

Savings for Australia's Top Guns

Paul Jenkins – Phillro Industries Australia, tells us how his sales team found an accurate measurement solution to save costs on essential maintenance.

The Royal Australian Air Force, RAAF, recently approached Phillro Industries looking for an accurate means to measure the wall thickness of drive shafts for their fleet of F1-11 strike aircraft. The drive shafts in each aircraft are manufactured of specially tempered high-grade tapered steel sections of a hollow construction used between the jet engines and turbines. The shafts also incorporate a solid inner section inserted during assembly and can be subject to corrosion from moisture presence during operations. This would result in deterioration of the thickness of the walls. In the past,

there have not been any satisfactory methods to check for this corrosion. During routine maintenance and whenever engine repairs are carried out, the shafts



Maintenance on the F1-11 Fighter Jet Aircraft

were scrapped and replaced, without knowing whether they were re-serviceable or not.

With a cost in excess of AUD\$100,000 each, not including labour, this practice was an expensive exercise. Local Sales representatives in Queensland for Phillro Industries, Barry Crocker and Rob Jerome, successfully demonstrated the Elcometer 207DL Ultrasonic Thickness Gauge proving an accuracy of 0.001" / 0.02mm when reading the thickness of the steel drive shafts.

According to the Department of Defence personnel involved in the test, a section of scrap shaft material was cut and three circles approx 40cm diameter were marked on the sectioned shaft with white paint. The Elcometer 207DL gauge was calibrated to the steel material and measurements taken at the same three points. It was proven to meet their specified requirements of 0.001" / 0.02mm accuracy. In fact the gauge also indicated the change in thickness associated with the taper in the shaft. The results showed that the Elcometer 207DL gauge consistently measured to this accuracy, when used to measure the wall thickness of the shaft.

The successful results of the tests have led to the procurement by the Department of Defence of an Elcometer 207DL Ultrasonic Thickness Gauge, which will also be used to check wall thickness of engine cowlings and various other elements of the F1-11 Jet Fighter Aircraft at the RAAF's Amberley Airbase in Queensland. This purchase will mean that previously discarded components can now be accurately measured for corrosion and wear. When found to be within specification they can be placed back into service rather than replaced, saving the Department of Defence many hundreds of thousands of dollars in maintenance costs.

Stick to quality

Markus Korn, Elcometer Germany reports on the latest quality control measures at Europe's leading adhesive tape manufacturer.

Tesa AG of Germany are Europe's market leader and the world's second largest manufacturer of adhesive tapes. Offering over 800 different adhesive tapes sold in more than 100 countries, Tesa are committed to continually improve their quality management systems.



Adhesive application machines at the Tesa facility

In their new manufacturing facility in China, the focus on quality lead Tesa to approach Elcometer for a solution to their quality requirement.

To apply the glue to the tape, application machines coat the thin foil with a layer of wet glue. The glue needs to be applied in a constant way, which is defined by application speed, temperature and consistency of glue. Before each batch is produced, the glue must be tested.

The Elcometer 4340 Motorised Film Applicators fitted Tesa's requirements perfectly. The 11 preset speeds, sample temperature control and automated settings of the Elcometer 4340 enabled Tesa to obtain clear, consistent and repeatable results. With many different tapes with different adhesive characteristics all produced in one plant, several of the Elcometer 4340s were purchased. This allows Tesa's engineers to check that each of their glues deliver the constant quality and adhesion that is demanded of them.



Elcometer 4340 Motorised Film Applicator in use

product of the month

Elcometer 6300 Colour Assessment Cabinets

The Elcometer 6300 range of colour assessment cabinets provide a controlled environment for viewing colour samples and are suitable for any industry where there is a need to maintain colour consistency and quality.

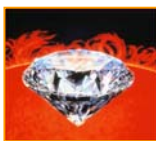


The Elcometer 6300 range offers a choice of 3, 4 or 5 light sources in a range of cabinet sizes. They are ideal for ensuring colour samples match under specific lighting conditions.

For further information on the Elcometer 6300 Colour Assessment Cabinets, or any of our other products or publications, please visit www.elcometer.com or contact your local Elcometer distributor.

Diamonds are forever

De Beers, the largest diamond mining company in the world, contacted BAMR (Pty) Limited, Elcometer distributors in South Africa, with a requirement to test adhesion strength of thin spray-on liners. These liners are used in underground mining to seal the excavated rock from the humid environment as well as to provide some tunnel support.



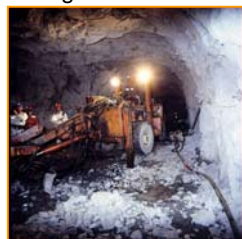
Adhesion testing of liners.

The outline of the tests were presented to BAMR in the hope that they could suggest a solution.

- Different liners were to be tested on the rock with material thickness ranging between 0.1mm and 10mm.
- The liners were also to be tested for adhesion strength between 0.5MPa to 5MPa.
- The tests were to be conducted on uneven rock surfaces.
- The dolly used must be 50mm due to the unevenness of the surfaces being tested.
- Measurements needed to be read off a dial gauge in MPa / kN.

After correspondence between De Beers, BAMR and Elcometer Technical Support, the Elcometer 1940 PAT™ GM01 Adhesion Tester was recommended. BAMR visited the client to demonstrate the Elcometer 1940 in action on the epoxy coated rock.

The Elcometer 1940 has the ability to provide an even, consistent pull force on an uneven surface by automatically compensating for uncontrolled movements during the test. This manual hydraulic tensile adhesion tester is fully portable with a precision gauge with both MPa and PSI readings. The Elcometer 1940 is supplied in an aluminium carry case, enabling the tests to be carried out initially in the laboratory and also on site in real working conditions, quickly and accurately.



Underground diamond mine

De Beers were very impressed with the capability of the unit, which met all of their requirements and has now been ordered.

Question corner?

Do you have a question you would like answering?

Do you have a problem knowing which is the best piece of equipment to use for the job?

Have you got an unusual application that you don't know how to test accurately?

Contact Question Corner at editor@elcometer.com and we will answer your questions and publish the best one of the month here.

Popularity of powder coating is gaining momentum

Over the last few decades, powder coating has grown in popularity

In the recent Finish Market Study, it was indicated that those surveyed will spend about 47% of their 2006 budgets on powder spraying equipment – up 25% from last year's survey. So why the change?

Powder coating has several advantages over paint. It's economical, environmentally friendly, produces excellent finish quality and improved corrosion resistance. New developments in powder coating equipment allow such improved efficiency that the cost of investment in new equipment is worth the spend. With lower costs being forced from regions such as Mexico, Asia and Eastern Europe, this improved efficiency allows Western companies to remain competitive.

Demand for quality finishes and increasing market requirements has helped to fuel this growth. The automotive industry for example, is also increasing its use of powder coating, taking advantage of the economic, quality and environmental benefits powder presents. Powder is now being used for the exterior bond intermediate coat, known more commonly as the primer surface. Companies such as Lincoln, Chevrolet, Daimler-Chrysler, Mercedes-Benz, Dodge and Jeep use it for the finishing of engine components. Clear powder coatings are also being used as an alternative to solvent borne clear coats for areas that need added protection as well as a decorative finish. Wheel finishing is an example, and European manufacturers such as BMW and Volvo are using powder over exterior base coats. Parts including hubcaps, door handles, radiators, bumpers, shock absorbers, mirror frames and more are increasingly powder coated.



Unused powder and over spray is easily reused, adding to the economy, while the absence of VOCs (Volatile Organic Compounds, which cause the environmental issues associated with paint), is also driving the demand for powder. New resin systems allow powder to meet end-user specification for almost any product. With many of the coatings able to cure as low as 121°C / 250°F, and the advent of infrared-cured powder, the market has opened for heat sensitive substrates such as wood and plastics and assembled components containing a variety of materials. Coating of metal substrates has also benefited, with low energy and investment costs, shorter cure times and subsequently higher production rates.

The correct quantity of powder to produce the desired finished thickness is easy to measure before curing. Using the Elcometer 550 Non-contact Uncured Powder Thickness Gauge, as the name suggests, offers an unrivalled approach to measuring uncured powder thickness without touching the powder. Able to predict the coating thickness after cure, the Elcometer 550 reduces the mistakes of applying too much or not enough powder, making the process even more efficient.

Environmentally friendly, efficient and economical, easy to apply and producing an excellent finish has made the use of powder rise across many industries. This trend that will continue as new applications are found.

Wet curing

The most important time in concrete's life is the first seven days. These first seven days are so vital because they affect the long-term strength, permeability, durability, abrasion resistance and shrinkage.

WHAT IS WET CURING?

Curing is the process of retaining enough moisture in fresh concrete to complete the hydration reaction between water and Portland cement. If too much water escapes too quickly, the hydration reaction will be incomplete.

Wet curing is the best method to ensure a lasting concrete structure. When wet curing, the fresh concrete is left in an environment of 100% humidity. This provides a much more favourable environment than those processes using a spray-on cure. This environment can be monitored using an Elcometer 319 Dewmeter, which provides all the relevant information required for accurate climatic condition testing.



BENEFITS OF WET CURING

- **Increased strength:** Wet curing ensures the Portland cement has enough moisture content to complete the hydration reaction. Because the process is allowed to complete fully, the strength of the concrete is increased.
- **Reduced permeability:** By allowing a complete reaction to take place, the tiny voids that are left when concrete cures too quickly are filled, greatly reducing the resultant permeability of the concrete.
- **Increased durability:** The surface of the concrete, because of the increased strength and decreased permeability is much more hard wearing and more resistant to abrasion. This increases the life-span of the concrete structure.
- **Reduce shrinkage cracks:** The very nature of the way that concrete cures, means that it is impossible to eliminate shrinkage cracks. By leaving the fresh concrete in 100% humidity conditions while the concrete gains strength, the resulting cracking is significantly reduced.

Although adding seven days to the timescale of a project for the wet curing of concrete, when there are many fast cure products available, the overall benefits for the total life span of the concrete structure outweigh this initial cost.

Warranty information on Elcometer 331 search heads

All search heads and the borehole probes used in conjunction with the Elcometer 331 Covermeters are supplied with a 12-month manufacturer's warranty. The conditions of the warranty exclude replacement due to normal wear and tear.

The ACI's 2006 Manual of Concrete Practice

The American Concrete Institute's 2006 Manual of Concrete Practice is now available.

Containing over 180 of ACI's committee standards and reports, it is arguably the most comprehensive reference set available. The manual contains all of the widely used ACI concrete and masonry code requirements, specifications, guides and reports. Additionally it includes information about code requirements, cracking, durability problems, temperature control, non-destructive testing and hundreds of other top areas.

Available as a six volume set, a CD-ROM and a one-year online subscription, it can be ordered via telephone on +1 248 848 38 00 or online at www.concrete.org

Elcometer training success down under

During February 2006, Steve Pollard from the Manchester Tech Support Team assisted Australian Principal Elcometer Distributor Phillro Industries in the provision of product training. The training was provided for resellers and a major distribution chain established by Phillro last year. It provided part of the support strategy to resellers, to assist sales growth through product knowledge and its application to the coatings industry sectors.

Phillro, who were recently approved as the authorised Elcometer test, calibration and repair centre in Australia, held a 3-day seminar in their Melbourne Headquarters. The seminar was welcomed and deemed an overwhelming success with a great deal of hands-on participation and interest shown by the 28 sales representatives.

A fourth day was spent with Steve training internal sales staff on the new range of concrete industry products including the Elcometer 331 covermeter, which has recently been launched in Australia.

Following the tremendous effort put in by Steve, advantage was taken of a magnificent 35°C day and the few spare hours before his return flight to Lancashire, to meet some of Australia's native fauna up close and personal. "Visiting the Healsville Wildlife Sanctuary in Melbourne's Outer Eastern



Steve gives Skippy and his friends a few tips on using the Elcometer 456 gauge!

Country region we hope gave Steve something other than his hotel room and our offices to remember from his trip and short visit to Australia. With so little time to spare and as our way of showing our appreciation for the fantastic job he did in helping us with the training, it was the least we could do." Said Paul Jenkins, Elcometer Product Manager from Phillro Industries.

As authorised Elcometer distributors, Phillro provides excellent service and support of the products at a local level. The successful training event has shown both Elcometer's and Phillro's commitment to a lasting and successful partnership.

Coatings on metal – Part 2

This time, we look at measuring the thickness of a coating on real items.

The metal under the coating is called the **substrate** and it is important to know what it is before we try to measure the thickness of the coating.

The choice of probe depends on both the coating and the substrate and many combinations can be measured with Elcometer probes, but not every one. Here are some popular examples:

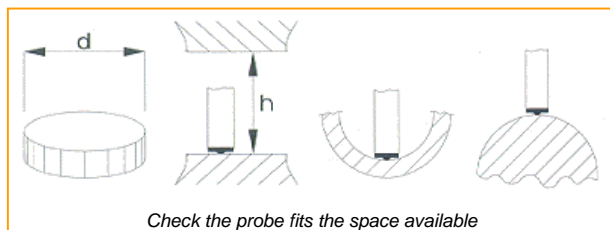
Zinc or galvanising on steel	F
Anodising on aluminium or magnesium	N
Lacquer on brass	N
Paint or enamel on steel	F
Hard chrome on high tensile steel	F
Electroplated nickel on steel	Cannot be measured
Tin on brass	with
Decorative chrome on zinc	F or N
Silver on copper	probe.
Chrome on plastic.	



SHAPE

The size and shape of the location to be measured can be big or small, wide or narrow and flat or round. It is very important to know about the shape before deciding which is the best probe to use.

Probes cannot measure on every surface; they are designed for specific tasks based on demand from users. You should compare the probe parameters with the shape and size of the item to be measured.



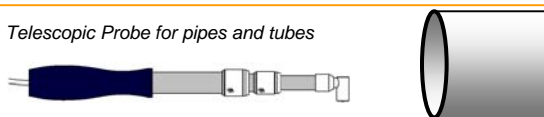
Check the probe fits the space available

Big things and large spaces are usually measured with the **Standard** probes, which are straight with a spring-loaded sleeve. But where there is little surface or the required measurement is in a confined space, use **Right Angle** probes or **Miniature** probes (see picture right).



For coatings inside cylinders, a Telescopic probe can reach over 1 metre - more if you can put your arm inside. Remember to calibrate on a similar curved surface with no coating before you measure the coated parts.

Telescopic Probe for pipes and tubes



PROBE PLACEMENT



It is most important to place the probe at 90 degrees to the plane of the surface. Otherwise, readings will be higher and inconsistent. Pressing the outer cylinder or sleeve of the probe against the test surface and holding it there for one second will ensure this.

Small tubes and large wires should be located in the V shape cut at the end of the probe sleeve. Larger diameter items will require the use of the Vee Adaptor T9997381 (*right*), which fits over the outside of the probe and can be positioned for the best effect. The probe can be inverted and the sample placed onto the end of the probe if that makes it easier to measure.



When measuring on surfaces with a small radius, remember to recalibrate to the same curvature first. Wires must be kept straight so there is only one curve. A compound of curves will give higher and lower readings not representative of the thickness of the coating.

CONSISTENCY



This is very important. The probe must contact all the samples in the batch in the same way. On a complex curved surface, it must be placed in a similar spot with similar curvature to that it was calibrated on. To make placement easier, users have made plastic holders and blocks to fit their complex items, drilling holes where the probe should go. This way, inspection becomes quite a simple and repeatable affair.

Smaller parts must be held firmly to avoid small changes in position distorting the measurement.

A Probe Placement Jig (*right*) helps in this case because it can be adjusted to both hold the sample and to place the probe consistently. The operator may choose to use the remote switch to lower the probe rather than do it by finger.

Special fixtures can be made to hold awkward samples. An example is the orange mould compound used to hold zinc plated steel pop-rivet heads.



Probe placement jig & vice.

In the next and final part of this series on coatings on metal substrates, we will look at the actual gauges and how their features make measuring, calculating and recording so much easier than by hand.