ATLAS
MATERIAL TESTING SOLUTIONS

SunSpots®

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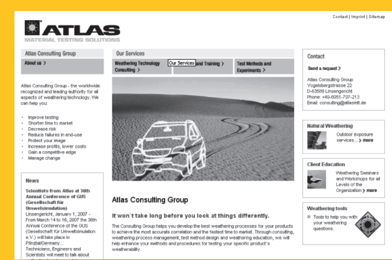

Atlas unveils new consulting website
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Reliability Assessment of New Polymer Products

Environmentally Driven Failures by Natural and Accelerated Means

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White Bear Lake, Minnesota 55110

Abstract

This paper presents a methodology for the reliability assessment of new product offerings, where product failures are driven by environmental conditions. The methodology is valid for the case of limited related product field data, related accelerated weathering data, and understanding of underlying environmentally driven failure mechanisms. The methodology uses reliability theory in concert with failure mechanistic models to provide high resolution models that can be used to forecast liability exposure of new product offerings. The methodology has been successfully demonstrated for two cases: 1) a polyolefin product where field data and accelerated xenon weathering are correlated through use of chemical and physical methods, and 2) an evaluation of vinyl-based products and field-driven failures. The quantitative results generated suggest environmental region risks, overall new product risk, and risk relative to existing related products.

Variable Definition

τ = time to failure
A, E, b = empirical constants
k = Boltzmann's constant
T = absolute temperature
S = stress level
F(t) = cumulative unit failure at time t
t = time
β = Weibull shape parameter
θ = Weibull characteristic life

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AtlasShows

2007

ExpoPharma
March 13–16
Mexico City, Mexico

Lab Africa
March 14–16
Johannesburg, South Africa

Strategies for Formulation & Forced Degradation
March 19–21
San Diego, California, USA

Saigon Textile and Garment Industry Expo
April 4–7
Hochiminh City, Vietnam

BULCONTROLA
April 25–28
Sofia, Bulgaria

FOCUS 2007
May 3
Troy, Michigan, USA

ANTEC 2007
May 6–10
Cincinnati, Ohio, USA
Booth #822

BrasilPlast
May 7–11
São Paulo, Brasil

European Coatings Show
May 8–10
Nürnberg, Germany
Hall #1, Booth #1-256

9th International Conference on Woodfiber-Plastic Composites
May 21–23
Madison, Wisconsin, USA
Booth #119

14th International Engineering
May 22–25
Nitra, Slovakia

Sink or Swim 2007
May 23–24
Akron, Ohio, USA

Coatings for Plastics Symposium
June 13–15
Chicago, Illinois, USA
Booth #10

Latin American Coatings Show 2007
July 10–11
Mexico City, Mexico
Booth #5

Designing for Durability 2007
July 23–25
Seattle, Washington, USA

Chemistry
September 3–7
Moscow, Russia

ITMA 2007
September 13–20
Munich, Germany
Hall #A4, Booth #338

Materials Testing 2007
September 18–20
Glasgow, Scotland

International Plovdiv Fair
September 24–29
Plovdiv, Bulgaria

ANALITICA
September 26–28
São Paulo, Brasil

MSV Industry Fair
October 1–5
Brno, Czechia

RICH MAC
October 2–5
Fieramilano, Italy

IFAI 2007
October 3–5
Las Vegas, Nevada, USA
Booth #2212

ICE 2007
October 3–5
Toronto, Ontario, Canada

Eurofinish 2007
October 17–19
Gent, Belgium

Automotive Testing Expo North America 2007
October 24–26
Novi, Michigan, USA

K-Show
October 24–31
Duesseldorf, Germany
Hall #10, Booth #10C23

ABRAFATI 2007
October 24–26
São Paulo, Brasil

Eurocoat 2007
November 6–8
Genova, Italy

23rd Annual Research Conference in Pharmaceutical Sciences and JSPS 1st Medicinal Chemistry Seminar of Asia/Africa Science Platform
December 14–15
Bangkok, Thailand

*For the latest on Atlas shows and presentations, visit **www.atlas-mts.com.***

Reliability Assessment, from page 1

Objective

It is desirable to have a methodology that supports rapid time to market of polymer-based products. The methodology must provide quantitative lifetime durability projections that support correct design decisions at the earliest phases of product development. Reliability theory coupled with quantifiable failure mechanism knowledge is necessary to realize this goal. A mathematically sound, design-based approach is crucial, as there is often limited or no field data available for the proposed product, and the highest resolution and highest confidence estimate is desired.

Methodology

Reliability theory provides a means to quantifiably predict the success rate of a product over its intended life. It involves a synergistic coordination of probabilistic concepts, design knowledge, and failure mechanism understanding. It is useful for predicting product field performance, as it captures the inherent variabilities of both the stress imposed by the environment and the inherent strength of the product to resist the environment. This probabilistic nature of reliability theory is critical, as products have such distributed strengths competing with distributed environments, rather than having discrete strength and stress levels. The areas of overlap of stress and strength distributions will result in product failure, as shown in Figure 1 [1].

The methodology developed toward the end result of capturing and quantifying such failure events for new products can be outlined as follows:

1. Statement of the problem
2. Failure Modes and Effects Analysis of the proposed product
3. Development of system model which incorporates the individual failure modes
4. Development of mechanistic models for each failure mode
5. Screening of field service data of relevant reference products
6. Failure distribution fitting of reference product field service data
7. Incorporation of relevant product distributions into mechanistic models
8. Projection of system reliability for proposed product

FIGURE 1: Continuous vs. Discrete Stress-Strength Distributions

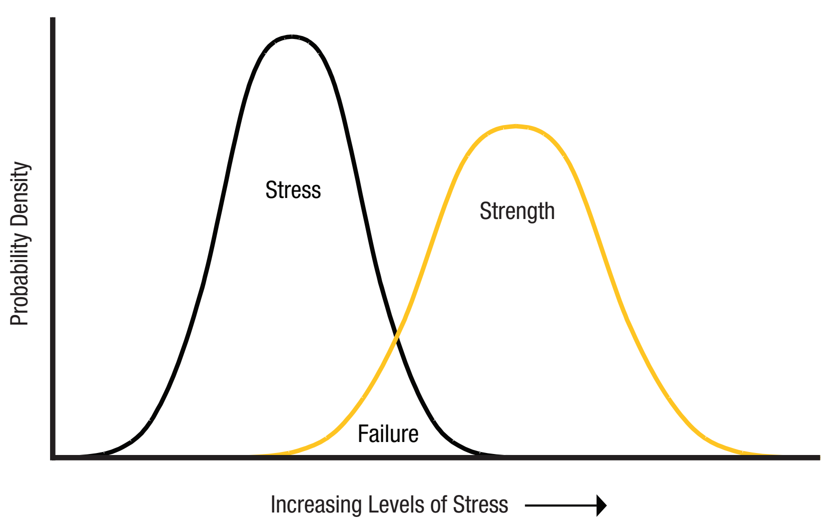


FIGURE 2: Failure Modes and Effects Analysis Template

Functions	Failure Modes	Effects	Severity	Causes	Occurrence	Controls	Detection	Recommendations	Status
Focus image	Cannot focus image	Difficult to see image	5	Adjust knob threads dmg	6	Visual	4	Use high grade screws	Pending cost/ benefit study
				Lens dmg				Use scratch-resistant lens coating	
Project image	Does not project image	Cannot see image	9	Bad bulb	4	Visual	3	Design a standby redundant bulb	Approved 5/20/00
				Bad switch					
				Bad motor					

Severity (1–10)	
1	Not noticeable
5	Customer inconvenience, but does not seek service
9	Non-life threatening risk
10	Hazardous

Occurrence	
1	Highly unlikely
5	Occasional failures
8	High occurrence
10	Certain occurrence

Detection	
1	Certain to detect
5	Medium detection
10	Almost impossible to detect

The first step, proper statement of the problem, is critical to success. The types of questions that need to be addressed at this point involve definition of what constitutes product failure, what environmental regions it will be exposed to, and the desired lifetime of the product. The answers to these questions should be stated in terms of quantifiable metrics, if possible.

The Failure Modes and Effects Analysis (FMEA) effort must then be performed with a diverse group that includes all relevant product experts [2]. The team should at minimum include representatives of quality, design, production, and marketing. The FMEA will provide a documented reference of the team's current best understanding of the system's potential failure modes. The causes and effects of the failure modes will be identified, as will the measures available for detecting the required metric. Severity, frequency of occurrence, and likelihood of detection will be determined. Risk priority numbers, based on severity, frequency, and detection likelihood will provide clarity as to how much resolution must be captured for the failure modes in the subsequent reliability development. A typical FMEA format is

FIGURE 3: System Block Diagram

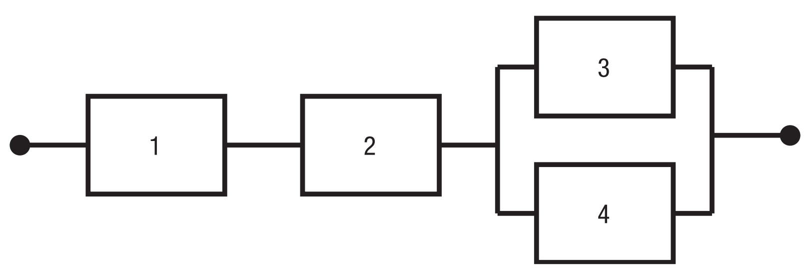
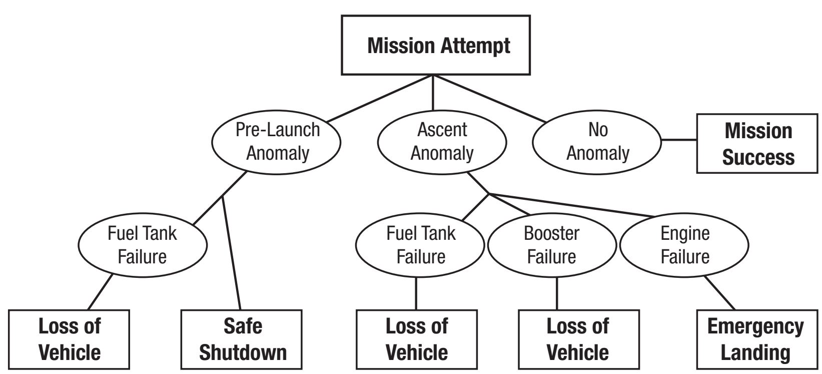


FIGURE 4: Fault Tree Diagram



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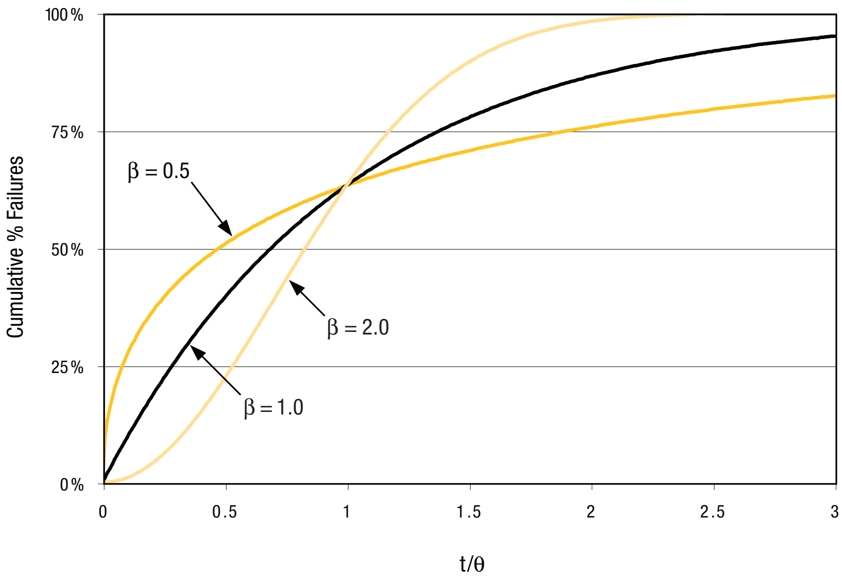
Reliability Assessment, from previous page

FIGURE 5: Capturing Field Failure Data with Reliability Distributions



shown in Figure 2. The FMEA will support the reliability projections, in that it will provide the template from which a system model can be developed and it will also capture insight into the underlying failure mechanisms.

The system model is a mathematical representation that describes how individual failure modes interact to result in total system failure. The model will take the form of either a system block diagram or a fault tree diagram. System block diagrams, such as shown in Figure 3, are used when there is no interaction between failure modes [3]. System block diagrams can represent series systems, redundant systems, or a combination of both. Series systems are those where a failure of any subsystem will result in total system failure. Redundant systems have a great reliability advantage over series systems. In practice, however, redundant systems are often impractical to achieve due to cost and design constraints. Systems that can be modeled as series, redundant, or combination system block diagrams are relatively straightforward for analysis purposes, as they will result in an exact mathematical solution.

Fault tree diagrams, such as shown in Figure 4, are used to represent systems with complexity beyond that which can be captured with block diagrams. In particular, they are necessary when there is either time or physical dependence among the failure modes. The diagram shows the general chains of events that result in individual failure modes. Fault tree analysis models generally cannot be solved with a direct mathematical solution. Rather, simulation methods such as Monte Carlo simulation must be used.

Once the system model has been established, it is then necessary to model the mechanisms of the failure modes. The first step toward understanding the mechanism is to determine which environmental cause, or causes, drive the failure. Such causes could be, for example, cumulative UV dosage, range of temperature exposure, or duration at a critical temperature level. The hypothesized driving environmental cause must then be validated through research or experimentation. Once the driving environmental cause has been validated, the time to failure as a function of the cause is developed. This relationship may be developed either through empirical test data or through development of a physics-based failure model. Examples of physics-based time to failure models include the Arrhenius model and cyclic fatigue models [4]. The Arrhenius model, shown in Equation 1, is developed from chemical reaction rate principles. It expresses time to failure in terms of empirical constants as well as Boltzmann's constant. The model's form has been demonstrated to be useful for a wide variety of applications which involve material degradation associated with temperature exposure. The cyclic fatigue model is shown in Equation 2. Its empirical constants are derived from exposures of the product to stated cyclic stress magnitudes.

$$\tau = A \cdot \exp\left[E \big/ k \cdot T\right] \qquad (1)$$

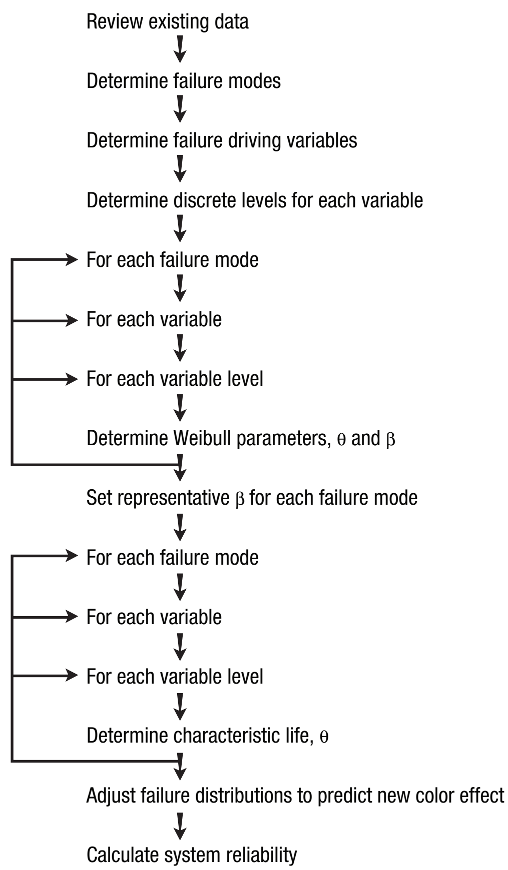
$$\tau = \frac{A}{S^b} \qquad (2)$$

Alternatively, if there is insufficient mechanistic knowledge to specify a physics-based time to failure distribution, an approach referred to as the proportional hazards method can be utilized. This approach relates the reliability as a function of the stress levels, rather than developing models of the expected time to failure. It is useful if empirical reliability observations at various stress levels are available for interpolation.

The time to failure functions are the first step toward development of mechanistic distributions. The effort doesn't end at this point, as the probabilistic nature of the time to failure distributions still must be captured. In general, the time to failure probability is included by either having the predicted time to failure inserted as one term in a relevant probabilistic distribution or having the elements of the mechanistic model described in terms of probabilisticly varying properties. An example of inserting the time to failure in a probabilistic distribution is using the predicted time to failure as the expected life in an exponential or Weibull distribution.

Existing test or field service data for relevant products must then be assessed for usefulness. In order to be useful, the data must contain time to failure data that can be attributed to identified failure modes. The data in terms of failure time resolution, failure mode resolution, and environmental condition at failure will all dictate the amount of resolution that can be expected from the reliability projections.

FIGURE 6: Reliability Methodology Assuming Existence of Field Data



The time to failure data of relevant reference products, retrieved from the field service data, is then fit to appropriate reliability distributions. Of the available reliability probabilistic distributions, the Weibull distribution is often used, as it is flexible enough to capture a wide variety of failure distribution forms [5]. The Weibull distribution for cumulative failures is described in Equation 3. Its parameters include a shape parameter and a characteristic life term. The shape parameter provides the distribution model flexibility to the Weibull. A shape parameter less than unity is used for infant mortality failures. A value greater than unity is used for wear out failures. The versatility of the distribution is shown in Figure 5.

$$F(t) = 1 - \exp\left[-\left(\frac{t}{\theta}\right)^{\beta}\right] \qquad (3)$$

The next key is to develop reliability distributions at the failure mode level for the proposed product. This is achieved by coupling the relevant reference product's failure mode reliability distributions with understanding of the failure mechanism. The reference product failure mode distributions will allow statements as to the variational spread of the proposed product distributions, as well as providing an initial reference point for the reliability projections. Understanding of the failure mechanisms will allow the differences between the reference and proposed product's performance to be captured in the proposed product's reliability projections. At this point, the reliability projections for the next key is to develop reliability distributions at the failure mode level for the proposed product. This is achieved by coupling the relevant reference product's failure mode reliability distributions with understanding of the failure mechanism. The reference product failure mode distributions will allow statements as to the variational spread of the proposed product

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Reliability Assessment, from previous page

distributions, as well as providing an initial reference point for the reliability projections. Understanding of the failure mechanisms will allow the differences between the reference and proposed product's performance to be captured in the proposed product's reliability projections At this point, the reliability projections for the individual failure modes are incorporated into the system model. The failure mode reliability projections are thus mathematically joined and the overall system reliability projections can be determined. If a system block diagram was used as the construct, the reliability projections can be determined directly. If a fault tree diagram was used, Monte Carlo simulation methods can be employed to determine the system reliability. Since the mechanistic models were developed in terms of environmental effect, the output reliability projections can be provided in terms of the levels of environmental stress anticipated. The projections can thus be captured in terms of potential sales regions with varying climatological characteristics.

Case Studies

Aspen Research Corporation has employed the above stated methodology in several successful product development projects.

For a vinyl-based window product, the failure modes as cyclic fatigue and stress relaxation were identified, a system series model was created, Weibull parameters and characteristic life were determined, and the desired system reliability in years, by client sales region, was calculated (methodology outlined in Figure 6).

For a polyolefin-based geo-membrane product, we exposed virgin material to nine weeks of UV aging per SAE J1960 with a boro/boro filter configuration, received from the client a 2–3 year exposed field sample, performed XPS (X-Ray Photoelectron Spectroscopy) to determine oxidation levels of all materials, performed tensile testing to determine physical strength changes between the samples and controls and then calculated proposed field life based on client business assumptions regarding financial risk.

Conclusion

By employing the reliability based methodology in concert with rigorous quantifiable understanding of failure mechanisms, quantifiable product life time assessments can be stated. The methodology provides a consistent, scientifically valid means of quantifying expected lifetime performance to support design decisions.

Acknowledgments

The methodology was refined and validated during practical application of this methodology at Aspen Research Corporation. The authors gratefully acknowledge our clients whom remain anonymous due to confidentiality.

For further information regarding this proven method or to discuss its application, please contact Allen Zielnik, Atlas Material Testing Technology, azielnik@atlas-mts.com, or Mark Citsay, Aspen Research, mcitsay@aspenresearch.com.

References

[1] Elsayed, E., *Reliability Engineering,* Addison Wesley Longman, 1996

[2] McDermott, R., Mikulak, R., Beauregard, M., *The Basics of FMEA,* Productivity, 1996

[3] Billinton, R., Allan, R., *Reliability Evaluation of Engineering Systems: Concepts and Techniques, Second Edition,* Plenum Press, 1992

[4] Nelson, W., *Accelerated Testing: Statistical Models, Test Plans, and Data Analysis,* John Wiley and Sons, 1990

[5] Tobias, P., Trindade, D., *Applied Reliability, Second Edition,* Chapman and Hall/CRC, 1995

www.weatheringconsulting.com is now online!

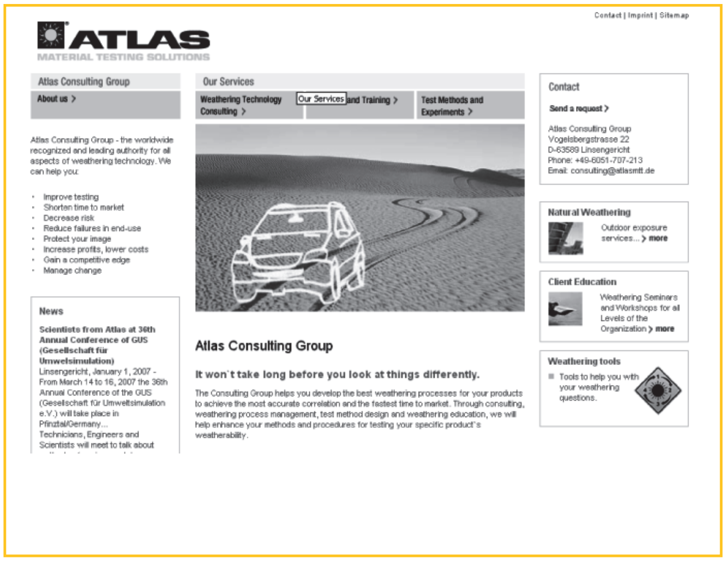
The Atlas Consulting Group is excited to launch its own website in March. The site will feature similar navigation to the Atlas corporate site, but maintain its own content and design. It will offer more in depth descriptions of the services offered by the Consulting Group than is currently available in the paper brochure.

The site is organized into three categories of services:

- Weathering Technology Consulting
- Education and Training
- Test Methods and Experiments

Prominently displayed on the home page will be the latest news and information from the Consulting Group as well as a link to contact a weathering technology consultant near you.

Visit the site today to see how our consultants can help you: www.weatheringconsulting.com.



Atlas Earns A2LA Accreditations

Atlas is proud to announce that the American Association for Laboratory Accreditation (A2LA) has again awarded Atlas certification to **ISO/IEC 17025,** *General Requirements for the Competence of Testing and Calibration Laboratories.* The scope of Atlas' continued accreditation covers two areas: 1) irradiance calibration of xenon and fluorescent light sources associated with the Ci Series Weather-Ometer®, SUNTEST®, UV2000, and Xenotest® instruments; corrosion cabinets; competitors' weathering devices; and environmental chambers; and 2) field service calibrations of these units performed by our Technical Services department.

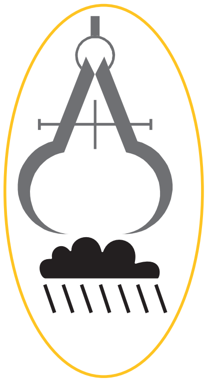
Atlas has also expanded the field service calibrations to include the United Kingdom and French business units. ISO 17025 accreditation is becoming a global requirement. Atlas reviewed several options on how to best serve our customers in territories that require calibration services from an ISO 17025-accredited calibration laboratory and determined that adding the UK and French technical service groups under Atlas MTT's accreditation was in everyone's best interest.

Earlier this year, Atlas MTT GmbH accelerated laboratory in Germany also received an extended accreditation to ISO 17025 for irradiance calibrations. With this achievement, Atlas customers can continue to depend on the independent assurance that the calibrations performed on their instruments meet the level of quality they have come to expect from Atlas.

Additionally, Atlas has gained **ISO 9001:2000** accreditation for Atlas MTT GmbH. This covers the implementation and maintenance of the Quality Management System for development, production, sales, and service of material testing equipment and analytic systems. ISO 9001:2000 ensures that we can consistently provide goods and services that meet your needs and expectations and comply with applicable regulations.

If you have any questions, please contact Matt McGreer at **mmcgreer@atlas-mts.com,** Ken Buckowski at **kbuckowski@atlas-mts.com,** or Michael Braatz in Germany at **mbraatz@atlasmtt.de.**

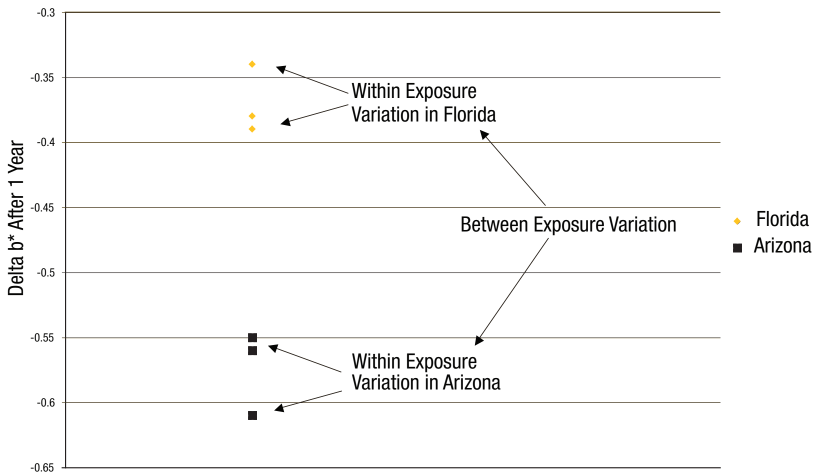
AtlasCommitment to Growth



n = Environments

Customers typically use products in a variety of end-use environments. Characterizing material degradation in a single environment often yields meager information with respect to actual customer experience. Single environment exposures do not provide researchers with information about material degradation rate variation in end use. This shortsightedness can be catastrophic if the single environment does not represent worst-case service conditions for the specific materials and failure modes. Degradation character changes from environment to environment for many materials. Researchers gain information regarding variation in degradation due to different end-use conditions by exposing materials in different environments.

Formulation changes to enhance degradation properties in Florida, for example, may have different consequences in Arizona. A coil-coated materials exposure in Arizona and Florida shows differences in degradation:



SUNTEST® Workshop Comes to U.S.

Atlas SUNTEST® CPS

Atlas is pleased to introduce the SUNTEST Workshop to the U.S. market. In this one-day, hands-on workshop, we'll guide you through operation, calibration, and maintenance using a SUNTEST CPS/CPS+ or a SUNTEST XLS/XLS+. Whether you are a new or experienced operator, this course will give you the skills to keep your SUNTEST operating longer and in specification.

Please join us **Tuesday, April 17** in **Cincinnati, Ohio.** For details on the course and to register, please contact Kerry Quilter +1-773-289-5567 or kquilter@atlas-mts.com.

Symposium Advances Testing Technology in China

The 4th Sino-American Academic Symposium on Environmental Corrosion and Degradation Tests of Material was held November 13–14, 2006 in Shanghai, China. This event was organized by Mechanical Environmental Technology Research Center (METRC–China) and co-organized by the Guangzhou Electric Apparatus Research Institute (GEARI), with support from Atlas.

This two-day technical symposium was attended by approximately 100 people from throughout China who advanced their knowledge in the application of testing technology in material and product development.

The keynote speaker was Dr. Mark Nichols of Ford Motor, Ltd. who presented a paper entitled "The Effect of Exposure Variables on the Accelerated Weathering Behavior of Automotive Coatings."

Atlas' Allen Zielnik presents "Weathering of Polymers and Reliability Assessment of New Polymer Products with Environmentally Driven Failures by Natural and Accelerated Means."

Papers were also presented by:

- Dr. Yvonne Mah, BASF
- Dr. Joung Yoon Choi, Korea Institute of Construction Materials
- Dr. Milo Feng, DuPont Titanium Technology
- Professor Li Xiao Gang, Beijing Science and Technology University
- Dr. Qi Huibin, Baosteel Research Institute
- Mr. Li Jigang, Si Fang Vehicle Research Institute of China Northern Vehicle Group
- Dr. Zheng Mingjia, Guangzhou Kingfa Science and Technology Co.,Ltd.
- Mr. Pengjian, Machinery Environmental Technology Research Center
- Dr. Feng Hao, Guangzhou Electrical Apparatus Research Institute
- Mr. Allen Zielnik, Atlas Material Testing Technology LLC

Attendees were able to have in-depth academic exchanges on testing techniques and standards in the areas weathering and corrosion in order to improve the level of research and technology of materials in China.

If you are interested in copies of the technical papers, or information on the upcoming 5th Sino-American Academic Symposium in China, please contact Atlas at info@atlas-mts.com. ■

AtlasClient Education

Atlas Client Education helps clients learn to design durability test programs to understand how weathering affects materials. Our education and training solutions will help you and your staff effectively master the skills and knowledge needed to develop long-lived products in shortened development cycles. Our programs are designed for all levels to ensure that everyone develops the skills required to understand the fundamentals of weathering and how to operate our instruments. For the latest schedules and locations, check the Atlas website, www.atlas-mts.com, or e-mail info@atlas-mts.com.

2007

Fundamentals of Weathering I

March 8
Miami, Florida, USA

March 26
Lochem, The Netherlands

June 20
Chicago, Illinois, USA

October 10
Chicago, Illinois, USA

November 6
Münster, Germany

Fundamentals of Weathering II

March 9
Miami, Florida, USA

March 27
Lochem, The Netherlands

June 21
Chicago, Illinois, USA

October 11
Chicago, Illinois, USA

November 7
Münster, Germany

SUNTEST® Workshop

March 16
Linsengericht, Germany

April 17
Cincinnati, Ohio, USA

October 12
Linsengericht, Germany

Weather-Ometer® Workshops

March 5–6
Ci35/Ci65 Series
Miami, Florida, USA

March 7
Ci4000/Ci5000
Miami, Florida, USA

June 19
Ci4000/Ci5000
Chicago, Illinois, USA

October 9
Ci4000/Ci5000
Chicago, Illinois, USA

November 27–28
All Ci Instruments
Duisburg, Germany

Xenotest® Workshop

March 13–14
Linsengericht, Germany

October 9–10
Linsengericht, Germany

For more information on courses in Europe, contact Atlas MTT GmbH, attention Bruno Bentjerodt, +49-6051-707-245 or clienteducation@atlasmtt.de.

For more information on courses in North America, contact Kerry Quilter at +1-773-327-4520 or kquilter@atlas-mts.com.

Or visit our website at www.atlas-mts.com.

New Atlas Representative in Mexico

Atlas is excited to announce the appointment of Equipos y Servicios Westek, S.A. de C.V. as its new exclusive representative in Mexico for Atlas products and services.

Westek, headquartered in Mexico D.F., has been the exclusive agent for SDL Atlas, a division of Atlas, since 2003. By working with SDL Atlas, Westek has gained experience providing technical support in both sales and service for the entire Atlas product line, including Weather-Ometer®, Fade-Ometer®, SUNTEST®, Xenotest® and corrosion instruments.

Westek, managed by Srs. Sebastian Limon-Lason and Ulrich Pruefer, is also the agent for HunterLab color measurement instruments, AATCC textile products, AES climatic chambers and other testing products and lab instruments in Mexico. Westek currently has sales and service offices in Mexico City and Guadalajara, and will be opening a new office in Monterrey later this year. More information on Westek can be found on their website: **www.westek.com.mx.**

Westek reps at the Paint & Powder Finishing Show in Monterrey, Mexico in 2005 (from left): Mariela Velazquez, Sebastian Limon-Lason, and Ulrich Prufer.

EUROPEAN COATINGS SHOW 2007

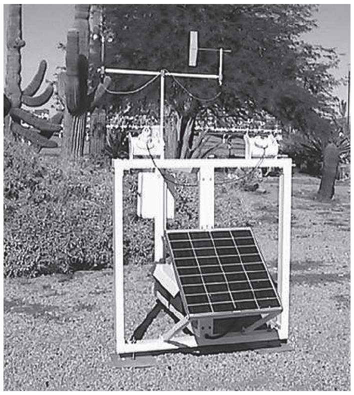
plus **Adhesives, Sealants, Construction Chemicals**

May 8–10 • Nürnberg, Germany
Atlas Booth: Hall #1, Booth # 1-256

Atlas is excited to exhibit at the EUROPEAN COATINGS SHOW plus Adhesives, Sealants, Construction Chemicals, the leading exhibition for the international coating and paint industry held every two years. Our booth (1-256, Hall 1) will showcase a range of instruments, including Ci4000 Weather-Ometer®, Xenotest® Beta+, SUNTEST® XXL/XXL+, and UV2000. Visit us at the show and find out how we can help you meet coatings industry testing standards.

Atlas SUNTEST® XXL+

AtlasWeathering Services Group



Atlas Weather Station Now Available to Customers

Atlas Weathering Services Group is pleased to announce a new product offering. The Atlas Weather Station is now available to customers who want to have their own test sites or who want to map various global climates.

There are three different options of the Weather Station:

Option A

Includes the Weather Station support mount, a UV and global radiometer, data collection capabilities, and remote solar power.

Option B

Includes Option A with the addition of a temperature and humidity probe.

Option C

Custom Weather Station.

Upon completion of an order, the unit will be shipped to the client in a container which will include an instruction manual and all necessary parts to complete the assembly of the Weather Station. The detailed instruction manual includes a parts list, instructions with photographs on assembly, software programming and operation instructions, a maintenance guide, and troubleshooting tips.

In the future, it will also be possible to customize the station by adding elements such as barometric pressure, rainfall, black panel/white panel, remote data telemetry and, additional radiometers at different angles.

If you have any questions regarding the new Atlas Weather Station and how it can benefit your operation, please contact Larry Bond at lbond@atlas-mts.com or +1-623-465-7356.

On the Move in Jacksonville

Atlas Weathering Services Group has moved its Jacksonville, Florida exposure site to a different location on Blount Island. Due to the heightened security at all U.S. ports, the U.S. Navy has closed access to its base on Blount Island for commercial business. AWSG has opened a new secure test site in-line with the private paint manufacturers on Blount Island. The Jacksonville location provides a unique combination of conditions yielding an “acid etch environment” for the exposure of coatings. The combination of several coal and oil fired electrical power plants, the salt atmosphere of the seaport, and the heat and humidity of Florida makes this an ideal location for environmental etch resistance tests, as specified by automotive manufacturers. Please continue to send your specimens to our Miami location in order to expose at our Jacksonville exposure site or to expose at any of our over 20 Worldwide Exposure Network locations.

For additional information on exposure testing at our Jacksonville location or for any weathering services, please contact your customer service representative at **+1-800-255-3738** or **+1-623-465-7356.**

AtlasSpeaks

2007

Gesellschaft feur Umweltsimulation (GUS)
March 14–16 • Pfinztal, Germany

Artur Schoenlein will present "Weathering Perils – Mystery or Explainable Phenomena."

Formulation and Forced Degradation Studies for Biopharmaceuticals
Institute for International Research
March 19–21 • San Diego, California, USA

Allen Zielnik will present "Photostability and Forced Degradation – Understanding Equipment & Techniques."

Techno Seminar
April 24 • Osaka, Japan

Kurt Scott will present "New Laboratory Weathering Technologies Lead to Improved Testing Capabilities."

ESTECH
April 29–May 2 • Bloomingdale, Illinois, USA

George Coonley will present "Climatic Testing Applications – Effectively Defining and Accurately Simulating Solar Conditions for Material Performance and Thermal Load Solar Testing."

FOCUS 2007
Detroit Society of Coatings
May 3 • Troy, Michigan, USA

Larry Bond will present "New Advancements in Accelerated Outdoor Testing," Kurt Scott will present "Innovations that Revolutionize the Development and Application of Weathering Tests for Coatings and Other Durable Products," and Matt McGreer will present "Fundamentals of Weathering."

SINK or SWIM
May 23–24 • Akron, Ohio, USA

Bill Lucas will present "New Advancements in Accelerated Outdoor Testing."

The Airbag and Seat Belts Technology Conference
May 23–24 • Dearborn, Michigan, USA

George Coonley will present "Static Airbag Testing Considerations for Compliance with ISO 12097"

Join Us at the 10th Annual Coatings for Plastics Symposium

June 13–15, 2007 • Chicago, Illinois, USA
Matt McGreer will present "Significance and Use of Standard Reference Materials for Weathering Testing Instruments." As a sponsor, Atlas will have a table and be on hand to discuss our latest products and services.

2007 ACSeries on Coating Wood and Wood Composites
July 23–25 • Seattle, Washington, USA

Allen Zielnik will present "Predicting Product Performance and Durability of WPCs" and "Weathering of Wood Coatings and Key Issues to Why They Fail."

13th Addcon World Congress
Rapra Technology
September 5–6 • Frankfurt, Germany

Dr. Olivier Haillant will present "Examination of the Physical and Chemical Behavior of Migrating Hals in Natural and Artificial Weather Conditions."

3rd European Weathering Symposium
September 12–14 • Krakau, Poland

Kelly Hardcastle will present "Effects of Moisture, Location, and Angle on Automotive Paint System Appearance During Natural Weathering," Artur Schoenlein and Jörg Hussong will present "Comparison of Tolerances for the Spectral Power Distribution Given by Technical Standards for Artificial Weathering to the Measurement Uncertainties of Typical Spectroradiometers in Use Determined by an International Round Robin Test," and Dr. Olivier Haillant will present "Natural and Artificial Photo-Ageing of a Pigmented, HALS-stablized Propylene-Ethylene Copolymer."

ICE
FutureCoat!
October 3–5 • Toronto, Ontario, Canada

Kelly Hardcastle will present "Considerations for Characterizing Moisture Effects in Coatings Weathering Studies."

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