MOTOR SERVICES IN 2024

Frédéric Beghain, EASA EAA Chapter
Bjorn Mjatveit, EMR Consulting

Motor Services in 2024

#MotorsAcademy

WEBINAR #7

June 12, 2024

15:00 – 16:00 CEST

Frédéric Beghain

EASA
Europe Asia Africa

Bjørn Eirik Mjåtveit

EASA
Europe Asia Africa

This session will elaborate on the diverse range of services provided by EASA members, addressing the challenges, opportunities, and emerging trends within the industry. Explore the enduring significance of repair and maintenance services, alongside advancements in sustainability practices such as motor recycling. Discover the ongoing progress of EASA Accreditation on Energy Efficiency and Reliability, shaping the landscape of industry standards.

Leonardo ENERGY

An initiative by

Cu International Copper Association Europe

MOTORS ACADEMY

Short Intro of the speakers

- Frederic Beghain

- Bjorn Mjatveit

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EASA members are the most active and best professionals in the motors/rotating machines systems Repair and Maintenance industry in the world

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SPECIFIC INDUSTRY
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300.000 MOTORS

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NUMEROUS PROJECTS
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REPRESENTATION IN
STANDARDS BODIES

EASA Accreditation
on Energy Efficiency and Reliability

UNIQUE SUPPORT & ACTIVE NETWORK

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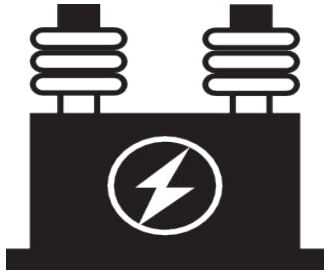
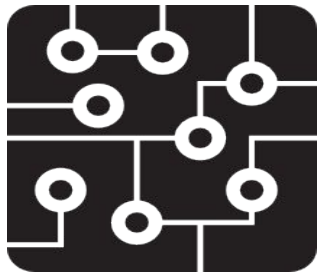
1800 service companies from 80 countries are EASA members in the world. Many suppliers are also members

EASA has unique powertrain domain-knowhow

We have the best insight into the installed base with 1.800 service providers in 70 countries



Static electrical machines



Power electronics

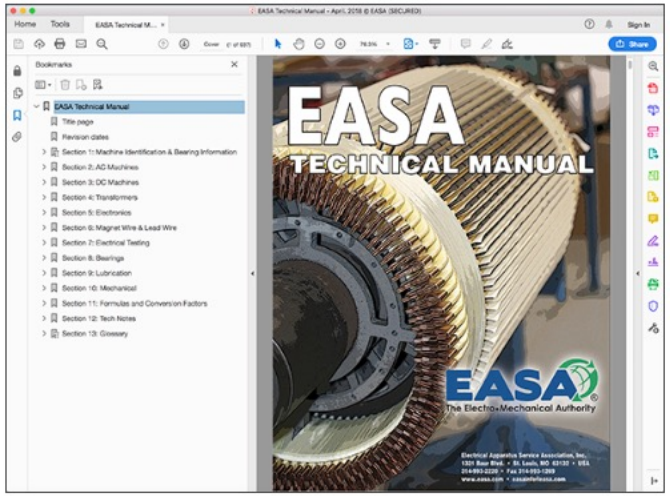
Rotating electrical machines

Rotating equipment

EASA Knowledge base

Download the Full Manual

The EASA Technical Manual is available FREE to members as downloadable PDFs of the entire manual or individual sections.



Revised May 2024 | 69 mb | Number of pages: 924

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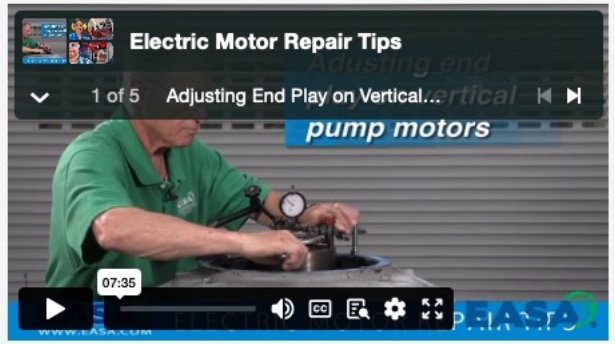
Download Sections of the Manual

- + Section 1: Machine Identification & Bearing Information
- + Section 2: AC Machines
- + Section 3: DC Machines
- + Section 4: Transformers
- + Section 5: Electronics
- + Section 6: Magnet Wire
- + Section 7: Electrical Testing
- + Section 8: Bearings
- + Section 9: Lubrication
- + Section 10: Mechanical
- + Section 11: Formulas
- + Section 12: Tech Notes
- + Section 13: Glossary

New Video Added to Video Training Library



Adjusting End Play on Vertical Pump Motors

This new video walks through the steps to adjust and set end play on a typical vertical hollow shaft pump motor. Proper end play adjustment is important to keep the lower bearing from supporting the weight of the rotor and to allow for thermal growth within the motor. The motor in this video has a thrust bearing in the top and a standard ball-type guide bearing in the bottom, which is typical of vertical pump motors. There are other bearing arrangements with somewhat different procedures for setting end play, but here we'll be working with the most common arrangement and procedure.

This video and four others can be found now and in the future as separate entries in the Resource Library, on the new Training Video

Webinar

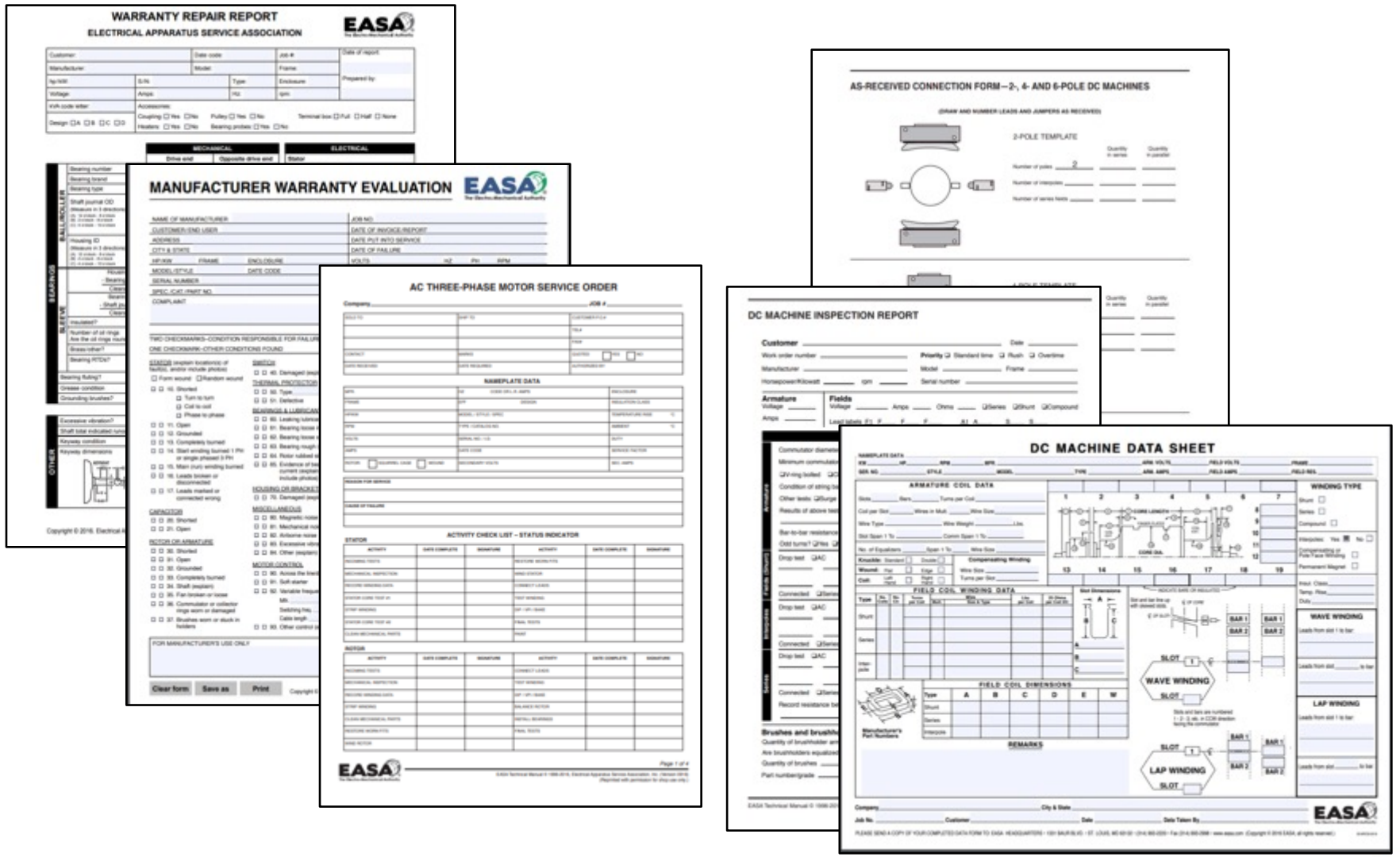
Using EASA's Motor Rewind Data – Version 4

Event date: 6/12/2024 12:00 PM - 12:30 PM Central

Sponsored by AKARD COMMUTATOR of TENNESSEE (ACT)

VISIT THEIR WEBSITE

Tools / Resources / FORMS



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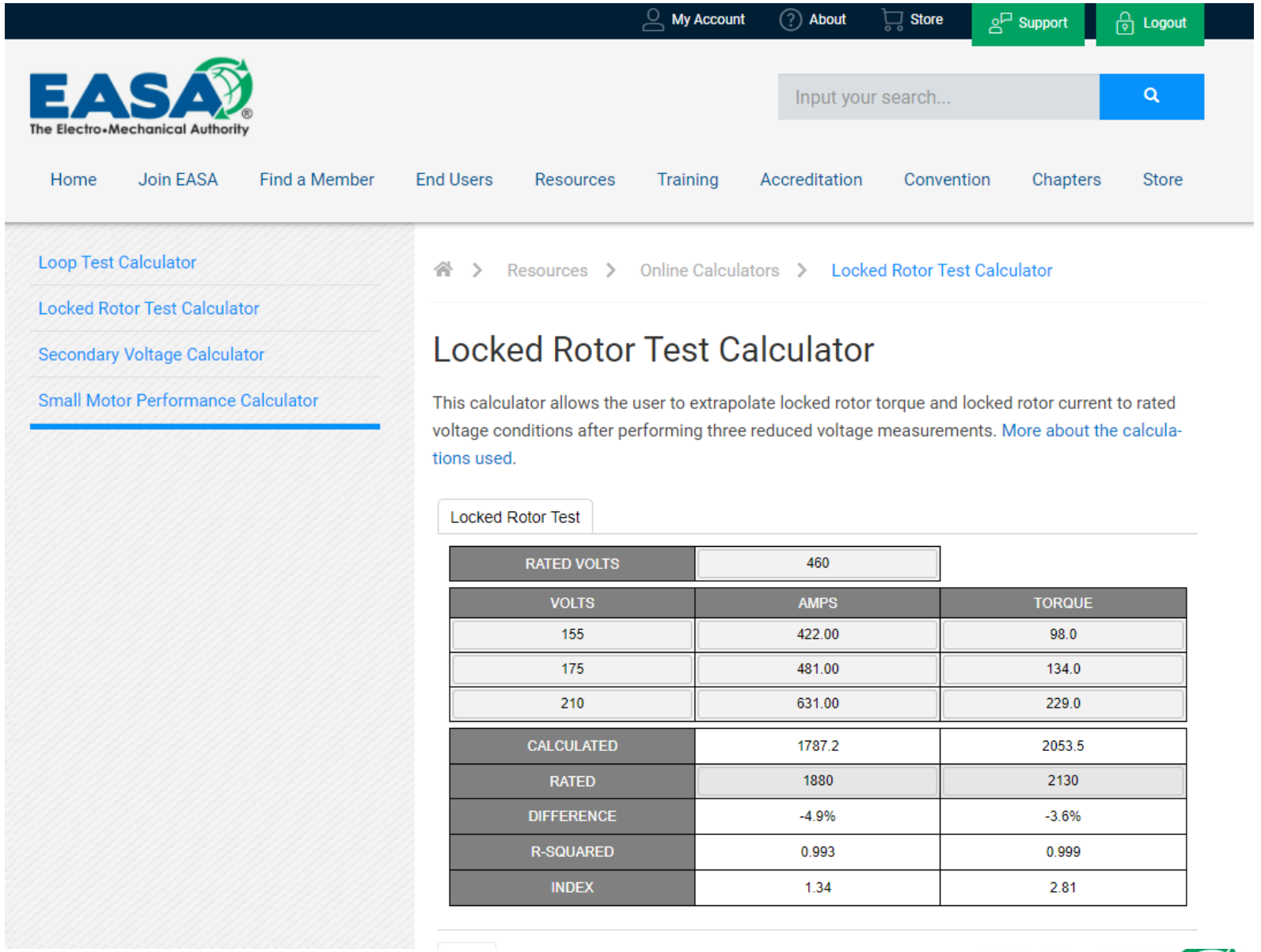
Online Calculators

- Loop Test
- Locked Rotor Test
- Secondary Voltage
- Small Motor Performance



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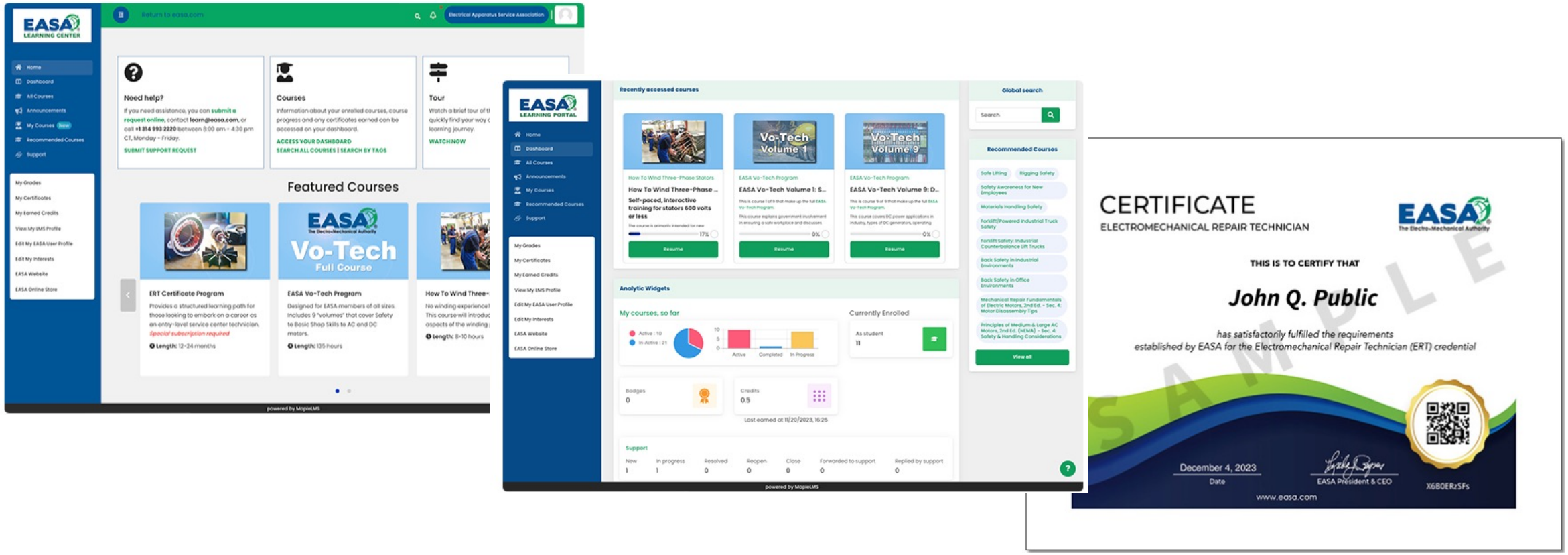
People drives Success



EASA Learning Management Platform

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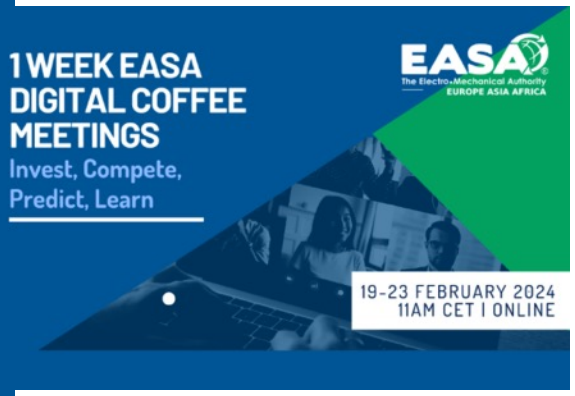

Visit www.easa9.org

Porto, Portugal, 3-5 of Oct 2024

27-28 Nov 2024, Paris Saclay

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5. ACTIVITIES AND FACILITIES CODES FOR WORK PERFORMED IN YOUR PLANT

This information will appear in your "Activities Code" and "Facilities Code" listing on EASA's website at easa.com.

a) ACTIVITIES CODE

Place a check mark (✓) in the box for each activity that your company is adequately equipped to handle.

1. AC ELECTRIC MACHINE REWINDING / REBUILDING
- ☐ Single-phase motors
- ☐ Polyphase motors less than 50 hp (37 kW)
- ☐ Polyphase motors up to 200 hp (150 kW)
- ☐ Polyphase motors over 200 to 1000 hp (150 to 750 kW)
- ☐ Polyphase motors over 1000 to 5000 hp (750 to 3750 kW)
- ☐ Polyphase motors over 5000 to 7500 hp (3750 kW to 5600 kW)
- ☐ Polyphase motors over 7500 hp (5600 kW)
- ☐ Polyphase motors with formed coils
- ☐ Polyphase motors over 5000 volts
- ☐ Wound rotors
- ☐ AC generator rewinding less than 50 kVA
- ☐ AC generator rewinding 50 kVA and over
- ☐ Brush shifting motors
- ☐ Synchronous motors

2. DC MACHINE REWINDING / REBUILDING
- ☐ DC motors or generators less than 10 kW
- ☐ DC motors or generators 10 kW and over
- ☐ Rotating fields less than 10 kW
- ☐ Rotating fields 10 kW and over
- ☐ Armature rewinding
- ☐ DC welders–rotating
- ☐ DC welders–static

3. SPECIALTY MACHINE REWINDING / REBUILDING
- ☐ Servo
- ☐ Traction
- ☐ Hermetic
- ☐ Hoist
- ☐ Cryogenic
- ☐ DC lifting magnets
- ☐ Magnets–other than DC lifting magnets
- ☐ Switched reluctance motors
- ☐ Wind generators
- ☐ Hydro generators

4. TRANSFORMER SERVICING
- ☐ Air-cooled rebuilding
- ☐ Air-cooled rewinding
- ☐ Oil-filled rebuilding
- ☐ Oil-filled rewinding
- ☐ Welder transformer rewinding
- ☐ Auto transformer rewinding

5. MECHANICAL SERVICING
- ☐ Dynamic balancing
- ☐ General machine shop
- ☐ Hermetic compressors
- ☐ Metal spraying
- ☐ Pump repairing
- ☐ Rotor rebarring
- ☐ Air compressors
- ☐ Combustion engines
- ☐ Babbitt bearing spin casting
- ☐ Restack core laminations

6. ELECTRIC/ELECTRONIC CONTROL SERVICING
- ☐ Electromechanical preventive/predictive maintenance services
- ☐ Electronic preventive/predictive maintenance services
- ☐ Printed circuit board repairing
- ☐ Switchgear 600 volts and less
- ☐ Switchgear over 600 volts
- ☐ Custom panel fabrication
- ☐ General electrical contracting
- ☐ Remote condition monitoring

7. FIELD SERVICE
- ☐ Electromechanical
- ☐ Electronic
- ☐ Vibration analysis
- ☐ Alignment
- ☐ Laser alignment
- ☐ Portable balancing
- ☐ Thermography
- ☐ Commissioning
- ☐ On-site rewinding

8. LOAD TESTING (DYNAMOMETER RANGES)
- ☐ Under 125 hp (93 kW) @ 1800 rpm
- ☐ 125 to 250 hp (93 to 186 kW) @ 1800 rpm
- ☐ 251 to 500 hp (187 to 373 kW) @ 1800 rpm
- ☐ 501 to 1000 hp (375 to 750 kW) @ 1800 rpm
- ☐ Over 1000 hp (750 kW) @ 1800 rpm
- ☐ Vertical motors up to 500 hp (373 kW)
- ☐ Vertical motors over 500 hp (373 kW)

9. ELECTRICAL APPARATUS SALES
- ☐ Single-phase electric motors
- ☐ Polyphase electric motors
- ☐ DC motors
- ☐ Transformers
- ☐ Gear motors, speed reducers
- ☐ Adjustable-speed drives
- ☐ Variable-frequency drives (VFDs)
- ☐ Power transmission equipment
- ☐ Generators
- ☐ Hoists
- ☐ Electric motor controls
- ☐ Portable tools
- ☐ Pumps
- ☐ Remote condition monitoring

10. PUMP SERVICING
- ☐ End-suction pumps
- ☐ Split-case pumps
- ☐ Vertical turbine pumps
- ☐ Submersible dewatering pumps
- ☐ Submersible municipal/commercial waste-water lift pumps
- ☐ Submersible domestic waste-water lift pumps
- ☐ Pool and spa centrifugal pumps
- ☐ Positive displacement pumps
- ☐ Pump removal and installation
- ☐ Impeller repair and balancing
- ☐ Impeller and volute coatings

11. ACCREDITATION/CERTIFICATION
- ☐ EASA Accredited
- ☐ UL or CSA approved for rebuilding of electric motors and generators in hazardous locations. (Will not be listed if you do not indicate file #.)

  UL File # _____

  CSA File # _____
- ☐ IECEx hazardous area equipment rebuilding

  Authorizing agency _____

  Certificate # _____
- ☐ ISO 9001 Series registration. (Will not be listed if you do not indicate certificate #.)

  ISO 9001 series certificate # _____

b) FACILITIES CODE

Except for Items 6 and 9, place a check mark (✓) in the box that best describes your company's largest capacities. For Items 6 and 9, put a check mark (✓) in each box that applies. (Metric equivalents are approximate.)

1. AREA DEVOTED TO SERVICE WORK
- ☐ Less than 2,000 sq. ft (186 sq. m)
- ☐ 2,000 - 4,999 sq. ft (186 - 464 sq. m)
- ☐ 5,000 - 9,999 sq. ft (465 - 929 sq. m)
- ☐ 10,000 - 14,999 sq. ft (930 - 1,393 sq. m)
- ☐ 15,000 - 49,999 sq. ft (1,394 - 4,645 sq. m)
- ☐ 50,000 sq. ft (4,646 sq. m) and over

2. AREA REGULARLY SERVICED (Radius from plant)
- ☐ Up to 50 miles (80 km)
- ☐ Up to 100 miles (160 km)
- ☐ Up to 200 miles (321 km)
- ☐ Over 200 miles (321 km)

3. LARGEST CRANE OR HOIST LIFTING CAPACITY
- ☐ Less than 2 tons (1.815 t)
- ☐ Up to 5 tons (4.535 t)
- ☐ Up to 10 tons (9.071 t)
- ☐ Up to 30 tons (27.215 t)
- ☐ Over 30 tons (27.215 t)

4. HEIGHT AND WIDTH OF LARGEST SERVICE ENTRANCE
- ☐ Personnel only
- ☐ At least 8 x 8 ft (2.4 x 2.4 m)
- ☐ At least 8 x 12 ft (2.4 x 3.6 m)
- ☐ At least 12 x 14 ft (3.6 x 4.3 m)
- ☐ At least 14 x 16 ft (4.3 x 4.9 m)

5. LATHE (MAXIMUM SWING)
- ☐ Less than 16 in (40 cm)
- ☐ 16 - 23 in (40 - 60 cm)
- ☐ 24 - 35 in (61 - 90 cm)
- ☐ 36 - 47 in (91- 120 cm)
- ☐ 48 - 71 in (121 -180 cm)
- ☐ 72 in (181 cm) or more

6. DYNAMIC BALANCING EQUIPMENT (Check all that apply)
- ☐ Less than 500 lbs (227 kg)
- ☐ 500 - 1,999 lbs (227 - 906 kg)
- ☐ 2,000 - 4,999 lbs (907 - 2,267 kg)
- ☐ 5,000 - 9,999 lbs (2,268 - 4,545 kg)
- ☐ 10,000 lbs (4,546 kg) and over

7. BURNOUT OVEN
Inside width and height and depth:
- ☐ Less than 4 x 4 x 4 ft (1.2 x 1.2 x 1.2 m)
- ☐ At least 4 x 4 x 4 ft (1.2 x 1.2 x 1.2 m)
- ☐ At least 6 x 6 x 6 ft (1.8 x 1.8 x 1.8 m)
- ☐ At least 8 x 8 x 8 ft (2.4 x 2.4 x 2.4 m)
- ☐ At least 10 x 10 x 10 ft (3.0 x 3.0 x 3.0 m)

8. DIPPING EQUIPMENT
Length and width and depth:
- ☐ Less than 4 x 4 x 4 ft (1.2 x 1.2 x 1.2 m)
- ☐ At least 4 x 4 x 4 ft (1.2 x 1.2 x 1.2 m)
- ☐ At least 6 x 6 x 6 ft (1.8 x 1.8 x 1.8 m)
- ☐ At least 8 x 8 x 8 ft (2.4 x 2.4 x 2.4 m)

9. VACUUM-PRESSURE IMPREGNATION (VPI RESIN) (Check all that apply)
- ☐ Epoxy
- ☐ Polyester
- ☐ Other

10. VPI PROCESSING EQUIPMENT DIAMETER
- ☐ Less than 3 ft (0.914 m)
- ☐ 3 - 5.99 ft (0.914 - 1.827 m)
- ☐ 6 - 7.99 ft (1.828 - 2.437 m)
- ☐ 8 - 9.99 ft (2.438 - 3.047 m)
- ☐ 10 - 11.99 ft (3.048 - 3.657 m)
- ☐ 12 ft (3.658 m) and larger

11. BAKE OVEN
Inside width and height and depth:
- ☐ Less than 4 x 4 x 4 ft (1.2 x 1.2 x 1.2 m)
- ☐ At least 4 x 4 x 4 ft (1.2 x 1.2 x 1.2 m)
- ☐ At least 6 x 6 x 6 ft (1.8 x 1.8 x 1.8 m)
- ☐ At least 8 x 8 x 8 ft (2.4 x 2.4 x 2.4 m)
- ☐ At least 10 x 10 x 10 ft (3.0 x 3.0 x 3.0 m)

12. AC TEST PANEL KVA CAPACITY
- ☐ Less than 100 kVA
- ☐ 100 - 500 kVA
- ☐ 501 - 2,500 kVA
- ☐ Over 2,500 kVA

13. MAXIMUM TEST PANEL VOLTAGE
- ☐ 600 volts or less
- ☐ At least 2,000 volts
- ☐ At least 4,000 volts
- ☐ At least 6,000 volts
- ☐ At least 11,000 volts

14. DC TEST PANEL KW CAPACITY
- ☐ Less than 100 kW
- ☐ 100 - 500 kW
- ☐ 501 - 2,500 kW
- ☐ Over 2,500 kW

QUALIFICATIONS AND CONDITIONS OF MEMBERSHIP

MEMBERSHIP QUALIFICATIONS

1. ACTIVE MEMBERS of this Association shall be firms engaged in the business of servicing electrical, electronic or mechanical apparatus. Members must meet the following qualifications:
   - A. Have been in business at least one year, except a newly established or acquired location of an Active member firm is eligible for Active membership regardless of its length of time in business as long as it meets the membership requirements;
   - B. Have at least two full-time employees;
   - C. Have been approved for membership;
   - D. Agree to be bound by and comply with the provisions of the Bylaws and Governing Policies of the Association.
2. Where an Active Member is a part of a business organization which has more than one such location, each facility is eligible to apply for its own membership in the Association and the benefits of membership shall not be made available to, nor be used by, any such separate facility which does not hold its own membership in the Association.

OBJECTS

The objects of the Association shall be:

1. To foster the trade, commerce and interest of those engaged in the business of servicing and marketing electrical, electronic and mechanical apparatus.
2. To correct trade abuses relative thereto.
3. To secure freedom from unjust or unlawful exactions.
4. To collect and disseminate information of value to members and the public.
5. To promote uniformity in the trade customs of those having a common interest in the industry.
6. To arbitrate differences between members.
7. To encourage friendly relations among members.
8. To promote voluntary standards and cooperation in order to avoid undue government intervention.

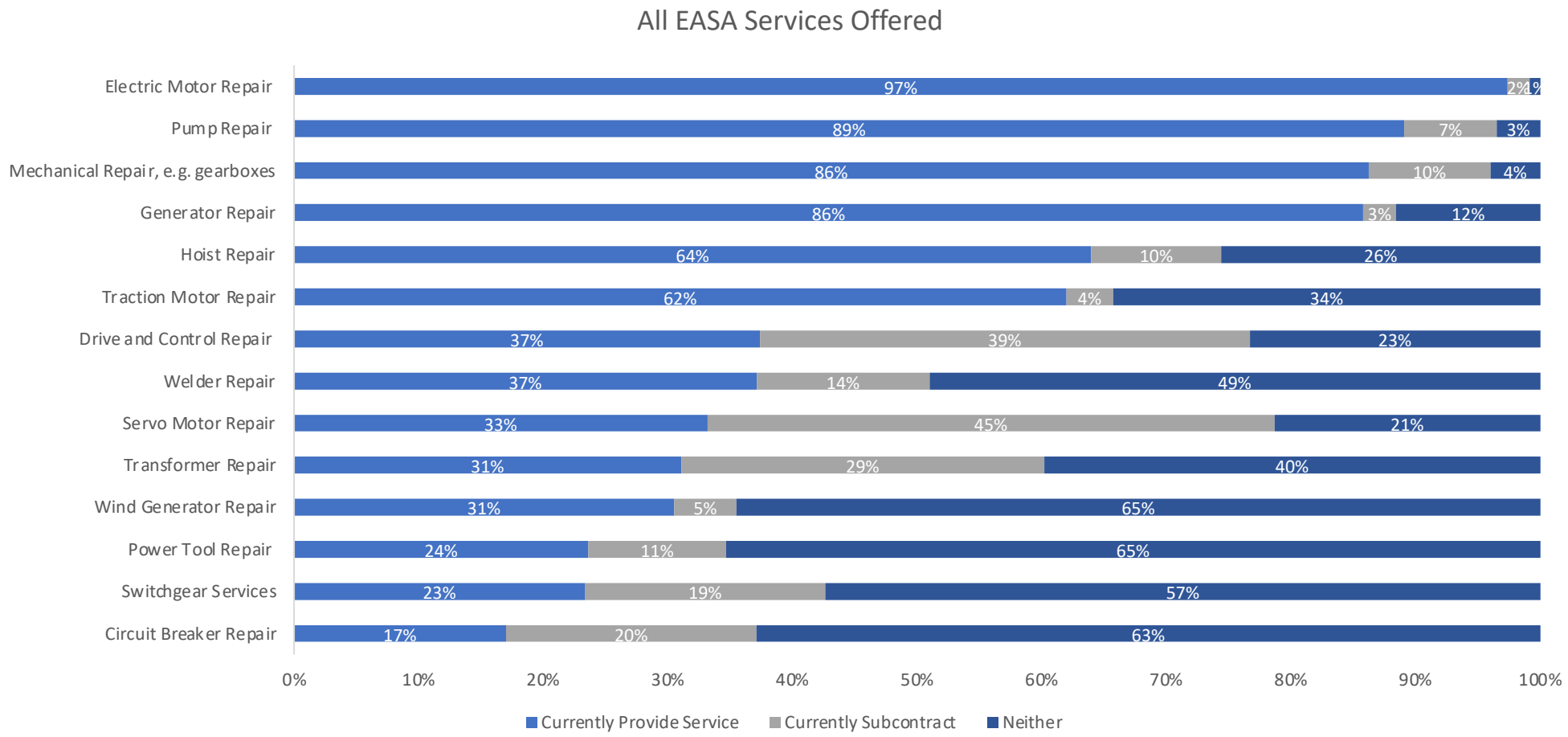
EASA CODE OF BUSINESS PRACTICE

EASA strongly encourages its members to represent the electrical apparatus sales and service industry with the highest quality of business integrity, ability and service by meeting the following guidelines. While EASA may not be able to enforce the guidelines, if a serious violation is reported, EASA may report the violation to the appropriate law enforcement agency.

1. A member will honor its financial obligations and warranties on any job undertaken.
2. A member will strive to adhere to all of the standards adopted by EASA (e.g., *EASA/ANSI Standard AR100: Recommended Practice for the Repair of Rotating Electrical Apparatus; EASA Limited Warranties*).
3. Members will offer discounts or arrange special terms to all purchasers in similar circumstances.
4. A member will not misrepresent its business, products or services.
5. A member will show respect for other members and not attempt to harm another's business through misrepresentation or any other false statements which would cause loss of good will or reputation.
6. A member will adequately provide for the well-being of its employees. The member will carry Workers' Compensation Insurance as required by Law, Liability Insurance, and such other insurance as may be necessary for the proper protection of its employees and the public.
7. A member will work with fellow members to the best of its ability in sound and lawful projects or programs intended to improve the quality of the industry's service in the public interest.
8. A member will be environmentally responsible at all times and will voluntarily attempt to comply with any and all environmental laws, rules and regulations applicable to the member's business.

DIVERSE RANGE OF SERVICES PROVIDED BY EASA MEMBERS

Services Offered



Indication by respondents as to whether services are currently provided, currently subcontracted or neither provided or subcontracted.

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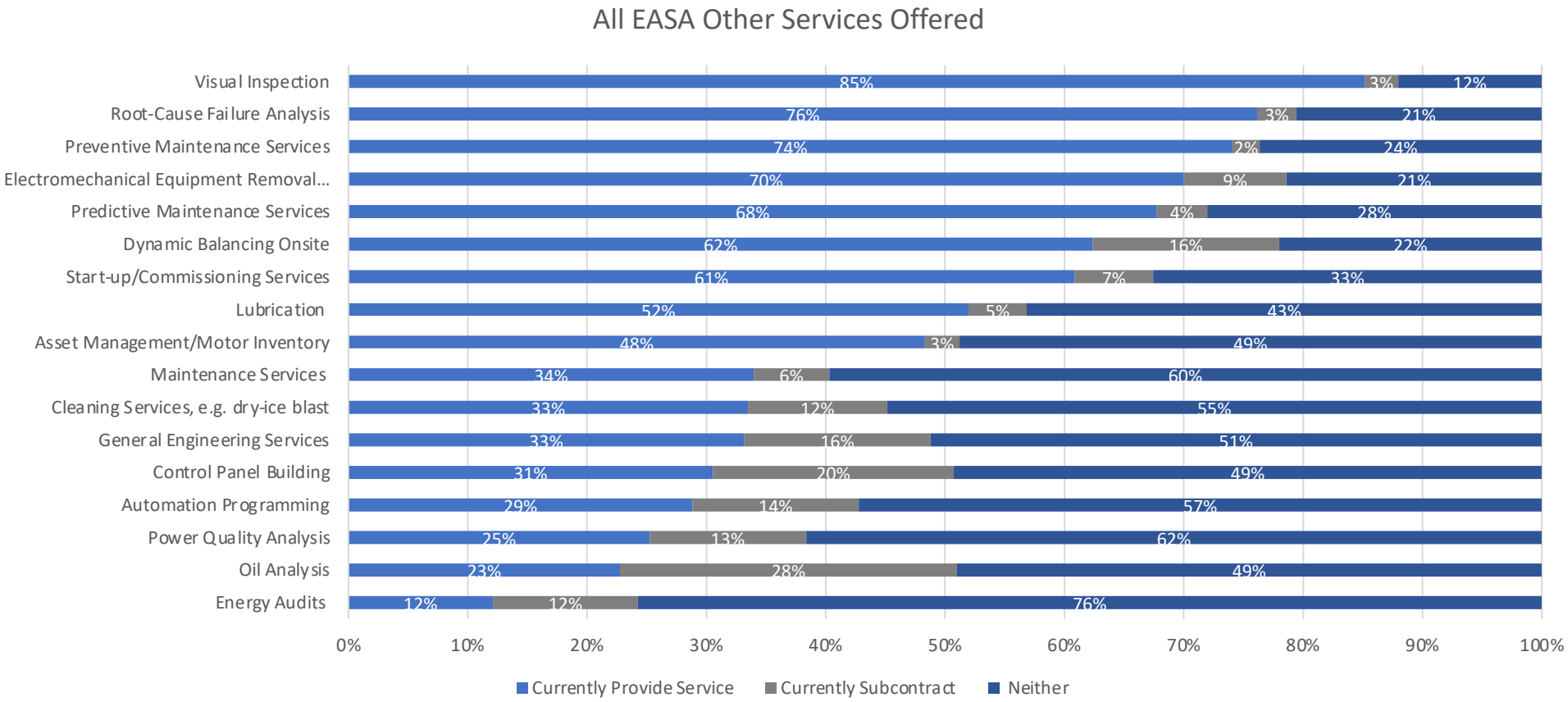
Other Services



Indication by respondents as to whether services are currently provided, currently subcontracted or neither provided or subcontracted.

A parenthetical example was included with the “Maintenance Services” category. The actual answer choice was, “Maintenance Services (Personnel Imbedded at Customer Facility).”

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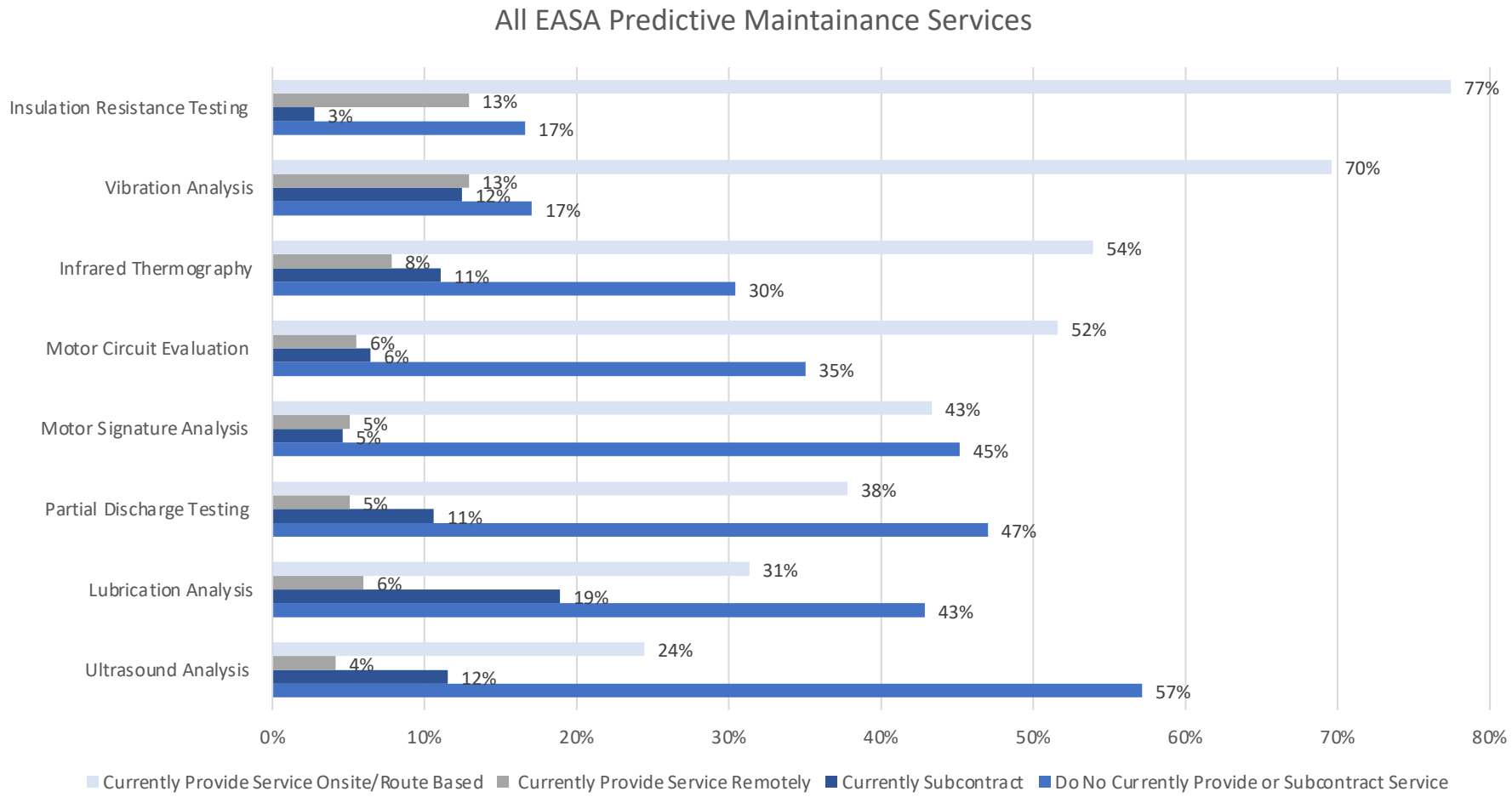
Predictive Maintenance Services



Respondents were asked to indicate whether they currently perform (or subcontract) any specific predictive maintenance services.

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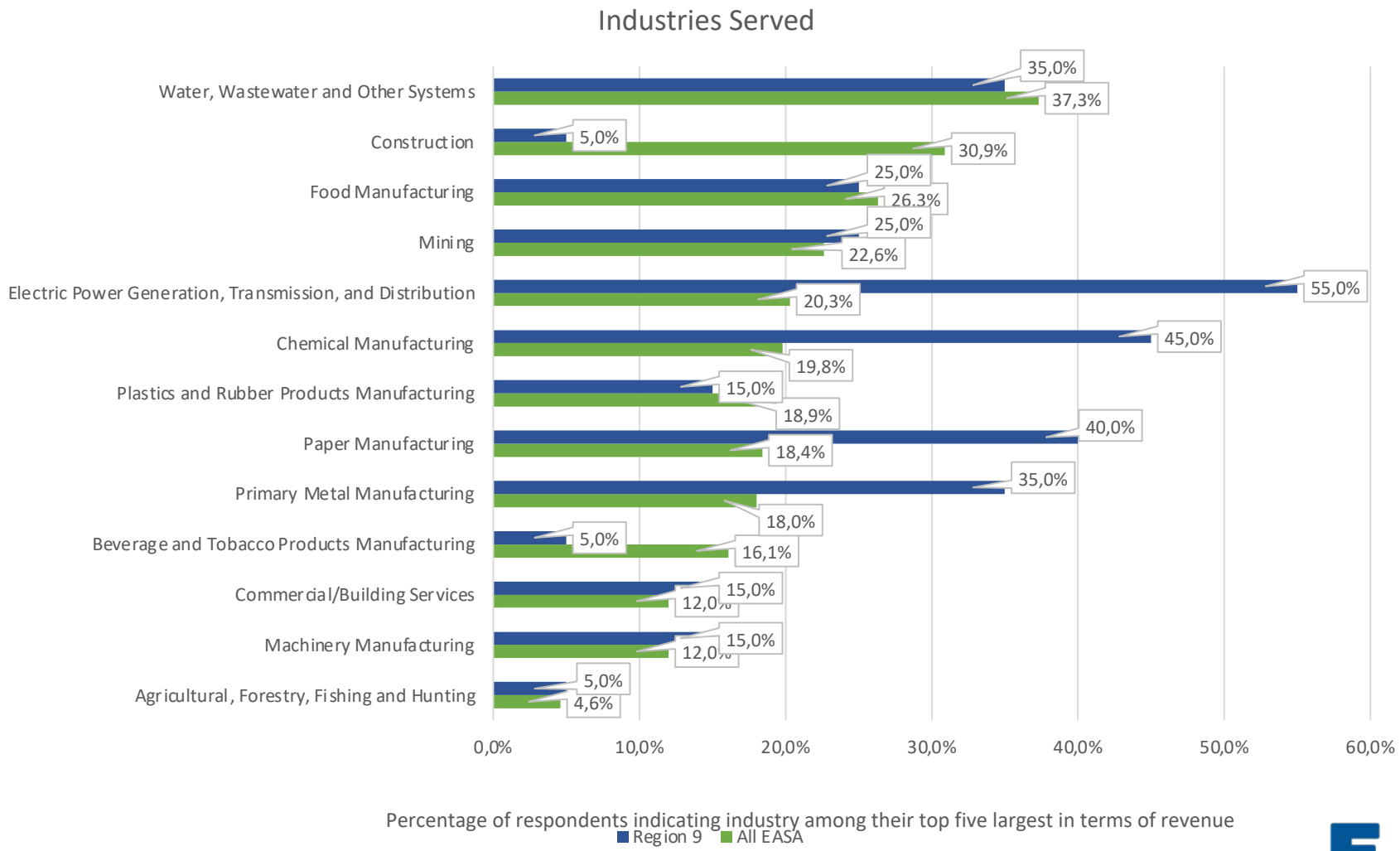
Industries Served



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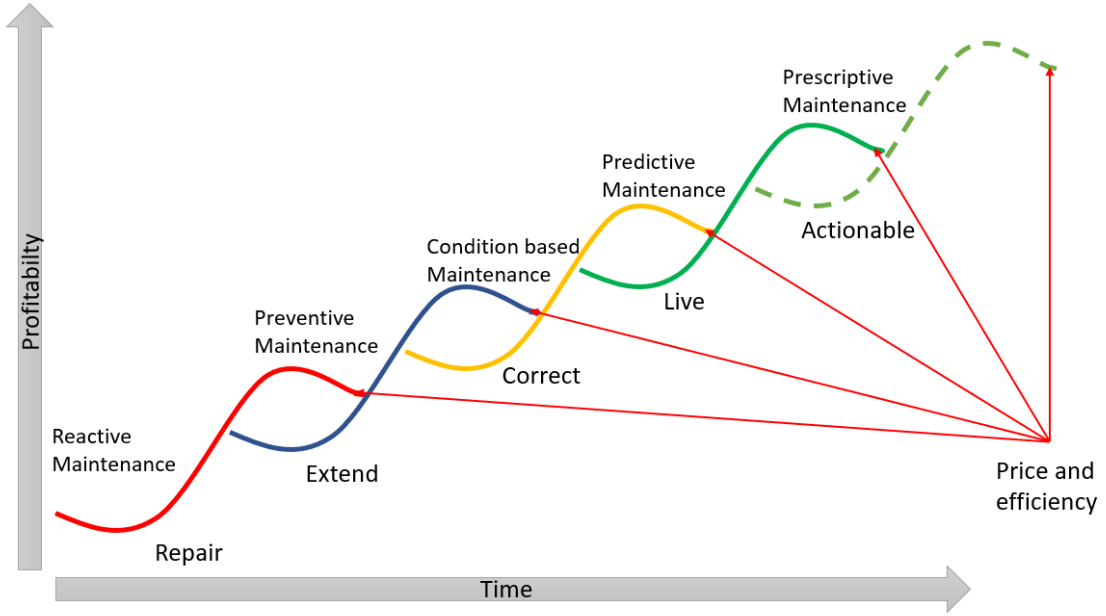
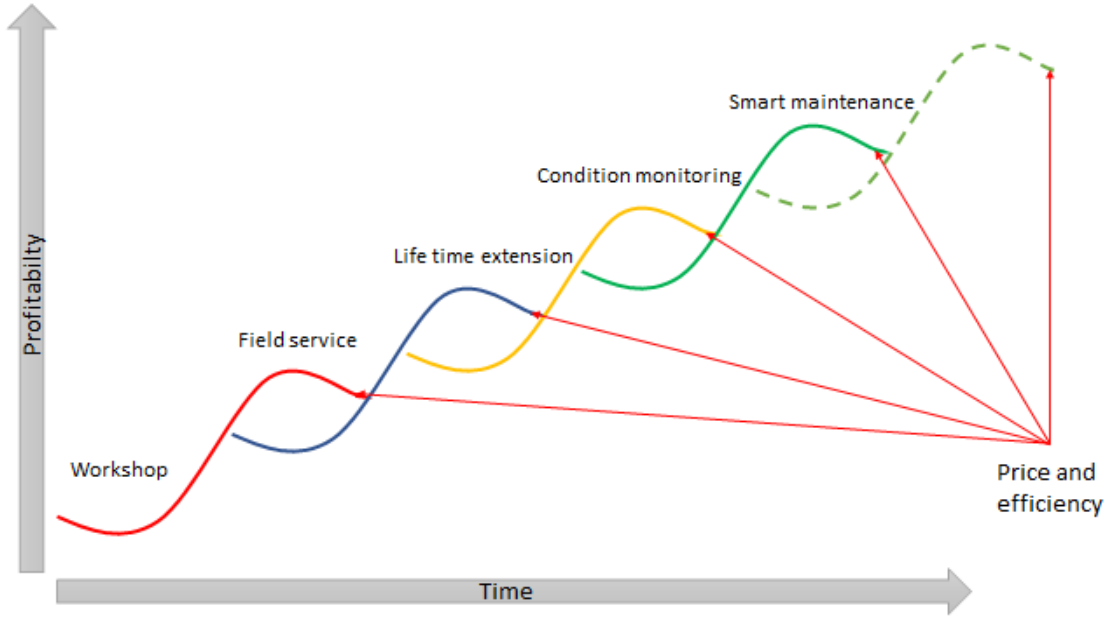
Continiously jumping the curve to create customer value





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CHALLENGES AND OPPORTUNITIES EMERGING TRENDS WITHIN THE INDUSTRY

Local, agile, multi-talentet – Not brand depended EASA members are considered as Trusted advisors

What it takes to be a "Trusted Advisor"

- Keeping your promises
- Solving problems – finding the root cause
- Meeting/exceeding expectations
- Providing services which customers can't perform in-house
- Presenting customers with options/alternatives
- Identifying issues before they become problems
- Offering new ideas
- Sharing your knowledge/expertise
- Focus on building a long-term relationship

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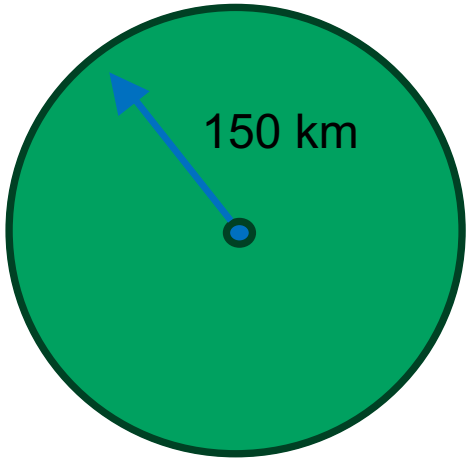

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What's happening in our industry?

Expertise that was required in the past :

- Electrical and mechanical engineers
- Condition monitoring engineers
- Motor rewinders
- Mechanics
- Electricians
- welder
- Paint and sandblast personnel

New Expertise are coming and at the same time we need to keep some of the old good ones:

- Electrical and mechanical engineers
- Condition monitoring engineers
- Ex engineers
- Motor rewinders
- Mechanics
- Electricians
- Service electronics, pump, gearboxes, … specialists
- Service specialists
- Certified welder
- Paint and sandblast personnel
- Data engineers
- Rams engineers (Reliabiltiy, availbility, maintainbility
- Data scientist / AI
- Mathematician
- 3D/modelling Engineers

What is servitization?

> “People don't want to buy a quarter-inch drill, they want a quarter-inch hole”
>
> ***– Theodore Levitt***

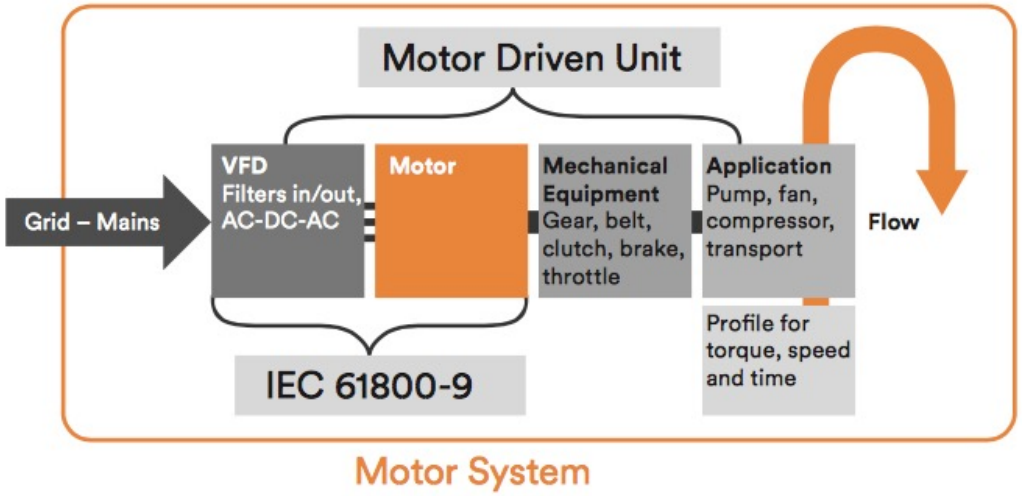

Figure 4: Motor System Definition (Source: Impact Energy Inc., 2014)

The motor is one the best cross cutting technology, it is an Electro-Mechanical equipment, one of the most important equipment, one of the most reliable, but also one of the best indicator in maintenance performances

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Actual Service scope and developing one

Sharing experiences and solutions

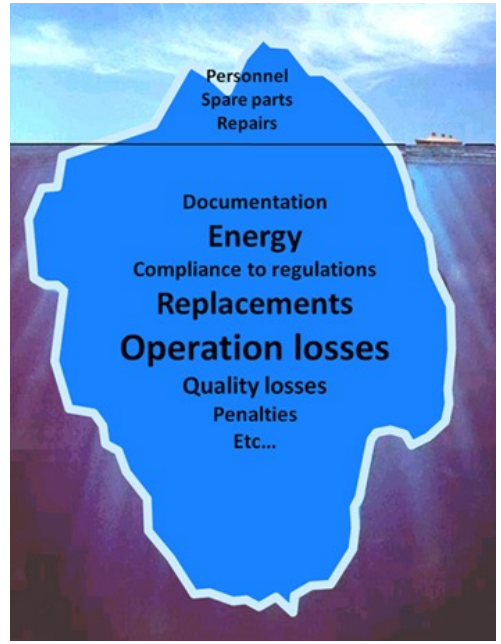
- *Substitution*
  - Replacement
  - Chemical and oil handling
- *Energy efficiency*
  - VFD
  - Correct control gear
  - Pump vs motor
- *Upgrade design and lifetime extension*
  - Bearing
  - Paint
  - Insulation materials
  - Design and upgrade
- *Operational parameter of workshop*
  - Electricity consumption
  - Use rest heat for testing and burnout
- *Field service*
  - Electric cars
  - Drive training
  - Planning to reduce driving

- *Procurement*
  - Green certificate
  - Require reporting from suppliers
  - Transport CO2 vs cost
  - Tracebility
- *Recycling*
  - %
  - Handlig
  - Certificate and documentation
- *Re-use*
  - Reuse critical parts
  - Improve design
- *Customer*
  - Where are their input?
- *Branding*
  - Upgrades, improvements and value added
  - Trend words, power of the words we use

EXPLORING THE ENDURING SIGNIFICANCE OF REPAIR AND MAINTENANCE SERVICES

Repair or Replace

- From the last Copper Alliance survey (2024)
  - *Typically motors less than 40 kW are replaced rather than repaired*
  - *In some cases, the threshold can be higher (In some countries it can be 160kW)*
- Importance of a workshop expertise
  - *Dismantling and Workshop Tests offer some additional infos very important to prevent repetive or future failures*
  - *In one of our previous market research we have discovered that only 25% of the motors who were sent to EASA workshops were rewound*
- Why do we repair?
  - *Lead Time, Production Losses, Logistic conditions*
  - *Integration in the existing systems (Caracteristics, Risk, Motors in Stock, Certification Issues, …)*
  - *Budget Available*
  - *Interlocutor*
- Why do we replace?
  - *Customer satisfaction when available and possible (Never forget that service companies work always on long term basis, they want to keep their customers, …*
  - *Higher Efficiency motor can be used*
  - *IEC Motors are dimensionally interchangeable*



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Trends in Plant Operation Goals

Rank the following plant operation goals in terms of their priority within your organization.

	2023 Rank	2019 Rank	2014 Rank
Reducing equipment downtime	1	2	2
Improving productivity/output	2	3	3
Improving safety	3	1	1
Overhead cost reduction	4	5	5
Quality improvements	5	4	4
Energy savings	6	6	8
Labor cost reduction	7	7	6
Adopting more environmentally friendly/sustainability practices	8	9	9
Shortening production cycle time	9	8	7

Ranking of weighted average for "First, Second, and Third Choice"

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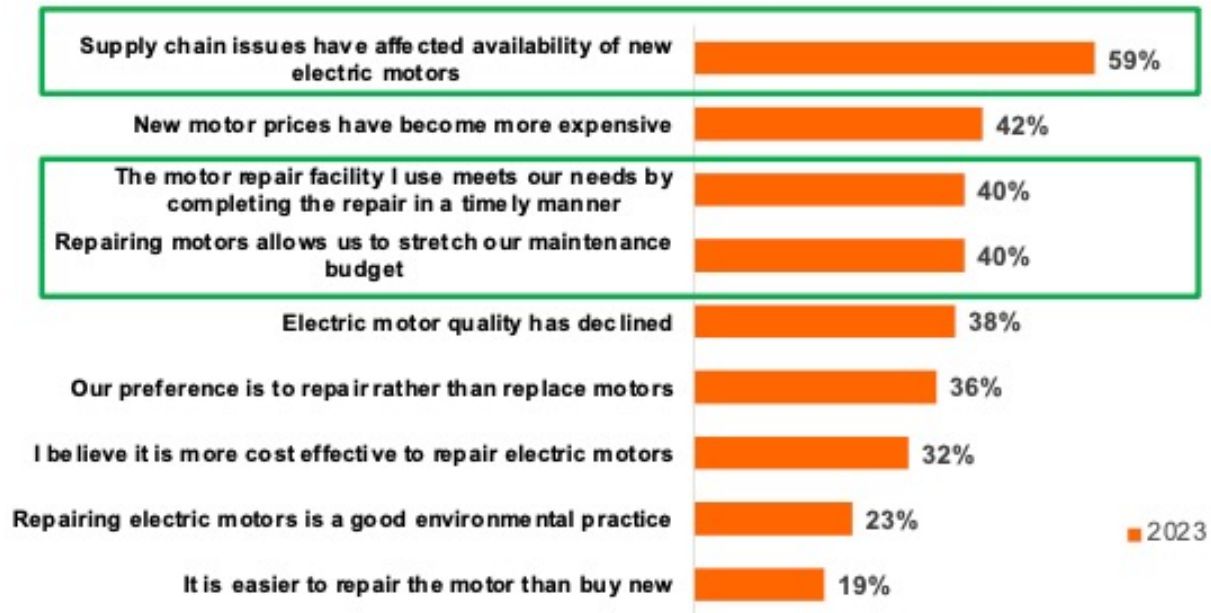
97% of decision-makers plan to invest in Energy Efficiency ???

Increase in Repairs

Please indicate which of the following may be contributing to this increase. (Please select all that apply)

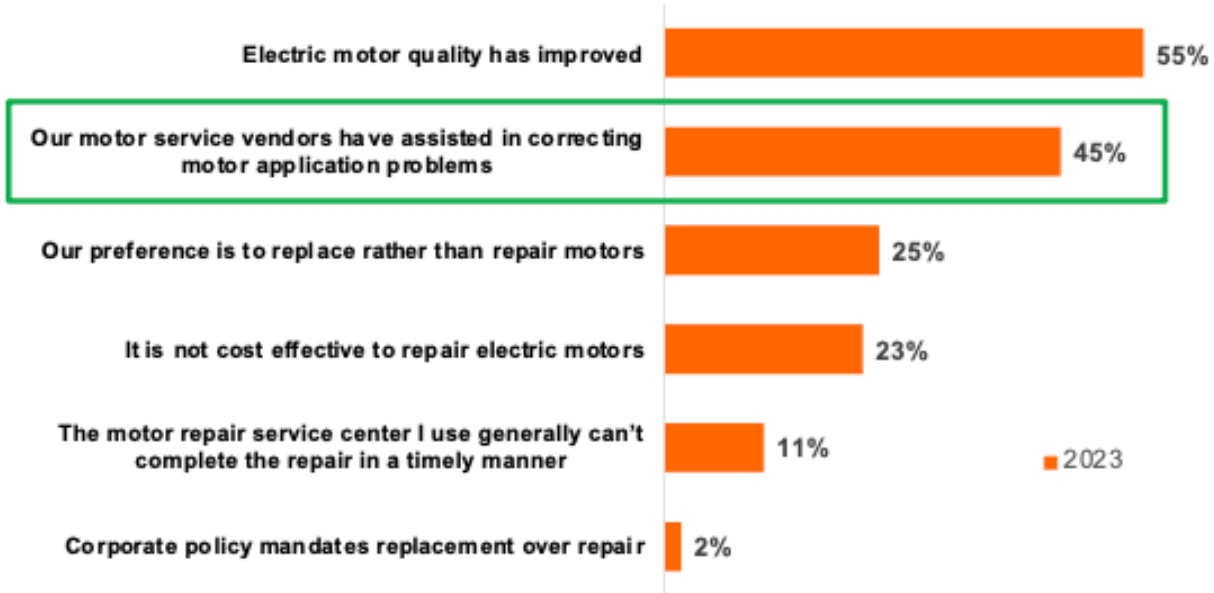


Base: Respondents who have seen an increase in electric motor repairs (n=73 in 2023); Multiple answers allowed

EASA

Decrease in Repairs

Please indicate which of the following may be contributing to this decrease. (Please select all that apply)



Base: Respondents who have seen a decrease in electric motor repairs (n=53 in 2023); Multiple answers allowed.

EASA ACCREDITATION ON ENERGY EFFICIENCY AND RELIABILITY

Developed accreditation together to lift the whole industry

Recognized as an
American National
Standard (ANSI)

ANSI/EASA
AR100-2020

EASA Standard
AR100-2020

RECOMMENDED PRACTICE FOR THE REPAIR OF ROTATING ELECTRICAL APPARATUS

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EASA ACCREDITED MEMBER

COMPLIES WITH
EASA AR100

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EASA Accreditation Program, is a transparent program, built by the industry and for the industry, based on the Best Practices to improve motor efficiency, reliability and Performances with : 23 categories, Over 70 total criteria elements

Housekeeping	Shafts	Accessories	High-potential tests
Training	Bearings (ball, roller; sleeve)	Winding removal and core integrity	Bearing insulation
Internal audits	Lubrication	Rewind data (specification)	No load tests
Identification and condition assessment	Frame and bearing housings	Stator windings, insulation system, conductors & coils	Finish and handling
Terminal leads, connectors and boxes	Squirrel cage rotors	Winding impregnation	Calibration
Cooling system	Balancing	Winding insulation and coil tests	--

Also for IE3 Motors

160 workshops already EASA accredited in the world,
More to come. Please visit: www.easa.com/accreditation

Why not having the EASA Accreditation as a global standard for workshops ?

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ADVANCEMENTS AND SUSTAINABILITY PRACTICES SUCH AS MOTOR RECYCLING

Information und Technik Nordrhein-Westfalen

Erzeugung von Abfällen

Identnummer: [redacted]

Quittung

Erzeugung von Abfällen 2018

Ihre Daten wurden erfolgreich am 26.07.2019 um 12:39:38 empfangen.
Sie können diese Quittung für Ihre Unterlagen ausdrucken oder archivieren.

Adress- und Ansprechpartner-Daten des meldepflichtigen Unternehmens

Adresse
Name [redacted]

Straße
Hausnummer
Postleitzahl
Ort
Postfach
Postleitzahl
Ort

Ansprechpartner
Nachname
Vorname
Telefon
E-Mail

Art und Menge der erzeugten Abfälle

Abfallschlüssel 1

Art und Menge der erzeugten Abfälle

Abfallarten-schlüssel	Abfallarten gemäß Europäischem Abfallverzeichnis, Stand 2018	Abfallaufkommen	
		Tonnen	Bei Schlämmen zusätzlich: Trockenmasse in Tonnen
150103	Verpackungen aus Holz	11,21	
200121	Leuchtstoffröhren und andere quecksilberhaltige Ab	0,267	
150106	gemischte Verpackungen	16,42	
140603	andere Lösemittel und Lösemittelgemische	0,623	
160508	gebrauchte organische Chemikalien, die aus gefährl	0,117	
130502	Schlämme aus Öl-/Wasserabscheidern	1,518	
120117	Strahlmittelabfälle mit Ausnahme derjenigen, die u	7,2	
200133	Batterien und Akkumulatoren, die unter 16 06 01, 1	0,085	
080111	Farb- und Lackabfälle, die organische Lösemittel o	0,358	
080112	Farb- und Lackabfälle mit Ausnahme derjenigen, die	1,243	

Abfallschlüssel 2

Art und Menge der erzeugten Abfälle

Abfallarten-schlüssel	Abfallarten gemäß Europäischem Abfallverzeichnis, Stand 2018	Abfallaufkommen	
		Tonnen	Bei Schlämmen zusätzlich: Trockenmasse in Tonnen
150110	Verpackungen, die Rückstände gefährlicher Stoffe e	0,049	
150202	Aufsaug- und Filtermaterialien (einschließlich Ölf	0,84	
150101	Verpackungen aus Papier und Pappe	48	
190902	Schlämme aus der Wasserklärung	15,28	
140603	andere Lösemittel und Lösemittelgemische	0,395	
150202	Aufsaug- und Filtermaterialien (einschließlich Ölf	0,52	

Bemerkungen/Abschluss

Bemerkungen

Erzeugung von Abfällen 2018





MUELL

VA
KABEL



From Tomas Jezdinsky, International Copper

Separation of raw materials & recovery for reuse

Pre-separation only with larger motors

- Smaller motors <150kg are usually not further dismantled. They go directly as entire unit as “electrical scrap” outside of the EU.
- For larger motors at least housing is cracked and stator vs rotor separated. Copper in the rotor is usually always taken out and sold separately at higher Cu scrap price to metal brokers or to recyclers.

Basically all metals from motors can be recovered almost 100%, with some impurities

- Recyclers with dedicated machinery, several lines of shears and shredders, then fine-sorting via belts (e.g. magnetic or flotation) to separate all metals
- However, the magnetic steel from the rotor core laminations is not treated in a separate way
- Recycled copper from industrial electrical motors said to achieve >98% purity
- Same for Fe and Alu (from housing), sold to EAF for new metal production and secondary fusion for new Alu in re-melters
- Permanent magnets made of rare earths are today in industrial motor recycler not yet an issue as extremely rare. No approach today to recover PM in large industrial motors.

courtesy: SK Metals

courtesy: Calico

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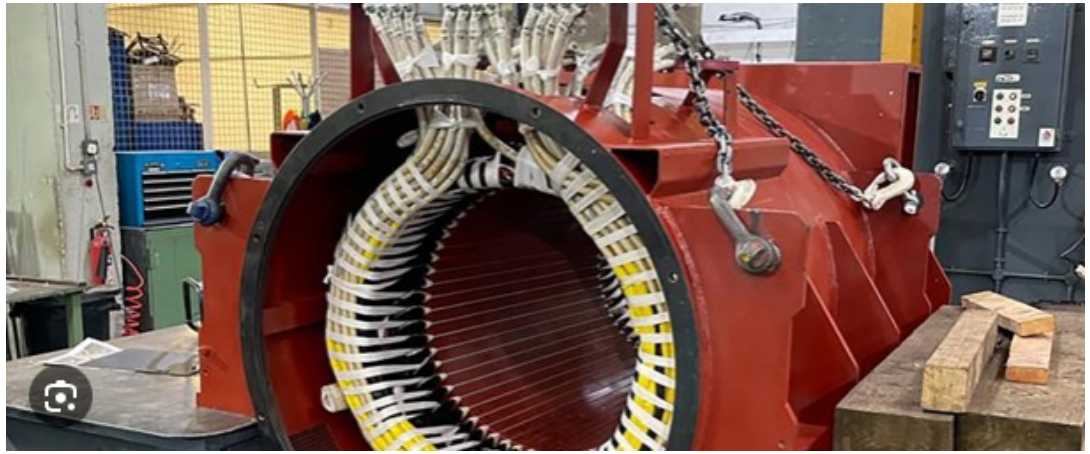
CONCLUSIONS

RJW,
Liverpool, UK



Glensol,
Baku, Azerbaijan

Spit Engineering,
Amelo, The Netherlands

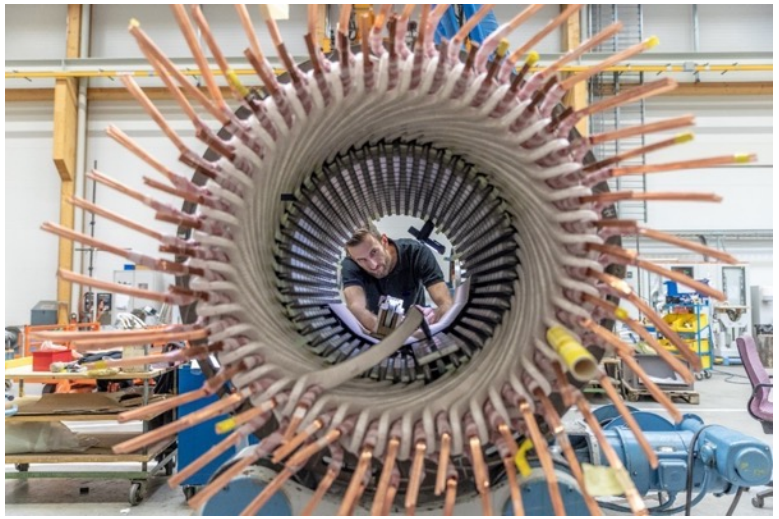
Servo Motors Adjust,
Barcelona, Spain

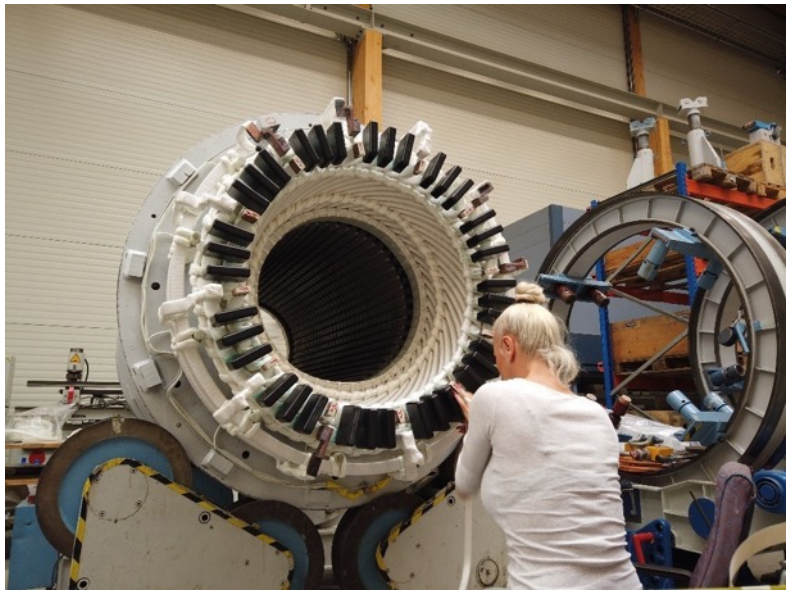
Avonmore, Ireland

Lehmus, Portugal

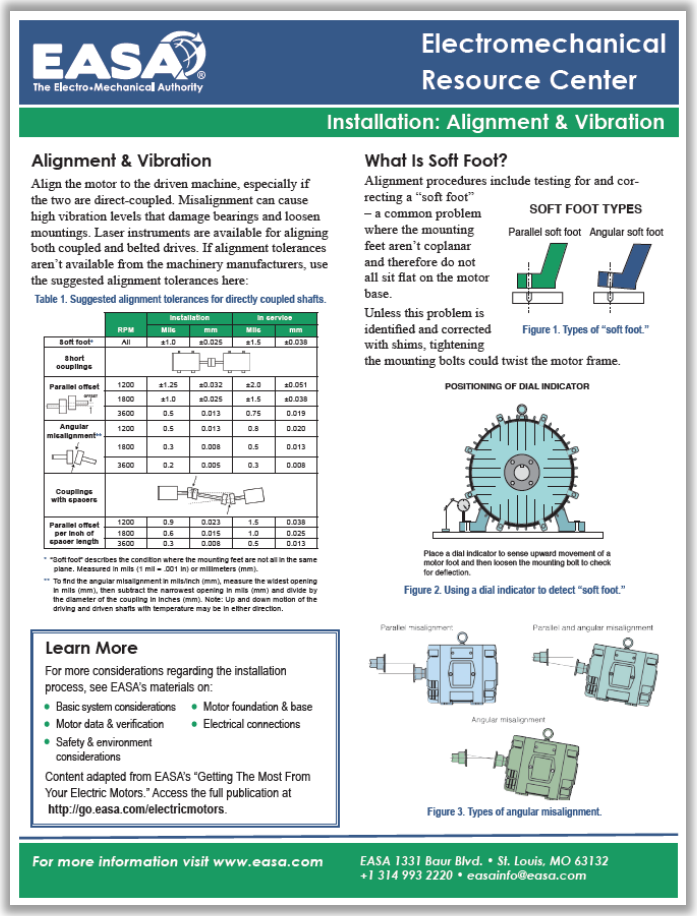
VDP Industries, Belgium

Bakker Repair, The Netherlands





Electromechanical Resource Center: easa.com/erc



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Electromechanical Resource Center

Installation: Alignment & Vibration

Alignment & Vibration

Align the motor to the driven machine, especially if the two are direct-coupled. Misalignment can cause high vibration levels that damage bearings and loosen mountings. Laser instruments are available for aligning both coupled and belted drives. If alignment tolerances aren't available from the machinery manufacturers, use the suggested alignment tolerances here:

Table 1. Suggested alignment tolerances for directly coupled shafts.

	RPM	Installation Mils	Installation mm	In service Mils	In service mm
Soft foot*	All	±1.0	±0.025	±1.5	±0.038
Short couplings					
Parallel offset	1200	±1.25	±0.032	±2.0	±0.051
	1800	±1.0	±0.025	±1.5	±0.038
	3600	0.5	0.013	0.75	0.019
Angular misalignment**	1200	0.5	0.013	0.8	0.020
	1800	0.3	0.008	0.5	0.013
	3600	0.2	0.005	0.3	0.008
Couplings with spacers					
Parallel offset per inch of spacer length	1200	0.9	0.023	1.5	0.038
	1800	0.6	0.015	1.0	0.025
	3600	0.3	0.008	0.5	0.013

* "Soft foot" describes the condition where the mounting feet are not all in the same plane. Measured in mils (1 mil = .001 in) or millimeters (mm).

** To find the angular misalignment in mils/inch (mm), measure the widest opening in mils (mm), then subtract the narrowest opening in mils (mm) and divide by the diameter of the coupling in inches (mm). Note: Up and down motion of the driving and driven shafts with temperature may be in either direction.

Learn More

For more considerations regarding the installation process, see EASA's materials on:

- Basic system considerations
- Motor foundation & base
- Motor data & verification
- Electrical connections
- Safety & environment considerations

Content adapted from EASA's "Getting The Most From Your Electric Motors." Access the full publication at http://go.easa.com/electricmotors.

What Is Soft Foot?

Alignment procedures include testing for and correcting a "soft foot" – a common problem where the mounting feet aren't coplanar and therefore do not all sit flat on the motor base.

Unless this problem is identified and corrected with shims, tightening the mounting bolts could twist the motor frame.

SOFT FOOT TYPES

Parallel soft foot Angular soft foot

Figure 1. Types of "soft foot."

POSITIONING OF DIAL INDICATOR

Place a dial indicator to sense upward movement of a motor foot and then loosen the mounting bolt to check for deflection.

Figure 2. Using a dial indicator to detect "soft foot."

Parallel misalignment

Parallel and angular misalignment

Angular misalignment

Figure 3. Types of angular misalignment.

For more information visit www.easa.com

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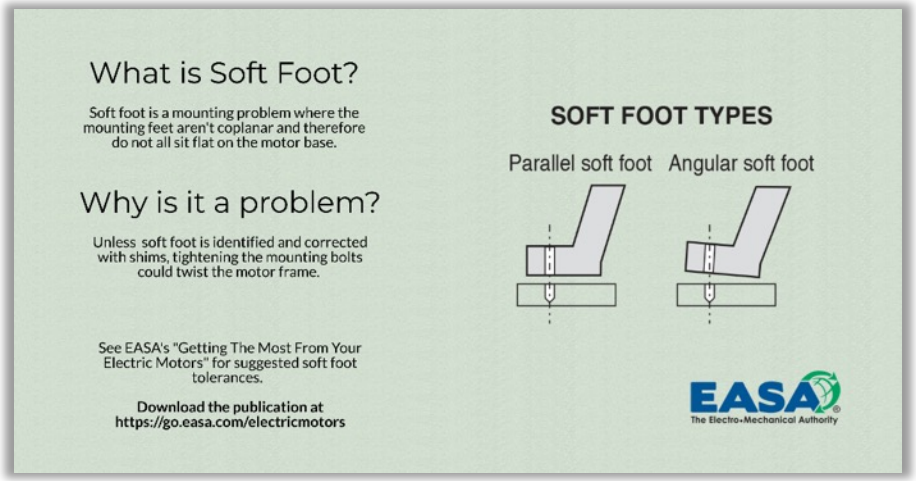

What is Soft Foot?

Soft foot is a mounting problem where the mounting feet aren't coplanar and therefore do not all sit flat on the motor base.

Why is it a problem?

Unless soft foot is identified and corrected with shims, tightening the mounting bolts could twist the motor frame.

See EASA's "Getting The Most From Your Electric Motors" for suggested soft foot tolerances.

Download the publication at https://go.easa.com/electricmotors

SOFT FOOT TYPES

Parallel soft foot Angular soft foot

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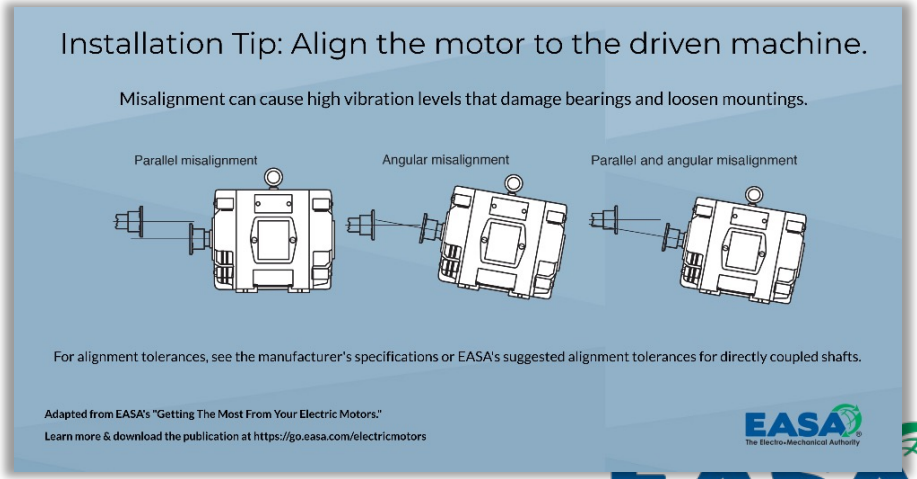

Installation Tip: Align the motor to the driven machine.

Misalignment can cause high vibration levels that damage bearings and loosen mountings.

Parallel misalignment Angular misalignment Parallel and angular misalignment

For alignment tolerances, see the manufacturer's specifications or EASA's suggested alignment tolerances for directly coupled shafts.

Adapted from EASA's "Getting The Most From Your Electric Motors."

Learn more & download the publication at https://go.easa.com/electricmotors

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QUESTIONS ?

Electrical Apparatus Service Association, Region 9, Europe and World Chapter

- Global website : www.easa.com
- Region 9 : www.easa9.org

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fbeghain@easa9.org

“The Electro Mechanical Service industry should speak with one voice internationally to share best practice and contribute to the debates for improving reliability and energy efficiency of the drive system from power input to transmitted power included.”

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