The official journal of the Vibrations Association of New Zealand

Spectrum

Autumn 2026 | Issue 119

Problems and solutions with Magnetic Stator Wedges

Managing a successful Condition Monitoring Program

Bearing cages

+ CONFERENCE 26

WHAT YOU NEED TO KNOW

- Speaker profiles
- Full timetables
- Exhibitor list

and more...

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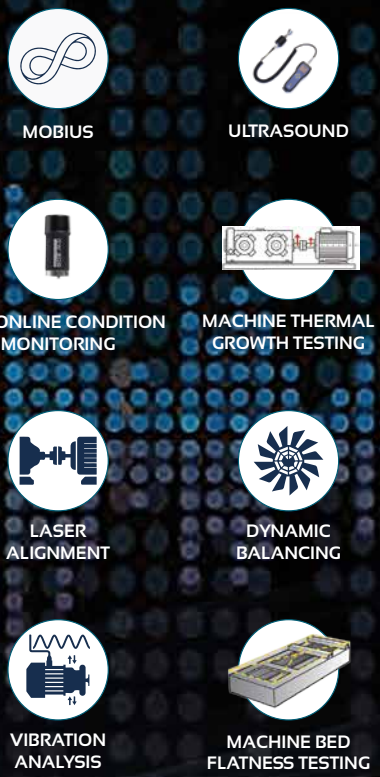

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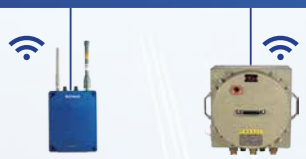
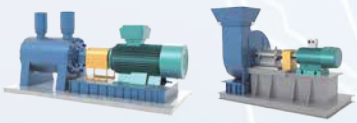


Wireless Gateway

Zigbee/LoRa

Wireless Sensors



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CONTENTS

Issue 119 | Autumn 2026

Features

Regulars

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**

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VANZ

PRESENTS

ROTORUA
AT RYDGES HOTEL
19–21 MAY 2026

THE NO.1 EVENT IN THE VIBRATIONS ASSOCIATION CALENDAR IS BACK IN 2026.

CONFERENCE 26

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Conference'26

RYDGES ROTORUA

Registration Options

19th - 21st May, 2026

1-Day Registration — TUE 19th MAY 2026

All conference pricing excludes GST.

Package	PRICE PER PERSON
Condition Monitoring Hands On	$398
Condition Monitoring Hands On – Attendance to verified apprentices / trades trainees / university	FREE!
Asset Management	$398

2-Day Registration — WED 20th - THU 21st MAY 2026

Package	PRICE PER PERSON
1-Day Conference Pass – Wednesday ONLY	$510
2-Day Conference – Wednesday and Thursday ONLY	$1020
2-Day Conference – Attendance to verified apprentices / trades trainees / university	50% OFF! $510

3-Day Registration — TUES 19th - THU 21st MAY 2026

Package	PRICE PER PERSON
1-Day Conference Pass – Thursday ONLY	$510
3-Day Conference – Full access Tuesday, Wednesday and Thursday	$1,185

- ***Complimentary parking is available at venue.***
- ***All conference papers available to download from www.vanz.org.nz.***
- ***If you purchase a Main Conference (1, 2 or 3-day) attendee pass, your membership for the next 12 months is automatically included and updated in that price.***

CONFERENCE DINNER

Note. Day 2 and 3 registrations includes the annual Wednesday dinner for the delegate.

There will also be provision for extra annual dinner attendee purchases at **$129 per person**. Please contact us if additional dinner tickets are required.

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CONFERENCE'26

CONFERENCE 26

CONFERENCE 2026 TIMETABLE

Note. All papers and times over the three conference days are correct at the time of publication but subject to change without notice.

Tuesday 19th May - Day 1

Practical Condition Monitoring Awareness stream + Asset Management Reliability Improvement stream

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 2026: 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: **Barry Robinson:** Connections Between Heat, Cracks and Failure	
9:30 AM	**0:30**	**10:00 AM**	**Morning Tea in the Exhibition room / Trade Stand area (with exibitor introductions)**	
Two Streams of Presentations			**Tradesman's Tools' + installation specifications Stream**	**Asset Management + Reliability Improvement Stream**
10:00 AM	0:30	10:30 AM	**Awareness Day Introduction by Dr Iain Epps:** Starting Out in Condition Monitoring and Reliability	**James Neale:** Lies, Damn Lies and Statistics! Alignment of the Right KPI's To Drive Real, Meaningful Change In Your Asset Management Programme
10:30 AM	0:30	11:00 AM	**Following will be mini-seminars on a rotational-based format. Below are the topics of discussion and host.**	**Iain Epps:** AI: A Cynics Journey Part 1: Understanding the Fundamentals
11:00 AM	0:30	11:30 AM	• **Bruce Shepherd:** Vibration Analysis • **Will Dale:** Mechanical Seals • **Dr. James Neale:** Infrared-Ultrasound • **Chris Unsworth:** Lubrication Distribution • **Mike Wharry:** Oil Analysis • **Stephen Read:** Alignment of Rotating Equipment	**Mike Davis:** Inside the Electric Motor: Part 1: Understanding Failure Before It Fails
11:30 AM	0:30	12:00 PM		**Iain Epps:** AI: A Cynics Journey Part 2: Getting the Most from Technology
12:00 PM	**1:00**	**1:00 PM**	**Lunch in the Exhibition room / Trade Stand area**	
1:00 PM	0:30	1:30 PM	*Rotational mini-seminars continue...*	**Mike Davis:** Inside the Electric Motor: Part 2: Detection, Degradation Tracking, and Mitigation
1:30 PM	0:30	2:00 PM		**Julien Maffre:** Anatomy of Asset Performance, Exploring the Brain, Nervous System and Muscle Behind High Performing Maintenance Team
2:00 PM	0:30	2:30 PM		**Jason Tranter:** 40 years: Analysers to AI
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	*Rotational mini-seminars continue...*	**Terry Blackman:** Articulating You Strategy or Mission - Can You Explain What You Are Wanting To Achieve?
3:30 PM	0:30	4:00 PM	**Craig Carlye:** Introduction to Computerised Maintenance Management	**Peter Caldwell:** Saving Money by Fixing Life Style Faults
4:00 PM	0:30	4:30 PM	**Mike Davis:** Understanding the Importance of Electrical Engineering	**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	

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CONFERENCE 2026 TIMETABLE

Wednesday 20th May - Day 2
Main Conference

Start	Duration	End		
7:30 AM	**0:20**	**7:50 AM**	**Registration and Exhibition / Trade Stand area is open for viewing, with Tea and Coffee available**	
7:50 AM	0:05	7:55 AM	Welcome to Conference 2026: VANZ President	
7:55 AM	0:05	8:00 AM	Today's agenda: VANZ Vice President	
8:00 AM	0:25	8:25 AM	Exhibitors Welcome and Introductions	
8:25 AM	0:40	9:05 AM	Keynote Presentation: **Barry Robinson:** Connections Between COLD, Cracks and Failure	
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	**Mike Davis:** Divergence of Traditional VA and Modern Electrical Analysis	**Bob Hoang & Michael Le:** Transition from Maintenance Manager to Consultant
10:15 AM	0:40	10:55 AM	**Cameron Blackbourn:** UPS Flight 2976-Small Failure, Big Consequence	**Rico Van Niekerk:** Reliability Engineer and Industry 5.0
10:55 AM	0:40	11:35 AM	**Glen Pepper:** Follow up on Motion Amplification on Hydro and Thermal Generators	**Freddie Coertze:** How AI Can Assist In Predicting Asset Health and Efficiency
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	**James Neale:** Applying of New Motor Current Signature Analysis (MCSA) Tools	**Mike Spence:** Overall Equipment Effectiveness - a case study
1:05 PM	0:40	1:45 PM	**Chris Engdahl:** Resolving Vibration issue on Ammonia Plant Main Air Compressor	**Peter Caldwell:** Applying HUMS Tequnicies to Industrial Applications
1:45 PM	0:40	2:25PM	**Bruce Shepherd:** A Series of Unfortunate Events	**Vishesh Arora:** The Journey of an Effective Condition Monitoring Program
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	**Julien Maffre:** AI Won't Replace Maintenance, But It Will Change How We Think, Decide, and Perform	
3:35 PM	0:40	4:15 PM	**Colin Robertson:** Maintenance and Operations Leadership 101	
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 21st May - Day 3
Main Conference

VANZ AGM will be held at 9:35am
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	**Ying Xie:** How AI Helps Improve Predictive Maintenance Efficiency	
8:50 AM	0:45	9:35AM	**Jason Tranter:** Three Things Every Vibration Analyst Should Know	
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	**Hariprasad Kongorpalli:** Transformative Technology for Condition Monitoring	**Adrian Goodwin:** Managing Lubrication Technologies
10:55 AM	0:40	11:35 AM	**Michael Le:** Problem Solving Hammer Mills	**Mark Ciechanowicz:** Remote monitoring of Plants Utilising Intuitive Ecosystems
11:35 AM	0:40	12:15 PM	**Taine Thompson:** Applications of Photogrammetry and 3D Scanning for Alignment	**Dr Jonathan Smith:** Lithium Batteries Follow Up Paper
12:15 PM	**0:50**	**1:05 PM**	**Lunch in the Exhibitor room / Trade Stand area**	
1:05 PM	0:40	1:45 PM	**Terry Blackman:** Vendors and Suppliers - What Are They Good For?	
1:45 PM	0:40	2:25 PM	**Dr Jonathan Smith:** AS/NZS 3788:2024 in Practice: What Changes for In-Service Inspection of Pressure Equipment	
2:25 PM	0:40	3:10 PM	**Barry Robinson:** Keynote Conference Closing Paper: What's the Point	
3:10 PM	0:45	3:55 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 2027. Please ensure you travel safely home.

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OUT & ABOUT IN ROTORUA

Rotorua is host city for the VANZ Conference in 2026. Below is useful information on getting around, accommodation and sight-seeing.

RYDGES HOTEL ROTORUA

In close proximity to the edge of the Redwood forest, overlooking the glistening waters of the Whakarewarewa Thermal Valley and surrounded by nature's best work, people come to Rydges Rotorua from all over the world.

Rydges Rotorua is host to the 2026 VANZ Conference, and has over 200 rooms on offer! Check into your choice of a Superior or Deluxe room, with comfy beds, unlimited WiFi and access to the geothermal heated swimming pool. If you're craving something a little extra, a private suite may be just what you need.

Switch on for the day with a morning visit to the gym or dive straight in with our heated outdoor swimming pool. You can even bring your own bike to do a bit of sight-seeing or hit the trails. When you're done, you can rest easy knowing your bike can be locked away in their on-site lockup storage area.

GETTING AROUND

An attractive advantage of getting around Rotorua is that you don't need to rely on using your own vehicle. You can easily bike, walk, catch a bus, shuttle or ring a taxi.

BY CAR

Rotorua is fairly easy to navigate. A mostly grid-like layout with wide streets and drive-in parking in the inner city make getting around a treat. Car parking is available throughout the city. Most spaces are metred, and use a pay-by-plate model. The city's only public multi-storied car park is on Pukuatua St and open all week from 6am to 11pm. The first hour is free. Taxis are also available day and night for travel to and from the city centre or to where you want to go.

ON BIKE OR FOOT

Rotorua has an enviable reputation as an international mountain biking destination. But, it's also New Zealand's number one cycling destination due to its cycling friendly landscape, and easy riding throughout the city, and to and from surrounding suburbs.

Many of our attractions, accommodation and facilities like the Library, Aquatic Centre, the Sir Howard Morrison Centre and Energy Events Centre are located in the inner city, for easy walking distance as well. With Rotorua city being mostly flat, walking to anywhere you need to go is easy.

ROTORUA MUST-SEES

Whilst visiting Rotorua, here is a selection of attractions that should be top of your list.

- Mitai Maori VIllage Dinner and Cultural Experience
- Wai-O-Tapu Geothermal Park
- Lake Rotorua Cruise and Buffet Dinner
- Buried Village of Te Wairoa
- Redwoods Altitude Tree-walk
- Skyline Gondola, Luge and Zipline
- Jade Carving Experience
- Government Gardens
- Polynesian Spas
- 3D-Trick Art Gallery.

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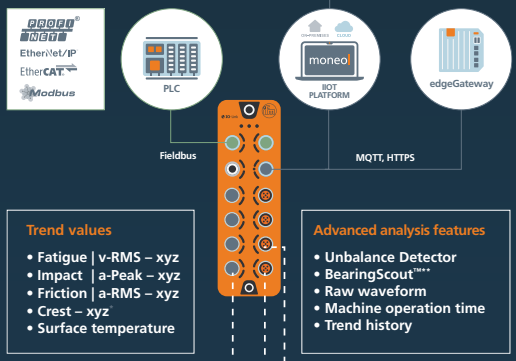

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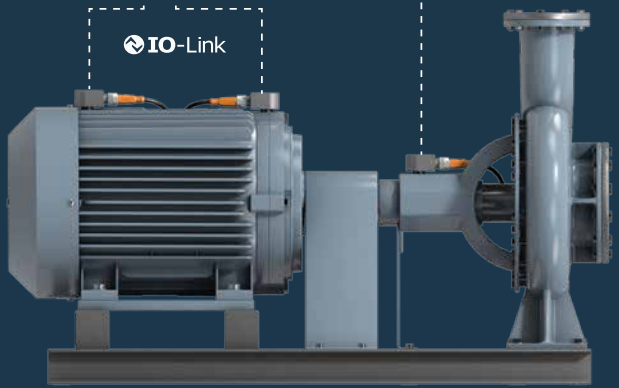

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Conference'26
EXHIBITOR LIST

Below, in no particular order is a list of exhibitors participating in the VANZ Conference 2026. We encourage you to take the time to visit each exhibitor to learn more about how their products and services may support the growth and success of your business. VANZ would also like to acknowledge and sincerely thank all exhibitors and advertisers for their valued support of this year's conference.

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Conference'26
SPEAKER BIOS Part II

Speakers Peter Caldwell, Jason Tranter, Terry Blackman and Jonathan Smith give a little insight into themselves and the papers they will be discussing at the VANZ Conference 2026.

PETER CALDWELL

PAPERS

"Saving Money by fixing life style faults"
(30 minutes) and
"Applying HUMS tequnicies to Industrial Applications"
(40 minutes)

ABOUT PETER

Peter has been working in the field of Condition Monitoring, and Test and Measurement since graduating in 2004 with a Bachelor of Engineering (Mechanical) from Curtin University in Western Australia. He is a Certified Vibration Analyst (VCAT IV). Since 2012 he has been focused on online condition monitoring and helping clients design, install and operate online condition monitoring systems. Recently he has been studying data science and the application of AI to Condition Monitoring.

JASON TRANTER

PAPERS

"40 years: Analysers to AI"
(30 minutes) and
"Three things every vibration analyst should know"
(45 minutes)

ABOUT JASON

Jason is the co-founder of Mobius Institute, starting the company with Georgina Breedon in 1999. After gaining an engineering degree, he began his career in reliability and condition monitoring way back in 1984. Having been involved in the practice of vibration analysis, the development of a wide range of condition monitoring software, and the development of the majority of Mobius Institute's training software and course material, it is fair to say that Jason is passionate about helping people achieve success in their reliability improvement efforts – whether that is detecting and diagnosing future failures, or avoiding them in the first place. Jason has worked in Australia and the United States and has presented courses, workshops, and technical presentations in many countries around the world. Jason is proud of the achievements of the Mobius Institute team and honored to have been able to help tens of thousands of people around the world achieve their personal and professional goals.

TERRY BLACKMAN

PAPERS

"Articulating you Strategy or Mission - can you explain what you are wanting to achieve?"
(30 minutes) and
"Vendors and Suppliers - what are they good for?"
(40 minutes)

ABOUT TERRY

Terry is the Director and Senior Instructor for the Reliability Institute of Australia, delivering classroom training in Asset Reliability and invigilating certification exams.

Continued over page >

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Starting his career as a Mechanical Engineer, Terry has 40 years' experience in equipment maintenance and reliability. Prior to starting Reliability Institute, he was General Manager of Mobius Institute, the world's leading provider of accredited reliability & vibration training and certification, supporting and appointing Mobius's Training Partners throughout the world. Earlier roles included 8 years with SIRF's Industrial Maintenance Roundtable, facilitating a collaboration and information sharing network with over 45 major industrial companies in Australia. Prior to SIRF, he was with SKF for over 20 years, in various engineering and management roles, including General Manager for SKF Australia Reliability Systems, with national responsibilities for providing condition monitoring services, installation support and reliability improvement projects for a wide range of industrial businesses.

JONATHAN SMITH

PAPERS

"AS/NZS 3788:2024 in Practice: What Changes for In-Service Inspection of Pressure Equipment"
(40 minutes) and

*"***Lithium Batteries follow up paper"**
(40 minutes)

ABOUT JONATHAN

I founded Optimech International Limited, based in Auckland, NZ. Optimech is a highly specialised company at the forefront of material science and precision engineering solutions. Our point of difference is that we have a wide range of highly specialised knowledge and expertise within one firm, which is rather unusual internationally. As a result of our diverse experience, we can provide comprehensive and innovative solutions, which is important especially in complex litigation or insurance cases. My background includes a myriad of specialties, including accident investigations, corrosion control, defect tolerance analysis, equipment product testing, and verification. I've honed my skills in failure investigations, material investigations, including the world of polymers and coatings. My expertise in fitness for purpose analysis, risk-based inspection, including forensic investigationn has provided vital insights to a diverse range of industries. My approach is based on fostering collaborative relationships, bridging the gap between scientific rigor and practical application. I thrive on assisting clients in making informed decisions by providing thorough analysis and actionable insights.

NOTICE OF AGM

DATE: **Thursday 21st May 2026**

TIME: **9:35am**

LOCATION: **Rydges Hotel - Stream Room 1**

Please attend if you can, this association is run by you, for you.

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PRESIDENTS' REPORT

By Tim Murdoch | VANZ President

I am very proud to be involved with VANZ and have been for many years now. We are a not-for-profit organisation run purely by volunteers that do an amazing and professional job providing a technical, educational and networking platform for people in industry.

This years VANZ Conference (May 19-21) is shaping up to be a standout event. There has been a huge amount of work put into this already and it's great to see it all coming together. Our Platinum sponsors are combined this year, Motor Bearings Specialists (MBS) and Ronds.

Our other sponsors include Genesis, Allied Petroleum and MB Century. Thank you all for your incredible support which help enable VANZ to be a success.

We have secured a great range of speakers this year. Have you had a look at the timetable? There is a mix of practical experience and broader industry insight, which should make for a programme that's both useful and engaging. Whether people are looking for technical knowledge, new ideas, or just a different way of looking at things, there is something there for everyone. We've also got a strong group of exhibitors lined up, bringing with them the latest technology and services from across the industry. It's always a valuable part of the conference, giving members the chance to see what's new and have direct conversations with suppliers and specialists.

None of this happens without a lot of effort behind the scenes. The committee has put in a significant amount of time organising the conference—everything from logistics through to the programme itself. It's a lot of work, and they've done an excellent job pulling it all together. I strongly encourage you all to attend and for companies to send their people along to the conference.

It's not just about attending presentations—it's about investing in your team. The opportunity to learn, connect with others in the industry, and come away with new ideas that can make a real difference back in the workplace. Just as importantly, it helps build the sense of community that makes this association what it is.

We believe apprentices, trainees and students are our future. VANZ have a great opportunity to help bring them along, their entry fee is free for the first day (Awareness Day) and half price for day two and three. How many apprentices/students can we get there this year?

A significant piece of work this year has been the successful re-registration of the Vibrations Association of NZ under the new legislative requirements. This involved a lot of careful work behind the scenes. I'd like to acknowledge the committee for the time and effort they put in to make this happen. Their attention to detail and commitment ensured we got it done properly, in time and that the association is in a strong position going forward.

The committee has agreed to present a new award this year, you'll have to be there to see what this award is.

Serving as President has been a privilege. I've appreciated the support I've received along the way, the learnings, the development and the chance to work with such a committed group of people.

Thank you all for your support and I look forward to seeing you in Rotorua in May.

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EDITORS' CORNER

By Angie Hurricks | Spectrum Editor

Greetings readers! Conference time is rolling around again and VANZ is a hive of activity planning this years' symposium so all who attend can benefit and take away new information and techniques not to mention the latest gadgets to roll out in to the field.

Our conference committee have got a lot in store for us this year as always and our platinum sponsor this year is MBS/RONDS! You can register online at **https://www.vanz.org.nz/conference-2025** so check out the website for more updates as conference gets closer.

Many thanks go to all those who are helping to sponsor the event this year with a variety of different support, from trade-stands to networking nights. Also to our continued advertisers who are much appreciated and are all an important part of keeping VANZ going.

Browse through the update from the President's Report by Tim Murdoch, he gives us an idea of what to expect from this years' conference. If you want to puzzle your grey matter then flip through to Carl's Quiz and see how well you score on the latest questions.

Enjoy the read and see you at the conference!

> **"Our conference committee have got a lot in store for us this year as always and our platinum sponsor this year is MBS/RONDS!"**

SKILLS AND PRACTICES

Bearing Cages

A rolling element bearing typically has 4 components. (Fig.1):
1. An inner ring
2. An outer ring
3. The rolling elements
4. And a cage (also known as the separator or retainer)

The cage has a number of functions:
1. To separate the rolling elements and maintain an even and consistent spacing.
2. To accurately guide the rolling elements along their path (the raceways) during rotation.
3. To stop the rolling elements falling out during handling!

The cage can be made of a number of materials including steel, brass, or plastic. **Plastic cages are prohibited at Western Port.** The NTN bearing code suffix is T1 or T2.
Steel is the most common cage material in NTN bearings.

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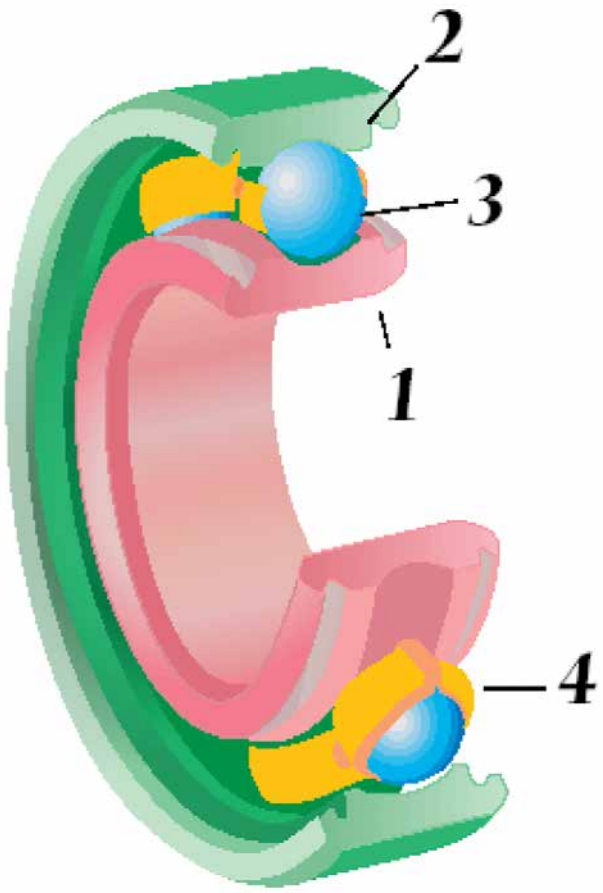

Above: Fig.1: Standard bearing components.

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The bearing code suffix is "J" although it is rarely used as it is the standard cage. Brass is sometimes used for high speed applications, or where the machine is subject to high vibration levels. The NTN bearing code suffix is G1 or L1.

The cage can be manufactured by either pressing, machining or moulding. Fig.2 shows just 3 of the many cage configurations available. There is a 2 piece pressed steel riveted cage, a one piece pressed steel cage, and one half of a machined brass cage.

Under normal conditions the cage carries very little load. However if the bearing is:

1. not installed correctly
2. operated at loads or speeds higher than recommended
3. not lubricated correctly, then the cage can be overloaded. The result is catastrophic failure of the bearing.

For this reason it is essential that you use a bearing with the recommended type of cage.

Plastic cage prohibition

There are a number of reasons for this:

1. Plastic cages are made brittle by the extreme pressure (EP) additives in lubricants.
2. Plastic cages have a lower temperature limit. They also become weakened if subjected to temperatures of 100 degrees Celcius for long periods of time.
3. Plastic cages are not very strong. They can be distorted easily with light finger pressure. Metal cages are much more robust and can take much more punishment before failure.
4. Plastic cages are more susceptible to damage from contamination. For example, metal particles spalling from the raceways are very hard and rapidly wear the soft cage material.
5. Plastic cage deterioration generates little vibration. This makes it difficult to detect through vibration analysis. Metal cage deterioration is detectable through vibration analysis.
6. Plastic cage deterioration does not show up in our oil analysis program. Metal cage deterioration does.
7. When plastic cages start to deteriorate, the progression to complete failure is very rapid. Metal cages give a longer warning of impending failure.

Fig.3 and 4 show what a plastic cage looks like in a spherical roller bearing.

Fig.5 shows how easily a plastic cage can be deformed. ■

Above: Fig.2 Cage configurations.

> **"Plastic cages are not very strong. They can be distorted easily with light finger pressure."**

Above: Fig.3. Below left: Fig.4. Below right: Fig.5.

■ *Article prepared by Rod Bennett.*

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FEATURE

Managing a Successful Condition Monitoring Program

Article by Jason Tranter - Founder and Advisor, Mobius Institute, and Tod Baer - Baer Essential Services and Technologies.

But after a period of time, the task becomes more difficult. Machines fail unexpectedly. Incorrect diagnoses are made. Certain people within the plant are skeptical about the technology, and may not believe in the philosophy of predict maintenance, so they take pleasure in seeing the failures.

Sadly, worse is yet to come. As the program matures, management forgets why the investment in people and technology were made. If machines continue to fail unexpectedly, people blame the technology, and the program may be scrapped. On the other hand, if machine failures are reduced, management might not feel there is a need for such a program, and it is scrapped to save money.

Condition based maintenance should provide great financial benefits to all organizations, in the short and long term. Technologies such as vibration analysis do work. This paper discusses ways that you can make sure that the program is run successfully, providing a benefit to the company, and providing a stable and satisfying career path.

Getting Started

This paper will primarily focus on vibration analysis; however most of the ideas can be equally applied to all of the condition monitoring technologies.

Condition monitoring programs are started for a variety of reasons. A manager might attend a seminar and be convinced of the benefits. There may be a catastrophic machine failure and it is suggested that a technology such as vibration analysis might have prevented the failure.

Whatever the reason, it is unfortunate that most programs start without sufficient planning or training.
Once the system has been purchased the analyst has quite a challenge ahead. In fact, the vibration analyst is surrounded by different types of challenges.

First they have to look at the machines in the plant. Each machine is a potential trouble maker. Thankfully, through changes in vibration/sound, electrical properties, temperature, and lubricant characteristics, the machines are trying to warn of impending problems. If you read the signs correctly and deal with them appropriately, you can be a hero. Miss them, or misinterpret them, and you can look like a chump...

Second there are typically people in the plant who don't understand what the vibration monitoring equipment can do - so they fear it. Often there is an us and them environment. The analyst makes a recommendation to make a repair, and "they" insist that the machine is fine. And then there is a stand-off; one hoping the machine is fine, the other hoping the bearing is shot... This is not a great work environment.

Continued over page >

> **If you read the signs correctly and deal with them appropriately, you can be a hero. Miss them, or misinterpret them, and you can look like a chump...**

And third there is the manager. The manager means well, but maybe he or she does not quite understand what the vibration program can achieve. Perhaps he or she expects that downtime will immediately become a thing of the past. That puts unbelievable pressure on the vibration monitoring team/person. So, what is the answer? The author believes it is quite simple: you must understand the failure modes, you must have realistic expectations, you must create and follow a plan, and you must have on-going training.

Setting Expectations

Everyone needs to have identical (and realistic) expectations. If every person who maintains, lubricates, repairs, and operates the rotating machinery understood what the vibration monitoring technology can achieve, and chooses to help/cooperate rather than do nothing (or actually work against the program), then the situation would be much improved. Imagine if these people actually told the vibration team what they knew about the machine, and gave them a heads up when they noticed a change in vibration (audible) or operating state.

And if the maintenance management, operators, production and planning folk understood what can be achieved with vibration monitoring (the capabilities and limitations), then realistic expectations would be set. When recommendations were made, they would have greater confidence in the information, and would be able to put it to greatest use.

Instead, what tends to happen is that everyone outside the immediate monitoring group has little understanding of the capabilities of vibration analysis, and not only do they question recommendations, but when a machine does fail, blame is quickly focused on the vibration group. (All of this is true for most of the condition monitoring technologies.)

The benefits of training

So how do we make it work? The first step is training - but not just for the vibration team - for everyone. You only have to look at a few vibration spectra to realize that vibration analysis is not easy to master. There is a lot to learn. You need to know how to operate the analyzer and software, but you also have to know how to interpret the spectrum and waveform patterns. Extracting the information out of the data is very tricky and interpreting the information is even more difficult.

There is another issue to consider. One way to handle vibration analysis is to try to remember the vibration patterns, perhaps with the aid of a wall chart. When you view the spectrum you can look for the classic patterns. And if you are not sure, just glance up at the wall chart and see if you can find a matching pattern. Sadly, in the author's opinion, this method is flawed.

Vibration analysis, in reality, is not that simple. The patterns for a given fault condition are not always the same. And when you consider that a machine may have multiple fault conditions (with varying degrees of severity), and that machines come in all shapes and sizes, the vibration patterns we actually see can be quite different to the simplistic patterns shown on wall charts.

This author believes that it is far more important to understand the machine, the analyzer, and the way vibration changes according to the forces present inside the machine. There is a reason why we see peaks, harmonics, sidebands, raised areas of the noise floor, and so on. If you understand, you can look at a spectrum and determine why the vibration has changed the way it has, and therefore what is wrong with the machine. This is extremely important in vibration analysis, and in other condition monitoring technologies.

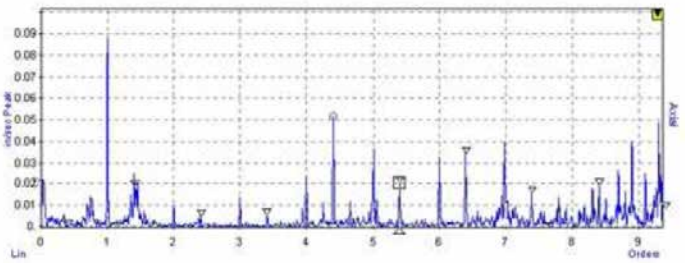

Fig.1. A Typical vibration spectrum. Not so easy to understand is it?

These days there are two ways to learn. The traditional classroom training suits a lot of people, and allows people to focus their time on learning the technology. However, without the correct teaching aids; classroom training can be very ineffective. By the end of the course, most people have forgotten what they were taught on the first day. And most people are forced to try to remember concepts and theory because the instructor does not have the time or the tools to ensure people understand. The use of interactive training aids, simulators, 3D animations, and hands-on tools offer the best solution.

A slight variation on public classroom training is on-site classroom training. Travel costs are greatly reduced, and the curriculum can be tailored to the customer's specific industry. But, as always, the tools used in the course determine whether the concepts, procedures and theory will be understood.

Web-based and computer-based (CBT CDs) offer a great alternative. While some people do not learn as well in a self-paced environment, the ability to revisit the lessons again and again ensures that the education can be most effectively applied.

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> **The selection of the people involved in the condition monitoring program is critically important. It takes a special kind of person to be successful in condition monitoring; regardless of the amount of training they receive.**

A combination of traditional classroom training and Webbased/CBTs offers (in the authors biased opinion) the best alternative: learn before the course so that you can get the most out of the course; learn during the course with the most modern techniques; and continue learning after the course so you never forget what you were taught.
But wait, so far we have only discussed training for the condition monitoring technical staff. What about the rest of the maintenance staff?

I firmly believe that practically everyone needs training. No, the person who lubricates the machine does not have to know how to analyze spectra, and the maintenance manager does not have to know how to diagnose bearing wear, however:

1. Everyone should know why we perform condition monitoring. They need to know that if the condition of the machine changes, the vibration level and/or pattern will also change.
2. Everyone should also have an idea of the limitations of the technology. Everyone should know that vibration analysis and other technologies can be applied to certain types of machines, and can detect certain types of faults. They need to know that some machines can present real challenges (for example machines under varying speeds and loads), and that some fault conditions can develop too quickly to be caught by vibration analysis.
3. And they also need to understand the concept of predictive maintenance versus breakdown and scheduled maintenance. A good idea of reliability centered maintenance would help too.

The goal is:

1. When they see the condition monitoring technicians collecting data, they know it benefits them (and their company).
2. When they witness a change in operating and maintenance state, they may like to tell the condition monitoring team. They should volunteer relevant information.
3. When the condition monitoring guys make a recommendation, whether it turns out to be right or wrong, everyone should know that they did so with the best intentions; using technology that gives a good, but not perfect, insight into the machine's condition.
4. When the budget becomes tight, management should still allow staff to receive training, and continue the program, even though there may not have been a spectacular save (or failure) recently. While the condition monitoring people need in-depth technical (and practical) training, the remainder of the maintenance staff, both the field workers and managers, need to have a training program suited to their needs. It may only require an hour a week for a few weeks, or a one day 'awareness seminar'. The benefits are significant.

Starting a program

The following sections describe a number of factors that should be considered when starting (or revitalizing) a condition monitoring program. The ideas are based on observations made by the author over a 20 year involvement with condition monitoring, but also from a survey conducted on users of our vibration analysis training product.

Use the right people

The selection of the people involved in the condition monitoring program is critically important. It takes a special kind of person to be successful in condition monitoring; regardless of the amount of training they receive. The condition monitoring technician (and program manager) must want to do the job; they must enjoy a challenge; they must be determined and have an inquisitive nature. Intelligence is also important; but that should not be confused with being well educated. Even with limited education, an intelligent person can master technology and perform investigative work in order to determine the condition of a machine.

The selection of condition monitoring technicians is handled in vastly different ways from one site to the next. In a small percentage of cases, people are tested in an attempt to assess their suitability. In many cases people are selected because they have shown an interest or have demonstrated the desired qualities in a different field of work.

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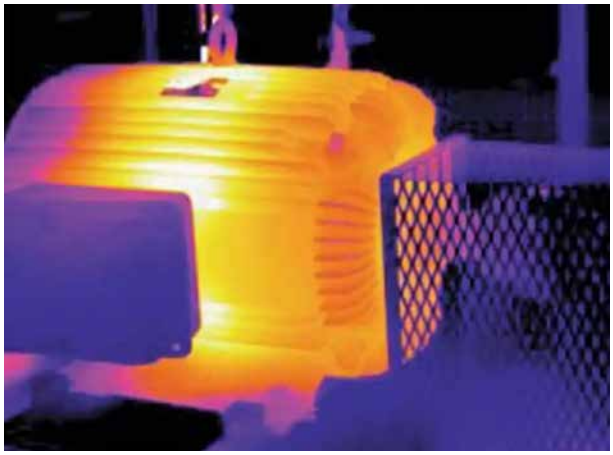

Above left: Fig.2. Technician collecting a vibration measurement. Above right: Fig.3. A thermographic image of a motor.

Unfortunately, in other cases people are chosen simply because they are available, or because, due to union rules, they are the next most senior person so they are taken off the tools and into condition monitoring. Often this results in a very poor condition monitoring program.

You need a champion

Most of the successful condition monitoring groups have a champion. He or she is the person who drives the program forward, inspires the people collecting the data and performing analysis, but also involves people from other sections of the plant - providing training and involving them in meetings. And most importantly (for the success of the group), the champion inspires management to maintain and grow the program.

Find a mentor

If you can find someone with experience to oversee your program, either from a sister plant or an outside consultant, you may avoid making costly mistakes. Don't be too proud to ask for help. The profitability of your plant (and the continuation of your employment) may depend on it.

Start small

Although this point is contentious, the author believes it is important that the program starts small. If you try to test too many machines you will spread yourself thin. It will take time to get the system set up correctly (the database, etc.), and it will take time to streamline the measurement routines and analysis procedures. Choose a small group of machines and try to do a good job with those. Have some success before you take the next step.

I cannot stress this enough. Take small steps. Start with simple machines, just so that you can get some experience using the equipment and the software. Analyze data that is relatively easy to understand. It is important for your own confidence that you do not immediately begin testing a large number of machines, or the most complex machines - even if they are critical.

Once you have some experience, work up to the larger machines. That is when you can establish the program and start a regular program. But do not rush into it. Take your time, and do the serious work only when you are ready.

Select the machines wisely

If the plant stops when a machine stops, monitor that machine. (Also look for expensive machines, machines that are difficult to replace, and machines that pose safety risks.) However, if that machine poses significant technical challenges, then it may be wise to avoid the machine - to begin with. For example, if it operates under varying speed and load, or it is very difficult to access the monitoring points, or it has a very complex gearbox, then it may be beyond you to successfully collect or analyze the data.

To begin with, it is better not to monitor the machine than to try and fail. You need to build your own confidence, and the confidence of the rest of the maintenance and production staff. However, it is essential that your manager knows which machines are being monitored.

Select an appropriate test schedule

It is normally recommended that you test a machine every thirty days. If a machine appears to be "healthy", and the condition is not changing, and it is not critical, then you could push it out to a sixty-day or even ninety-day cycle. However, if the machine does appear to have a fault condition, then, depending on the severity of the condition, and the criticality of the machine, you may even monitor it weekly or daily.

Don't work in isolation

Vibration monitoring is great, but it is not perfect. It

cannot help you to understand the condition of all plant equipment.

Vibration monitoring will not necessary give you the earliest warning of a fault condition. Infrared analysis, oil analysis, wear particle analysis, acoustic emission, motor signature/circuit analysis, and other technologies all play a vital role. If someone is performing these tests within your plant (either in-house or a consulting service) make sure that you learn about the technology, and befriend the people involved. Share the data to get the best results.

Understand the failure mechanism

Before you begin to monitor a machine with any condition monitoring technology, you should do your best to learn as much as you can about the machine. If you have access to mechanical information (bearing number, gear ratios, vane counts, lubricants, motor details, etc.), that will assist your condition monitoring work. But it is more important to understand the maintenance history and failure mechanisms. For example, knowing that a machine has a history of bearing failures will help to focus your attention, and you can choose the measurement types (shock pulse, enveloping, PeakVue, etc.) accordingly.

Understand the reporting process

When you detect a fault condition, be sure to report it to the right people. Make sure that your report is clear and understandable. It does not make sense to present a series of spectra and vibration levels (for example) to people who do not understand them.

Find out what they need to know, and report it to them in the desired format.

There is a growing trend in the vibration analysis world (especially with some consultants who have taken legal advice) to be as vague and non-committal as possible. If a report states that a machine has a "stage three bearing fault and it will only run for eight weeks", then a consultant could be liable if it fails in just a few weeks, or the bearings are found to be in good condition when the machine is opened. If the analyst has economic pressures to complete the test/analysis phase quickly, and he/she is concerned about liability, then the report is more likely to read vibration levels indicate a possible increase in bearing wear.

Don't be too gung-ho

If you think you will change the world in a day, and try to force people to accept your recommendations, and try to take on too much, you are likely to fail. You need to be cooperative. You need to be seen as an ally. You need to help people achieve their goals. Once people perceive you as someone who can help, rather than as a threat, then you will have success.

Keep management informed

No matter which machines you choose to monitor, no matter which technologies are used, no matter how often they are monitored - make sure your manager has a clear understanding of what can be achieved. It is the wrong time to explain your plan after there is an unexpected failure.

Mature program

The following is a list of tips for an established condition monitoring program - how to keep the program alive and continue to be successful and effective.

Record your successes

It is essential that you document the benefits of your program in a way that will continue to prove to management that the program should continue for the long term. The 'obvious' way to do that is via cost savings, reduction in downtime, and other financial benefits. But there are two important warnings:

1. It can be easy to generate savings that are not believable. For example, if you detect a bearing fault and that bearing is replaced, you could argue that if the bearing failed catastrophically there would have been "thousands" of Euro or dollars lost in downtime, additional parts (due to secondary damage), and additional labor. While that may be true, most managers will not credit the program with such savings every time a bearing fault is detected.
2. When a program is started there are bound to be a large number of machines with fault conditions, and there have probably been recent failures that are still fresh in everyone's memory. However, as time progresses the number of failures should be reduced, and the number of faults detected should also be reduced. Therefore, if you base your success on the reduction in failures or faults detected, you may find that after a year or two you may not have very much to report - therefore it may be concluded that the program is no longer required. Sadly, this has occurred a number of times. (And of course, it won't take too long before the failures begin to occur again and someone will decide to start a condition monitoring program.)

You must be vocal and clear. Take pictures, keep notes, build case histories, and make sure everyone knows about the effectiveness of the program. Don't show off or annoy people, but if management does not understand the group's value, budgets will be squeezed (there goes the training budget) and squeezed (there goes the software upgrade) until the group no longer exists (there goes your job).

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> **A technology might be "cool", but it may not be appropriate. Remember, the goal is to save the organization money in reduced downtime and reduced repair/ maintenance costs. Bigger is not always better!**

But you have to be sensible. If you continually report that you are avoiding thousands of dollars every time you detect bearing wear, nobody will take you seriously.

Investigate other technologies
As I have already stated, vibration is not the only condition monitoring technology, so explore other methods (infrared, oil analysis, etc.).

Expand the program
Try to expand the program in small steps. Slowly increase the number of machines monitored. That may require additional staff to collect data, and as the collection periods are increased on certain machines you will naturally have more time available.

Consider installing permanent sensors on machines that are difficult to access, and on-line monitoring systems on machinery that is either difficult to monitor, difficult to predict faults (bearings seem to fail quickly), very critical to production, or that pose a safety risk.

You should learn the language of upper management. You cannot simply report the benefits of a new technology. You should determine the ROI, NPV, IRR and other financial measures when you propose additions to your program. But please, don't build an empire. Don't add people and technologies just so that you have a larger group. A technology might be "cool", but it may not be appropriate. Remember, the goal is to save the organization money in reduced downtime and reduced repair/maintenance costs. Bigger is not always better!

Perform root-cause analysis
When you determine that a fault condition exists you must find out what caused the problem in the first place. Why did the bearing begin to wear prematurely? Was the lubricant contaminated? Was the machine misaligned? With that knowledge you can review your monitoring practices AND you can review the operation/maintenance of the machine so that the machine is more reliable in the future.

Verify the repair
When a machine is returned to service, collect more data to make sure that the fault was actually repaired (and that it is balanced and aligned). Your diagnosis may have been incorrect, so the machine may not be fit for service - and you still need to determine what is really ailing the machine.

Survey results
The survey was sent to a number of the author's iLearnVibration users from small and large companies, from a variety of industries, and from different countries. Given that they are iLearnVibration users, they are probably value training, but their comments and results were interesting nonetheless. Here are a few comments:

Management support
Almost all respondents said that their biggest concern was that their management did not understand what they did. They felt that with greater understanding they would get better support, and greater cooperation when either funds were needed for training, upgrades, etc., or more importantly, when a recommendation was made to correct a fault condition.

Training
The majority of people said that their management appeared to value training. A number reported that when times got tough the training budget was slashed.
All respondents believed that training was essential to their success. All respondents believed that on-going training, and quick access to a good reference was essential. All respondents believed that computer based training was the most effective form of training, because they could learn at their own pace, at their own timetable, and could get refresher training at any time. Most respondents also believed that it was essential to also attend seminars, conferences or classroom training so that they could get face-to-face with trainers and their peers.

Return on investment
Almost all respondents said that they were sure that the investment in condition monitoring technology was an excellent investment, with an ROI achieved in less than one year. In many cases, however, they did not have the financial data to justify that statement.

Continued over page >

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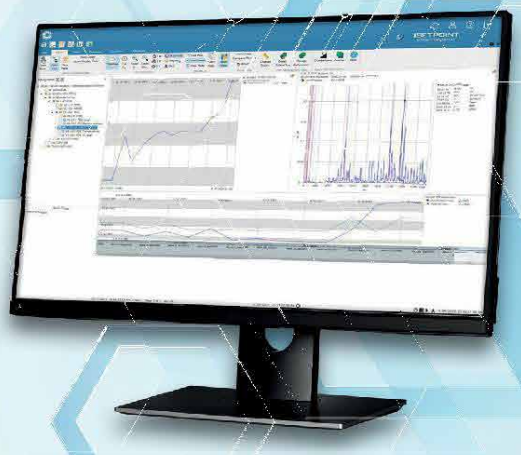

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Sometimes it was difficult to gather this information. One person queried "how can you tell what the cost saving is by not delaying a space shuttle launch by a few days". While we don't all work for NASA, it is not always easy to determine the exact financial benefit of avoiding unexpected failures and improving reliability.

Financial information
Almost all respondents believed that recording financial data was important, so that they could justify their program, however less than half of the respondents appeared to actually record the figures. One person said I don't do money!

Certification
Certification options have changed a great deal in the past couple of years. The ISO has released the standard 18436, and part 2 deals specifically with vibration analysis. There are other parts of the standard that related to other condition monitoring technologies.

The ASNT has also defined a recommended practice for vibration analysis which includes a specification of the topics that must be covered and the format of the exam. Certification is predominantly used to measure a person's understanding of the concepts and skills that must be used as a vibration analyst. It is not yet possible to provide a practical examination of a vibration analyst's competency. However it is believed that certification to an internationally recognized standard will become a requirement for vibration analysts in the future. The advice provided by the analyst, and the potential for significant financial ramifications if an analyst misses a fault condition (or misdiagnoses a fault condition), will result in employees and clients demanding a proven level of proficiency.

The costs required to run a program
Often when a company is looking to purchase a system, a great amount of time is spent analyzing the purchase costs. Bargaining and horse-trading continues until the lowest price is achieved. But little thought is given to the ongoing costs - the life-cycle costs.

All respondents stated that salaries were by far the largest cost. In the first year (when equipment is purchased), the purchase costs represents a large percentage (if you do not take depreciation into account), but still not as much as the staff salaries. In subsequent years, the maintenance costs (vendor support contracts, upgrades, etc.) can still be quite expensive, but still the dominant cost is staff (depending upon the size of the program, the number of employees, etc.).

So, what is the point? It is essential, in the author's opinion, to ensure that the equipment you purchase will do the job for you. If you understand your plant, and the failure modes of your equipment, you will have a better chance to buy appropriate equipment.

Make sure you buy equipment that enables you to achieve the desired goals. That does not mean that you have to order the optional bells and whistles, but you should spend money wisely. (And remember, it is easier to buy wisely in the first place, than to go back later and ask for more money.)

The second point is that you should analyze the on-going costs of the program - training, upgrades, and maintenance contracts. Consider the future.

Failed programs
Three main reasons were given for failed programs:

1. Lack of management support. Management either assigned staff to too many tasks, not realizing what it took to run a vibration program, or they did not understand the financial benefits (whose fault is that?) and simply cancelled it because it was considered too expensive.
2. Lack of understanding of the real benefits. In a mature program there should be fewer failures. Based on root cause failure analysis, maintenance procedures (and purchase procedures and design processes) are changed so that machines are more reliable. Greater reliability will result in fewer failures, which can result in upper management asking what have you done for me lately - just before they cut the program. You can suffer as a result of your own success.
3. Lack of training. Staff felt so frustrated at not knowing how to use equipment, or more-so not understanding the technology, that they could not be successful. They grew frustrated and gave up.

Conclusions
There is little doubt that condition monitoring can be used to determine machine health, and that maintenance can be planned based on that data. However, it has been shown that without the right people, training and management support, most programs will fail. The condition monitoring program will be halted, either as a way to save money, or simply because it is believed that the technology does not work.

The solution is to select the right people who are well suited to condition monitoring; continuously conduct training courses to ensure a high level of skill; carefully plan and execute the use of the technology; expand the program as time, budget, and necessity exists; and collect and distribute information to relevant management that sells the benefits of the program. ■

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FEATURE

Problems and Solutions with Magnetic Stator Wedges

Abstract

The use of magnetic materials for wedging induction motor stator windings has become more prevalent over the last decade. The move to the use of these materials has led to new reliability and maintenance challenges. This paper briefly discusses the function of stator wedging, the historical development of magnetic wedge material, the advantages of using magnetic wedges. Maintenance considerations for magnetic wedge integrity is also discussed.

Function of Stator Wedging

In large electrical machines the stator slots are opened to the width of the slot to allow the fitting of coils. The stator core laminations are punched in a manner to allow the fitting of wedges in rebated landings at the top of the slot. After coils are fitted and packed in the slots wedges are fitted in the slot landing.

The purpose of the wedging is to restrain the coils in the slot against steady state bar forces (100Hz or 120Hz vibration) and transient bar forces (Starting forces are proportional to in-rush current squared). Historically the material used for wedging has been non-magnetic - typically an epoxy glass laminated board machined to match the stator slot landing. Increasingly the epoxy laminate is being replaced with magnetic laminate.

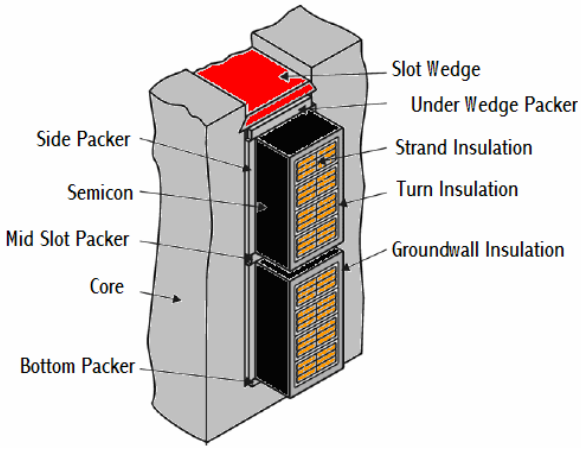

Fig. 1. Typical arrangement of wound stator slot.

Magnetic Wedging

The typical material composition of magnetic wedging is detailed in table below:

Typical Material Composition of Magnetic Wedges	
Iron	*70%*
Glass Fabric	*10.8%*
Binder	*19.2%*

Continued over page >

Article by Mike Davis - EMKE.

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The use of this type of material changes the wedge from a magnetically passive characteristic to being magnetically active. As a result of this the normal wedging function of retaining the coils in the slot is changed to one of retaining coils and providing a low reluctance magnetic path across the opening on the top of the stator slot.

As a result of providing a magnetic closure on the top of the slot the following improvements are achievable;

- Reduced core losses.
- Lower magnetizing current.
- Reduction in zig zag torque.
- Improved Efficiency.

The level to which these improvements are realised has wide variation and is dependant on case by case design parameters of the machine. In modern machines it could be said that the addition of magnetic wedges is one way manufacturers can reduce the active material content of machines; the others being better insulation and smarter ventilation design.

Studies have shown the net result of this trend of reducing active material content for given outputs has led to a 14 times reduction in mass of machines at given outputs in the period of 1920s to 1990s. [1]

The machine performance benefits in life cycle power cost associated with using magnetic wedges can easily be lost in additional reliability costs associated with magnetic wedge failure particularly after rewedging of machines. [2]

Given magnetic wedges are subjected to un-remitting magnetic forces throughout operational life the challenge for designers is to apply wedges with considerations for material reluctance, flux densities and physical assembly to prevent looseness developing in service. Meeting this challenge has occupied designers since the 1920s. The figure below shows a magnetic wedging technique patented in 1945 by Fisher. Many such designs exist all aimed at ensuring the magnetic and restraining function of magnetic wedges are preserved throughout the operational life of the machine.

The modern magnetic wedge material design and application approach relies heavily on “gluing” the wedge in position with epoxy resin. The life limiter for wedge systems using this approach is the epoxy resin. In circumstances where localised temperature rise (hotspots) in stator cores occurs through high flux concentration the thermal aging of the wedge bonding epoxy is accelerated.

Epoxy based materials shrink with thermal aging. Once the bonding is compromised the wedges are free to move independently in response to the machine magnetic

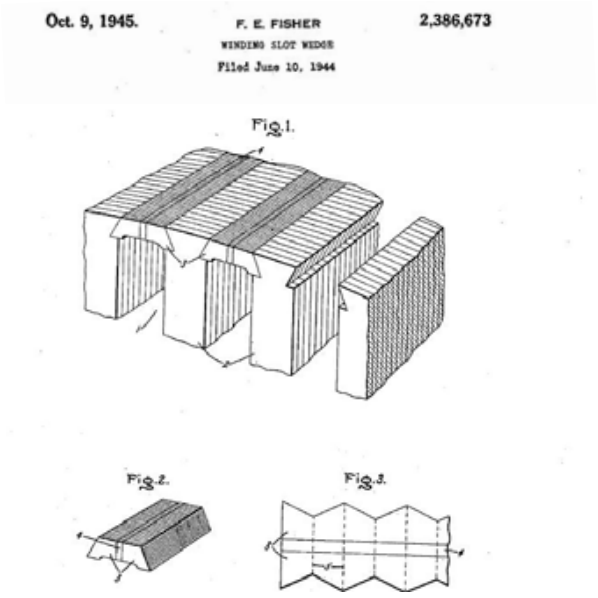
Oct. 9, 1945. F. E. FISHER 2,386,673
WINDING SLOT WEDGE
Filed June 10, 1944
Fig. 1.
Fig. 2.
Fig. 3.

Fig. 2. Early magnetic wedge patent (US Patent No. 2 386 673).

field. In circumstances such as this wedges vibrate and are progressively reduced to iron powder and debris due to the abrasive nature of the stator slot landings.

One fix for this problem is to replace the magnetic wedge material with traditional non-magnetic material. The impact on machine performance in removing magnetic wedges and replacing them with non magnetic wedges range from no change [3] up to a 50% reduction in magnetizing current. [4]

Detecting Failed Magnetic Wedges

Machines with failed magnetic wedges may display one or more of the following operational characteristics;

- Higher no-load current when compared to “type test” value.
- Increased temperature rise.
- Increase in Endwinding Discharge due to the presence of wedge material contamination on the stator endwinding (HV Machines).
- Increase in electrically excited vibration.

Due to the inconclusive nature of the above characteristics as an indicator of magnetic wedge failure it turns out that the most effective detection technique is a visual inspection.

The visual evidence for failed magnetic wedges is;

- Ferrous contamination on the stator endwindings.
- Ferrous and glass matting debris in the base of the machine.
- Glass matting debris in the machine primary air circuit ducting.
- Missing wedge sections from the stator slots (predominantly in the middle of the stator slots).

Having detected failed magnetic wedging a maintenance choice needs to be made which can include only re-wedging slots where wedges have failed (Partial re-wedge), completely re-wedging the stator and replacing the wedge material with nonmagnetic material. In either case significant reliability risk can result from what appears to be simple maintenance.

Maintenance Considerations

There are important considerations before attempting re-wedging maintenance where magnetic wedges are employed. These include;

Wedge removal – the removal of wedges is high risk maintenance particularly on windings which have been Vacuum Pressure Impregnated. The risk of causing impact damage to stator coil groundwall insulation needs to be evaluated. A low risk approach is to run a saw down the centre of the slot to a depth slightly less than the wedge thickness and collapse the wedge in toward the cut.

Wedge size – It is important when surveying the wedge dimensions that accurate measurements are made. The wedge dimensions should match the profile of the slot landing and maintain the original design thickness. The finished wedge size should allow for a neat fit in the landing whilst applying downward pressure on the coils in the slot.

Vented core – when wedging machines with vented cores attention should be paid to ensuring the wedges are notched at a location corresponding to core vent to ensure no ventilation restrictions occur.

Lamination shuffle – When laminated stator cores are assembled all laminations never align in precisely the same location due to manufacturing tolerances. This results in
what is termed lamination shuffle. When fitting wedges lamination shuffle can impact on the fit of the wedge in the slot.

The uneven edge of the slot landing serves to take material off the wedge as it is dredged into the slot. The results of this problem can be observed in machines with failed wedges as most wedge portions fail in the centre of the slot – the location of wedges which have been dredged the greatest distance along the slot landing.

Slot length – When fitting magnetic wedges the less force required to fit the wedge the better. Force required to fit wedges can be reduced by reducing the length of the wedges. Careful consideration should be given to ensuring that wedges are fitted in short lengths. In vented cores the butted joints of wedge portions should always be positioned within the core packs.

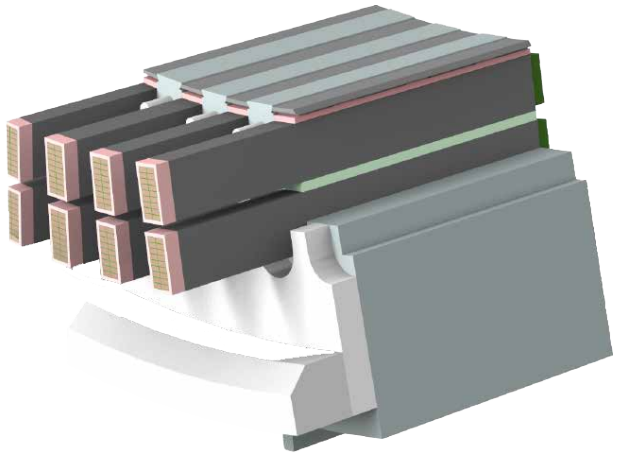

Fig. 3. Magnetic Slot Wedges.

Bonding material – The fit of magnetic wedges and downward force on the stator coils on their own are not enough to restrain magnetic wedges in the stator slots. To achieve bonding of the wedge to the slot landings epoxy resins need to be applied during the fitting of the wedges. The epoxy used in this application should be of appropriate thermal rating.

Conclusion

The utilization of magnetic wedging systems in induction motors is becoming more prevalent. The following conclusions are drawn from experience with magnetic wedge systems:

- Magnetic wedges compensate for deficits in active material content.
- The impact of magnetic wedges on machine performance varies on a case-by-case basis.
- Detection techniques for magnetic wedge failure are limited with visual inspection being the most useful.

Careful consideration needs to be applied prior to re-wedging machines after magnetic wedge failure to ensure successful maintenance. Design efficiency gains through employing magnetic wedges can be a fraction of the reliability cost of failed wedges. ■

References

[1] Glew. C.N "The Next Generation" –A Review of the Factors influencing the Output of an Electrical Machine in the New Millennium. INSUCON/ ISOTE`C '98 p 231-242

[2] Scollay & Stewart "The Real Cost of Magnetic Wedges in Improved Performance of Induction Motors" CWIEME 2007 - Berlin, Germany

[3] Hanna, Hiscock & Klinowski "Failure Analysis of Three Slow Speed Induction Motors For Reciprocating Loads" IEEE Paper No. PCIC-2005-XX

[4] Magnatuff MDS "Case Studies" http://www.camawi.com

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Engineering is constantly evolving alongside advances in technology, materials, and manufacturing. Today's engineers use multiple condition monitoring tools to support predictive asset management—a critical but demanding role. With high costs tied to downtime, equipment failure, and safety risks, skilled analysis is essential. The Vibrations Association of New Zealand (VANZ) exists to support professionals by providing:

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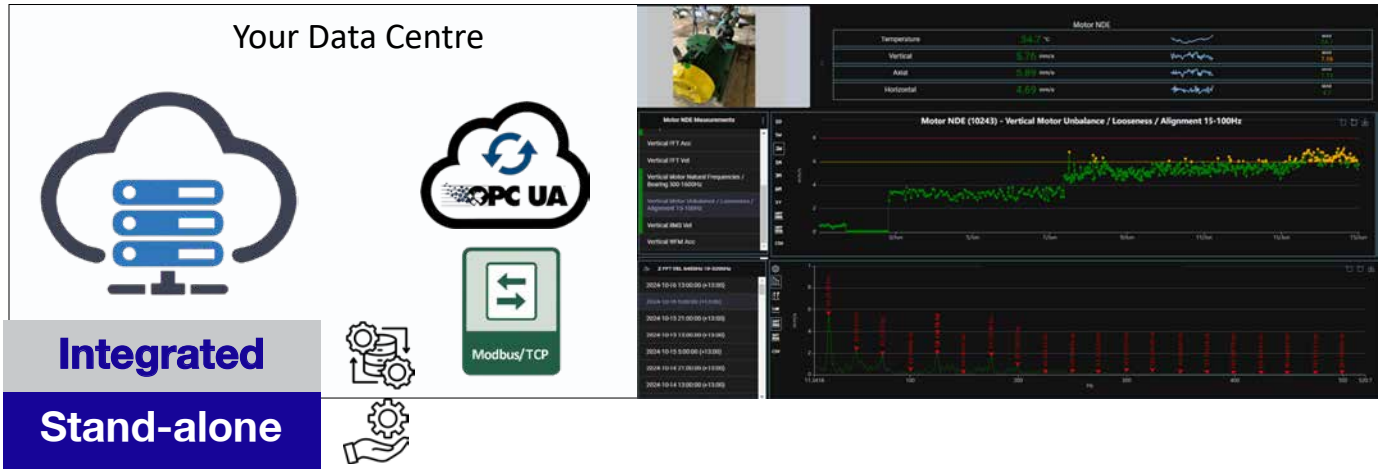

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Solutions on page 46

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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.

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25 - Good | 40 - Very Good | 50+ - Excellent

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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.

1 **BOOK**

2

3

4

5

6 **READ**

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. Difficulty: **Next Level**

Only 41.2% of puzzlers can solve this. Can you?

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

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TEST YOUR KNOWLEDGE - PART 83 OF A SERIES

1. When setting up new measurement points in a database, an acceleration measurement was supposed to be set up with fmax = 10 kHz, 800 lines, 2 averages. However the fmax was inadvertently set to 1 kHz. How might this erroneous measurement differ from the correct setup?

A. The overall acceleration level of the erroneous measurement might be lower than the correct one
B. The erroneous measurement might take longer to collect than the correct one
C. Neither A nor B is correct
D. Both A and B are correct.

2. There is a beating vibration on a belt-driven fan which is due to unbalances in the motor and fan shaft coming in and out of phase. The motor and fan speeds are closely matched but not identical. You time the beat with a stop-watch and it equates to 17 bpm. You can strobe the motor, and its speed is 2974 rpm. The fan and its pulley are enclosed so you cannot strobe its speed. What speed do you think the fan might be doing?

A. 2991 rpm
B. 2957 rpm
C. 2967 rpm
D. The fan speed could be A or B.

3. A paper machine is running at a line speed of 1400 metres per minute. You are doing vibration tests on one of the rolls and its diameter is 350 mm. What is the rpm of that roll?

A. 1173 rpm
B. 1273 rpm
C. 1373 rpm
D. 1473 rpm.

4. A vibration analyst was asked to test a hot oil pump for the first time as the pump was reported to be noisy following replacement of the motor and overhaul of the pump. The pump is a centrifugal type coupled to a motor. By ear, the analyst thought the pump sounded like it was cavitating, and after taking his readings he checked the direction of rotation and found it to be wrong. This was corrected and in the next routine test he observed which of the following?

A. The pump was running quieter and the acceleration levels on the pump had reduced significantly
B. The discharge pressure was back in the normal range after being very low in the original test
C. Neither A nor B
D. Both A and B.

5. With the appropriate signal conditioning in the acquisition device, an accelerometer can measure...

A. Acceleration
B. Velocity
C. Displacement
D. All of the above.

6. A centrifugal fan has once-per-rev vibration that is very high (25 mm/s pk) in the horizontal plane, but only 1 mm/s pk in the vertical plane. What do you think might be the approximate phase relationship between horizontal and vertical planes?

A. 0 degrees
B. 90 degrees
C. 180 degrees
D. Could be A or C.

7. With the fan mentioned above, if you were to impact test it for resonance, in which plane would you place your sensor and apply the impact force?

A. Horizontal
B. Vertical
C. Axial
D. It doesn't matter which plane.

8. You are carrying out vibration tests on a 4-stroke diesel engine for the first time. Overall vibration levels are good but you notice a series of low level ½ order vibrations in the spectra. What would you conclude from this?

TEST YOUR KNOWLEDGE

Further enquiries can be directed to: Carl Townsend at Carlton Technology Ltd.
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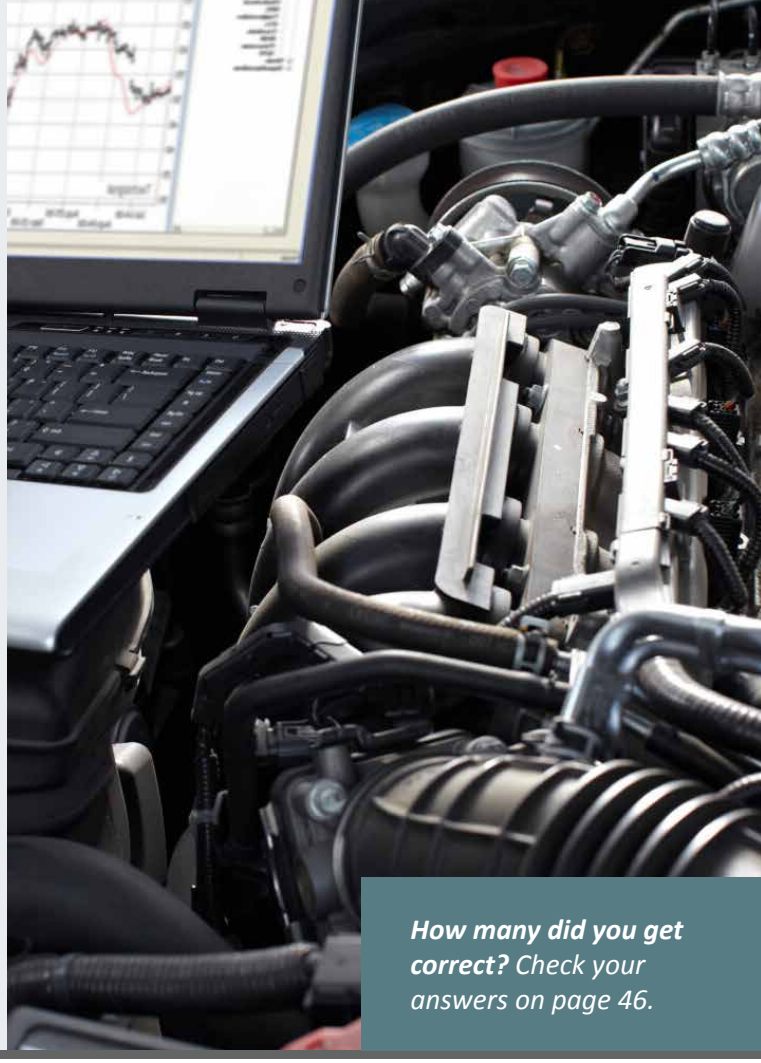
A. The engine has a looseness problem
B. There is a rub in the engine
C. Low-level ½ order vibrations can be expected in a 4-stroke diesel engine
D. The flywheel on the engine needs balancing.

9. You achieve a good balance on a fan impeller by applying a temporary 40-gram weight at a radius of 300mm. However for a permanent solution the weight needs to be moved to a 250 mm radius. What should the final correction weight be?

A. 28 grams
B. 33.3 grams
C. 48 grams
D. 58 grams.

10. A 2-pole, 3-phase induction motor runs at 2970 rpm when a 50 Hz power supply is applied. What will be the approximate speed of the motor if the electrical supply frequency is increased to 60 Hz?

A. 1470 rpm
B. 2475 rpm
C. 3564 rpm
D. 4375 rpm.



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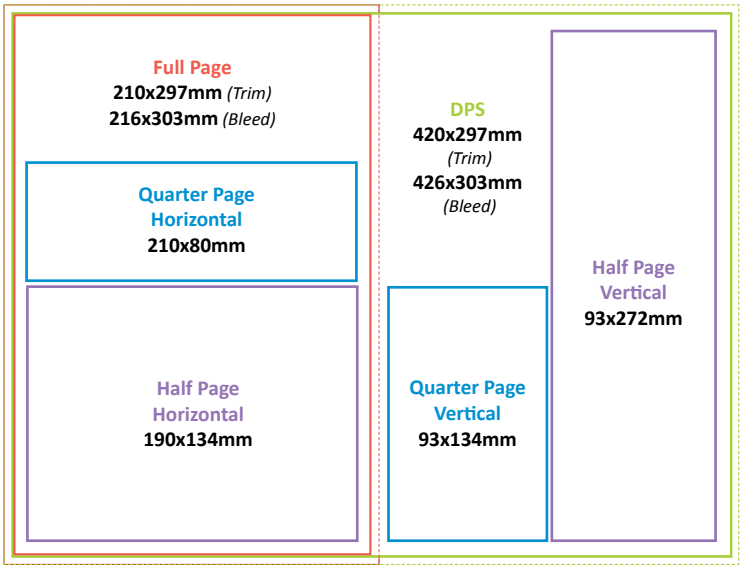

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QUIZ + PUZZLE CORNER

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Word Ladder: 1. BOOK, 2. ROOK, 3. ROOM, 4. ROAM, 5. REAM, 6. READ

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