The official journal of the Vibrations Association of New Zealand

Spectrum

Summer 2025 | Issue 114

GET READY!

Conference 25

May 20th - 22nd, 2025

INSIDE:

- Full three-day timetable
- Keynote speaker bio
- Accommodation details

and more...

Electrostatic discharge & ammonia compressor lubrication systems

PART ONE

+ Gravimetric transducer calibration

Balancing by the components method

VANZ
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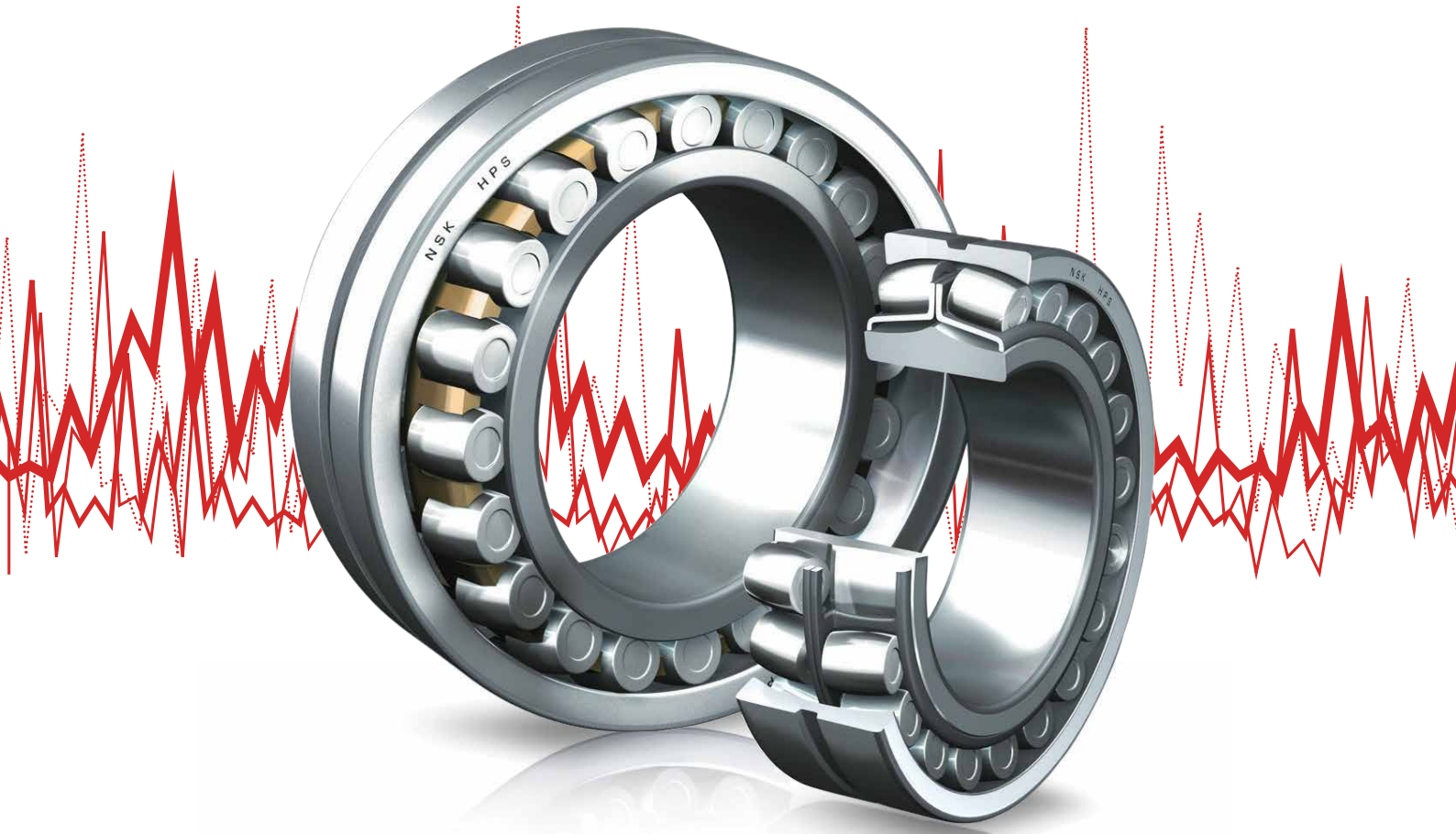

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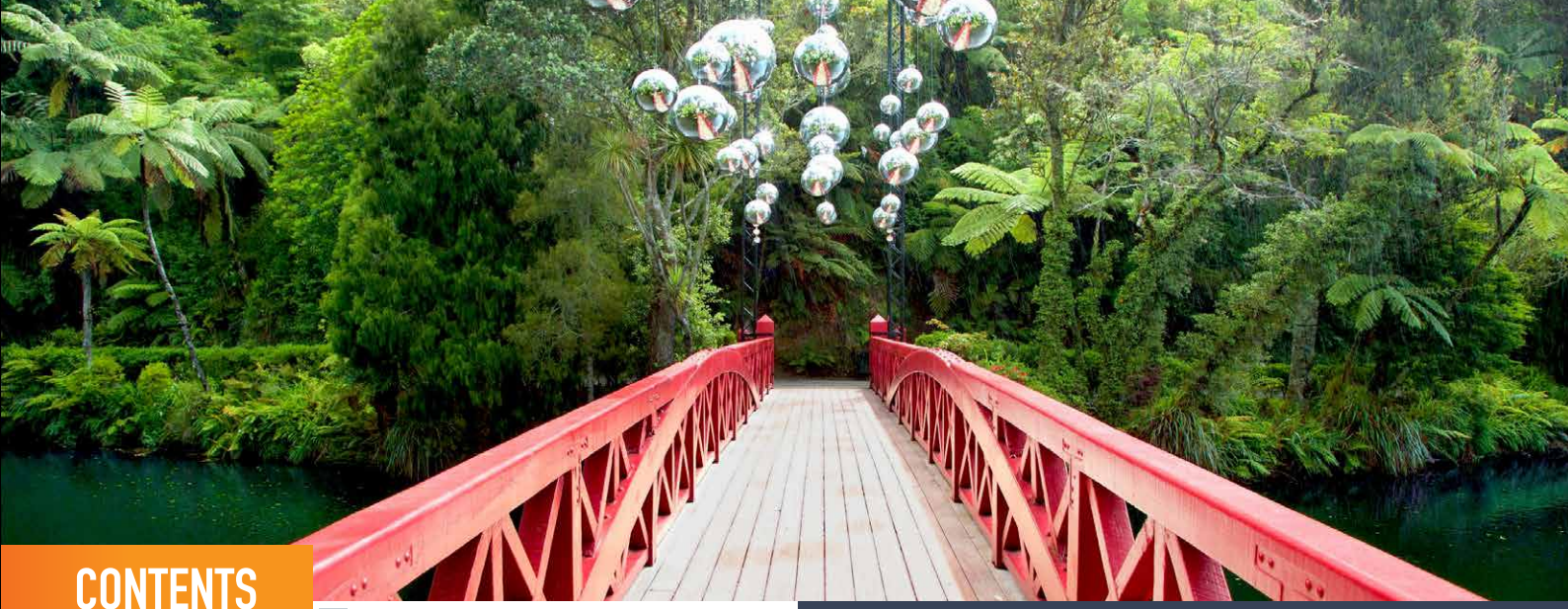

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Spectrum

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Spectrum is published by the Vibrations Association of New Zealand (VANZ). The magazine is produced in a quarterly cycle annually in both digital and printed mediums.

The magazine is designed to cover all aspects of the Vibration, Condition Monitoring, Reliability and the wider Predictive Asset Management field and distributed to all VANZ members, including corporate members.

Missed an issue?

Simply scan the QR code here to link your device directly to the VANZ website. There you will find Spectrum issues available to view or download*. You can also access previous issues by visiting our website online at: **www.vanz.org.nz**

**QR code reading app need on your device first.*

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VIBRATIONS ASSOCIATION *of* NEW ZEALAND

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PRESIDENTS' REPORT

By Tim Murdoch | VANZ President

Welcome to 2025, I hope you all were able to relax and spend time with family and friends over the Christmas and New Year period.

I was privileged to be able to get out and explore our amazing country at a few of our national parks here in New Zealand. What a beautiful country we live in!
I reflected on VANZ and the great community it is, spanning across many different industries with people attending and presenting from across the globe. The level of knowledge is outstanding and for the most part the VANZ community is happy to share information and lessons from experience to assist each other. I know I have called upon some of this experience from people I have met through VANZ in the past.

I had a colleague of mine comment that in the past when he was in a condition monitoring role working for another company, that one of the favourite things his team looked forward to during the year was the VANZ conference. I was happy to hear that and know that I am a part of the team that helps to bring this all together for you.

> **"I had a colleague of mine comment that one of the favourite things his team looked forward to during the year was the VANZ conference."**

At the conference last year, VANZ was loaned some old vibration analysis related equipment to display. For those of you that attended you would have seen these items on our stand in the exhibitor area. Looking around at the exhibitors displaying their latest technology it's incredible to see how far the technology has come in such a short time. It begs the question - Where are we headed now? What will the next latest developments be?

Congratulations to Dr Iain Epps from Mobolo Technology Ltd for his latest patent with the New Zealand Intellectual Property Office for a bearing monitoring method and system. Great achievement for your hard work!

Join us in May at the Plymouth International Hotel in New Plymouth for our 2025 Conference to meet with like-minded people, to network, to learn and participate. We have some amazing speakers lined up and engaging exhibitors to chat with and inspect their technology. Book now and don't miss out.

We have the privilege this year to have Rob Simmonds from R&T Reliability Technologies Australia as our VANZ keynote speaker. Rob brings with him a wealth of reliability, lubrication and wear debris analysis experience of which we will be able to tap into and learn from his experience and knowledge.

Before breaking away for the holidays the VANZ committee were working hard on bringing together all the finer points, which, when brought together make up our vibrant conference. They are doing an amazing job, thank you for your effort. If you would like to share a presentation, please get hold of papers@vanz.org.nz while there is still a chance to lock you in. Follow us on LinkedIn and Facebook to keep up with the latest news.

May this year be a year full of joy, success and opportunities for you all. ■

VANZ
VIBRATIONS ASSOCIATION of NEW ZEALAND

Conference 25

New Plymouth, NZ

20-22 May 2025

Join us for the VANZ 2025 Conference event!

We're back in beautiful New Plymouth at the Plymouth International Hotel.

If you have an interest in the area of mechanical and electrical machine condition monitoring, to facilitate predictive asset management – this conference is for you. Calling all in-house technicians, consulting engineers, engineering students, and suppliers and/or distributors of specialised equipment – **this conference is for you!**

Proudly brought to you by:

ABD GROUP

For more info,
please contact us at:
secretary@vanz.org.nz

Registration Options - Conference'25

Secure your booking early.

See our 2025 registration options below.

Conference 25
New Plymouth, NZ

1-Day Registration

All conference pricing excludes GST.

Package	PRICE PER PERSON
Condition Monitoring Hands On	**$385**
Condition Monitoring Hands On – Attendance to verified apprentices / trades trainees / university	**FREE!**
Asset Management	**$385**
1-Day Conference Pass– For Tuesday only.	**$385**
1-Day Conference Pass– For Wednesday or Thursday only.	**$495**

2-Day Registration* WED 21st - THU 22nd MAY 2025

Package	PRICE PER PERSON
2-Day Conference Pass – Wednesday and Thursday only.	**$990**
2-Day Conference Pass – Attendance to verified apprentices / trades trainees / university	**$495**

3-Day Registration* TUES 20th - THU 22nd MAY 2025

Package	PRICE PER PERSON
3-Day Conference Pass – Full access Tuesday, Wednesday and Thursday	**$1,150**

Booking is quick, easy and hassle free!

Visit our website www.vanz.org.nz or simply scan the QR code below.

* Note. **Day 2 and 3 registrations also include:**

- **Wednesday evening dinner for the delegate.**
  One (1) dinner ticket is issued per registration. There will be provision for extra dinner attendee purchases at $125 per person.
- **A one (1) year membership with VANZ.**

Complimentary parking is available at the venue.

Accommodation

Booking accommodation? We've secured rooms at Plymouth International and Auto Lodge Motor Inn *(located just around the corner)* for a fantastic rate – especially for VANZ members attending the conference!

- **Plymouth International:** Ph. 0800 800 597 or visit www.plymouth.co.nz
- **Auto Lodge Motor Inn:** Ph. 0800 800 896 or visit www.autolodge.co.nz

Use code **VANZ 2025.**

For more info, please contact us at:
secretary@vanz.org.nz

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Exhibitor Packages for Conference'25

Secure your booking early. Packages will sell quickly! See our 2025 exhibitor options below.

Conference 25
New Plymouth, NZ

Package	Gold	Silver	Bronze
Price	$3,355	$2,420	$1,760
Naming rights of conference			
Primary sponsorship on key online & offline promotional material before and during conference*			
Official role at the opening of the conference and five minute speaking opportunity			
Trade stand that offers sponsors the opportunity to showcase products, services and ideas	Premium	Standard	Table
Signage opportunities at conference & dinner			
Pre conference Spectrum advertising opportunities (early registrations only)	✓		
Acknowledgement as sponsor & vendor	✓	✓	
Company literature in delegates goodie bags	✓	✓	
Brand on conference programme (early registrations 1 month before event)	✓	✓	✓
Sponsorship on key online & offline promotional material before and during conference**	✓	✓	✓
Logo on VANZ conference publications & website***	✓	✓	✓
Post conference Spectrum advertising opportunities	✓	✓	
Conference entry for staff	x2	x1	x1

Booth size (Platinum and Gold)	1.8 x 3.0 metres
Booth size (Silver)	1.2 x 2.4 metres
Table top size (Bronze)	1.8 x 0.6 metres

*Website** *Animated landscape panels @ 460px wide x 200px high*
*Website*** *Animated landscape panels @ 460px wide x 200px high - x1*
*Logo file**** *To be supplied as either a vector eps or hi res tif/png/jpeg*

Files to be supplied to specifications.

Further Sponsorship Options

Informal Welcome Event (Tues night)	$2,000	Lanyard sponsor	$500 + lanyards
Networking Session Sponsor NEW	$1,000	Bag sponsor	$500 + bags
Dinner Sponsor	POA		

All conference pricing excludes GST.

Note. All exhibitors have the annual dinner included for the number of delegates associated with the respective category.
Example: Gold 2 delegates, Silver 1 delegate, Bronze 1 delegate. There will also be provision for extra annual dinner attendee purchases at $125 per person.

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For more info, please contact us at:
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Conference 25

A RETURN TO NEW PLYMOUTH

New Plymouth is a vibrant gem in the wider crown known as Taranaki. Host city for the VANZ Conference in 2025. Here are some fun facts you may not know about the region.

New Plymouth is a city on the west coast of New Zealand's North Island. It's known for its art scene and coastal walkway stretching from Bell Block all the way to Port Taranaki.

New Plymouth was originally called Ngāmotu (the islands). Pākehā first arrived and set up a trading station at Ngāmotu in 1828, but it was not until 1841–42 that planned settlement brought 868 immigrants from Devon and Cornwall in England to the 'New' Plymouth.

The city is predominantly a service centre for the region's principal economic activities such as farming, oil, natural gas and petrochemical exploration and production. Notable areas of interest include the botanic garden (Pukekura Park), the acclaimed Mothers and Daughters sculpture, local Art Gallery, Te Rewa Rewa bridge, the scenic 13 km New Plymouth Coastal Walkway, Paritutu Rock, and of course

Above: The Three Sisters and Elephant Rock.
Left: Paritutu Rock.
Below left: Te Rewa Rewa pedestrian and cycleway bridge across the Waiwhakaiho River.

Mount Taranaki as a backdrop. Mt. Taranaki is 2,518m high, and is the second highest mountain in the North Island. At low tide, you can also visit the amazing Three Sisters coastal rock formation.

New Plymouth is a city of growth, diversity, and opportunity. Its steadily increasing population, thriving economy, and commitment to sustainability make it a desirable place to live, work, and visit. From its dynamic cultural scene to its robust industrial base, New Plymouth's story is one of resilience and innovation.

New Plymouth's has a vibrant heart. With its blend of urban convenience and natural beauty, it truly offers something for everyone. Lonely Planet for example, has named and listed the Taranaki region as one of the world's best regions to visit.

The Plymouth International.

Conference 25

Accommodation

Held in the beautiful city of New Plymouth, and once again hosted at the Plymouth International Hotel, the VANZ Conference is back and this year is shaping up to be one of the best, with an exciting line-up of guest speakers, our ever popular trade/exhibitor stands, round table discussions and much more. You could, in theory, stay anywhere during your visit to New Plymouth over the three days, but given the following accommodation options, why would you want to stay anywhere else?

Like previous years, VANZ has a number of rooms secured at both the Plymouth International and the Auto Lodge New Plymouth (just around the corner from the Plymouth International) exclusively for the confernece, and can be pre-booked using the code **VANZ2025**. This will enable attendees to book the accommodation for a special discounted rate for the duration of their stay.

Plymouth International Hotel

The Plymouth International is host for the VANZ conference 2024. It is New Plymouth's largest independently owned hotel, conference facility and events centre and one of only a few 4-Star Qualmark hotels in town. Their very own The Orangery (restaurant) has been rated New Plymouth's best restaurant on Tripadvisor for the past year and won a Silver Sustainable Tourism Business award. The Plymouth is set between New Plymouth's two major one-way systems – so driving across town in either direction is super-easy. The town's beloved Coastal Walkway is a short stroll from our front desk and great swimming at East End Beach is less than five minutes from there. The CBD is 750m away and you can jump in the car and be at Fitzroy Beach's world-class surf break in five minutes.

Address: 220 Courtenay Street, New Plymouth
Contact: 0800 800 597 / www.plymouth.co.nz

Auto Lodge New Plymouth

Located between the chic CBD and trendy suburbs of Strandon & Fitzroy, Auto Lodge is New Plymouth's most surprising accommodation. The Auto Lodge offers class-leading modern and refurbished studio rooms, executive & superior suites, private picturesque houses and a penthouse apartment. With their own unique artistic style throughout the hotel you will find hidden gems of architectural brilliance. Auto Lodge pride themselves on personalised service and long-term guest relationships. They are proud to be Qualmark 4-star rated. Auto Lodge is just literally around the corner from Plymouth International Hotel and is a brisk walk away from town. ■

Address: 393 Devon Street East, New Plymouth
Contact: 0800 800 896 / www.autolodge.co.nz

Above: The Auto Lodge in New Plymouth.

KEYNOTE SPEAKER PROFILE...
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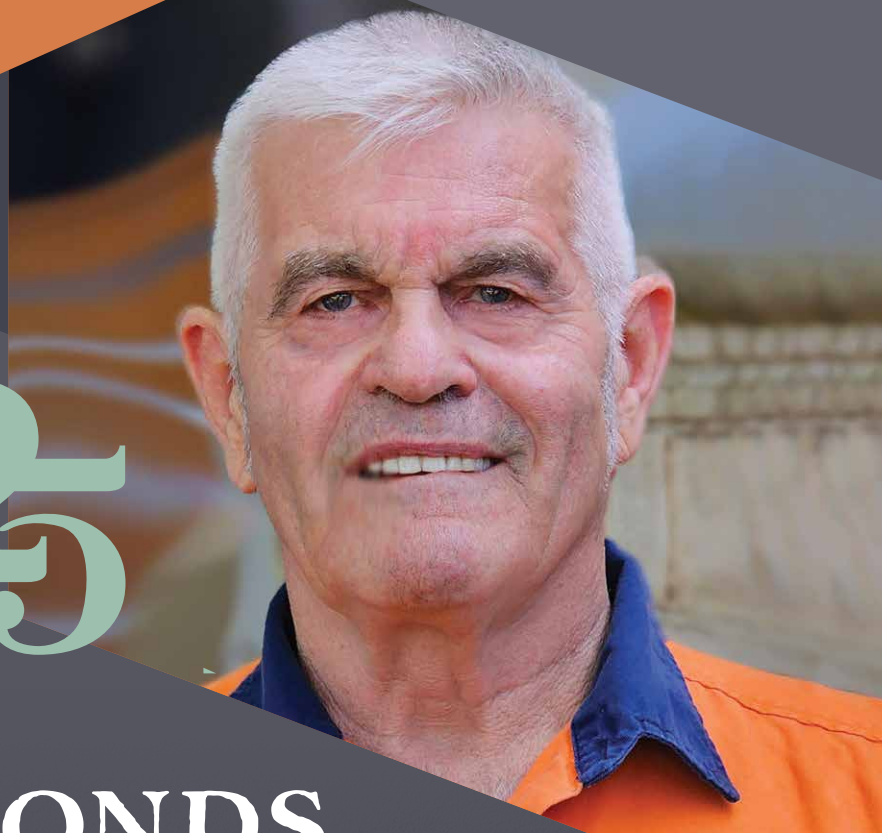

Conference 25
NEW PLYMOUTH, NZ

INTRODUCING
ROB SIMMONDS

Rob Simmonds is a Reliability Manager and tribologist at R&T Reliability Technologies PL in Sydney, Australia. He has 30 years of experience in lubrication, including selling, manufacturing, and monitoring. Back in 1998-1999, one of Rob's top salespeople received specialised training at Monash University by ICI on how to perform wear debris analysis (WDA) on oil samples. Monash University had developed the original technique. This salesperson was later recruited by a fuel company but not before passing on his knowledge to Rob. This pivotal moment led Rob to realise that he could better serve his customers by monitoring their plant for abnormal wear rather than just manufacturing lubricants.

In 2000, Rob and his team established the R&T lab, focusing on microscope-based WDA for manufacturing plants. Rob's career in WDA has been pioneering, as there were no similar labs available for reference when setting up R&T. This led to extensive investigative microscope work to ensure consistent, clean, and accurate results with ongoing monitoring of in lab dust levels weekly and also when samples are being processed. They developed a clean environment with proper filtration and equipment to ensure consistent results. The R&T Analysis reports have been tailored to meet customer requirements.

Key Projects and Experiences
- Wrote the paper "It's All About Size" back in 2003-2004, the paper was published in both Machinery Lubrication and Electrix Magazine, both magazines have a worldwide distribution area
- Wrote a paper on Electrostatic Discharge In Ammonia Compressors
- Botany Industrial Park (BIP): Monitored gearboxes, compressors, and auxiliary equipment for 25 years in a gas-to-polymer plant
- NSW State Rail Laboratory – Collaborated with for 2 years, gaining experience in metallurgical work and monitoring various train components, extending the rebuild time for various components on the trains
- Developed a RCA for ESD and varnish build up in turbine systems based on the colorimetric analysis technique and report for ESD and Varnish build up in turbine systems.

Diverse Industry Experience
- Worked with papermills, cement plants, plaster mills, steel mills, rod mills, tube mills, plaster board plants, cement board plants chip board plants, bakeries, flour mills, polymer injection and blow moulding plants
- Filter Debris Analysis (FDA) - Developed proficiency in identifying abnormal wear, contamination, and root-causing failures across various filter types
- Gas Engine Genset Monitoring - Extended Jenbacher engines rebuild time from 60,000 to 120,000 hours
- Iron Ore Train Automatic Braking system component evaluation, extending rebuild time from 6 years out to 8 years
- Suburban Rail Car Compressor Monitoring, extending service interval from 3 months out to 4 months saving one service per year
- Monitoring Locomotive Engines to extend the rebuild time from 18,000 hrs out to 30,000 hours work ongoing
- Monitoring Haul Truck Centrifuge Filters For the evaluation of a new engine lubricant for a fuel company
- Dust & Dirt Sample Analysis root causing the origin of the contamination found in new equipment to establish whether manufacturing left over debris or environmental contamination, shot blast crystals found forcing the warrantee back to the OEM. ■

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Full Timetable - Conference'25

Note. Correct at the time of print. Timetable could be subject to change.

Conference 25

Tuesday 20th – Thursday 22nd May 2025

Brought to you by: VANZ Vibrations Association of New Zealand

Major sponsor: ABD Group

Tuesday 20th May - Day 1

Practical Condition Monitoring Awareness plus **Reliability Improvement**

Start	Duration	End		
7:45 AM	**0:30**	**8:15 AM**	**Registration and Exhibition / trade Stand area is open for viewing, with Tea and Coffee available**	
8:15 AM	0:05	8:20 AM	Welcome to Conference 2025: **VANZ President**	
8:20 AM	0:05	8:25 AM	Overview of Conference Timetable for the Day and the next 2 days: **VANZ Vice President**	
8:25 AM	0:20	8:45 AM	Exhibitors Introductions	
8:45 AM	0:45	9:30 AM	Keynote Presentation: **Rob Simmonds**	
9:30 AM	**0:30**	**10:00 AM**	**Morning Tea in the Exhibition room / Trade Stand area**	
Two Streams of Presentations			**The Tradesman's Tools' and installation specifications**	**Asset Management and Reliability Improvement**
10:00 AM	0:30	10:30 AM	**Dr Iain Epps:** Awareness Day Intoduction	**Stage 1:** TBC
10:30 AM	0:30	11:00 AM	**Bruce Shepherd:** Vibration Analysis	
11:00 AM	0:30	11:30 AM	**Will Dale:** Mechanical Seals	**Dr Iain Epps:** TBC
11:30 AM	0:30	12:00 PM	**Dr James Neale:** Infrared-Ultrasound	
12:00 PM	**1:00**	**1:00 PM**	**Lunch in the Exhibition room / Trade Stand area**	
1:00 PM	0:30	1:30 PM	**Chris Unsworth:** Lubrication Distribution	**Julien Maffre:** TBC
1:30 PM	0:30	2:00 PM	**Mike Wharry:** Oil Analysis	**Robert Dent:** TBC
2:00 PM	0:30	2:30 PM	**Chris O'Leary:** Alignment of Rotating Equipment	**Clyde Volpe:** TBC
2:30 PM	**0:30**	**3:00 PM**	**Afternoon Tea in the Exhibition room / Trade Stand area**	
3:00 PM	0.30	3:30 PM	**John Clynes:** Fitting of Bearings	**Cameron Blackbourn:** TBC
3:30 PM	0:30	4:00 PM	**Craig Carlye:** Introduction to Computerised Maintenance Management	**Steve Hall:** TBC
4:00 PM	0:30	4:30 PM	**Round Table Discussions** - Your chance to ask your questions from todays presenters, panel experts and colleagues on a specific subject at an assigned table.	**Round Table Discussions** - Your chance to ask your questions from todays presenters, panel experts and colleagues on a specific subject at an assigned table.
4:30 PM	1:15	5:45 PM	**'Meet & Greet' Networking** | Complimentary Refreshments and Canapés available in the Exhibition Area	

TIMETABLE FOR DAY 2 & 3 OVER PAGE

Wednesday 21st May - Day 2
Main Conference

Start	Duration	End		
7:30 AM	**0:30**	**8:00 AM**	**Registration and Exhibition / Trade Stand area is open for viewing, with Tea and Coffee available**	
8:00 AM	0:05	8:05 AM	Welcome to Conference 2025: **VANZ President**	
8:05 AM	0:05	8:10 AM	Today's agenda: **VANZ Vice President**	
8:10 AM	0:15	8:25 AM	Exhibitors Introductions	
8:25 AM	0:30	9:05 AM	Keynote Presentation: **Rob Simmonds**	
9:05 AM	**0:30**	**9:35 AM**	**Morning Tea in the Exhibitor room / Trade Stand area**	
Two Streams of Presentations			**Stream 1: Room One**	**Stream 2: Room Two**
9:35 AM	0:40	10:15 AM	**Clyde Volpe:** Reliability, Strategy, Tactics	**Anthony Mack:** TBC
10:15 AM	0:40	10:55 AM	**Mike Yardley:** Motion Amplification	**Larry Wiechern:** Counterfeit Products
10:55 AM	0:40	11:35 AM	**Steve Hall:** Flood Protection Asset Care program	**Rico Van Niekerk:** Keeping it simple monitoring Wind Turbines
11:35 PM	**0:50**	**12:25 PM**	**Lunch in Exhibitor room / Trade Stand area**	
Two Streams of Presentations			**Stream 1: Room One**	**Stream 2: Room Two**
12:25 PM	0:40	1:05 PM	**Ian Van der Sar:** Case Studies	**Paul Bosauder:** Improving Reliability and Performance in Complex Engineering Systems
1:05 PM	0:40	1:45 PM	**Erik Vandenberg:** TBC	**Sven Fleischer:** TBC
1:45 PM	0:40	2:25PM	**John Clynes:** When Critical Plant Goes Down	**Peter Caldwell:** What features/functions are important in an online CM system
2:25 PM	**0:30**	**2:55 PM**	**Afternoon Tea in the Exhibitor room / Trade Stand area**	
2:55 PM	0:40	3:35 PM	**Brian Ropitini:** TBC	
3:35 PM	0:40	4:15 PM	**Dr Iain Epps:** TBC	
4:15 PM	1:00	5:15 PM	**'Meet & Greet' Networking** | Complimentary Refreshments and Canapés available in the Exhibition Area	
6:00 PM	**3:30**	**9:30 PM**	**Conference dinner**	

Thursday 22nd May - Day 3
Main Conference

VANZ AGM will be held at 10:00am
PLEASE ATTEND!

Start	Duration	End		
7:30 AM	**0:30**	**8:00 AM**	**Exhibition room / Trade Stand area is open for viewing, with Tea and Coffee available**	
8:00 AM	0:50	8:50 AM	**Rico Van Niekerk:** Artificial Intelligence within Industry 4.0	
8:50 AM	0:45	9:35AM	**Peter Caldwell:** The applications and implications of Artificial Intelligence on Condition Monitoring	
9:35 AM	**0:40**	**10:15 AM**	**Morning Tea in Exhibitor area** ** VANZ AGM WILL BE HELD IN STREAM-1 ROOM **	
Two Streams of Presentations			**Stream 1: Room One**	**Stream 2: Room Two**
10:15 AM	0:40	10:55 AM	**Clyde Volpe:** Technical VA, Wave Forms Etc	TBC
10:55 AM	0:40	11:35 AM	**Bruce Shepherd:** TBC	**Simon Hurricks:** Unit 2 Incident
11:35 AM	0:40	12:15 PM	**Julien Maffre:** TBC	**Sven Fleischer:** TBC
12:15 PM	**0:50**	**1:05 PM**	**Lunch in the Exhibitor room / Trade Stand area**	
1:05 PM	0:40	1:45 PM	**John Clynes:** Underwear versus Overwear, The Naked Truth	
1:45 PM	0:40	2:25 PM	**Mike Warry:** TBC	
2:25 PM	0:40	3:05 PM	**Rob Simmonds:** TBC	
3:05 PM	0:45	3:50 PM	**Awards Presentations, Vendor Prize Draws:** You need to be there to claim the prizes & Conference closing address	

Conference officially closed. We look forward to seeing you all again next year in 2026. Please ensure you travel safely home.

Conference 25

NEW PLYMOUTH, NZ

CALL FOR PAPERS

The VANZ conference is a place for learning and sharing

- **Have you ever had an experience that you think others would benefit from?**
- **Something that went right or wrong?**

We can all learn from our own experience, but we can avoid a lot of problems if we learn from other people too! That is what VANZ is all about.

If you could talk for just 15 minutes (or longer if you like), we would love to hear from you.

For more info,
please contact us at:
papers@vanz.org.nz

VANZ
VIBRATIONS ASSOCIATION *of* NEW ZEALAND

VANZ MAILBAG

Engineering a membership

Hi team.
Recently my family and I shifted to Auckland from Melbourne. I am 26 years old and have a three-year Bachelor of Science degee at Melbourne University. Both my wife and I have been lucky enough to both obtain good local jobs here in New Zealand, which has made for a seemless shift from Australia.

I was talking to a work collegue the other day - who is a current member of VANZ, and he suggested that I attend your next conference and become a member myself. With little connections in New Zealand, we think this would be a great opportunity for us to reach out and meet many like minded people and learn more about the industry over here.
My question I guess is is how do I go about becoming a member of VANZ, and what are the time-frames around this?
Thanks very much. Chris.

Hi Chris. Thanks for your message.
It sounds like you've really landed on your feet over here in New Zealand and it's exciting to know that we're getting some really highly qualified engineers entering into our workforce here.

*VANZ is always looking for new members, and joining is easy. Visit our website, **www.vanz.org.nz** and follow the on-screen instructions, or you can email us; **secretary@vanz.org.nz**. Membership costs $110, and lasts for 12 months. For that you get access to our in-depth knowledge centre, a subscription to our quarterly magazine 'Spectrum', and other exclusive membership offers around our special conference events and more. Membership is immediate from the time of payment.*

*Alternatively, If you register and attend our next conference over two or three days as either an exhibitor or delegate, you automatically receive a 12-month VANZ membership, FREE! Our next conference is 20-22 May. All registrations for the event are done online at **www.vanz.org.nz**.*

We hope this helps. VANZ.

Do you have something you might like to share? Have feedback, or a question for the VANZ team? We would love to hear from you.

- *Send us an email at: secretary@vanz.org.nz*
- *Write us a letter. Send all correspondence to: VANZ Mailbag, PO Box 308093, Manly, Auckland 0952, New Zealand*

EDITORS' CORNER

By Angie Delfino | Spectrum Editor

Right: Our fun 2024 Christmas message we posted for our members on social media, based upon our magazine, but with a festive message adorning the cover along with the jolly man himself, kitted out in worksafe gear, of course!

A very Happy New Year to all our readers/VANZ members/advertisers! Here's hoping the festive season was a chance for a good break with fun, sun and family.

We are continuing to put things together for this years conference with committee members buzzing around like busy bees organising our venue at the Plymouth International Hotel, accommodation, presenters and everything else that goes into putting together a conference!

In this issue we have an article about Balancing by the Components Method written by Ray Beebe, Gravimetric Transducer Calibration by Simon Hurricks, and also Part 1 of an article from our keynote speaker Rob Simmonds; Electrostatic Discharge & Ammonia Compressor Lubrication Systems. The President's Report has some pearls of wisdom from Tim Murdoch so read up on that as well. Check out the first quiz of the year from Carl and many thanks go to our advertisers who continue to support us, it's very much appreciated as we head into 2025 and gear up for another conference with our platinum sponsor ABD Group.

Best wishes for a prosperous year and happy reading!!

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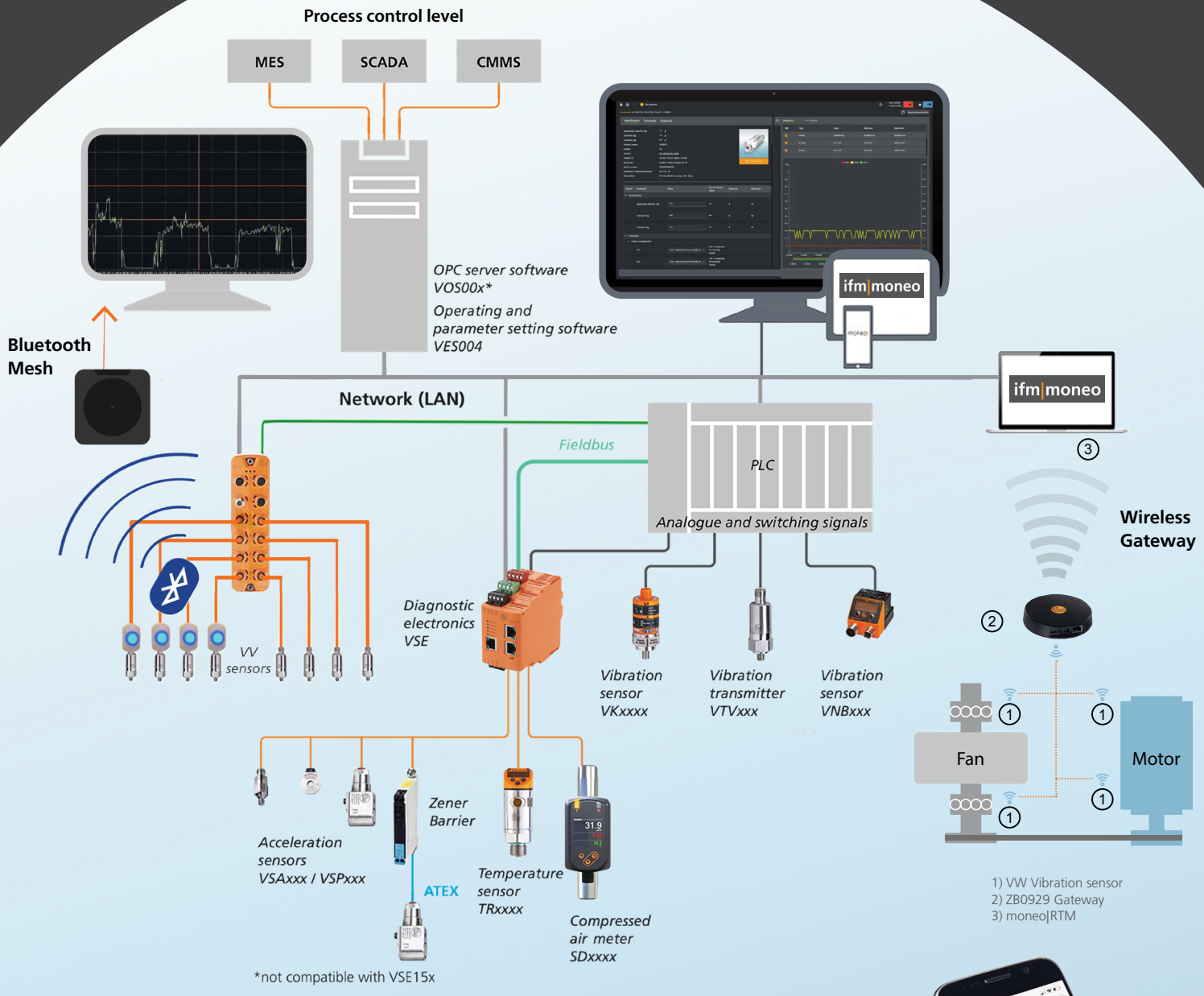

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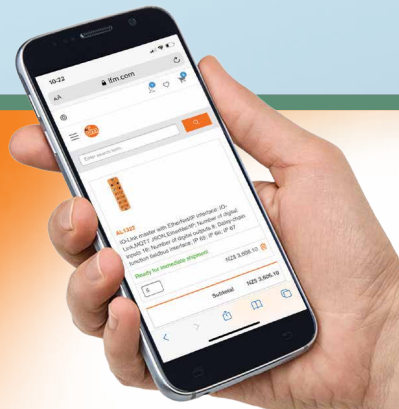


Fig.1

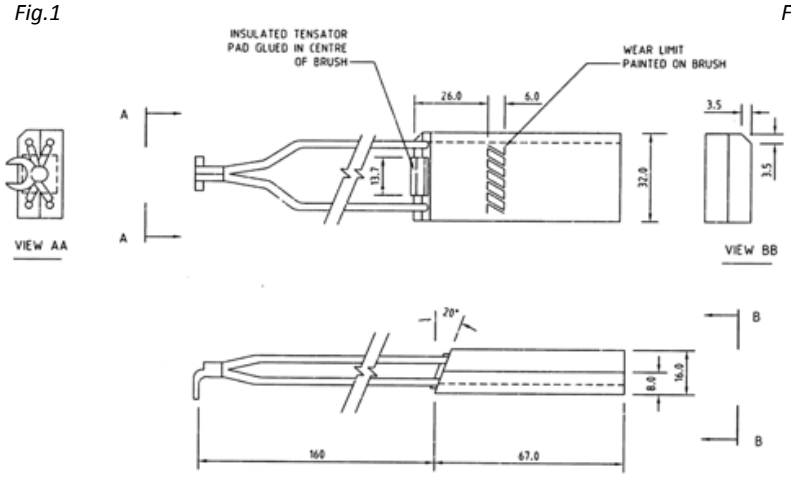


Fig.2

Fig.1: Example of carbon brush dimension drawing: HE32138 (Western Port works).

Carbon brush compliance check

Scenario: You are about to install replacement carbon brushes into an electrical machine such as a D.C. Motor, D.C. Generator or a Slip Ring A.C. Motor.
Ask yourself: Are the new brushes OK to install (PASSED an inspection)?

Review the carbon brush Specifications data (BSL Electrical Carbon Brush Drawing or Sketch). Noting:

- Carbon Brush Grade and Brand
- Dimensions of Carbon Brush
- Flexible Pigtails configuration
- Carbon Brush appearance.

All carbon brushes used at BSL have been selected to meet the right application requirement for each individual machine. The correct brush selection will ensure reliable operation and long life of the machine.

When replacing carbon brushes installed in a machine, check the plant equipment specifications or the prepared WORK ORDER that stipulates the correct brush to be installed into the machine.

Do not install incorrect brushes into any machine!

Do you have the right brush in your hand?

- The brush must be identifiable
- This may be printed or engraved on the surface of the brush
- The Identification MUST have as a minimum;
  - Brand Name or LOGO (eg. Morgan, National, SCHUNK
  - Brush Grade (eg. EG251, SA45, E46).

Is the brush the right size ?

Measure and check all critical dimensions of the carbon brush. Carbon brushes are made to a tight dimensional tolerance to ensure correct installation and reliable operation.

Pigtails

- Check the pigtail configuration.
- Are the pigtails the right size?

Fig.3

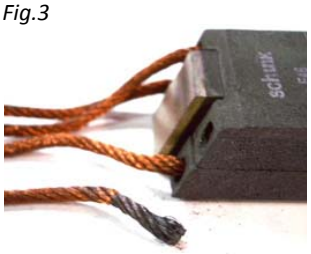


Fig.4

Fig.5

Fig.3: Pigtail tamping damage. Poor tamping causes a "Hot Joint" during operation.
Fig.4: Tensator pad broken loose.
Fig.5: Pigtail connector lug (OK). Will it fit the terminal?

Article prepared by Rod Bennett.

Fig.6

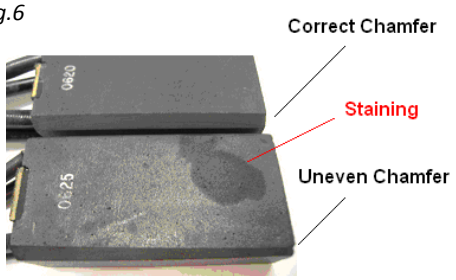


Fig.7

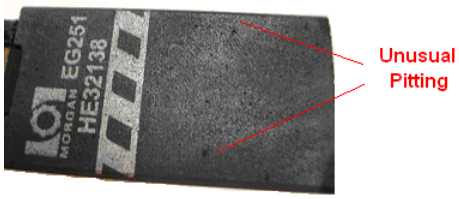


Fig.6: Dimensional irregularity and surface stain found on brush.
Fig.7: Surface pitting on carbon may indicate porosity or inclusions.

- Are the pigtails the correct length?
- Are the pigtails in good condition – free of frayed conductors?
- Are the pigtails the correct Amperage (Cross Sectional Area)?
- Is the tamping of the pigtails secure in the carbon? (see photo below of what can result if loose)
- Are the pigtails conductors tinned (if required)?
- Do the pigtails have insulated sleeves (if required)?
- Are the pigtail ends fitted with the correct connection lug?

Tensator or brush pressure spring pad

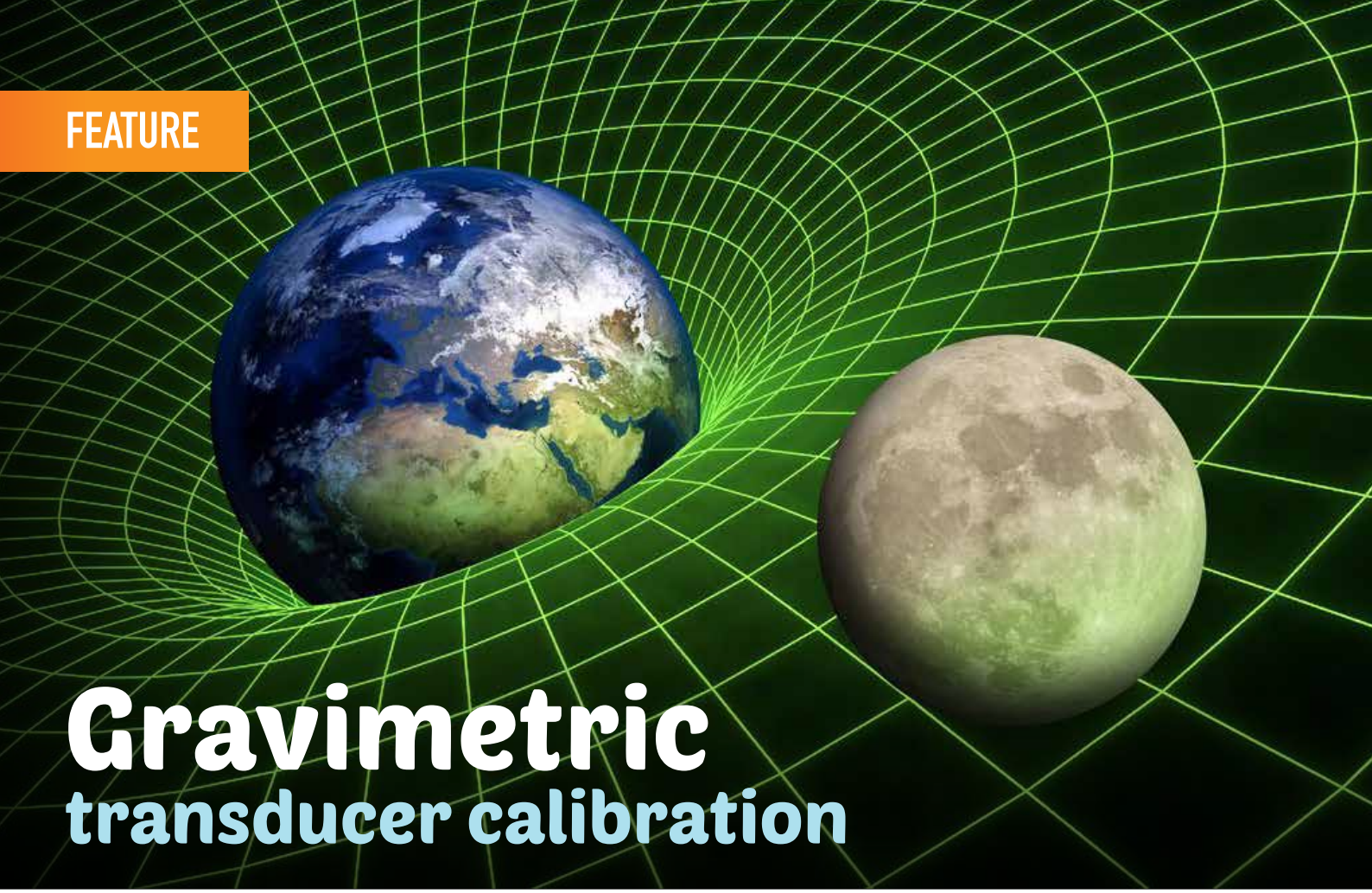
- Is the pad secure on top of brush?
  Note: Not all type brushes have a pad.

Abnormal appearance

Inspect the brush carbon surface. Look for:

- Unusual marks on carbon surface
- Cracks and chips
- Staining of carbon due to contaminants (eg. Oil)
- Excessive porosity, inclusions or pitting. ■

FEATURE



Gravimetric
transducer calibration

In 1901 the third General Conference on Weights and Measures defined a standard gravitational acceleration for the surface of the Earth: gn =9.80665 m/s2. It was based on measurements done at the Pavillon de Breteuil near Paris in 1888, with a theoretical correction applied in order to convert to a latitude of 45° at sea level. At the equator this value is decreased slightly (0.3%) due to the earth's rotation. Gravity also decreases with altitude and at a height of 9000 metres g is reduced by 0.29%.

Accelerometer output

ICP (Integrated Circuit Piezoelectric) accelerometers have their output stated in terms of mv/g. I.e. a 100 mv/g accelerometer will produce an AC voltage of 100mv (0 to Peak) when vibrated at 1 g as long as the frequency is within the frequency range of the transducer. The transducer specification will state the % reduction or dB drop outside of that range.

A typical industrial grade accelerometer range will have the output stated as 100mv/g +-10%, this means that a particular transducer could be 90mv/g up to 110 mv/g and will come with a calibration certificate with the actual output stated.

For routine monitoring we would typically set our vibration instrument to 100mv/g and leave it at this setting even when we use numerous transducers. If we are doing routine monitoring, we generally use the same transducer, and we are looking for changes in amplitude and / or frequency component changes. In this situation it does not matter if the calibration is not precisely set to that of the transducer. What is more important is the position and mounting of the transducer to ensure the readings are repeatable.

Calibration and traceability

There are several calibration systems available on the market, the simpler ones have a small shaker which vibrates at a known output at a fixed frequency. The more complex ones have a variable amplitude variable frequency shaker and use an internal accelerometer to measure output of the shaker, and this is compared to the output of the transducer being calibrated. The output is generally measured with a data collector or similar vibration analyser. Both systems should be themselves calibrated to ensure they are reading correctly.

Continued over page >

Article prepared by Simon Hurricks, Predictive Maintenance Engineer, Genesis Energy Ltd

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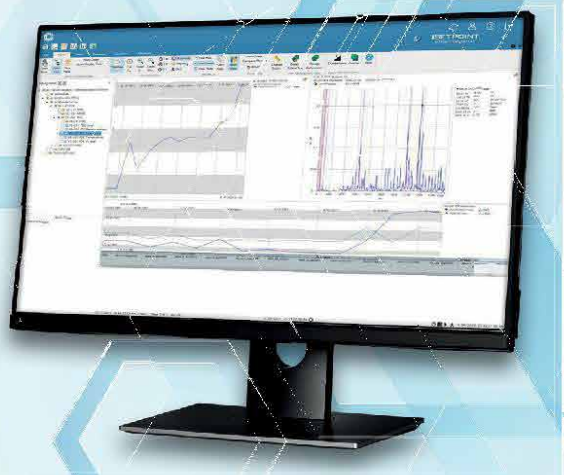

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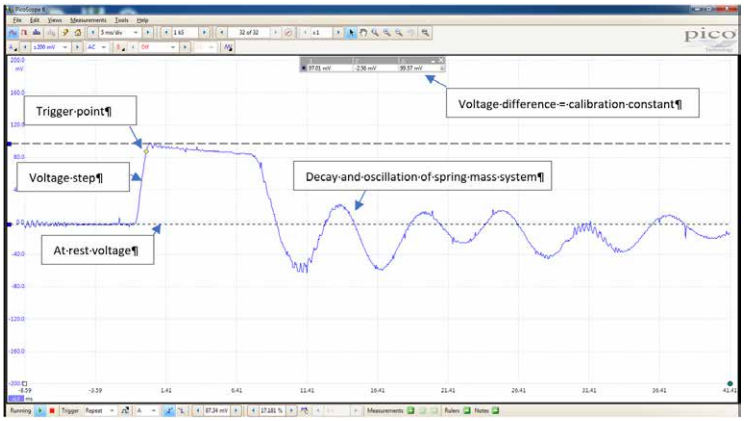


Above left: PCB Gravimetric calibrator. Above right is a screen shot from a Pico Scope when the transducer had a short free fall as described.

Many of these systems have a weight limit of 100 grams on the shaker, which is fine for the smaller transducers but not for the larger low frequency transducers. To calibrate the calibrator, it is checked against a standard which is itself traceable back to a primary standard.

These calibration systems are quite expensive, and the calibration would probably need to be done offshore.

AC coupling of vibration transducers

The ICP transducer is powered by an 18-volt DC, 4ma constant current from the vibration instrument or by an independent power source.

The ICP amplifier in the transducer modulates the DC such that the change in the DC voltage is the g value expressed in mv. i.e., a 1 g signal for a 100mv/g transducer will have a peak to peak modulation of 200 mv.

The transducer power supply or vibration analyser has 10 µF capacitor in the measuring circuit which blocks the DC so that the instrument only sees the modulation. i.e., the AC component.

When the instrument is first powered up there is a large value seen by the instrument while the capacitor is charging, and most instruments prevent measurements until the transducer has settled.

This is best seen using an oscilloscope.

The drop calibration

If we applied a constant acceleration to the accelerometer the output from the accelerometer would be a step change in the DC voltage which would be detected by the oscilloscope. This voltage would quickly decay to 0 as the capacitor charged to its new level. If we measured the step change in the DC voltage we can determine the acceleration if we knew the calibration constant.

> **At the top of Mt Cook you would still have a g value in free fall withing 0.3%.**

If we dropped the accelerometer, i.e. give it a 1 g acceleration we could measure the voltage step change and thus determine the accelerometer calibration constant in mv/g. Unfortunately, after dropping the transducer, it may be calibrated but no longer serviceable.

Gravimetric calibration

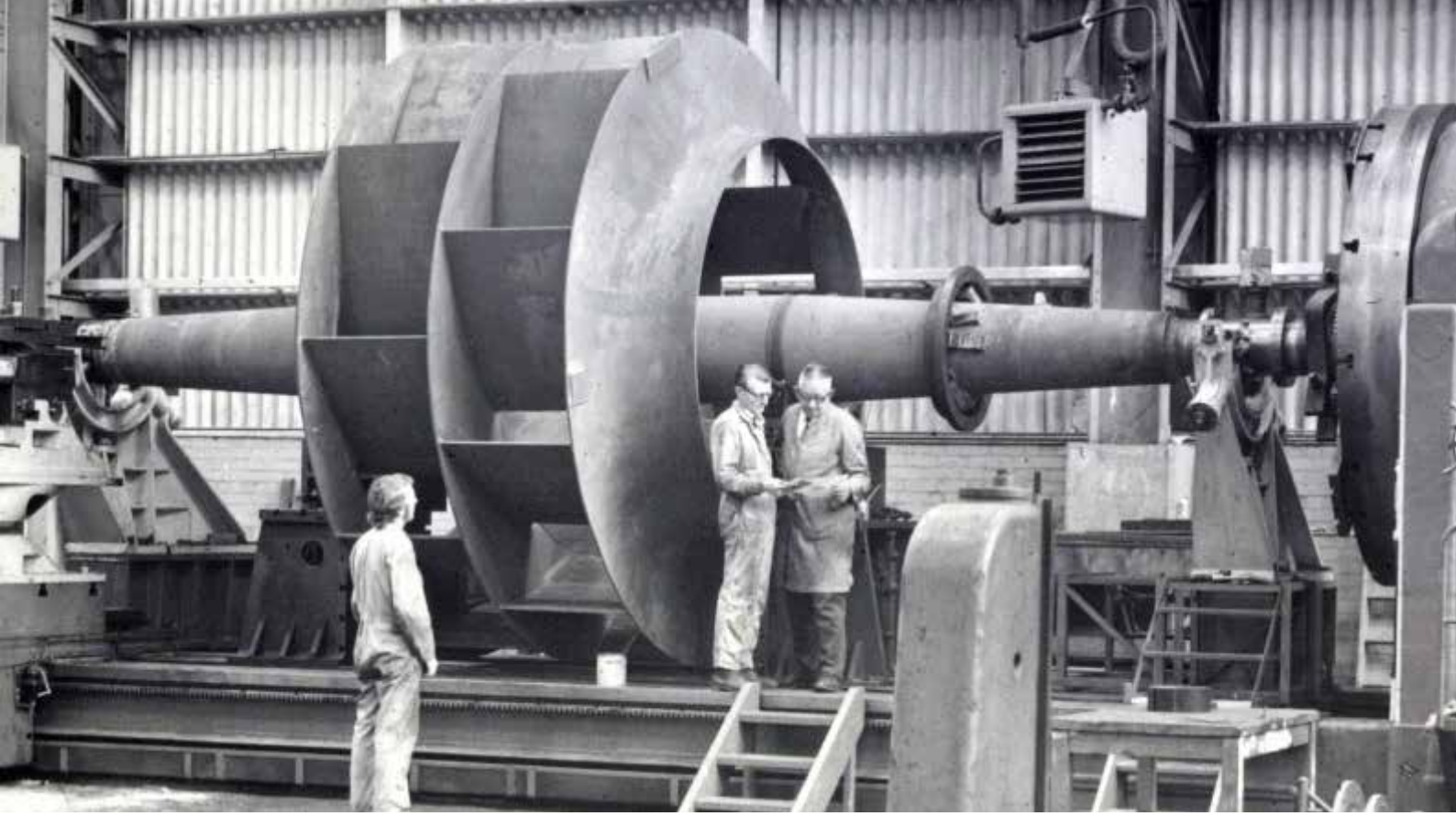
If we were to suspend the transducer from an elastic cord via a thin string and then tap the cord, the accelerometer would experience a short 1 g drop before being arrested by the cord. Using an oscilloscope, we can accurately measure the step voltage and thus the calibration constant in mv/g.

Conclusions

New Zealand is close to latitude 45 so even if you were calibrating at the top of Mt Cook you would still have a g value in free fall withing 0.3%.

We have experimented using a simple length of shock cord ($1.94 per metre) and two uprights to tie off the cord, suspended the transducer from a piece of thin nylon fishing line and achieved repeatable results within 0.5%. Having proven the concept, we purchased the PCB calibrator as it looks more professional and better in calibration reports. It was no more accurate than our trial system.

How accurate do you need to be, when just using the nominal calibration from the manufacturer could put you 5 t0 10 % out, because for the most part it does not matter as the measurements are being used for detection of change not absolute vibration values. ■



Balancing by the components method

My biggest success in balancing a large fan was a few years ago, but what I learnt may be of interest to people doing balancing today.

It was a constant speed 590 r/min boiler ID fan, double entry impeller, 11 ft diameter, 21.5 tons mass, 2370 h.p. (Love those old units - but it was in the pre-SI days here in Australia).

The impeller was too long to be treated as a single plane, but too short for two-plane treatment. There are 16 of these fans, and a rotor and impeller are shown in a lathe: U-bolt clamps mounted on the inlet flaring were used as trial masses. These were placed in the same angular position on each end. We used a velocity transducer to measure the vibration amplitude at each bearing. The instrumentation read in displacement.

Phase was measured with a stroboscope, tuned to the value of maximum vibration.

> “If this level was not acceptable, the process could be repeated, but with masses in anti-phase configuration.”

As described in my first book, the original vectors at ends A and B were as shown in the sketch (fig.1).

These can be resolved into in-phase components and anti-phase components. Here the two in-phase components were a little greater than the anti-phase, so balancing proceeded using a shared pair of masses, with the usual vector plotting. After fixing of the calculated masses, the vibration would be expected to be anti-phase, with the corresponding residual vibration to scale of components MA, MB.

If this level was not acceptable, the process could be repeated, but with masses in anti-phase configuration.

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Article prepared by Ray Bebee.

Fig.1

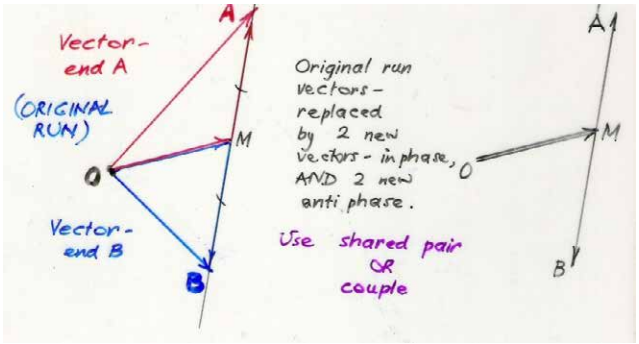
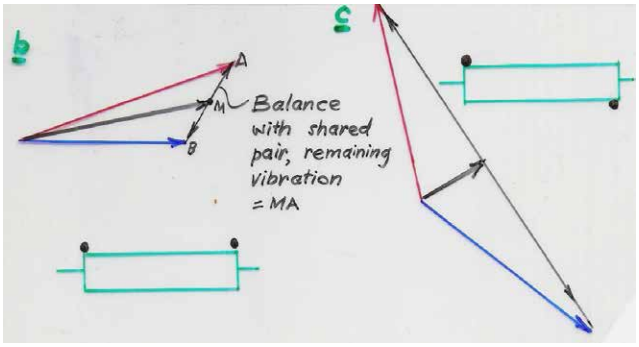


Fig.2



If the original vectors were much larger in anti-phase than in-phase, then the pair of masses would be placed on the impeller, one on each end as before, but 180degrees apart in phase to give a couple effect: the right hand situation in this sketch (fig.2).

This method is essentially the same as balancing a flexible rotor with a limited choice of balancing planes.

The vibration at around the first critical speed would be mostly in-phase, and near the second critical speed, mostly anti-phase.

The end result for a rigid rotor could be achieved also by a two-plane balance, the "Thearle" method, as used in today's portable equipments. However, this needs an extra run to speed, and it may be more economic to use the components method, and return for the second stage if necessary.

Welding was not allowed on this alloy steel impeller, so holes had to be drilled to bolt on the balance masses. The first hole took over an hour – what a hard steel we thought. The fitter got a new drill – and it took only 5 minutes for the second hole! ■

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FEATURE

PART ONE

Electrostatic discharge & ammonia compressor lubrication systems

Over the past 20 plus years of R&T's laboratory analysing oil samples it was always noted there was an elevated amount of dirt, organic debris, carbonised lubricant and broken oil filter glass fibres found in oil samples from ammonia compressors.

Because of an experience about 12 years ago when oil sampling the ammonia compressors in an ammonia compressor room at a bakery where it was noted that all the screw compressors in this compressor room were plumbed up for new oil delivery direct into each individual compressor. When changing oil or topping up the oil level all that was necessary was to open two valves preventing the necessity of taking new compressor fluid containers to the compressor room when servicing the compressors.

When the new oil, application system in the ammonia compressor room at the bakery was inspected it was noted that the common reservoir supplying the new lubricant to each compressor was basically unsealed and had a loose lid. When the lid was lifted and the interior of the reservoir inspected it was found there was 50 mm of fine dirt, organic debris and water in the bottom of the new oil reservoir. When the site engineer was shown the contamination in the new oil supply it was immediately cleaned out.

Because the majority of the ammonia compressor oil samples are sent to the lab R&T was not able to go onsite and investigate this any further. When ammonia compressor oil samples were analysed, it was considered whether there could have been new lubricant contamination when contaminated samples were encountered an oil and filter change was recommended plus to check the new lubricant cleanness.

It was when Matt Hindmarsh from Australian Refrigeration Services was delivering oil samples to the lab that we were able to discuss with Matt the contamination we

Continued over page >

Article prepared by Rob Simmonds, Reliability Manager

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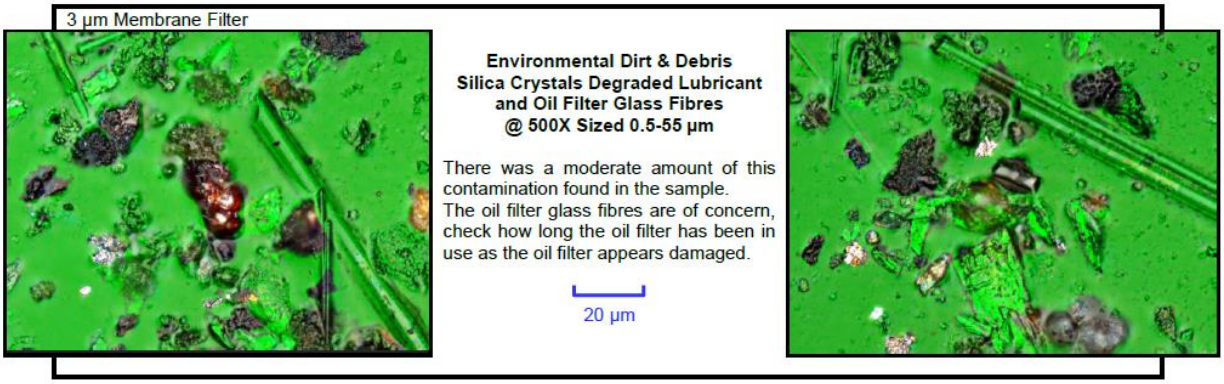

were seeing and drawing upon Matt's knowledge and understanding of ammonia compressors and his work we were able to appreciate the requirements on lubricants when lubricating ammonia refrigeration compressors.
As further ammonia compressor oil samples were analysed it was apparent that electrostatic charging and electrostatic discharge arcing was occurring in the ammonia compressors lubrication systems.

The above images display the types of metallic wear debris, arc discharge carbonised lubricant and shattered glass oil filter fibres from ESD arc discharge occurring in the oil filter typically found in ammonia compressor oil samples.
To establish the extent of the ESD (Electrostatic Discharge) arcing occurring an oil filter from one of the sites ammonia compressors was analysed. Upon discussion with and assistance from Mr Steve Leghorn, Manager of Australian Refrigeration Services Sydney plus the maintenance team at Coles Retail Ready Ammonia Compressor Site further samples were provided and the opportunity to investigate the sources of ammonia compressor ESD contamination in far more detail.

The first ammonia compressor oil filter analysed from the Coles Retail Ready Ammonia Compressor Site was an "AUSFIL Sydney CF 1456 / 25µm" galvanised steel filter with felted polymer media, galvanised steel mesh media pleat reinforcement layer and an outer galvanised sheet strengthening and oil diffusion layer.

The sample was from Compressor No. 1 at the Coles Retail Ready site. The RH Image displays the filter analysed after being in use for 6 months, filter was removed on the 23/02/20.

The filter was opened and there was a moderate amount of ESD Arc damaged lubricant and melted metallic wear debris found in the filter. Note the soot on the white rag wiped off the filters core.

As the above micro images display there was a significant amount of ESD charging and discharging occurring on Compressor One's lubrication system for this type of debris to be in the oil filter media.

Another compressor was selected, Compressor No. 4 at the Coles Retail Ready site and a filter was removed and analysed. The No. 4 Compressor (fig.1) is a Mycom 250 VLD Screw Compressor.

The No. 4 Mycom 250 VLD Screw Compressor at the Coles Retail Ready site was selected to trial several different filter

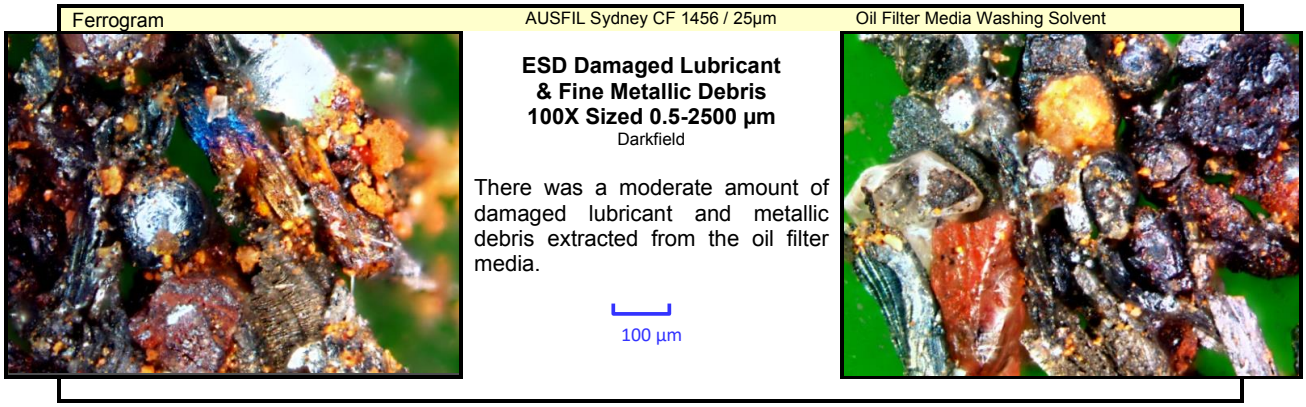

Fig.1

configurations to establish if the amount of ESD occurring could be reduced by the application of a specific filter configuration.

Next the first oil filter from Compressor No. 4 at the Coles Retail Ready site was analysed. The filter was an "AUSFIL Sydney CF 1456 / 25µm" galvanised steel filter with felted polymer media, a downstream galvanised steel mesh media pleat reinforcement layer and an outer upstream galvanised sheet strengthening and oil diffusion layer. The sample was from Compressor No. 4 at the Coles Retail Ready site. The RH Image displays the filter analysed after being in use for 6 months, filter was removed on the 25/05/20.

The filter was opened and there was a moderate amount of ESD Arc damaged lubricant and melted metallic wear debris found in the filter. Note the stain on the white rag wiped off the filters core.

The filter was opened and there was a moderate amount of ESD Arc damaged lubricant and melted metallic wear debris found in the filter. Note the heat damaged lubricant on the white rag wiped off the filters core.

As the above micro images display there was also a significant amount of ESD charging and discharging occurring in the lubrication system of Compressor No. 4 from Coles RR for this type of debris to be found in the oil filter media.

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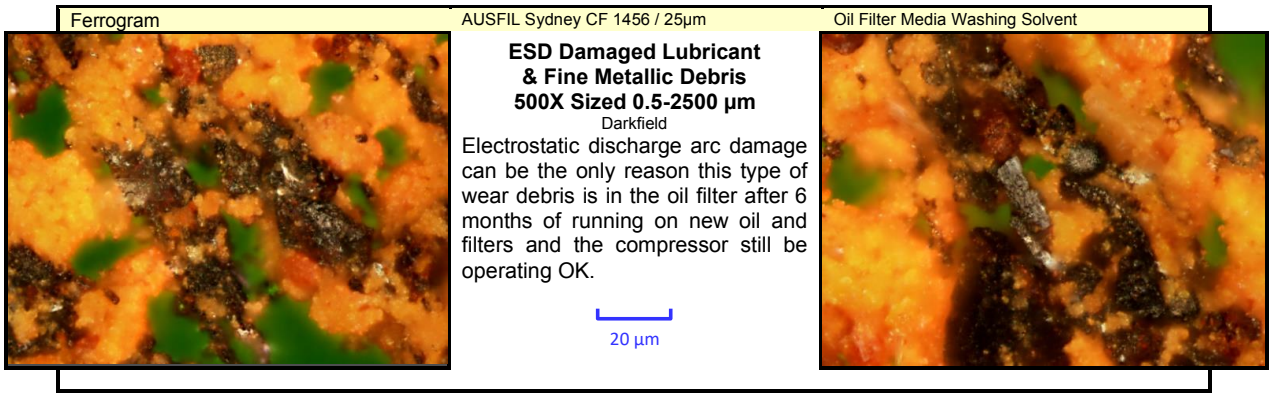
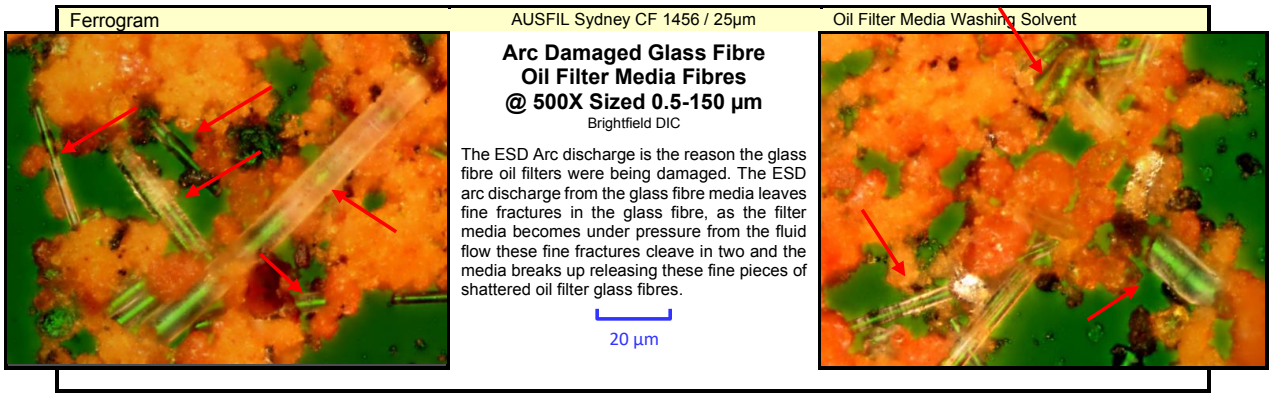
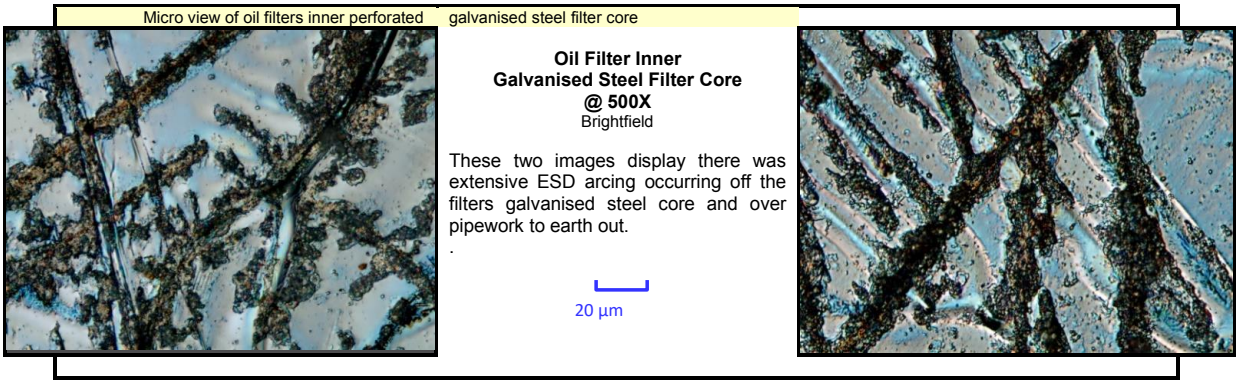


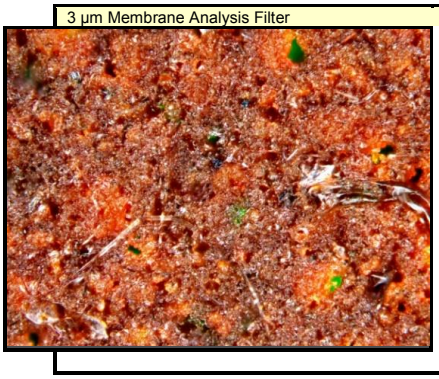


The following oil filter applied to Compressor No. 4 at the Coles Retail Ready site was an upgrade to an "AUSFIL Sydney CF 1456 / 10µm" galvanised steel filter with felted polymer media, downstream galvanised steel mesh media pleat reinforcement layer and an outer upstream galvanised sheet strengthening and oil diffusion layer. The main fine filtering media consisting of a 10-40 µm polymer fibre sized composite felted media layer 3 mm (3000µm} thick providing a significant depth of filtering media The RH Image displays the filter analysed after being in use for 1 month, filter was removed on the 25/06/20.

The filter was opened and there was a moderate amount of ESD Arc damaged lubricant and melted metallic wear debris extracted from the oil filter media. Note the heavy layer of ESD Arc Damaged varnished lubricant deposited across the filters galvanised steel core. From the heavy layer of ESD Arc Damaged varnished lubricant seen in the filter it's apparent there is a significant amount of ESD charging and discharging occurring in the # 4 Compressors Lubrication System. The 10µm filter was introduced to remove the contamination found in the previous report plus reduce the amount of fine carbonised lubricant particles circulation with the refrigeration lubricant. A sample of the filters galvanised steel core was examined for evidence of whether ESD arcing was occurring in the filter and as the images above display there was extensive ESD arcing occurring in the No. 4 Compressors Lubrication System.



3 µm Membrane Analysis Filter



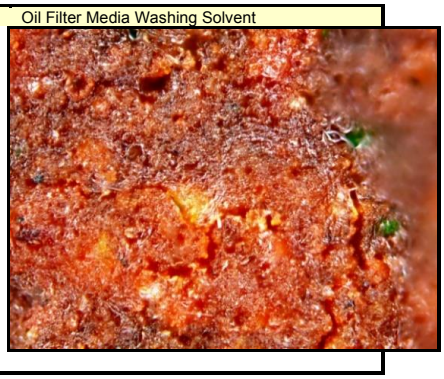
AUSFIL Sydney CF 1456 / 10µm

ESD Damaged Lubricant & Fine Metallic Debris 500X Sized 0.5-25 µm

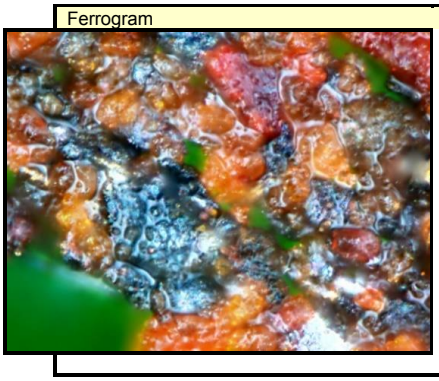
There was a heavy amount of damaged lubricant debris and a light number of fine metallic particles extracted from the oil filter media.

20 µm

Oil Filter Media Washing Solvent



Ferrogram



AUSFIL Sydney CF 1456 / 10µm

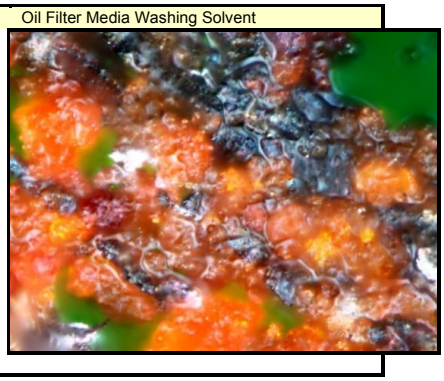
ESD Damaged Lubricant & Fine Metallic Debris 500X Sized 0.5-2500 µm

Darkfield

There was a heavy amount of damaged lubricant and a light amount of heat damaged melted ferrous wear debris extracted from the oil filter media.

20 µm

Oil Filter Media Washing Solvent



The above two row of images display the contamination, damaged lubricant and metallic wear debris extracted from the "AUSFIL Sydney CF 1456 / 10µm ammonia compressor fluid oil filter.

The next filter applied to the Compressor No. 4 at the Coles Retail Ready site was another "AUSFIL Sydney CF 1456 / 1µm." This filter was modified with 1µm filter media plus the addition of earthing straps that are to be attached to the oil filter housing earthing the outer shell of the oil filter directly to earth. The following filter was the "AUSFIL Sydney CF 1456 / 1 µm" galvanised steel filter with felted polymer media, galvanised steel mesh media pleat reinforcement layer and an outer galvanised sheet strengthening and oil diffusion layer.

The sample was from Compressor No. 4 at the Coles Retail Ready site. The RH Image displays the filter analysed after being in use for 1 month, filter was removed on the 08/08/20. This filter was modified with a change to 1 µm media plus the addition of earthing straps that are to be attached to the oil filter housing earthing the outer shell

of the oil filter directly to earth The filter was opened and there was a moderate amount of ESD Arc damaged lubricant and melted metallic wear debris found in the filter. A sample of the filters galvanised steel core was microscopically examined and displayed evidence that the ESD arcing was continuing to occur in the filter as the images below display.

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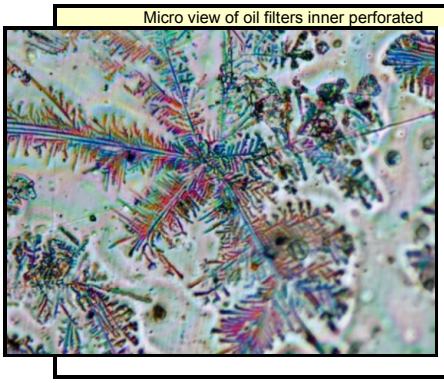
Micro view of oil filters inner perforated galvanised steel filter core



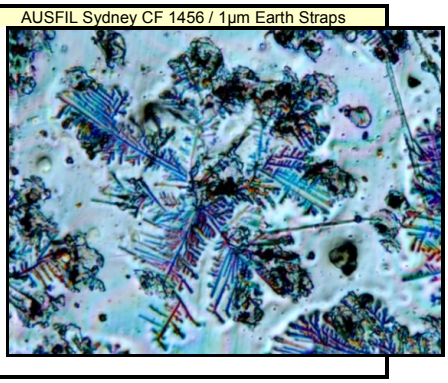
Oil Filter Inner Galvanised Steel Filter Core @ 1000X

Brightfield DIC

The images @ 1000X have been taken to display the arc trails etched onto the filters steel core. The fine coloured lines in these images are only 1µm wide, same thickness as the lubrication film in the rolling element thrust bearings in the compressor.

10 µm

AUSFIL Sydney CF 1456 / 1µm Earth Straps



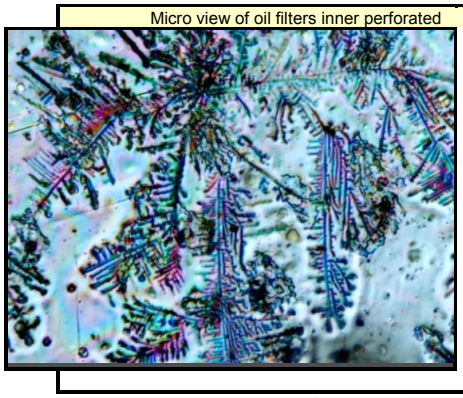
The previous images were taken from the filters galvanised steel core displaying that the ESD arcing had continued despite the addition of earth straps onto the filters outer cannister.

The images *(below)* show the damaged lubricant and metallic wear debris the ESD arcing that had continued despite the addition of earth straps onto the filters outer cannister. ■

TO BE CONTINUED...

This article continues in the next issue of Spectrum.

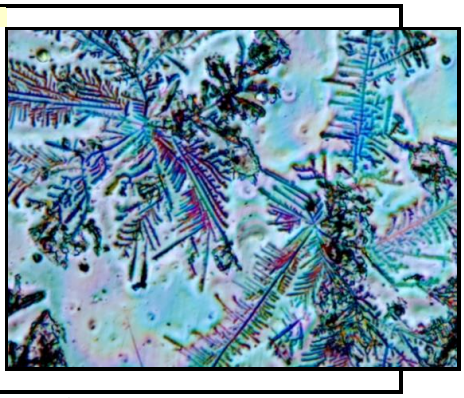
Micro view of oil filters inner perforated galvanised steel filter core



Oil Filter Inner
Galvanised Steel Filter Core
@ 1000X
Brightfield DIC

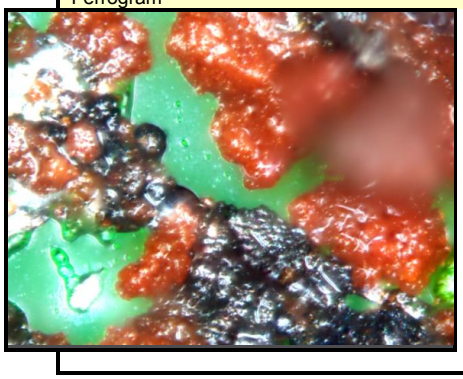
The arc trails etched onto the filters steel core are very interesting and we need to keep in mind the arc temperature is thought to be between 10,000°C and 20,000°C displaying why the damage we have been observing is occurring to the oil filters and compressor fluid.

10 µm



These images were taken from the filters galvanised steel core displaying that the ESD arcing had continued despite the addition of earth straps onto the filters outer cannister.

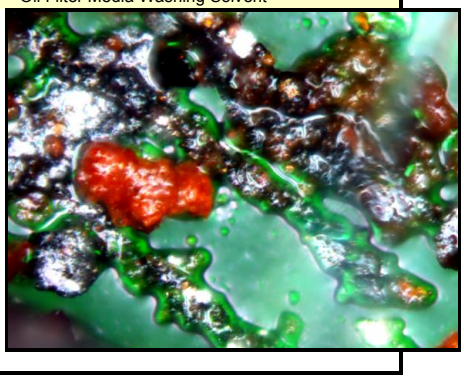
Ferrogram AUSFIL Sydney CF 1456 / 1µm Earth Straps Oil Filter Media Washing Solvent



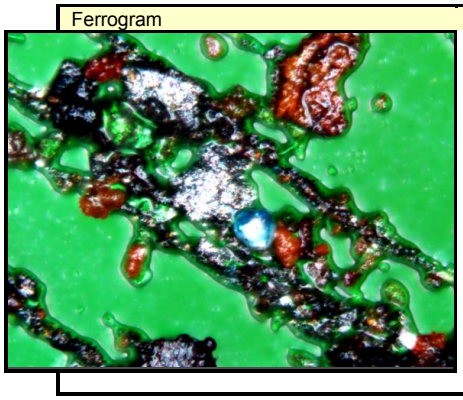
ESD Damaged Lubricant
& Ferrous Wear Debris
200X Sized 0.5-150 µm
Darkfield

The ferrous wear debris aligned by the magnets is melted blue black coloured showing this debris is a result of ESD arc discharge occurring in the oil filter.

50 µm



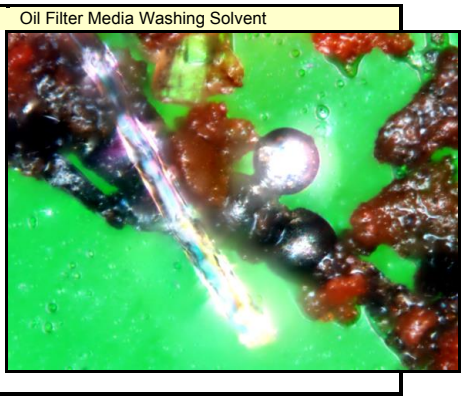
Ferrogram AUSFIL Sydney CF 1456 / 1µm Earth Straps Oil Filter Media Washing Solvent



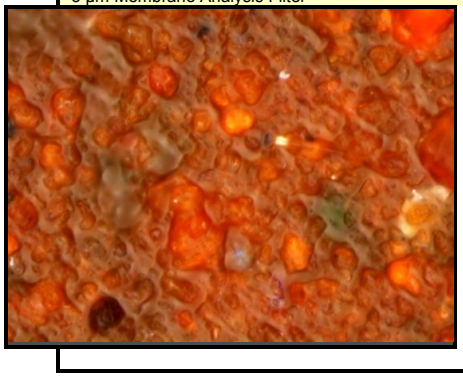
ESD Damaged Lubricant
& Ferrous Wear Debris
200X/500X Sized 0.5-150 µm
Darkfield

The ferrous wear debris, aligned by the magnets is melted blue black coloured showing this debris is a result of ESD arc discharge occurring in the oil filter.

50 µm



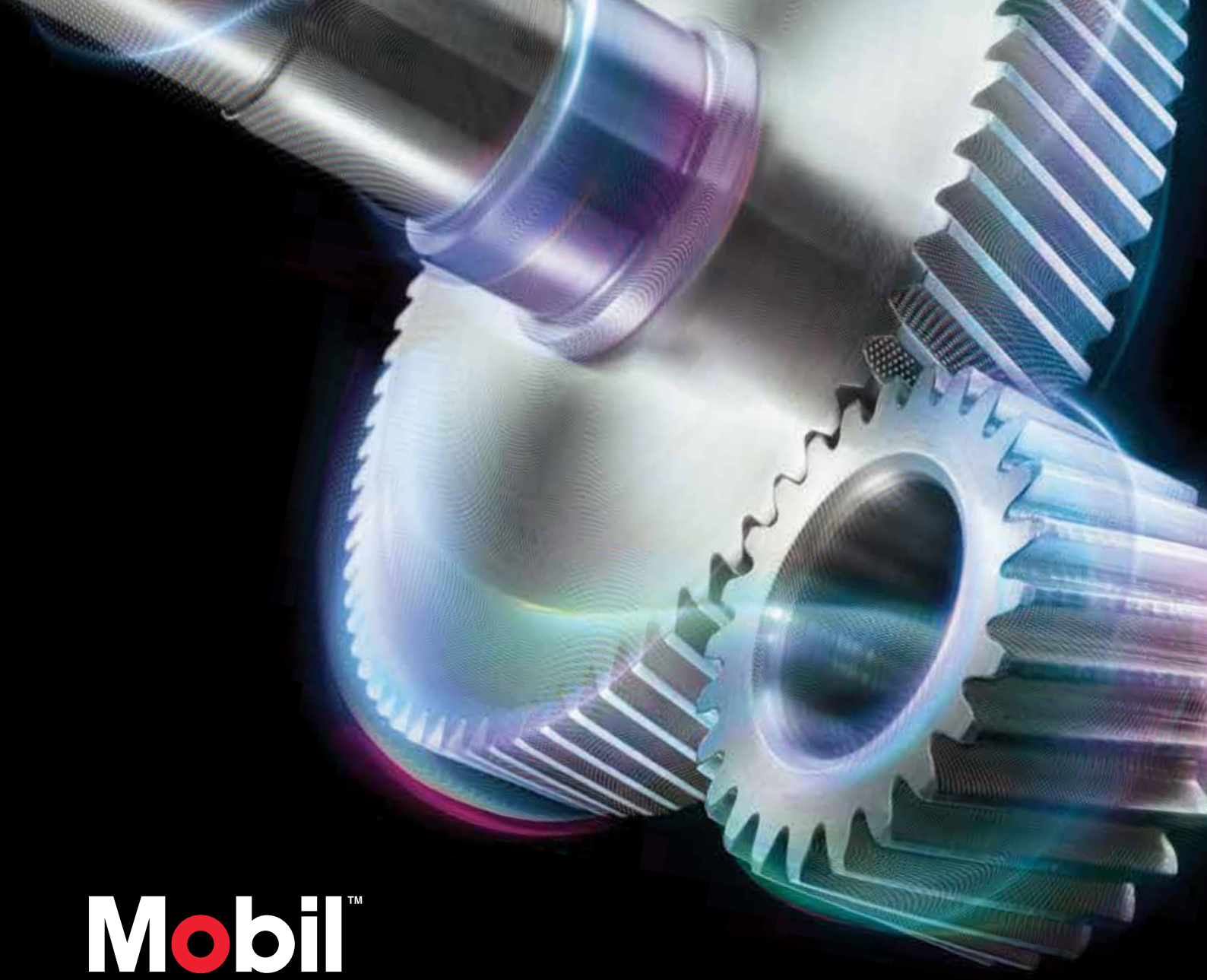
3 µm Membrane Analysis Filter AUSFIL Sydney CF 1456 / 1µm Earth Straps Oil Filter Media Washing Solvent



ESD Damaged Lubricant
& Fine Metallic Debris
500X Sized 0.5-250 µm

The rapid build-up of heat cracked lubricant debris extracted from the oil filter media displays the damage the electrostatic discharge is causing to the compressor fluid.

20 µm



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PUZZLE CORNER

Solutions on page 36

WORD BUILDER

How many words of **three or more** letters can you make using the six letters below? You can only use each letter once. Plurals are allowed, but no foreign words or words beginning with a capital.

Word scores expected...

20 - Good | 30 - Very Good | 35+ - Excellent

G	C	E	A	H	R

There's 40 possible three or more letter words to find.

There is two 6 letter words in this puzzle.

WORD LADDER

A Word Ladder has two words in the ladder, one at the top and one at the bottom. You must form a sequence of words going down. On every step of the ladder (1-6), you must unscramble and create a new word that only differs by one letter from the word above it until you reach the destination word on line 6.

Dry to Wet...

1. SORT
2.
3.
4.
5.
6. KIND

SUDOKU

To solve, each number from 1 to 9 must appear once in:

- **Each of the nine vertical columns**
- **Each of the nine horizontal rows**
- **Each of the nine 3 x 3 boxes**

No number can be repeated twice in a box, row or column. **We've started it off for you...**

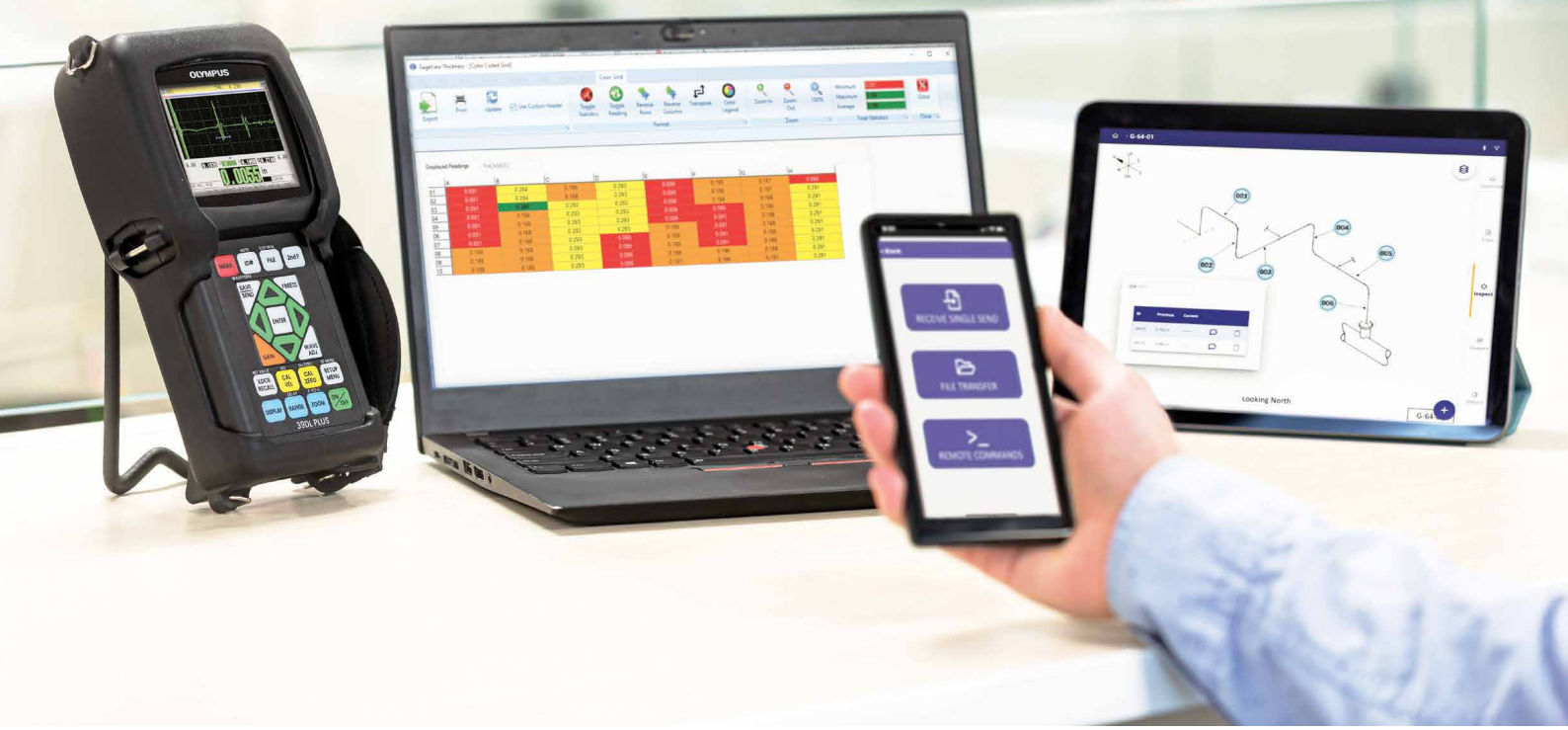
Puzzle difficulty: **Hard**

47.7% of puzzlers can solve this. Can you?

				8			4	
					5			
8								3
1	5						9	
		7	2	4				5
	8	9		5		7	3	
					7			
	2		8					
4	9	5		6		2	8	

EVIDENT

Faster Thickness Results



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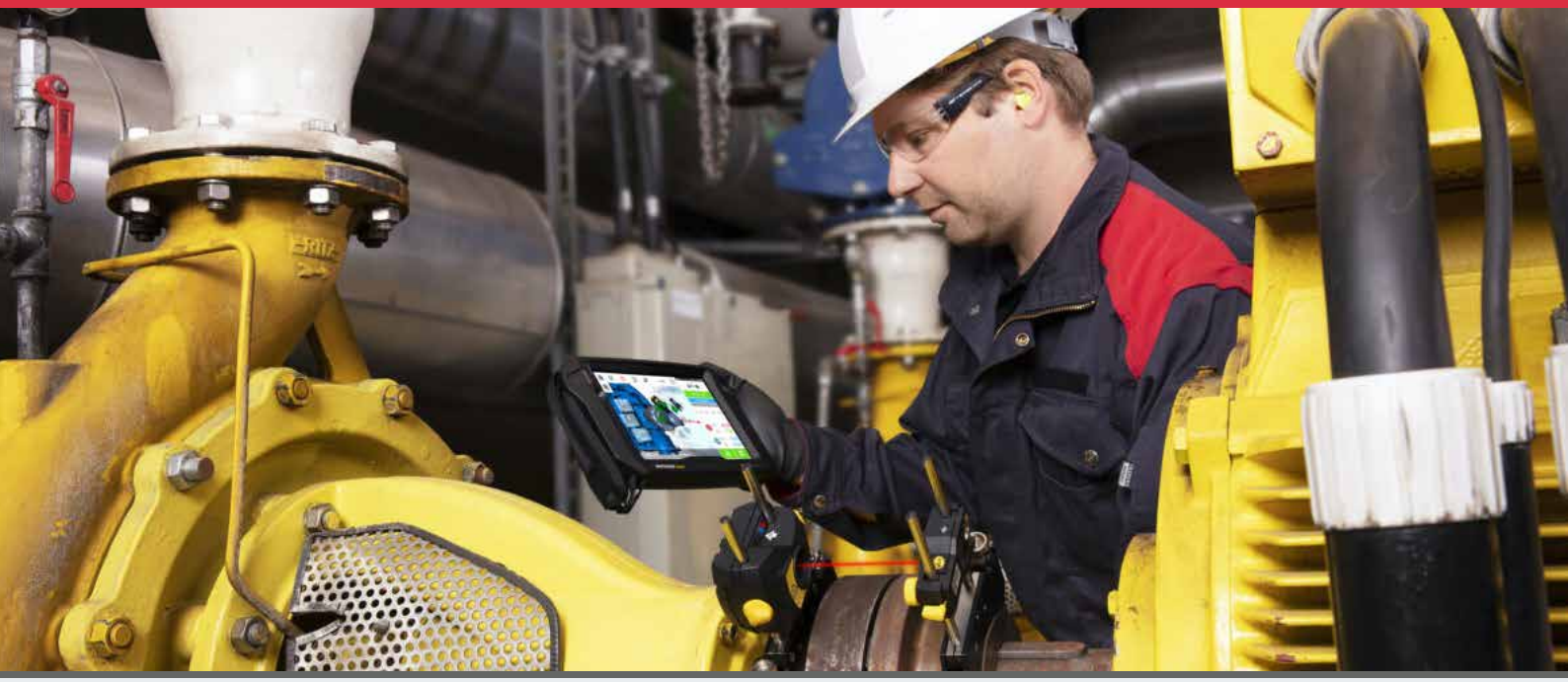
TEST YOUR KNOWLEDGE - PART 78 OF A SERIES



1. A belt-driven fan on variable-speed control runs with low vibration levels throughout the speed range except for one point where the vibration increases slightly at "1x" fan frequency, and a multiple of belt frequency which is close to the "1x" fan frequency. What conclusion would you draw to explain this slight increase in vibration?

A. The fan impeller is badly out-of-balance
B. The belts are poorly tensioned or are in bad condition
C. There may be a resonance at that particular point in the speed range
D. Both A and B.

2. A large furnace fan requires balancing insitu. The fan impeller is supported between the bearings. You set up your analyser on the drive-side of the machine, mount your tachometer and attach an ICP accelerometer to the drive-side bearing. To reach the bearing on the non-drive side of the furnace with your 2nd ICP accelerometer you will require a cable length of 30 metres which is much longer than your longest cables of 6 metres. Your I&E department can make up a 30-metre coaxial extension cable. Which of the following is true?

A. The extension cable should work ok.
B. The cable length is beyond the 20-metre length limit for ICP powering
C. The cable length is beyond the 10-metre length limit for ICP powering
D. The cable length is beyond the 6-metre length limit for ICP powering.

3. One factor you need to consider when collecting vibration data from diesel engines is that the acceleration levels can be very high, and if they are too high this can lead to saturation of the electronics on ICP accelerometers. What is the most obvious sign that the accelerometer has become saturated?

A. The high-frequency signals will become attenuated
B. The low-frequency signals will become attenuated
C. Signals across the frequency range will become attenuated
D. "Ski-slope" effects will most-likely be evident in velocity spectra.

4. You are using a standard 100 mV/g accelerometer to take vibration measurements on a diesel engine and you notice that the accelerometer's electronics have become saturated due to the high signal levels. How might you be able to take proper measurements under these conditions?

A. Change to using a 10 mV/g accelerometer
B. Change to using a 500 mV/g accelerometer
C. Change to using a 1.1 V/g accelerometer
D. None of the above will improve your chances of taking meaningful measurements.

5. A cantilever steel beam is vibrating in its first mode. If you were to plot its pk-pk displacement at various equi-distant points along its length from its fixed end to the free end, what would you observe?

A. The displacement would be at a minimum at the fixed end, and reach a maximum at the free end. The plotted displacement figures would produce a straight line
B. The displacement would be at a minimum at the fixed end, and reach a maximum at the free end. The plotted displacement figures would produce a curve
C. The displacement would be at a minimum at the fixed

end, reach a maximum half way along its length, then drop to a minimum at the free end.
D. The displacement pattern cannot be predicted unless the mass and the length of the beam are known.

6. Vibration measurements are to be undertaken with an accelerometer on a bearing housing in the horizontal direction where there is a machined flat surface. In what order would you rank (best-to-worst) the following mounting methods if you want to extend the lineal response as high as possible in the frequency range?

A. Stud mount, flat magnet, dual rail magnet, probe
B. Stud mount, dual rail magnet, flat magnet, probe
C. Dual rail magnet, stud mount, flat magnet, probe
D. Probe, dual rail magnet, flat magnet, stud mount.

7. A temporary balancing weight of 20 grams is fitted at a 200 mm radius and has achieved a good result, but the best radius to fix a correction weight permanently is 100 mm. How many grams should the permanent weight be?
A. 5 grams
B. 10 grams
C. 20 grams
D. 40 grams.

8. A large, slow speed (200 rpm) air-conditioning fan is supported on vibration isolation mounts. Given its low speed, which of the following mounts are likely to be selected?
A. Mounts made of high-density foam pad of 2 mm thickness
B. Mounts made of high-density foam pad of 5 mm thickness
C. Mounts made of high-density foam pad of 10 mm thickness
D. Spring mounts.

9. "M" and "W" shapes in vibration waveforms are sometimes associated with which of the following?
A. unbalance
B. misalignment
C. looseness
D. electrical effects.

10. Which of the following rolling element defects is often accompanied by cage (FTF) sidebands in vibration spectra?
A. Ball / roller defects
B. Outer race defects
C. Inner race defects
D. Could be any of the above.

Check your answers on page 36 >

TEST YOUR KNOWLEDGE

Further enquiries can be directed to: Carl Townsend at Carlton Technology Ltd.
Phone: 64-6-759 1134 | Email: ctownsend@xtra.co.nz | Address: P.O. Box 18046 Merrilands, New Plymouth 4360, NZ

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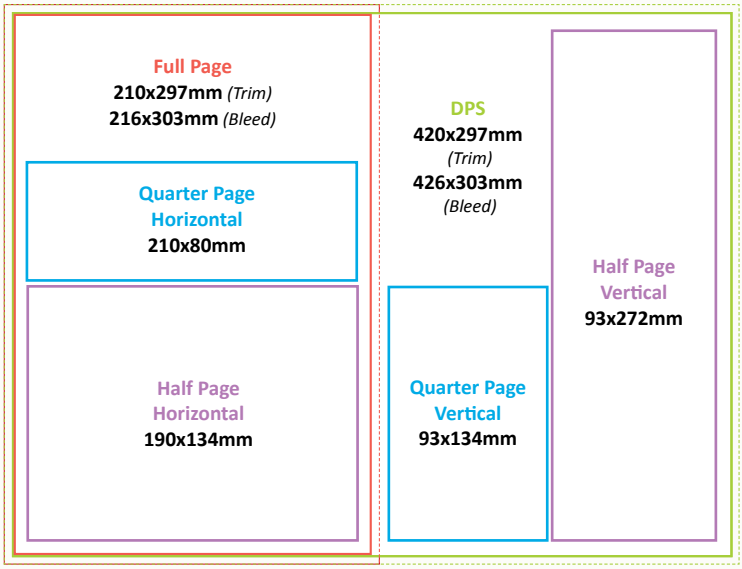

Carlton Technology Quiz 78: 1C, 2A, 3D, 4A, 5B, 6A, 7D, 8D, 9B, 10A

Word Builder: Charge, Gacher

Word Ladder: 1. Sort 2. Sord 3. Ford 4. Fond 5. Find 6. Kind

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OPTIME

Condition Monitoring

ProLink processor modules, vibration modules and I_O modules

OPTIME Gateway

OPTIME Ecosystem

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The 24/7 monitoring capability of OPTIME offers real-time data and analysis and allows maintenance technicians to tackle emerging issues promptly. This is a key factor in saving time and resources.

An integral component of the system is the OPTIME ExpertViewer digital service. This service is compatible with OPTIME and "OPTIME-ready" data, including data from Schaeffler SmartCheck and Schaeffler ProLink. ProLink, like SmartCheck, is part of Schaeffler's range of innovative monitoring tools, designed to work seamlessly with OPTIME. This compatibility ensures a comprehensive approach to condition monitoring, allowing users to leverage the strengths of different Schaeffler products in a unified manner. Additionally, the OPTIME C1 wireless automatic lubricator and the integrated digital lubrication management ensure optimal machine performance by continuously monitoring lubricator devices, alerting maintenance teams to critical lubricant levels and enabling remote adjustments, further enhancing operational efficiency.

Furthermore, OPTIME forms a key part of Schaeffler's broader Lifetime Solutions suite, offering an extensive approach to machine lifecycle management. This suite combines monitoring, analysis, and maintenance support into a cohesive package, addressing various industrial maintenance needs.

Schaeffler's OPTIME is a groundbreaking development in condition-based monitoring. Its amalgamation of cutting-edge technology, ease of use, cost-effectiveness, and integration with a broader suite of tools, including ProLink, positions it as an indispensable asset in modern industrial maintenance. By implementing OPTIME, industries are poised to significantly improve their maintenance processes, resulting in enhanced efficiency, minimised downtime, and substantial cost savings. The OPTIME Ecosystem exemplifies Schaeffler's commitment to driving innovation and excellence in industrial maintenance solutions.

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