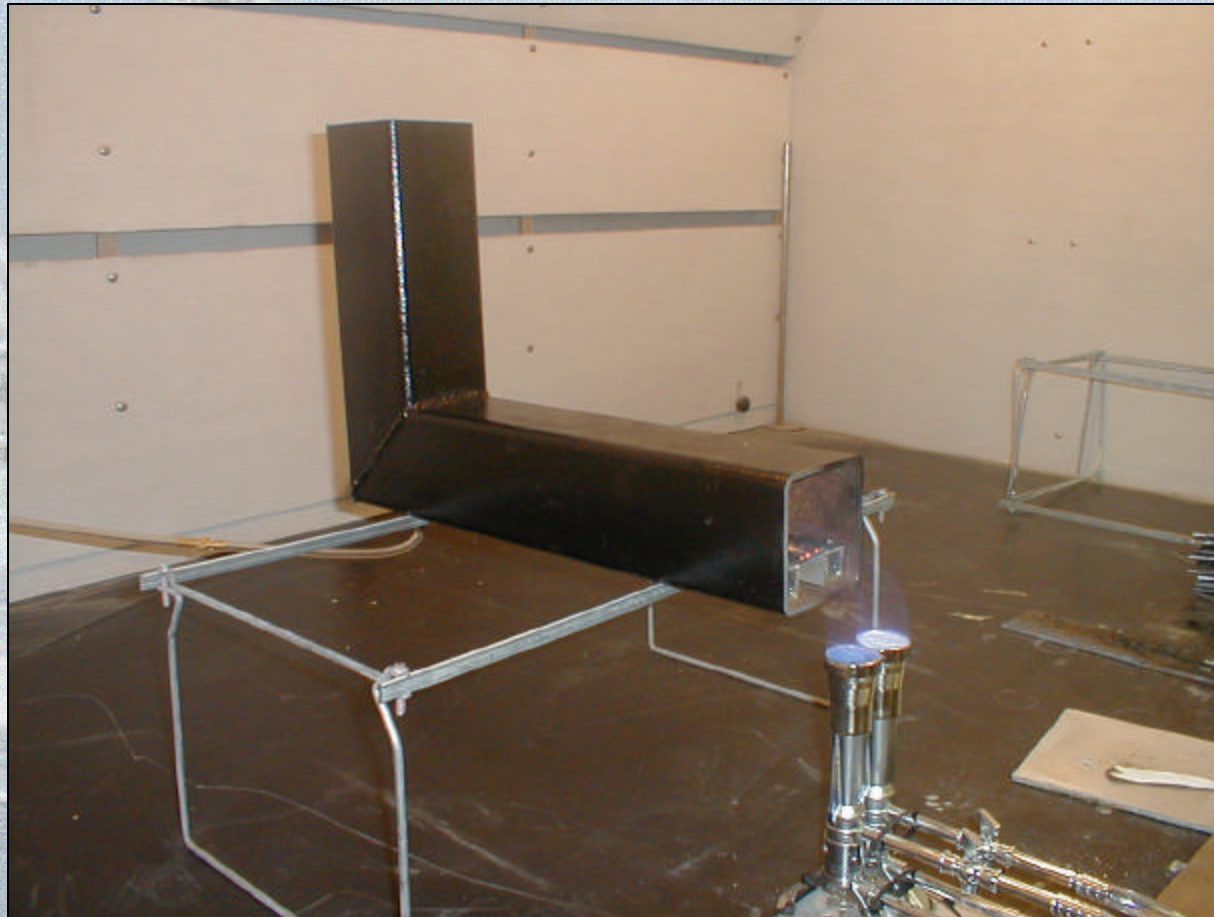
FEDERAL STANDARD 501 METHOD 6011

Sample after test



TRI TEST FABRICATION

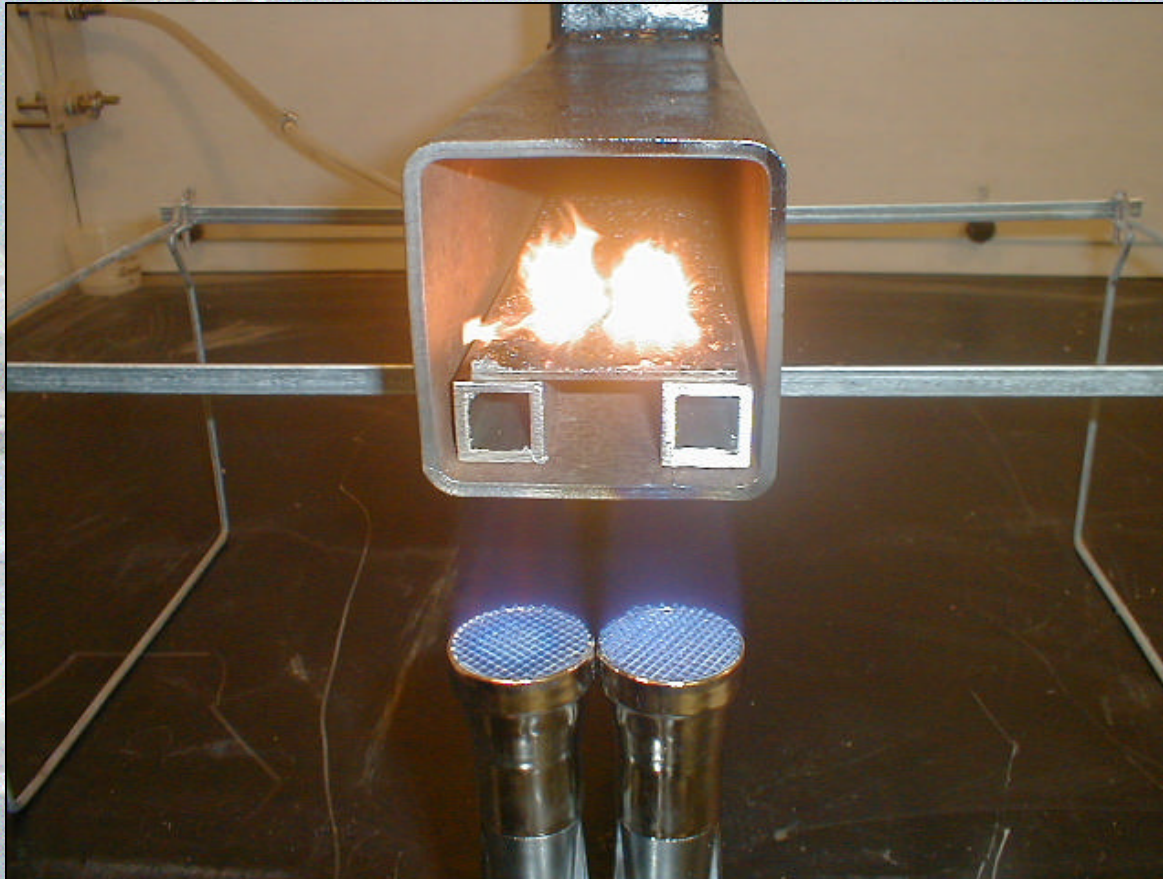
FEDERAL STANDARD 501 METHOD 6411



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TRI TEST FABRICATION

FEDERAL STANDARD 501 METHOD 6411



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FEDERAL STANDARD 501 METHOD 6411



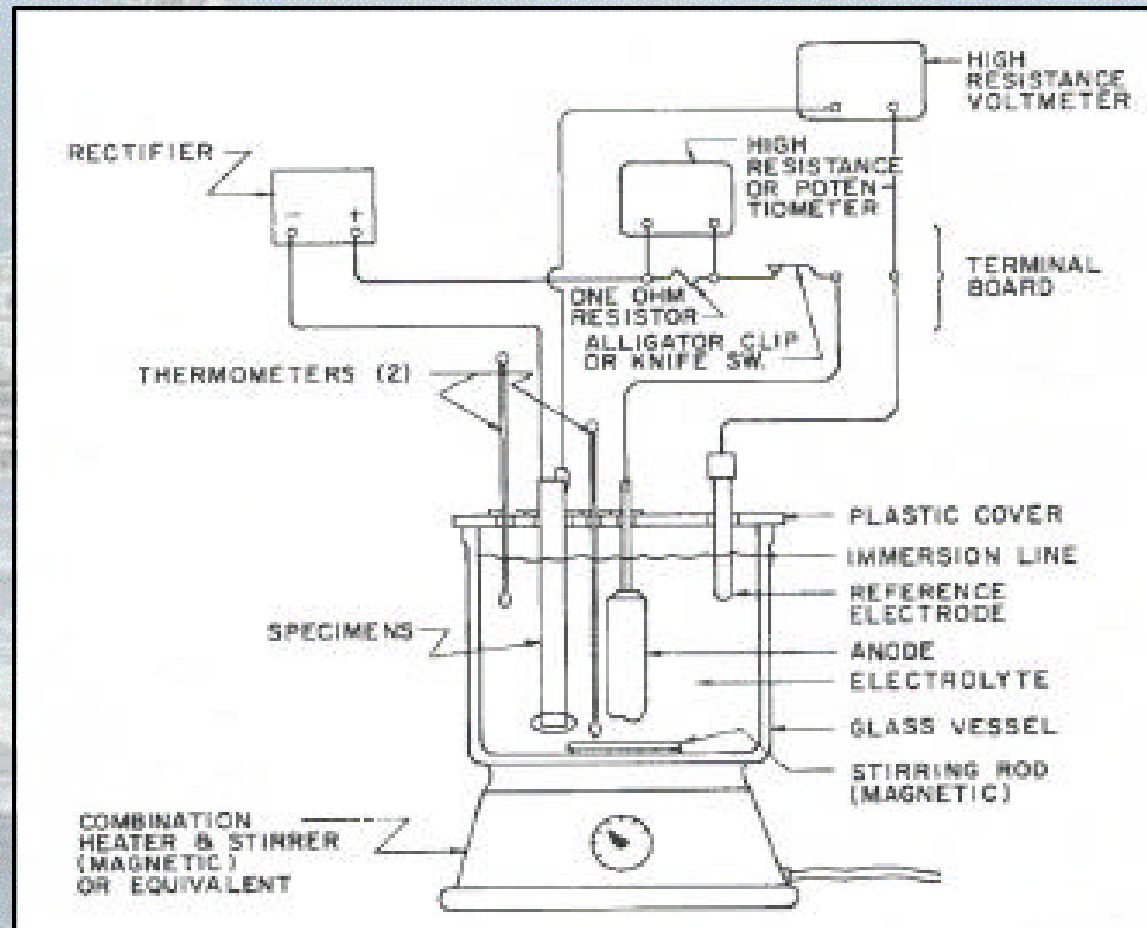
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TRI TEST FABRICATION

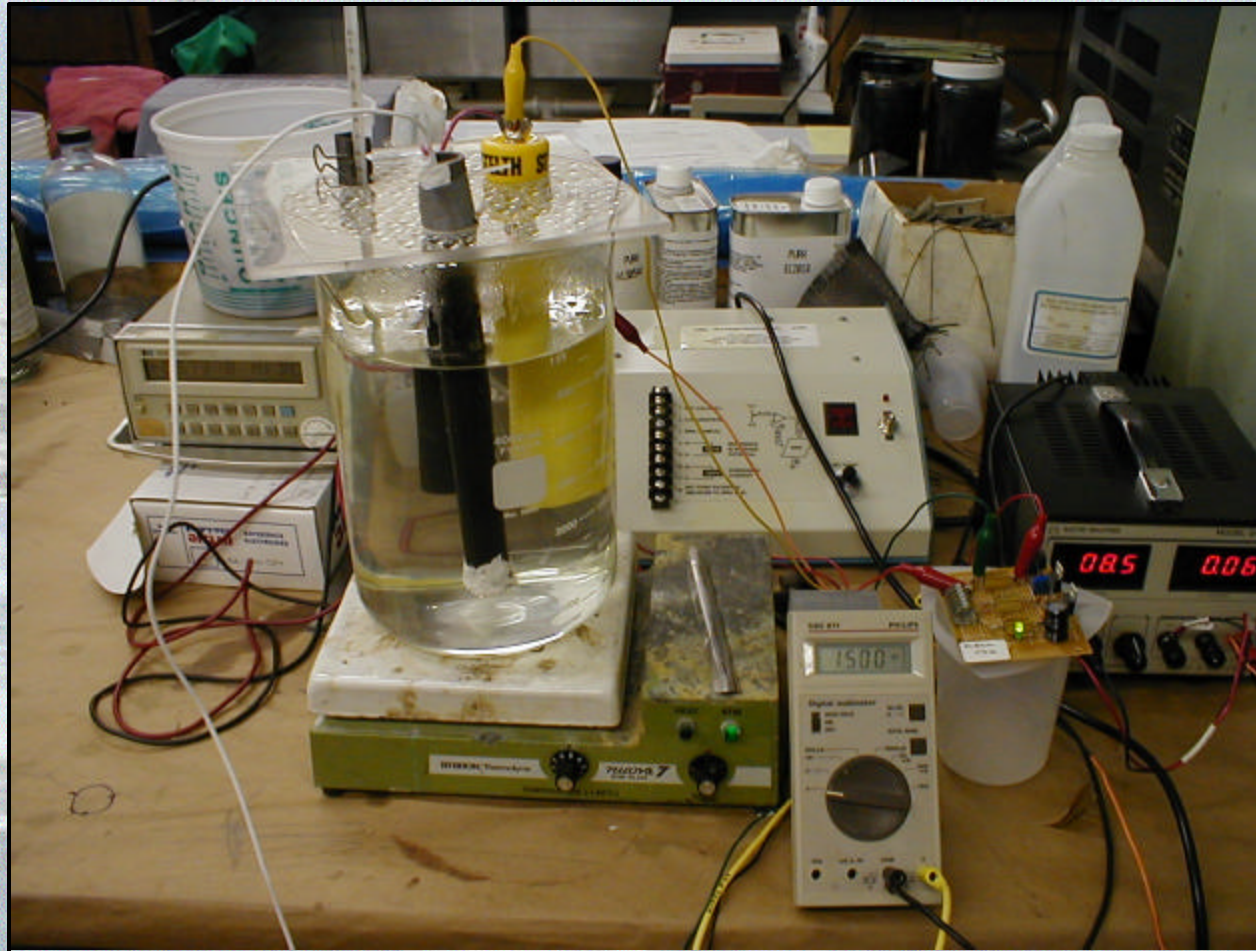
Reproduction of a large-scale test apparatus into a lab-scale version with excellent correlation.



CATHODIC DISBONDMENT TESTING NACE RPO394-94



TRI CATHODIC DISBONDMENT TESTING APPARATUS



CATHODIC DISBONDMENT TESTING



FLAMMABILITY TESTING



ASTM D2843
SMOKE
GENERATION

ASTM D2863 OXYGEN
INDEX



TRI DEVELOPED FIRE SUIT TEST



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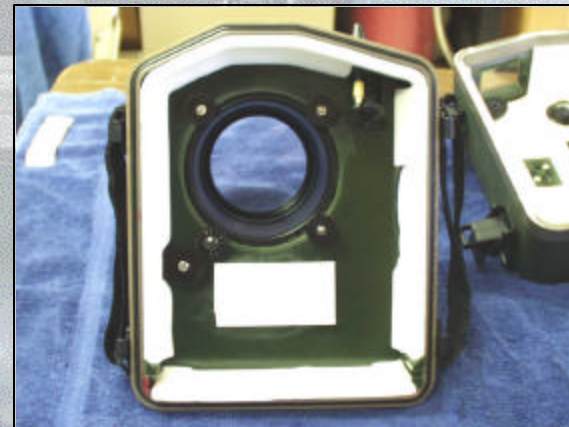
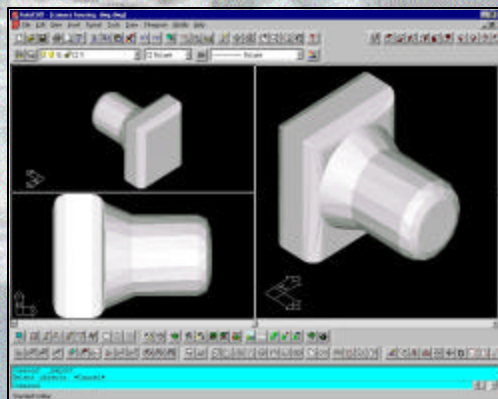
UNIQUE CAPABILITIES

Polyurethane / Polyurea Spin Casting



POLYURETHANE SPIN CASTING

Hostile Environment Camera Housing



U.S. GOVERNMENT CLIENTS

Air Force Research Laboratory

Army Corps of Engineers

Army Materials Technology
Laboratory

Army RDT&E

Army Redstone Arsenal

Army Research Laboratory

Army Research Office

Army TACOM

Army TACOM-ARDEC

Defense Electronics Supply Center

Defense Supply Center Columbus

DOT FHWA

Marine Corps Systems Command

NASA Langley Research Center

Naval Air Systems Command

Naval Air Warfare Center

Naval Facilities Engineering
Command

Naval Postgraduate School

Naval Research Laboratory

Naval Sea Systems Command

Naval Surface Warfare Center

Naval Undersea Warfare Center

Navy Aviation Depot

Navy Ships Parts Control Center

Office of Naval Research

SPAWAR

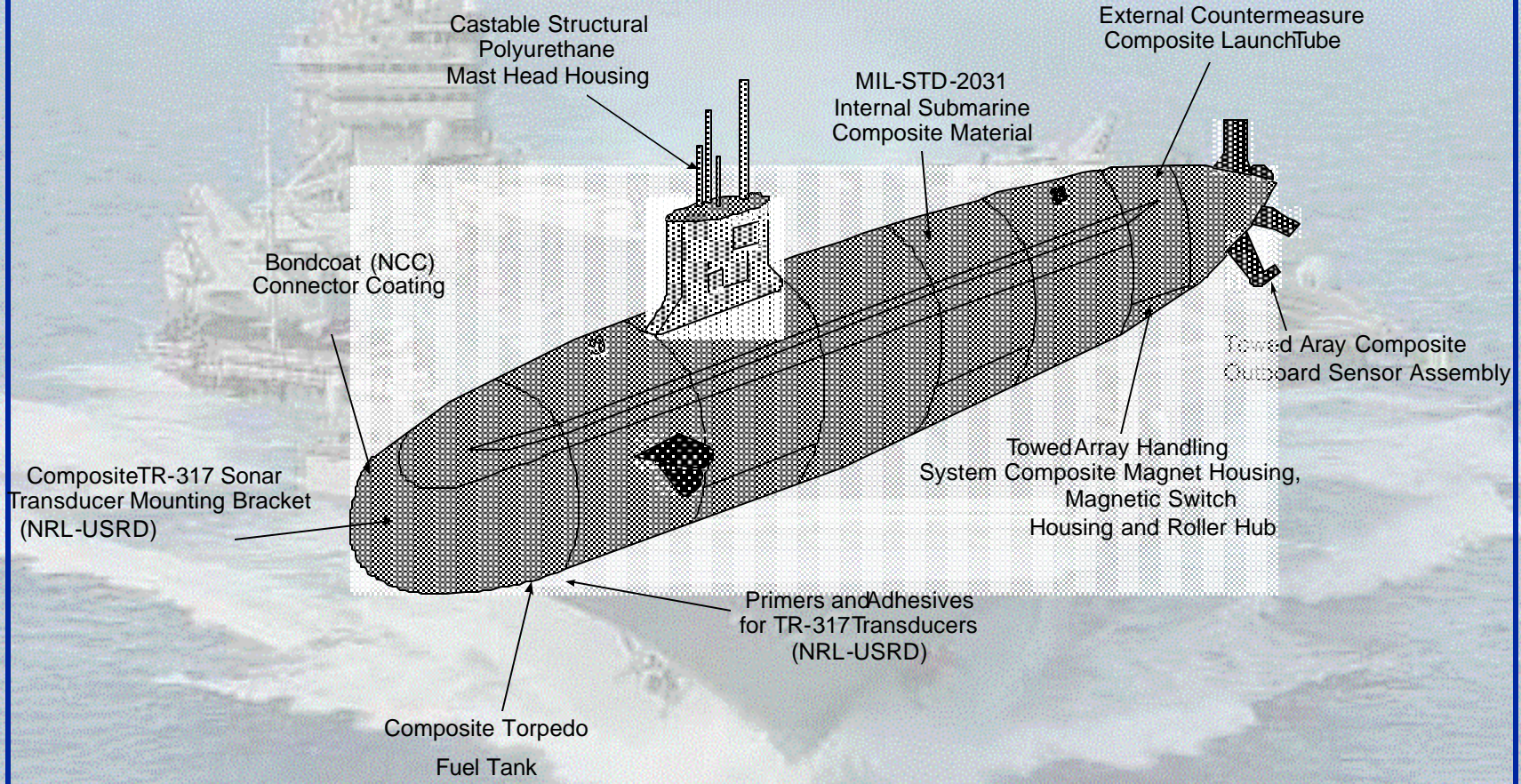


COMMERCIAL CLIENTS

- American Petroleum Institute
- Arco
- AT&T
- Chevron
- Ciba-Geigy
- Cypress Semiconductor
- Dow Chemical
- DuPont
- Exxon
- General Electric
- Hoechst-Celanese
- IBM
- Johnson & Johnson
- Kimberly Clark
- Lockheed Martin
- Mobil
- Motorola
- Occidental Chemical
- Radian
- Sematech
- Teledyne
- 3M
- Tracor
- TRW
- Union Carbide
- W.L. Gore



TRI NAVAL SUBMARINE PROJECTS



AEGIS DESTROYER

Ongoing/completed projects

High Performance
Non-skid Deck Coatings

Low Smoke
Cable Jackets

Fast Room Temperature
Cure Fiber Optic Adhesive



Composite Pipe
Coupling

Corrosion Under Pipe
Insulation NDE

Corrosion Under
Paint NDE



THE U.S.S. TRUMAN

An mobile facility of considerable surface area requiring constant coating application.



NON-SKID AIRCRAFT CARRIER COATING

How tough is your coating?



TAILHOOK LANDING ARRESTOR



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TAILHOOK LANDING ARRESTOR



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AIRCRAFT CARRIER FLIGHT DECK WITH ARRESTOR CABLES VISIBLE



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TRI/AUSTIN AIRCRAFT CARRIER REAR NON-SKID TEST PATCH AREA



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TRI/AUSTIN AIRCRAFT CARRIER FORWARD NON-SKID TEST PATCH AREA



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JOY OF JOYS

Proper high-pressure water jet surface preparation of the steel surface!

(Note fresh tire tracks over prepared steel)



ROLLER COAT PRIMER APPLICATION



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ROLLER COAT APPLICATION OF NON-SKID TOP COAT



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ENVIRONMENTAL APPLICATION CONDITIONS: NON-IDEAL

After persistent rain, the storm passed and the project immediately commenced.



Carrier Deployment Time: 1 year
Estimated Number of Landings: 10,000
Deck Surface Coating: TRI/Austin Tough-Grip™

