TECHNICAL
EDUCATION
ACADEMY

School of Engineering

COURSE PROGRAMME

000291

MAIN014 - Rotating Machinery - Troubleshooting Analysis

The course covers essential dynamic equipment (pumps, compressor units, gas turbines for drive, diesel engines) used in the transportation of hydrocarbons through pipelines.



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Course overview

Advanced level

Why take this course

The course covers essential dynamic equipment (pumps, compressor units, gas turbines for drive, diesel engines) used in the transportation of hydrocarbons through pipelines. It addresses issues of troubleshooting analysis and early diagnostics of rotating equipment, with a focus on preventing and eliminating malfunctions.

To enhance the quality of information transfer and knowledge retention, the course employs an interactive combination of lectures and seminars. Seminars will begin with raising the most relevant questions and motivating all participants to find the correct answers. Additionally, delegates will be encouraged to ask their own questions and participate in formulating correct answers using their own analysis and experience.

Who it is for and how it helps

Vibration diagnostics engineers, technical personnel involved in the operation of dynamic equipment.

What you will learn

- Diagnose defects in rotating equipment using vibration signal spectra
- Use modern diagnostic instruments for rotating machinery
- Perform static and dynamic balancing of machines correctly
- Apply technical conditions for the repair, testing, adjustment, and commissioning of repaired equipment
- Verify the accuracy and load test the repaired equipment
- Diagnose the condition of dynamic equipment foundations

Curriculum

Modules 01–02

01 Diagnosing Defects in Rotating Equipment Using Vibration Signal Spectra

- Key signs and characteristics of defect development
- Diagnosing defects in rotating equipment using vibration signal spectra
- Diagnosing defects in rolling bearings
- Methods for diagnosing bearing defects
- Diagnosing defects by overall vibration level
- Diagnosing bearing defects using signal spectra
- Diagnosing using peak factor
- Diagnosing using RMS vibration signal and peak values – classic peak factor diagnostic method
- Diagnosing using the kurtosis ratio of the vibration signal and overall level
- HFD (High Frequency Detection) method
- SPM (Shock Pulse Measurement) method
- SE (Spike Energy) method
- Diagnosing bearing defects using the envelope spectrum
- Diagnosing defects in sliding bearings
- General issues of sliding bearing diagnostics
- Increased clearance in sliding bearings
- Vibration of the oil wedge in sliding bearings
- Installation of sliding bearings
- Ellipticity of the shaft journal

02 Mechanism-Level Equipment Defects

- Rotor mass imbalance
- General diagnostic issues of imbalance
- Static imbalance
- Dynamic imbalance
- Non-stationary imbalance
- Thermal imbalance
- Aerodynamic and hydraulic imbalances
- Hysteresis imbalance
- Electromagnetic imbalance
- Methods to eliminate rotor mass imbalance

Curriculum

Modules 02–04 · Module 02 — continued

- Balancing on balancing machines
- Shaft bends
- Shaft bend at the bearing journal
- Shaft bend between bearings

03 Mechanical Looseness

- General diagnostic issues of looseness
- Looseness of mechanism elements on the shaft
- Cracks in the assembly
- Looseness in vertical-axis assemblies
- Rubbing
- Gearbox and multiplier defects
- General analysis of gearbox conditions
- Causes of gear pair vibration
- Vibration level standards in gearboxes
- Vibration sensor placement requirements
- Diagnostic features of gearbox defects
- Electrical machine issues
- Summary of rotor and stator electromagnetic problems
- Diagnosing stator electromagnetic problems
- Eccentric rotor
- Incorrect axial engine installation
- Rotor bar breakage
- Blade vibration
- Flow turbulence
- Cavitation
- Monitoring screw working surfaces
- Axial vibrations of screw compressors

04 Unit-Level Defects

- Shaft misalignment in the unit
- General diagnostic issues of misalignment

Curriculum

Modules 04–05 · Module 04 — continued

- Angular misalignment
- Parallel misalignment
- Influence of coupling type on misalignment manifestation
- Technological shaft misalignment
- Rigid coupling defects
- Semi-rigid coupling defects
- Torsional and spring coupling defects
- Finger and gear coupling defects

05 Vibration Diagnostics of Foundation Condition

- General foundation weakening of rotating equipment
- Weakening of the assembly to foundation connection

Pre-course requirements

- Intermediate knowledge of rotating machinery

Programme instructor



Boris Koryagin

Борис Корягин является высококвалифицированным специалистом с более чем 30-летним опытом работы в механике и инженерии в нефтегазовой отрасли. Его карьерный путь включает широкий спектр должностей, от ведущего инженера-механика до консультанта и инструктора.

Профессиональные успехи и достижения:

Борис начал свою карьеру в 1999 году и с тех пор накопил богатый опыт в различных областях. Он занимался проектированием и анализом механического оборудования, обеспечивал техническую поддержку и обслуживание, координировал деятельность субподрядчиков и управлял проектами. В частности, он принимал участие в проектной документации для крупных нефтегазовых проектов в России, Туркменистане и Казахстане, обеспечивал соответствие международным и местным стандартам и успешно адаптировал проектную документацию.
На протяжении своей карьеры Борис занимался обучением и разработкой учебных программ. Он разработал и провел множество курсов по механическим дисциплинам, обучая студентов и специалистов основам работы с механическим оборудованием, включая статическое и вращающееся оборудование, а также дисциплины, связанные с бурением и контролем скважин. Борис также активно участвовал в управлении проектами, обеспечивая координацию деятельности субподрядчиков и взаимодействие с проектными группами. Он успешно руководил проектами по модернизации газоочистных заводов и строительству региональных нефтеперерабатывающих заводов, разрабатывал специальные технические условия для согласования российских и международных стандартов, проводил инженерные изыскания и управление интерфейсами.

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Participation and contacts

Joining the programme

Contact the Academy and quote course code 000291 to confirm dates, delivery format, prices and enrolment terms.

Training for your team

Tell us your business goals, the roles and number of participants, and your preferred dates and location. This will help us discuss the right training option.

Preparing for the programme

Read the pre-course requirements in this programme before enrolling.

Discuss your training needs

mail@tecedu.org
www.tecedu.academy

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