elconews e-zine
international
May 2006

Training to make bridges better

Sunny Nietubicz – Elcometer USA, reports on how a range of Elcometer instruments helps to keep the Californian transport system moving.

The California Department of Transportation (Caltrans) is responsible for the design, construction, maintenance and operation of the California State Highway System. Managing more than 45,000 miles of California's highway and freeway lanes, as well as inter-city rail services, the staff across the whole operation have to be properly and thoroughly trained. This includes the bridge painters and the maintenance teams.

Caltrans were looking to update their training classes with the most up-to-date, accurate and reliable equipment available on the market today. After researching different providers of inspection equipment, Caltrans opted to use the Elcometer range of equipment.

A kit of products was developed to meet their specific requirements in order to train their employees to assess optimum conditions for painting in a variety of ways, as well as achieving the correct thickness. Purchasing Elcometer 456 gauges enabled staff to train with accurate, non-destructive instruments and to take measurements of dry film thickness. Caltran's other purchases included Elcometer 319 Dewmeters, Elcometer 115 Wet Film Combs, Elcometer 212 Digital Pocket Thermometers, Elcometer 114 Dewpoint Calculators, Elcometer 113 Magnetic Surface Thermometers and Elcometer 214 Infrared Digital Thermometers.

This investment in products to use during training courses, shows the level of commitment Caltrans has to the transportation needs of the 30 million residents in its area. They ensure the protective coatings systems on their bridge are applied correctly, first time, every time.

French connection

Chrystel Pressat – Elcometer France, informs us why a French Communications company chose Elcometer instruments.

TDF and its subsidiaries are responsible for the broadcasting of television and radio channels as well as being a key player in telecoms and data transmission. Based primarily in France with over 4400 employees, one of TDF's subsidiaries is involved in the maintenance and inspection of the transmission equipment, such as pylons and antennas. TDF had a requirement to measure both the overall thickness of galvanised steel as well as the thickness of the galvanising. Contacting Elcometer France for advice on how to accomplish this, they were presented with a solution. Elcometer 456 coating thickness gauges are used to measure the thickness of the galvanising, while an Elcometer 206DL ultrasonic gauge is used to measure the overall thickness of the steel with it's coating.

Elcometer 456 involved from start to finish

Markus Korn, Elcometer Germany, tell us how critical the Elcometer 456 is to the construction process of the biggest exhibition hall in Europe.

The Elcometer 456 Coating Thickness Gauge is an industry-leading gauge in the protective coatings industry and is on display at all the major quality and coating shows around the world. Due to its excellent reputation, it is now being used in the construction of a new exhibition centre.

Close to the Stuttgart International Airport in Germany, Europe's largest exhibition centre is currently under construction. In a project of this size, it is essential that the protective coatings on the steel structures be applied to the required specifications. The Elcometer 456 is playing a key role in checking these thicknesses.

The new Stuttgart Trade Fair Centre

Herr Otte, Technical Engineer of one of the construction companies involved, is responsible for the quality control of the large steel roof mountings. He tells us:

"The Elcometer 456 is an amazing gauge, very easy to use and extremely accurate. One of the best features for me is the ability to take more than 60 readings in a minute. When you have to take in excess of 10,000 readings every day, this is a very important feature.
Herr Otte also adds "I can't tell you how many times this gauge has been dropped on the ground, but it still works as well as it did the first day I used it."

The accuracy, durability and speed of the Elcometer 456 made it the instrument of choice for this project. With its industry-leading status, it will one day be displayed in the exhibition hall it was used in during its construction.

product of the month

Elcometer 215 Oven Data Logger

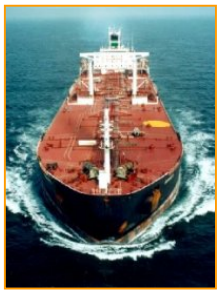
The Elcometer 215 Oven Data Logger is easy to use to measure and record the temperature profile of powder ovens. Having a wide range of probes and up to 12 channels, the Elcometer 215 has the ability to store up to 10 batches of 25,000 measurements each. With the capability to link it to a PC, to generate comprehensive reports via the Ideal Finish Software, as well as to receive test parameter information from the PC, the Elcometer 215 is the ideal gauge for profiling the temperature of powder coated parts curing in your oven.

For further information on the Elcometer 215 Oven Data Logger, or any of our other products or publications, please visit www.elcometer.com or contact your local Elcometer distributor.

coatings on site

Avoiding explosions

Due to their highly flammable cargo, oil tankers require special attention to safety. The oil they carry and the fumes it produces are so highly explosive, that any equipment used on board must not be capable of generating a spark.



These huge steel vessels are continuously under attack from the conditions they operate in. The high salt content of the sea leads to aggressive corrosion on the outside, while the cargo of warm crude oil corrodes from the inside. It is therefore necessary that the protective coatings applied to the tanker are of the correct thickness and that regular checks are made to ensure the coating thickness is up to standard during the life of the vessel.

Elcometer developed a unique inspection kit to provide the perfect combination of products for this particular application, supplied in a carry case. One ship operating company purchased a complete kit for each tanker in their large fleet.

The set of instruments for this application include:

- Elcometer 128 Pictorial Surface Standard - which includes SSPC, British & Swedish Standards for surface cleanliness.
- Elcometer 113 Magnetic Surface Thermometer – it shows the surface temperature of the steel safely, without the use of batteries. The steel should be above dewpoint so as not to adversely affect the adhesion of the protective coating to be applied.
- Elcometer 116 Whirling Hygrometer – provides a traditional measure of the relative humidity.
- Elcometer 114 Dewpoint Calculator – when used with the Elcometer 116, it allows accurate calculation of the dewpoint without a book of tables.
- Elcometer 115 Wet Film Comb – ensures the coating is thick enough while being applied and meets the required specification.
- Elcometer 211 Mechanical Coating Thickness Gauge – this non-destructive mechanical gauge gives a reading of the dry film thickness without the use of any batteries or any power supplies.

Elcometer can develop a customised inspection kit for your particular industry, too, selecting from our extensive range of inspection equipment for coatings, concrete and industrial metal detection.

We want your news!

Have you got an application problem you solved with a little ingenuity or maybe a snippet of news that you think will benefit the readers of **elconews** e-zine? If so, please send it to editor@elcometer.com and see your name & article published here!

coatings in the lab

News from Leneta

Leneta, known for the black and white test charts supplied by Elcometer, is pleased to announce that a new coating process has been successfully developed that results in charts with improved characteristics.

Leneta have built a reputation for high quality drawdown charts. They constantly strive to ensure the consistency of important characteristics such as colour, gloss, imperviousness, adhesion, surface smoothness and non-fluorescence.

With changes in availability of raw materials as well as the impact of environmental regulations, Leneta have investigated alternative materials and processes. Advances in coating technology have enabled the development of a manufacturing process, which enhances shade control, gloss uniformity and solvent resistance. In addition, the use of thicker, more rigid paper improves curl resistance.

Charts from the new production will be used to fill orders as they become available.

Your questions answered

Pelikon design and manufacture Printed Segmented Electroluminescent (pSEL™) displays, backlights and the driver electronics to control them. Pelikon products are used in applications such as mobile phones, remote controls, MP3 players, washing machines, dishwashers and control panels for security, heating and air conditioning systems.

Remote controls using Pelikon technology

The displays are printed on plastic film. They are thin and flexible with high definition, multi-colour, graphical icons that can be individually 'animated'. Pelikon needed to check the adhesion of the multiple layers of inks on the plastic membrane switches, to comply with their quality standards. ASTM F1842-02 *Test Method for Determining Ink or Coating Adhesion on Plastic Substrates for Membrane Switch Application* needed to be achieved, which requires adhesion testing to the ASTM D3559 standard. Pelikon contacted Elcometer for help.

In order to test the coating effectively, Elcometer suggested the sample be applied to a smooth, hard, flat surface such as glass. To carry out effective tests, the Elcometer 141 Paint Inspection Gauge (P.I.G) was suggested as being of the greatest use for this particular application. This gauge provides a quick, versatile and portable method of examing and measuring the coatings. The Elcometer 141 can be converted into the Elcometer 107 Cross Hatch Cutter, which can be used in conjunction with the specified adhesion standard. This two in one gauge provided the perfect solution to Pelikon's application. More information on Pelikon products can be seen at www.pelikon.com.

If you have a question you would like answering here, email us editor@elcometer.com

concrete inspection

Singapore flyovers

Andy Foo – Elcometer Singapore, reports on the new procedures to ensure long lasting flyovers.

Singapore is one of the world's most prosperous countries. With 4.5 million inhabitants in an area covering just 693 sq km and more than 3165km of roadways, it is important that the infrastructure of the country is regularly maintained and serviceable for as long as possible.

In the past, all the concrete highway flyovers were always left uncoated. The Singapore government have now accepted that the lifespan of each concrete structure can be significantly increased when a protective coating is applied to it.

The humid climate and the heavy rainfall can cause carbonation of the concrete and accelerate the corrosion of the steel reinforcement (rebars) inside it.

To ensure the finished coating thickness meets with the required specifications, it is necessary to have strict test procedures and controls in place.

The Elcometer 121 Paint Inspection Gauge was selected for the task. This destructive coating thickness gauge is easy to use and provides the inspector with a cutter, microscope and light all in one housing for ultimate portability and convenience. The Elcometer 121 can be used in accordance with ASTM D 4138, BS EN 3900-CS-5B and ISO 2802-5B methods.

Elcometer 121 Paint Inspection Gauge

The gauge is used to assess coating thickness between 2 – 2000µm / 0.08 – 70 mils. The 50x magnification of the integral microscope allows a clear assessment of the coating thickness after the cut has been made.

It is this versatility and ease of use that makes the Elcometer 121 the perfect gauge for Singapore in this application, providing accurate, simple and clear results time after time.

Elcometer's construction update

You can follow the progress of the new extension at Elcometer's Head Office in Manchester by visiting: **www.elcometer.com/uk_extension**

standards news

Elcometer renew ISO 9001

Elcometer are pleased to announce they have once again been awarded ISO 9001 certification. The new certificate is valid from 1st May 2006 to 30th April 2009 and is available for download as a PDF document at **www.elcometer.com/downloads**.

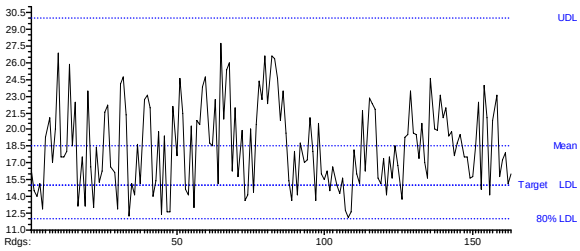
Intumescent Coatings - SCI P160

The second edition (2005) of the industry standard "Structural Fire Design: Off-site Applied Thin Film Intumescent Coatings" from the Steel Construction Institute provides a Model Specification that can be used in contracts.

Intumescent paint provides protection from fire to structural steel beams. When heated, it expands to solid foam and slows the temperature rise of the metal; the burning building stands longer and is safer. The link between thickness and safety is such a strong one that insurance companies must be convinced before they take on the risk. Of course, they must have proof.

Measurement of the thickness of the coating and analysis of the readings is explained in Part 2 Section 5.4 of this standard. Here is how the requirement relates to Elcometer products.

In a project, the specified nominal thickness of intumescent paint is the 'target' value. In the EDCS+ database, the Lower Design Limit (LDL) is set to this value. The coating is then measured according to BS EN ISO 2808. The average must be thicker than the target and no more than 10% of the readings can be thinner than 80 percent of the LDL. Use the "80/20 chart" in EDCS+, but change it to 80/50 as half the readings must always be above the target, otherwise the Mean will be too low. Simply record how many readings are below the 'reasonable limit' of 80% LDL.



"80/20 chart" can be used with settings modified by the user

PROCEDURE

The reading rate is 2 per metre on web and flange outer faces but only 1 per metre on the inside face of flanges. The readings of each steel member must be recorded so the coating thickness gauge must have a memory. An Elcometer 456 Top is suitable because the readings can be kept in separate Batches, one for each beam. After the readings are transferred to EDCS+, we rename each Batch with the beam's identification number. All the readings and reports are then handed over to the client and the insurance company.

For more details about this standard, please see www.steel-sci.org. For more information on relevant gauges and software, visit **www.elcometer.com**

Measuring Coatings – Part 3

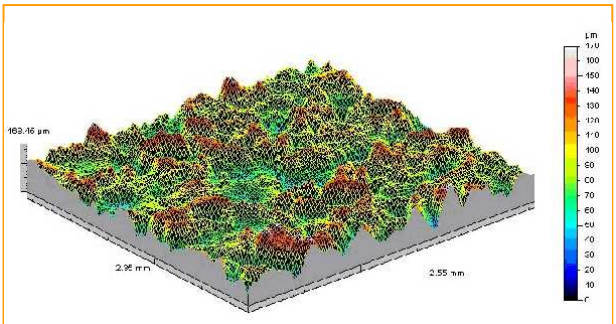
We look at some of the features and techniques built into the Coating thickness gauges to simplify the measurement, collection and analysis of data.

CALIBRATION TECHNIQUES

Previous parts of this series have shown that the readings on the gauge depend on what is being measured; the material, its curvature and roughness are the main variables. The process of adjusting the gauge to read thickness values correctly is called calibration and it is generally done with foils or shims of known thickness placed on an uncoated sample.

Most metal substrates with smooth surfaces give 'linear' readings, which means that if the coating thickness is doubled or halved, so is the reading on the gauge. A normal calibration is performed on these using one known thickness and a zero point on the bare surface.

Non-linear substrates include high-carbon steels and some stainless steels. For these, a 2-point calibration technique provides good readings over a shorter part of the scale. This calibration technique can be used for thick metal coatings on mild steel and for thin paints on thinly galvanised steel, such as is used for car bodies. It also helps on blast cleaned surfaces and sand castings to give readings that are effectively above the top of the peaks. In this case, the uncoated surface does not read zero but a value below it (minus value).

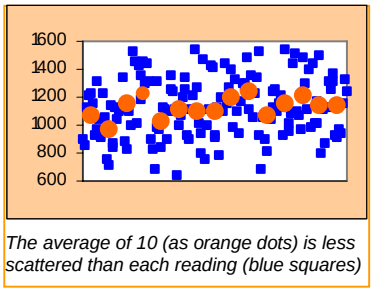


The map of a 'rough' grit-blasted surface, thanks to Corus. This 2.4 x 2.6mm area is similar to the 2mm diameter F1 probe tip, which will stand on many of these peaks.

The way to decide if a special calibration should be done is to conduct a test. Measure some known thicknesses of plastic or known coated samples and determine the deviation. The best method and the gauge to use will depend on the job requirements and what functions are available in a particular model.

AVERAGE

Roughened metal surfaces provide a range of readings depending on the shape of the surface profile, its amplitude and the density of its peaks. The way to reduce the spread is to calculate the average of the readings at a number of different spots (see graph). Rough non-ferrous metal surfaces have a stronger effect on the reading than rough steel. However, when groups of readings are averaged, the results are reasonably consistent though some variation remains. In the graph, the average coating variation is about 95-125 but the individual readings ranged 600-1600. This technique is valid because it takes away the 'noise', due to the mechanics of the surface and placement of the probe, exposing the 'real' readings.



The average of 10 (as orange dots) is less scattered than each reading (blue squares)

STATISTICS

Microprocessors have little difficulty in calculating simple sums at the same time as everything else they do inside a gauge. By having a dynamic recalculation of statistics after each reading, the operator can see stability or any trends. Before digital displays were used, the slight movement of a meter needle gave this information (anyone remember the Elcometer 150H?), but then there was no display of highest and lowest reading, standard deviation, coefficient of variation or number of readings taken. Now, all these are available at the press of a key.

STATISTIC TERMS

Average or mean: The sum of all readings in a group divided by the number of readings.
Standard deviation: A measure of the spread or the scatter of readings around the mean of a normal distribution.
Coefficient of variation: The standard deviation divided by the mean and shown as a percentage.

STORAGE

It is not that often that single readings of the thickness of a coating are made. More often, groups of readings are taken and results must be presented in a report of conformance to specification. Writing numbers on paper is avoided by having them collected automatically in the gauge's memory as groups or batches. The transfer of these readings into a computer for storage is then followed by a report. Keeping the numbers in electronic form is convenient. It means analysis is quick and errors in transcription are avoided. Sometimes it is demanded.

Elcometer Data Transfer System (EDTS) is a software bridge between various gauges and a spreadsheet.

Elcometer Data Collection System (EDCS) is a database or archive of measurements and can provide reports in your own style.

GAUGES

Two popular coating thickness gauges available today include the Elcometer 456 family, general-purpose gauges that work with many different probes. There is a Top version to store many groups of readings, a Standard version with less memory and a Basic version with no storage but with statistics.

The Elcometer 355 coating thickness gauge has a higher specification and is more robust. The difference between its Top and Standard versions is mainly storage capacity. Various probes can be connected to it.

So, we have seen how the thickness of coatings on metals of many shapes, sizes can be checked, and the results analysed and stored.

In the next issue of elconews e-zine the product group focus will be on the subject of clean and rough surfaces.

Published for the benefit of our customers by Elcometer. Editor: Vicky Meldrum, Assistant Editor: John Podvoiskis, editor@elcometer.com • tel. +44 161 371 6000 • fax: +44 161 371 6010. We welcome your contributions.