TECHNICAL
EDUCATION
ACADEMY

School of Engineering

COURSE PROGRAMME

000555

MECH020 – Repair of technological installations and equipment

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



Learn from the Best in the Business!

Course overview

Intermediate level

Why take this course

The course covers essential dynamic equipment (pumps, compressor units, gas turbines for drives, diesel engines) used in the transportation of hydrocarbons through pipelines. Topics include operation, repair technologies, workplace safety, design features, and technical characteristics of the equipment. Additionally, stationary equipment (shut-off and control valves, tanks, separators, filters, heaters), their maintenance, and organizational and technical measures for repair are discussed.

The course also includes the basics of materials science, reading blueprints and technological schemes, fits and tolerances, technical measurements, and instrumentation and automation at pump stations. Both theoretical and practical aspects of equipment fault diagnosis and analysis of main failure causes will be covered, along with non-destructive testing methods, and techniques for assessing the technical condition and integrity of pipelines.

To enhance the quality of information transfer, an interactive combination of lectures and seminars will be used. Seminars will begin with the most relevant questions and motivate all attendees to find correct answers. Delegates will also have the opportunity to ask their own questions and participate in developing correct answers using their own analysis and experience

Who it is for and how it helps

Technicians involved in the repair of technological installations and equipment

What you will learn

- Understand the structure and design features of complex dynamic and stationary equipment
- Learn the technological sequence and labor organization during repair, assembly, and installation of equipment
- Study methods for repairing equipment and apparatus operating under high pressure
- Learn about the types of materials used and metal technology
- Apply practical methods for determining premature wear of parts and restoring worn parts
- Understand the procedure for performing static and dynamic balancing of machines
- Learn technical conditions for repair, testing, adjustment, and commissioning of repaired equipment
- Check accuracy and conduct load testing of repaired equipment
- Know the maintenance and diagnostics system for equipment and pipelines

Curriculum

Modules 01–03

01 Materials Science - Basic Properties of Materials

- Crystalline structure and properties of metals
- Classification of metals and alloys
- Types and methods of testing metallic materials
- Physical methods of analyzing metals and alloys
- Metal corrosion and protection against it
- Cast iron - conditional designation of main elements in metals and alloys
- Density, heat capacity, thermal conductivity
- Grades, mechanical properties

02 Materials Science - Carbon Steel

- Carbon structural steel
- Alloyed structural steel
- Aluminum and its alloys
- Copper and its alloys
- Brasses
- Tin bronzes processed by pressure
- Plastics
- Rubber materials
- Adhesives and sealants
- Paint and varnish materials
- Synthetic polymers
- Textolite
- Fluoroplast-4
- Gasket and friction materials

03 Reading Blueprints and Technological Schemes

- Arrangement of views
- Representation in sections
- Representation in cross-sections
- Rules for indicating form and location tolerances of surfaces

Curriculum

Modules 03–05 · Module 03 — continued

- Surface roughness indication
- Thread representation
- Representation and designation of welded seams
- General rules for dimensioning
- Datum points and dimensions from them
- Datum points on curved surfaces of parts
- Dimensions on repeating elements
- Technological schemes, conditional designations of elements, tables of conditional graphic symbols

04 Fits and Tolerances

- Basic concepts of sizes, fits, and tolerances
- Unified system of fits and tolerances (ESDP)
- Shaft and hole systems
- Deciphering fit and tolerance designations
- Deviation and tolerance of form and surface location
- Fits and tolerances of rolling bearings
- Fits of key and spline connections
- Fits of threaded surfaces and connections
- Fits of gear wheels and transmissions

05 Technical Measurements

- Measurement tools for linear dimensions
- Flat-parallel end measures of length
- Measuring rulers, caliper tools
- Micrometer tools
- Measurement tools with mechanical conversion
- Surface waviness and roughness
- Basic terms and definitions
- Surface roughness designation on blueprints
- Measurement and control tools for waviness and roughness

Curriculum

Modules 06–09

06 Instrumentation and Automation

- Concepts and terms
- Physical quantity
- Unit of physical quantity
- Types of measurements
- Classification of errors
- Accuracy class of measurement tools

07 Pressure Measuring Instruments

- Liquid manometers - single-tube, double-tube
- Application area and pressure measurement range
- Deformation manometers
- Types of sensitive elements
- Pressure measurement ranges

08 Temperature Measuring Instruments

- Glass liquid thermometers
- Manometric thermometers, indicating and recording, electric contact
- Principles of operation, construction
- Temperature sensors
- Resistance thermometers
- Construction of sensitive elements

09 Instruments for Measuring Quantity and Flow

- Turbine gas meters, rotary meters
- Construction, application area
- Turbine, impeller, screw meters
- Construction, application area

Curriculum

Modules 10–12

10 Main Pipeline Equipment

- Pumps: design, operation, maintenance, and repair
- Fans: design, operation, maintenance, and repair
- Pressure regulators. Maintenance and repair
- Dirt filters. Maintenance and repair
- Pressure wave smoothing system. Maintenance and repair
- NPS tanks: design, operation, maintenance, and repair
- NPS pipelines and pipeline fittings: gate valves, shut-off valves, taps, lever safety valves, electric drive reducers
- Auxiliary NPS equipment: oil system, cooling system, leakage pumping system, ventilation, sewage, water supply. Maintenance and repair
- Diesel engines, compressor units, gas turbines for pump drives, electric generators. Operating principles, operation, scheduled work
- Safe operation and repair of main and auxiliary equipment at MPS facilities

11 Equipment Technical Diagnostics

- Tasks and methods of equipment diagnostics
- Systematic approach to determining the need for diagnostics
- Vibration diagnostic method. Determining pump unit faults using vibration diagnostics
- Thermodynamic method for pump unit diagnostics
- Diagnosing the end seal assembly of main and booster pumps
- Valve diagnostics
- Diagnostics of oil transfer station electric motors
- Evaluation of shaft technical condition
- Shaft defectoscopy
- Shaft diagnostics during pump unit operation
- Non-destructive testing methods
- Analysis of main equipment failure causes

12 Reliability of Technological Machines and Equipment

- Concept of reliability

Curriculum

Modules 12–13 · Module 12 — continued

- Basic terms and definitions
- Failures by type and origin
- Reliability properties
- Reliability, durability, and failure-free operation indicators

13 Organization of Work for Technological Equipment Maintenance and Repair

- Types of maintenance
- Maintenance methods
- Maintenance work content and planning
- Types and methods of repair
- Repair standards: frequency, duration, and labor intensity of routine and major repairs
- Planning repair work
- Organizing and conducting repairs
- Repairability indicators

Joining the programme

Contact the Academy and quote course code 000555 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

The published programme does not specify any prerequisites. Contact us before enrolling to confirm how to prepare.

Discuss your training needs

mail@tecedu.org
www.tecedu.academy

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