ATLAS
MATERIAL TESTING SOLUTIONS

SunSpots

Material Testing Product and Technology News

Volume 31
Issue 66

Fall 2001

KHS' Rail Test & Research Project will test complete trains within a climatic tunnel. See page 12.

In This Issue

Paint Weathering Research at Ford

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The object of an accelerated weathering test for automotive paint systems is to determine long-term weathering performance well in advance of the results from actual outdoor exposure tests. The use of a trustworthy accelerated weathering test could reduce the lead time for the introduction of new paint systems: paint systems with lower solvent emissions, lower painting costs, improved scratch, mar, and chip resistance, and appearance changes designed to attract customers. Unfortunately, after more than 50 years of research, an accelerated weathering test that can adequately simulate natural weathering conditions for all coating chemistries does not yet exist.

Specialized tests that can reproduce the in-service weathering performance of specific coating chemistries do exist, however. Such tests are the end result of combining years of outdoor exposure test results with years of accelerated weathering test results to produce correlations. Once correlations have been established for a given coating chemistry, the test becomes a powerful developmental tool for that chemistry. However, an accelerated weathering test tailored to fit a specific coating chemistry is not necessarily appropriate for other coating chemistries. In fact, treating specialized weathering tests as if they are generic has led to costly mistakes.

Accordingly, coating suppliers and their customers are hesitant to introduce new coating chemistries or even seemingly minor formulation changes on the basis of accelerated weathering test results alone. Most prefer to wait for the results of at least five years of outdoor exposure tests from several environmentally different locations before making decisions. Waiting for the results of outdoor exposure tests dramatically slows the introduction of new paint technology. It therefore comes as no surprise that research designed to produce a trustworthy accelerated weathering test

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AtlasSpeaks

The Detroit Colour Council
September 11, 2001

Kurt Scott, Director, Research and Development for Weathering Instruments, Atlas Material Testing Solutions, will present a paper on methods of accelerated weathering.

22th Colloquium of the Danubian Countries on Natural and Artificial Ageing of Polymers
September 17–18, 2001
Berlin/Germany

Dr. Jörg Boxhammer, ATLAS Material Testing Technology GmbH, will present two papers: “Increased Levels of Irradiance in Outdoor and Artificial Weathering as a Measurement to Accelerate Weathering Tests” and “Influence of Exposed Specimens in Weathering Instruments (xenon radiation) on the Spectral Distribution of Radiation at Sample Level.”

Dr. Dieter Kockott, Technical Consultant of ATLAS Material Testing BV, will present two papers: “Calculation of Irradiance and Radiant Exposure of Solar Radiation and Comparison of These Results” and “Chemiluminescence — A Sensitive Tool for Early Detection of Ageing Processes and Polymer Materials.”

Cees van Teylingen, of ATLAS Material Testing Technology BV, will present a paper: “Surface Changes — Instrumental Evaluation and Classification of Results.”

BPRI Conference: Polymers in Building and Construction II
September 19, 2001
Belgian Plastics & Rubber Institute
Limette, Wavre, Belgium

Dirk Oefner, Manager Profit Center International Sales of Atlas Material Testing Technology GmbH, will present “Fluorescent UV Condensation Aging.”

Textile Technology Forum, IFAI Expo 2001
October 17, 2001
Nashville, Tennessee

Matt McGreer, General Manager of Client Education, Atlas Material Testing Solutions, will present “Weathering Testing of Automotive Interior Materials.”

AtlasShows

Major Textile Shows Stress Solutions to Global Testing Problems

For the first time, Atlas Electric Devices Company, Raitech Inc. — Partner of Atlas Textile Test Products — SDL America Inc., and SDL Textile Innovators will share a booth at the **AATCC 2001 International Conference & Exhibition.** The conference and exhibition will be held at the Hyatt Regency in Greenville, South Carolina, October 21–24, 2001. Atlas has recently appointed the SDL Group as a non-exclusive worldwide distributor of Atlas Textile Testing Products. The partnership of these firms offers textile laboratories the most complete solutions to their testing problems.

Atlas offers a full range of lightfastness and weatherability testing instruments. Featured at the AATCC show will be the economical Suntest, XLS+ Tabletop Xenon Exposure System and the sophisticated model Ci3000+ Xenon Arc Fade-Ometer®.

Raitech Inc. will be exhibiting two of their newest instruments in addition to their flagship product, the Quickwash Plus™ for 15-minute fabric shrink testing. Other instruments that will be featured are QuickView™, for optically measuring shrinkage, and QuickPunch™, for cutting multi-layer fabric specimens.

SDL America Inc. — the American arm of the SDL International Group, the world’s largest supplier of textile testing and laboratory equipment — will exhibit and demonstrate the latest in physical test equipment. These include the new Digital Elmendorf Tear Tester, the latest Micro AX range of tensile strength testers, and the redesigned P3000 Digital Burst Strength Tester for loads up to 1,000 psi with distention height measurement. Textile Innovators, now a member of the SDL Group of Companies, will show its expanded range of standard test fabrics and consumable products for the textile and chemical industries.

All instruments and test products conform to today's global test specifications, including AATCC, ASTM, ISO, SAE, and others. Visit us at the AATCC show, Booths 19, 20, 21, 26, 27, and 28.

ITMA 2001

Atlas and Raitech will also share a booth (#6B–78) in Hall 6 at the 1st Asian International Exhibition of Textile Machinery (ITMA Asia).

Atlas and Raitech will feature the following equipment: the QuickView™ that uses optical measurement for fabric shrinkage testing, the Quickwash Plus® that performs shrinkage testing in 15–20 minutes instead of 8 hours, the QuickDry™ for fabric sample drying in 7 minutes, and the QuickPunch™ for punching multi-layer fabric samples on your tabletop.

Other instruments to be featured include the Ci3000+ Xenon Weather-Ometer®, the Random Tumble Pilling Tester, and the Linitest+ that has been used for many years in the laboratories of the textile industry and is still going strong.

2001

ITMA Asia
October 15–19
Booth #6B–78
PSA Singapore Expo
Singapore

IFAI
October 18–20
Booth #1913
Opryland Hotel
Nashville, Tennessee

AATCC
October 21–24
Booth #19, 20, 21, 26, 27, 28
Hyatt Regency Hotel
Greenville, South Carolina

K'2001
October 25–November 1
Düsseldorf, Germany

FSCT ICE 2001
November 5–7
Booth# 1528
Georgia World Congress Center
Atlanta, Georgia

Kemodijana
November 15–17
Helsinki, Finland

EXPOTRONICA
November
Barcelona, Spain

PDA
December 3–7
Booth #1212
Marriott Wardman Park
Washington, D.C.

2002

SAE 2002
March 4–7
Cobo Center
Detroit, Michigan

Analytica
Munich, Germany
April 23–26

EuroCoat 2002
Barcelona, Spain
June 4–6

Quality Expo 2002
June 12–13
Novi Expo Center
Novi, Michigan

Surfex 2002
Manchester, United Kingdom
June 26–27

FAKUMA
Friedrichshafen, Germany
October 15–19

Atlas Goes on the Road

Hosts Automotive Test Method Technical Briefing

June 20, 2001 marked an historic event for Atlas. On this day in Detroit, Michigan, Atlas hosted a "Technical Briefing" in collaboration with Ford and GM. The idea for this "Road Show" was born when Atlas asked how we would get the news of the changing automotive test method requirements out to automotive suppliers. The purpose of the briefing was to act as a transition consultant/coach to our customers to help them through the changes.

One hundred twenty-five people attended the briefing, representing the full spectrum of automotive suppliers, from raw resin to colorants and stabilizers.

The program was originally designed to have morning and afternoon programs, one for Ford and one for GM. The two OEMs surprised us the week before the event and agreed to participate in a single, all-encompassing program.

Kurt Scott, Director, Research and Development of Weathering Instruments, Atlas Electric Devices Co., kicked the technical program off with an introduction to new automotive interior test methods. He gave a brief history of the light source change from carbon to xenon. He showed how the design of automobiles has changed to include much more glass, which leads to more potential degradation of interior materials. Laura Soreide, Ford Material Engineering, Ford Motor Company, presented information that focused on the weaknesses of the existing SAE J1885 test and Ford's goal to improve the test cycle to better replicate end use exposure conditions. She emphasized that the tests have been completed for IP materials only. Martin Sechan, of General Motors, presented the new test method GMW3414. He explained what the test method is and why it was developed.

Ford and GM appeared on a panel with Atlas to answer questions from suppliers on new test methods.

For both GM and Ford, the objective in changing the existing test cycle was to better replicate the end-use environment and thus limit the amount of expensive UV stabilizers used. Differences between the two methods were seen in the details of their cycles. These included the use of the Black Standard Thermometer, relative humidity of 25% ± 5% and irradiance of 2.2 ± 0.02 W/m^2/nm @420nm.

Kurt followed up the Ford and GM presentations with summaries of the new test methods and a brief explanation of test equipment requirements. Mark Chomiczewski, Atlas Electric Devices Co., presented the equipment requirements for the two new test methods in detail. The final segment of the program was a question and answer session with the Ford and GM participants as the panel. The panel discussion was extremely successful as the OEMs were able to answer questions from their suppliers all at once.

This was truly a groundbreaking experience for all the participants and, by all accounts, an unmitigated success. Atlas was able to successfully bring together two large OEMs with their suppliers to hear firsthand the new changes to automotive test standards.

Paint Weathering Research, from page 1

for automotive coatings remains very active. Several consortia, as well as numerous private industry research groups — including a group at Ford Motor Company in collaboration with Atlas — are presently addressing this topic.

Accelerated weathering test research has been ongoing at Ford Research Laboratory for more than 15 years. Early work was aimed at understanding the fundamentals of paint weathering chemistry. Today, the results of this groundwork are being applied in two approaches to predicting the long-term weathering performance of automotive paint systems: 1) Spectroscopic analysis is being used to glean long-term weathering performance information from relatively short-term outdoor exposure test panels, and 2) an attempt is being made to develop a better accelerated weathering test, wherein what you see is what you will get in service.

The first approach makes use of modern spectroscopic/analytical techniques to assess weathering performance. Spectroscopic analysis provides detailed chemical composition change information. This approach reduces the art of testing weathering performance to a science. The second approach applies what is learned in the first to reduce the science of testing weathering performance to engineering. In the final analysis, the science will become transparent, and weathering performance assessment will return to the traditional observation of appearance changes. The progress of both approaches is reviewed below.

Approach 1: Learn to Obtain Long-term Weathering Performance Information from Short-term Outdoor Exposure Test Specimens

The weathering performance of multi-layer automotive paint systems is determined primarily by their ability to resist sunlight-initiated reactions with oxygen: photooxidation. Photooxidation occurs when trace components or the coating polymers themselves absorb sunlight and dissipate the excess energy by breaking chemical bonds. Bond breaking can produce reactive species called free radicals that can react rapidly with oxygen. The reaction can be a cyclic process such that a single free radical formation event can lead to the incorporation of many molecules of oxygen. Ultimately, photooxidation changes the chemical composition of a paint system. When chemical composition changes are restricted to the surface of a paint system, as in the case of traditional monocoat systems (pigment + binder), paint system failure takes the form of gloss loss as degraded material erodes to expose pigment particles that scatter light. Gloss loss is an easily repaired, non-catastrophic failure mode.

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However, when chemical composition changes are not restricted to the surface, as in the case of modern clearcoat-over-basecoat paint systems, catastrophic failure can occur. Photooxidation of the clearcoat bulk can lead to clearcoat cracking. And photooxidation of the underlying basecoat can lead to clearcoat peeling. Generally, neither failure mode provides a visual indication that failure is imminent, and both require repainting to repair.

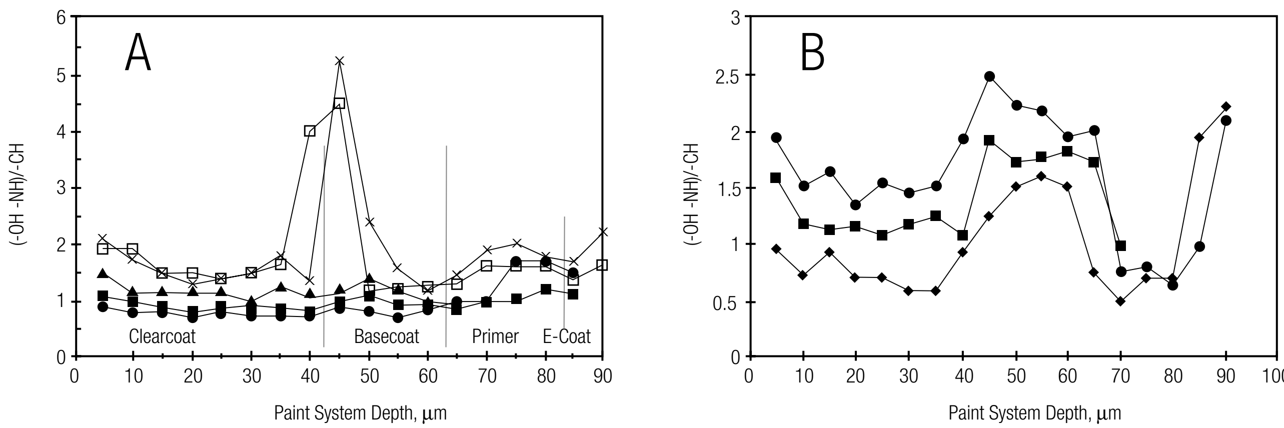

Figure 1. Chemical composition as a function of paint system depth as measured by FTIR (-OH, -NH)/-CH absorbance ratio for Florida exposed test panels

According to this scenario, one way to choose superior clearcoat/basecoat paint systems is to select those that undergo the least change in chemical composition during exposure. Our work has culminated in the development of techniques to map chemical composition changes in paint systems that are less than two human hairs thick, ~150 µm. Our techniques provide a means to obtain long-term weathering performance information from relatively short-term outdoor exposure test specimens as described below.

The results of three types of chemical change measurements: 1) progress of photooxidation across all coating layers, 2) disposition of clearcoat ultraviolet light absorber (UVA) additive, and 3) disposition of clearcoat and basecoat hindered amine light stabilizer (HALS) additive, are illustrated in **Figures 1, 2, and 3,** respectively, for two paint systems, A and B. The results of these measurements are generic in the sense that there is no need to have specific information about the paint chemistry to draw conclusions. Analysis results were obtained for individual 5 µm-thick paint system slices cut from standard steel test panels using an in-plane microtome. This procedure typically yields 8–10 clearcoat slices, 4–6 basecoat slices, 5–7 primer slices, and several e-coat slices depending on the thickness of the individual coating layers. Analysis results for individual paint system slices are combined to map chemical composition change across all coating layers.

Photooxidation analysis results are illustrated in **Figure 1** for paint systems A and B. Transmission Fourier Transform Infrared (FTIR) spectroscopy was used to assess the degree of photooxidation of each paint system slice for test panels weathered for increasing amounts of time. Analysis results for minimum exposure (preferably no exposure) test panels are compared with results for exposed test panels to reveal the progress of photooxidation as a function of exposure time.

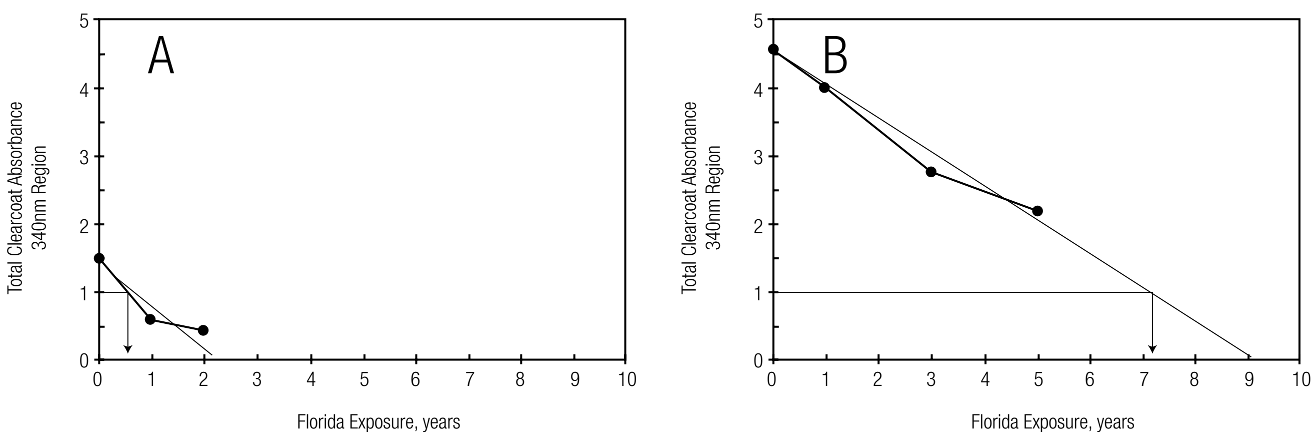

Figure 2. Decrease in total clearcoat absorbance in the 340 nm region as a function of Florida exposure

As can be seen, the clearcoat and the basecoat in paint systems A and B undergo minimal photooxidation during the first 3 years of exposure. However, after 3–4 years of exposure, the interface between the clearcoat and the basecoat in paint system A begins to photooxidize rapidly. This behavior suggests that the risk that paint system A will fail by clearcoat peeling is high at long exposure times because oxidation can destroy adhesion between clearcoat and basecoat coating layers. Paint system A does, in fact, fail by clearcoat peeling/cracking after ~5 years of Florida exposure. Paint system B, on the other hand, shows no indication of rapid photooxidation even after 5 years of Florida exposure and, in fact, continues to perform well after more than 8 years of Florida exposure.

UVA analysis results for paint systems A and B are illustrated in **Figure 2.** UVA additives are added to the clearcoat in clearcoat/basecoat paint systems to absorb sunlight that could otherwise initiate free radical formation. Just as importantly, clearcoat UVA screens the underlying basecoat from UV light. Transmission UV spectroscopy was used to measure the amount of UVA present in individual clearcoat slices and the individual slice results were combined to determine how long the clearcoat in each paint system could screen underlying basecoat from UV light. As

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can be seen, the clearcoat in paint system A provides far less UV screening than the clearcoat in paint system B. This suggests that the risk of failure by clearcoat peeling is higher for paint system A than B, provided the basecoats in the two paint systems are equally susceptible to photooxidation. The photooxidation results shown in **Figure 1** clearly indicate that the basecoat in paint system A is not photooxidation resistant and that the rapid photooxidation of the basecoat can be attributed to clearcoat UVA loss. While the 2-year

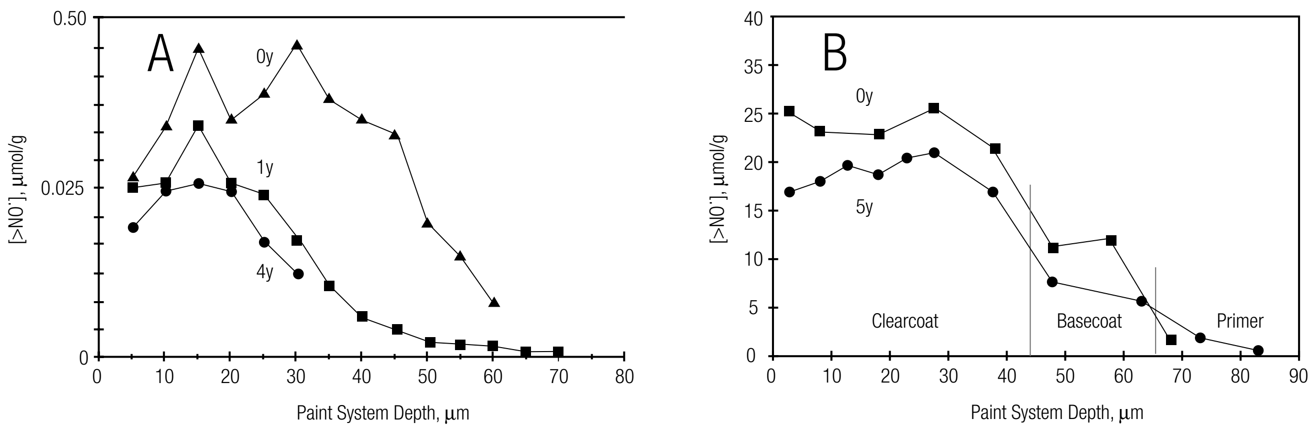

Figure 3. Concentration of "active HALS" as a function of paint system depth for Florida exposed test panels

paint system A exposure test panel provides no indication that basecoat photooxidation will be rapid **(Figure 1),** the rapid loss of clearcoat UVA provides a very early warning that the risk could be present. Nothing can be said about the photooxidation resistance of the basecoat in paint system B because it is screened from UV light in the oldest test panel analyzed.

Finally, the results of HALS analysis for paint systems A and B are illustrated in **Figure 3.** HALS additives are added to the clearcoat and basecoat in clearcoat/basecoat paint systems to slow photooxidation. HALS act to remove free radicals that could otherwise drive photooxidation. Electron spin resonance (ESR) spectroscopy was used to assay the "Active HALS" content of individual paint system slices from test panels weathered for increasing amounts of time. The term "Active HALS" is used to specify HALS that can inhibit photooxidation. Not all HALS are equally active and it is difficult to know in advance which HALS will be an effective antioxidant in which coating chemistries. As can be seen, the Active HALS content of paint system A is very low relative to paint system B. This behavior also provides an early warning.

According to the photooxidation results illustrated in **Figure 1,** the clearcoat in paint system A does not rely on HALS to achieve photooxidation resistance and HALS inactivity is unimportant. However, the interface between clearcoat and basecoat does require an active HALS when clearcoat UVA loss exposes it to UV light. Little is present and, consequently, the basecoat photooxidizes rapidly.

Taken together, the results of the chemical composition change measurements described above afford clear insight into long-term weathering performance when applied to relatively short-term outdoor exposure test panels. However, it is clearly advantageous to quickly weather test panels under controlled conditions in the laboratory for chemical and appearance analysis instead of waiting years for test specimens to weather outdoors.

Approach 2: Develop a Trustworthy Accelerated Weathering Test for All Coating Chemistries

The primary problem with weathering test panels in the laboratory is one of chemistry. The chemical changes produced by accelerated weathering need not match those produced by actual outdoor exposure. Because mechanical performance change is rooted in chemical composition change, it is not surprising that artificial weathering need have little bearing on actual outdoor performance behavior unless the chemical composition changes produced by artificial exposure match those produced by outdoor exposure. The long-held conviction that a paint system will perform well in service if it can cope with harsher than natural exposure conditions is ill founded. For example, there is substantial evidence that harsh exposure can cause HALS and UVA additives to be much more effective than they are during actual outdoor exposure.

The first step toward the development of a general accelerated weathering test suitable for all coating chemistries is to determine which aspects of accelerated exposure are most likely to distort weathering chemistry. The results of experiments designed to address this question are described below.

FTIR spectroscopy has been used to follow the chemical composition changes that occur when two well-studied clearcoat chemistries — C and D — are subjected to a number of accelerated weathering tests. Clearcoat C is known to quickly fail most accelerated weathering tests and yet it exhibits superior Florida exposure weathering performance. This behavior makes clearcoat C an excellent tool with which to examine accelerated weathering tests for chemical distortion. Clearcoat D on the other hand, performs well during both accelerated weathering tests and Florida exposure.

The results of FTIR measurements that reveal the balance of chemical composition changes that occur when clearcoats C and

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D are subjected to a number of accelerated weathering tests, as well as actual exposure in both Florida and Arizona, are illustrated in **Figure 4.** The results of these FTIR measurements have been treated such that the slope of accelerated exposure test lines will match the slope of Florida/Arizona exposure lines when accelerated exposure reproduces the balance of chemical compositions changes produced by Florida/Arizona exposure. As can be seen, the slopes of accelerated test lines match the slopes of the Florida/Arizona

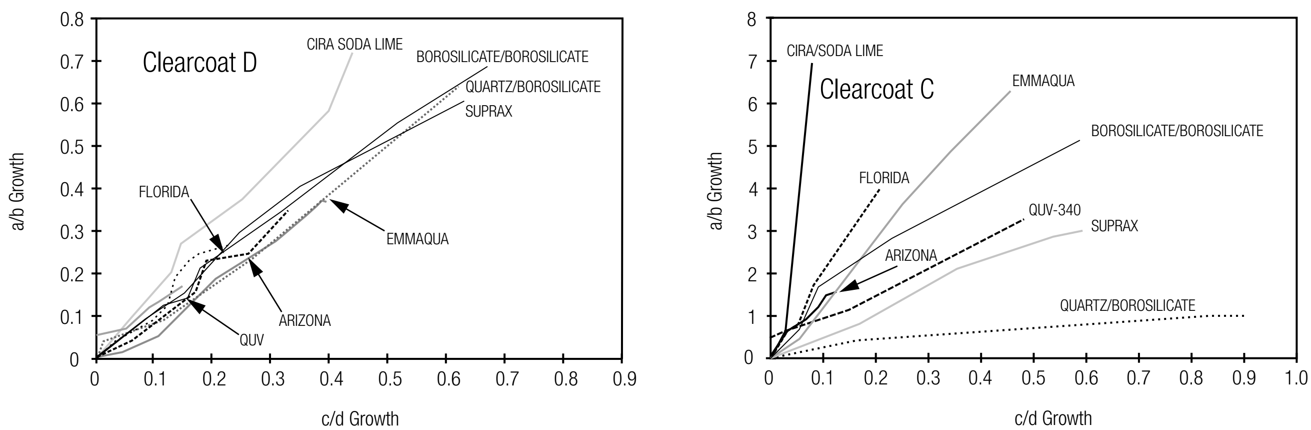


Figure 4. Balance of chemical composition changes as measured by FTIR for paint systems C and D subjected to a number of exposure tests

exposure test lines for clearcoat D. This behavior is in accord with the superior performance of clearcoat D in these accelerated weathering tests. In contrast, only EMMAQUA (Equatorial Mount with Mirrors for Acceleration with Water) exposure appears to reproduce clearcoat C's Florida/Arizona exposure chemical composition changes. This behavior matches the fact that EMMAQUA exposure is the only accelerated weathering test to correctly predict clearcoat C's superior weathering performance during Florida/Arizona exposure. Other accelerated weathering tests produce chemical composition changes that are not related to the changes that occur during Florida/Arizona exposure and therefore the results of these accelerated tests are questionable. The EMMAQUA concentrates natural sunlight, by the use of an array of 10 highly reflective, specially coated mirrors, on the specimen target area which results in a specimen irradiance of approximately 8 suns.

The fact that EMMAQUA exposure can reproduce the chemical composition changes that occur in clearcoat C during Florida/Arizona exposure, even though it employs very high light intensity, is an important finding. It indicates that a high light-intensity, laboratory-controlled, accelerated weathering test that does not distort weathering chemistry is possible, at least for the materials studied. One of the major differences between EMMAQUA exposure and the other accelerated weathering tests studied is the nature of the light source used to drive photooxidation. EMMAQUA exposure uses reflected sunlight whose wavelength distribution matches sunlight more closely in the critical 295–400 nm region than the artificial light sources studied. Based on this observation, research is presently underway at Ford and Atlas to develop a high-intensity artificial light source that matches sunlight much more closely than present artificial light sources. Early experiments are exploring several possibilities, the use of ozone among them, to filter a UV-rich artificial light source to produce high-intensity sunlight in the same fashion that stratospheric ozone filters UV-rich solar radiation to produce sunlight. When this stage of the work is complete, attention will be focused on making the mechanical stresses afforded by accelerated weathering tests more realistic.

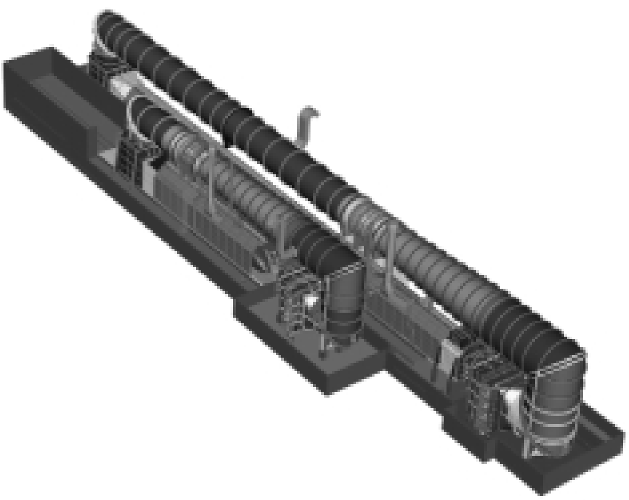
Acknowledgment

The authors would like to thank Ms. S. G. Gerlock for her valuable consultation.

Rail Test & Research Project in Vienna: The Atlas Network of Weathering at Work

What is the Atlas Network of Weathering? The combination of our instruments, services, and technical expertise to assist our clients in developing weathering test programs to meet their business needs. The Rail Test & Research Project in Vienna is one of many initiatives that illustrates Atlas' Network of Weathering philosophy.

Also known as the "Wien Arsenal" project, the Rail Test & Research Project will test complete trains up to a length of 100 meters within a climatic tunnel simulating nearly all factors of weather. The project concept began in 1992–93 when Burkhard Severon, K.H. Steuernagel and Helmut Dreyer, Atlas Material Testing Technology BV,



Construction begins on the revolutionary Rail Test & Research facility in Vienna.

went to Vienna to present the fundamentals of weathering to the Rail Test and Research Group.

After many presentations and discussions, the solar conditions were defined in the year 2000. Since there were no existing standards for this kind of application, another part of the basic consulting was the search and recommendation of applicable standards. A modified version of DIN 75220, a common standard used in the automotive industry, was selected. As a final step in this process, a specification for the design of the solarsimulation system was created that would meet the selected standard and the defined solar conditions.

Pre-design work began in 1997 and was completed in 2000. Within the pre-design process, a key job was to select the right tools so that the specified needs could be fulfilled. This part of the project required a high level of experience and expertise in weathering testing. Critical factors not often found in test specifications and standards needed to be carefully discussed for the considerable impact they may have had on the test results.

The process of system design is an important milestone of the project and, financially speaking, production is a major part. But assuming the produced tool is as functional as it should be, this process plays a minor role in the Network of Weathering. Finally, we officially began the project in 2001.

The test design which can take place before, during and after system design shows that the most important way to create and verify tests in simulated environmental conditions are correlation studies to the indispensable tests in the real world. This is achieved through the utilization of our natural weathering services sites.

This is just one example of our Network of Weathering philosophy and it is still not finished. Look for updates on the progress of this project in a future issue of *Sun Spots*. ■

A section of the wind tunnel is lowered into position.

Solar Simulation System for Rail Test & Research Climatic Wind Tunnel Vienna (Project Data)

Ambient Conditions:	-50°C to +60°C / 10%r.H. to 95%r.H. / Wind speed up to 250km/h	
Exposure Area:	Side Arrays	
	Large Wind Tunnel:	47.5m x 3.55m (LxH) – 168m^2
	Small Wind Tunnel:	30m x 3.55m (LxH) – 106m^2
	Front Arrays:	2.5m x 2m (WxH) – 5m^2 each
Irradiance:	250W/m^2 to 1,000W/m^2	
Uniformity:	+/-10% at 1,000W/m^2	
Spectral Power Distribution:	Full Spectrum Reference Global Radiation (CIE Publ.85 T4)	
Installed Lamp Power:	Side Arrays	
	Large Wind Tunnel:	418,000 Watt (418 lamps MH1000)
	Small Wind Tunnel:	264,000 Watt (264 lamps MH1000)
	Front Arrays:	32,000 Watt (8 lamps MHG4000) each
Control System:	PC SolarSoft	

2001

Fundamentals of Weathering I
October 15
Buena Park, California

October 30
Raleigh, North Carolina

November 6
Duisburg, Germany

Fundamentals of Weathering II
October 16
Buena Park, California

Ci4000/Ci5000 Weather-Ometer® Workshop
November 14

Ci35/Ci65 Weather-Ometer® Workshop (2-day course)
November 15–16

Atlas School for Natural and Accelerated Weathering (ASNAW)
October 24–26
Phoenix, Arizona
(ASNAW-Automotive)

XENOTEST® Workshop
November 27–28
Linsengericht-Altenhasslau, Germany

For more information on our Educational Workshops and Seminars, please check the corresponding box on the reply card.

Atlas Commitment to Education

Phoenix to Host ASNAW Symposium

The 2001 Atlas School for Natural and Accelerated Weathering (ASNAW) symposium for the automotive industry on the subject of materials durability and weathering will be held October 24–26, 2001 in Phoenix, Arizona. Guest speakers will cover new testing and modeling techniques on automotive products, service life prediction, spectroradiometry studies, and advanced evaluation of materials, as well as the most recent changes in automotive test standards and specifications. The speakers are experts in automotive durability testing for both interior and exterior applications and represent several major automotive manufacturers and suppliers.

The school benefits anyone involved in materials durability and weatherability testing in the automotive industry. This includes materials engineers, product managers, quality control supervisors, and others involved in determining product durability. Students will learn the effects that various elements of nature have on the degradation of materials.

The course will be held at the Sheraton Crescent Hotel, located at 2620 West Dunlap Avenue just minutes from downtown Phoenix, Scottsdale, and Sky Harbor International Airport.

Course tuition is $1,295 and covers a welcoming reception, course materials, instruction, refreshments, and meals. All other costs are the responsibility of the attendee. Advanced registration is required.

Registration information and ASNAW brochures are available by contacting Theresa Schultz at (773) 327-4520, by sending a fax to (773) 327-9731, or by e-mailing clienteducation@atlas-mts.com.

Featured Speakers

Karl Adamssons,
E.I. DuPont

Dave Bauer,
Ford Motor Company

Vispy Gheyara,
Cooper Standard Products

Fred Lee,
Atlas Electric Devices Co.

Kurt Scott,
Atlas Electric Devices Co.

George Coonley,
KH Steuernagel

Kelly Hardcastle,
Atlas Weathering Services Group

Special Note for 60 and 600 Series Weather-Ometers®

Since the introduction of the Atlas 60 and 600 Series Weather-Ometers® in the early 1960s, there have been many advances in electronics, weathering technology, and testing standards. With this progress in mind — and with newer, improved versions to take their place — Atlas is retiring the 60/600 Series and officially discontinued supporting these instruments as of September 1, 2001.

Weather-Ometer® Workshops Still Available

Two dates still remain for the popular Atlas Weather-Ometer® Workshop (see box below). The workshops are hands-on training courses intended for operators of the Atlas Ci35, Ci65, Ci4000, and Ci5000 Weather-Ometers. Atlas offers the classes you require to become a Weather-Ometer expert, whether you are a first-time operator or have been working with the instrument for years.

The **Ci4000/Ci5000 Weather-Ometer Workshop** is a one-day course offering in-depth, hands-on training for operators of the Ci4000 and Ci5000 Weather-Ometers. This comprehensive course will demonstrate operation, calibration, and maintenance to both experienced and inexperienced personnel using operational Weather-Ometers. Course tuition is $550 and includes course materials, a continental breakfast, lunch, and refreshments.

The **Ci35/Ci65 Weather-Ometer Workshop** is a comprehensive two-day course which features hands-on instruction with operational Ci65A Weather-Ometers. The course covers a brief history of accelerated testing, installation procedures and requirements, operating systems, calibrations, routine maintenance, and troubleshooting techniques. The course is designed for equipment operators, quality assurance and control personnel, laboratory technicians, and anyone who is responsible for equipment operation, maintenance and calibration. Course tuition is $925 and includes a continental breakfast, lunch and refreshments for both days, and all course materials.

The remaining available dates are:

November 14	Ci4000/Ci5000 Weather-Ometer Workshop
November 15–16	Ci35/Ci65 Weather-Ometer Workshop (2-day course)

All 2001 workshops will be held at South Florida Test Service's Accelerated Laboratory in Miami, Florida, located at 17301 W. Okeechobee Road. Matt McGreer, General Manager of Client Education for Atlas Electric Devices Co., and a representative from the Atlas Technical Service will facilitate the workshops.

Registration information and workshop brochures are available by contacting Client Education Coordinator Theresa Schultz at (773) 327-4520 or by sending a fax to (773) 327-4023.

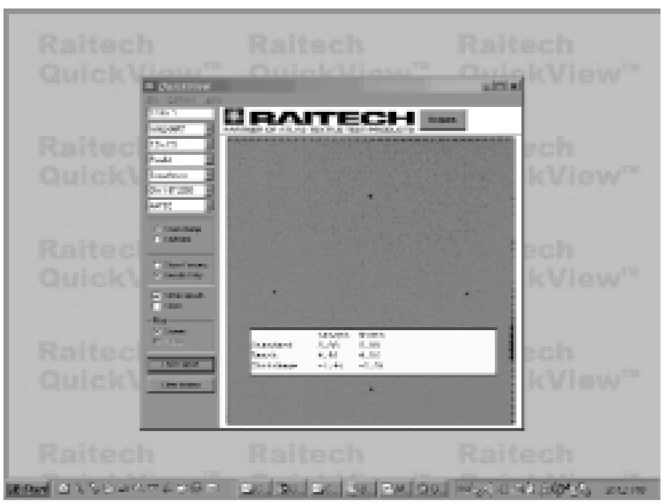
Atlas will offer one free admission to its Weather-Ometer Workshop with the purchase of a Ci4000 or Ci5000 Xenon Arc Weather-Ometer. The offer includes all course materials, a continental breakfast, lunch, and refreshments. Accommodations and travel expenses are not included. Customers purchasing a Ci3000+ Xenon Arc Weather-Ometer will receive a free Weather-Ometer Workshop course manual. These offers are available globally through all Atlas Sales Representatives.

Raitech Announces the New QuickView™

Raitech, Partner of Atlas Textile Test Products, has announced the new QuickView™ to enhance your capability to accurately measure changes in dimensional stability of your fabric specimens. QuickView has been developed by Raitech specifically for the textile industry and provides a quick and accurate way to determine fabric shrinkage results using digital optics and computer imaging software. Anyone using the Quickwash Plus or traditional laundering machines for dimensional change will benefit from the QuickView. How? *It will reduce labor, increase accuracy, and improve record keeping!*

Until now, dimensional changes of fabrics have been determined manually, using a template or marking device and a percent ruler for calculations — a tedious and imprecise methodology. The QuickView eliminates both marking and measurement errors and the need for double-checking of marks, measurements, and calculations. Two models are available — QuickView™ and QuickView Plus™.

The basic system uses a digital scanner and software to photograph and calculate fabric measurements before and after washing/drying procedures. Grid placement or alignment of the specimen is not required since the system automatically locates the data points marked on the specimen. The QuickView will measure shrinkage and skew of 7-inch-square Quickwash Plus specimens used for AATCC Test Method 187-2000. Output results are stored in an Excel file for easy analysis and report printing.



Screen capture from Raitech's dynamic new QuickView.

For larger specimens used in the traditional washing machine methods, such as AATCC Test Method 135 and ISO 6330, the QuickView Plus is a must! It will measure specimen markings ranging from 5 inch square to 20 inch square. The QuickView Plus uses a CCD camera with a frame grabber mounted in a stand to photograph the fabric specimen. In addition, it is capable of averaging multiple marks on a specimen and marks from multiple specimens and also offers optional remote operation.

Both QuickView and QuickView Plus have database software for client base, history, and pass/fail criteria. Both systems automatically determine which test method is being used, distinguish data points from other marks that may be on the specimen, and record the size without operator input. For fabrics with unusual patterns that are difficult to read, an optional light pen allows the user to mark the specimen on the computer screen. Custom reports of each specimen can be printed.

For more information, please contact Katie Novello, Product Specialist, at (773) 327-4520 or by e-mail at knovello@atlas-mts.com.

Germany Hosts Russian Paint Association Conference

The Russian Paint Association CENTRLACK held its annual conference at ATLAS Material Testing Technology in Gelnhausen, Germany, June 5–9. (The previous year's conference took place in Sochi, Russia on the Black Sea.)

The group of people that met at ATLAS represented nine of the most important Russian paint companies. Atlas Product Specialists and Client Education Representatives gave several presentations to the guests on the fundamentals of weathering, international standards for testing the weatherability of coatings, testing technology, and correlation and acceleration in weathering.

The participants were particularly interested in the Atlas VIEEW™ Digital Image Analyzer — our newly developed image analysis system for a precise and simple surface defect evaluation of paints and coatings after corrosion or stone-chipping.

While in Germany, the CENTRLACK group visited one of the world's largest and most well-known paint companies, BASF Münster, allowing participants to have an open discussion with their German peers. The Russian experts were invited to visit the new ATLAS laboratory for customer service in Duisburg.

The visit was an overall success, so that at the end of the five-day visit, all participants agreed to stay in close contact with Atlas for further developments in weathering technology pertaining to the paint industry.

Russian Paint Association delegates pause for a photo at their conference at Atlas' facility in Germany.

To Our Readers:

We are interested in hearing about your experiences with Atlas instruments and services. We hope that you would be willing to share a materials testing applications story with us in which Atlas has helped you with your weathering testing solutions. To express our appreciation for every testimonial we receive, we will send you an ***Atlas Weathering Guidebook.*** If we choose to print your story, Atlas will invite you for an all-expenses-paid trip to our Atlas Weathering Services South Florida Test Service exposure site and accelerated laboratory in Miami, Florida. Please send your submissions to:

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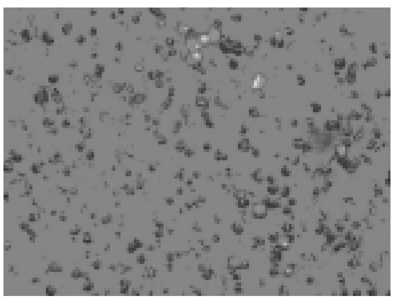
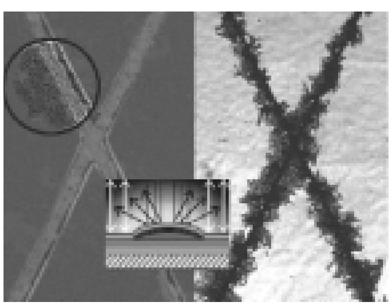
Atlas' VIEEW™ Digital Image Analyzer Improves Coatings Test Evaluation Results

Atlas' VIEEW™ system now may be applied to enhance the evaluation of coated specimens that have undergone numerous types of tests and exposures, including corrosion, gravelometer, crosshatch, abrasion, and acid rain. The superior imaging and analysis features of VIEEW provide a more comprehensive definition of coating degradation than has ever been available, with an ease and level of accuracy far exceeding the capabilities of traditional visual methods. The characteristics of surface degradation can be numerically defined by area, size (min./max. width and height), frequency of occurrence, distribution, and grayscale histogram — not only in the topcoat layer, but also in all the layers of a substrate. The statistics from specimens so analyzed may then be compared to one another, or to the analysis data of reference specimens, via convenient software manipulation. VIEEW eliminates the bias of an inspector's judgment while more precisely and conveniently defining a specimen's characteristics and digitally storing the results for future analysis, evaluation, and distribution. Some example applications are presented below.



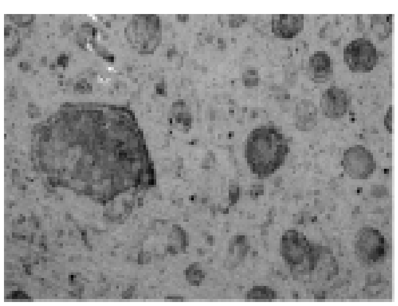
Gravelometer Testing

Specimens subjected to gravelometer testing (e.g., SAE J400) exhibit damage that may extend through all layers of the coating. VIEEW uses a combination of diffuse and direct illumination to highlight the pits and craters on each individual layer. The analysis software then measures and quantifies each damage site. A layer-by-layer report is then generated, allowing easy comparison between different coating topologies. Measured characteristics include: Percent Damage, Number of Defects, Mean Size, and Size Standard Deviation.



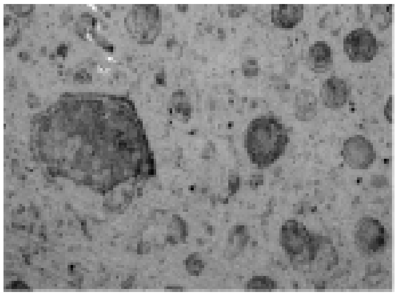
Corrosion Testing

Evaluation of specimens that have undergone the scribe corrosion test (e.g., ASTM B117) benefits dramatically from the application of VIEEW direct illumination. The full extent of the coating under-creep corrosion is revealed, allowing for a more accurate quantification.



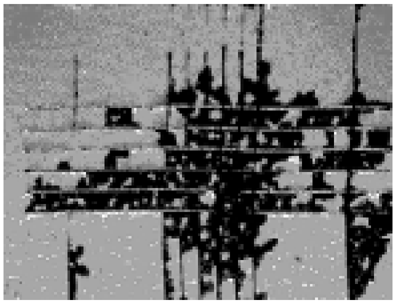
Acid Rain Testing

The image of specimens tested to an acid rain environment are digitally captured and then analyzed via a grayscale histogram. The histogram provides a quantitative measure for describing the effects of the exposure and thus a means for comparison among sample types.



Abrasion Testing

The abrasion resulting from application of the scratch and mar test or car wash test is most clearly revealed by the application of direct illumination. Surface degradation of the abraded area is then quantified with a gray level analysis that defines the mean gray level as well as the standard deviation. This result provides an easy means for comparing and grading the test samples.



Crosshatch (Adhesion) Testing

These specimens are scribed and then a special tape is applied over the scribed area and peeled off (e.g., ASTM D3002, D3359). The integrity of the coating is measured by the area of scribed squares that exhibit no surface peeling. VIEEW can measure this area, after applying a combination of diffuse/direct illumination and magnification, with far greater accuracy than the human eye.

Specialized Testing for Automotive Coatings

In viewing a climatological map of the world, it is obvious that a wide range of climates exists. These different climates are a result of latitude, weather patterns, topographical, and geographical features. Each class of materials is sensitive to a specific group of environmental parameters.

Jacksonville, Florida is one of the largest import and export centers for automobiles in the United States. The location has relatively high annual radiant energy and humidity, but because of several industrial plants that contribute to the pollution, the area has a rather unique environment. With the development of base coat/clear coat paint systems, cars awaiting distribution to U.S. auto dealers were found with an acid etch phenomenon on the exterior paint caused by this special combination of atmospheric conditions. This obviously created a concern for these auto manufacturers because the cars were unacceptable to the public before they were even available for sale. Many auto manufacturers now require automotive paint systems to be exposed to this environment for acid etch resistance before they are approved for use.

Coming Next Issue:

Activation spectra of coated wood — importance of visible wavelength to color stability and mechanical strength

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