KAZAKH engineering

ANSYS Course Catalog 2026

Electromechanics

kz-engineering.com

KAZAKH engineering

Basic Course.
Electromagnetic Field Simulation in ANSYS Maxwell 2D/3D

Duration — 4 days

The course is dedicated to electromagnetic field simulation in 2D planar, axisymmetric, and full 3D formulations using ANSYS Maxwell. It covers steady-state, harmonic, and transient electromagnetic analyses. Participants will learn how to evaluate key characteristics such as magnetic field intensity, magnetic flux density, magnetic flux, inductance matrices, and other parameters. The course also addresses material properties, boundary conditions, solver settings, and post-processing tools.

For users with no prior experience in ANSYS Twin Builder (formerly Simplorer) or ANSYS Maxwell, part of the course is devoted to learning the interface, as well as creating geometric and mesh models.

The course is recommended for beginner users.

Course Outline:

- Theoretical foundations
- Working with the graphical user interface
- Types of analysis (at this stage, participants choose a preferred focus area)
- Material properties and working with material libraries
- Types of boundary conditions and modeling simplification methods
- Mesh generator and mesh operations
- Adaptive solution and estimation of computational errors
- Calculation of capacitance and inductance
- Demagnetization of nonlinear permanent magnets and determination of operating points based on magnetization
- Working with the postprocessor
- ANSYS Optimetrics module: parametric studies and user-defined variables
- Transient analysis: problems involving motion of model components
- Direct and indirect methods for evaluating losses in electrical steel under alternating magnetic fields
- Managing electromechanical models using the ANSYS Maxwell Circuit Editor
- Introduction to system-level simulation in ANSYS Simplorer (Twin Builder)
- Basic optimization tasks
- Simple examples of coupled problems

KAZAKH engineering

Basic Course.
Electric Machine Simulation in ANSYS Motor-CAD

Duration — 3–9 days (depending on the selected course content)

The course is dedicated to the simulation of electric machines using a multiphysics analysis module that includes electromagnetic, thermal, and mechanical solvers. It covers several types of electric machines with detailed explanations of solver settings.

The course is recommended for beginner users. Upon completion, participants receive guidance for independent work and supporting materials.

Course Outline:

- Permanent Magnet Synchronous Machine (PMSM)
- Direct-On-Line (DOL) induction machine
- Inverter-driven induction machine
- Synchronous reluctance machine
- System-level modeling with ANSYS Motor-CAD
- Multiphysics optimization of electric machines using ANSYS optiSLang
- Thermal analysis in ANSYS Motor-CAD

KAZAKH engineering

Basic Course.
Electric Machine Simulation in ANSYS Maxwell 2D/3D

Duration — 4 days

The course is dedicated to electromagnetic field simulation in 2D planar, axisymmetric, and full 3D formulations, with a focus on electric machine applications, using ANSYS Maxwell. It covers steady-state, harmonic, and transient analyses, including problems involving motion.

Participants will learn to evaluate key characteristics such as magnetic field intensity, flux density, magnetic flux, as well as inductance and capacitance matrices, among others. The course also addresses material properties, boundary conditions, solver settings, and post-processing tools.

For users with no prior experience in ANSYS Twin Builder (formerly Simplorer) or ANSYS Maxwell, part of the course is devoted to learning the interface, as well as creating and simplifying geometric and mesh models.

The duration may vary significantly depending on the participants' preferences. This course complements the ANSYS Maxwell 2D/3D course and is more specifically focused on electric machines. User-specific problem-based courses are not included in this module.

The course is recommended for beginner users. Upon completion, participants receive guidance for independent work and supporting materials.

Course Outline:

- Specialized solution for electric machines: ANSYS RMxprt
- Selection of electric machine type
- Working with tabular input forms: defining key geometric dimensions, material properties, winding parameters, and more
- Analytical calculation of electric machine characteristics
- Parametric studies: defining user variables, performing parametric analysis, parallel computing, and running simulations on remote computing resources
- Working with the postprocessor
- Examples of model performance optimization
- Examples of creating 2D/3D field simulations in ANSYS Maxwell based on an RMxprt model
- Setup of motion-related simulations
- Use of built-in macros for creating rotating machine models
- Modeling power and control circuits in ANSYS Twin Builder (formerly Simplorer) in combination with analytical RMxprt models or finite element models in ANSYS Maxwell 2D/3D

KAZAKH engineering

Specialized User-Oriented Course. Electromagnetic Field Simulation in ANSYS Maxwell 2D/3D

Duration — depends on the complexity of the task

Completion of the basic course is a mandatory prerequisite.

A technical specification is prepared, and time is allocated for its development prior to the training.

The course is dedicated to electromagnetic field simulation in 2D planar, axisymmetric, and full 3D formulations using ANSYS Maxwell. It covers steady-state, harmonic, and transient analyses, including problems involving motion.

Participants will learn to evaluate key characteristics such as magnetic field intensity, magnetic flux, inductance matrices, and other parameters. The course also addresses material properties, boundary conditions, solver settings, and post-processing tools.

The course includes solving transient problems with moving components and is recommended for users already familiar with simulation methodologies.

Course Outline:

Based on the provided simulation models, problems of magnetostatics, harmonic fields, and transient processes are solved. Electrostatic problems are considered separately.

KAZAKH engineering

Specialized User-Oriented Course. Electromagnetic Field Simulation in ANSYS Maxwell 2D/3D. Multiphysics Analysis

Duration — depends on the complexity of the task

The course requires knowledge at the level of basic courses in ANSYS Maxwell 2D/3D. For multiphysics applications, additional knowledge of ANSYS IcePak, ANSYS Fluent, ANSYS Meshing, and Fluent Meshing is recommended.

A technical specification is prepared in advance, and time is allocated for course development.

The course focuses on electromagnetic field simulation in 2D planar, axisymmetric, and full 3D formulations. It includes steady-state, harmonic, and transient analyses, as well as evaluation of key characteristics such as magnetic field intensity, magnetic flux, inductance and capacitance matrices, and the thermal state of the model.

The course also covers material properties, boundary conditions, solver settings, and post-processing tools. It includes transient simulations with moving components and is recommended for users familiar with simulation methodologies.

Course Outline:

Based on the provided simulation models, problems of magnetostatics, harmonic field analysis, and transient processes are solved, as well as multiphysics problems involving electromagnetic–thermal coupling.

Specialized Course.
Thermal Analysis of Electric Machines in ANSYS Fluent and ANSYS Maxwell. Multiphysics Simulations

Duration – 4 days

The course requires knowledge at the level of a basic course in electric machine simulation using ANSYS Maxwell 2D/3D and conjugate heat transfer modeling in ANSYS Fluent.

The course demonstrates the workflow for solving conjugate heat transfer problems in electric machines using ANSYS Fluent, with input data generated in ANSYS Maxwell. It includes transient electromagnetic simulations with motion, post-processing of results, preparation of the geometry in ANSYS SpaceClaim, and generation of a high-quality mesh for thermal analysis using ANSYS Fluent Meshing.

By agreement, the user's own electric machine model can be used during the course.

The course is recommended for users familiar with simulation methodologies.

Course Outline:

- Setting up the problem in ANSYS Maxwell
- Preparing the geometry in ANSYS SpaceClaim
- Creating the mesh in ANSYS Fluent Meshing
- Solver setup in ANSYS Fluent and coupling with ANSYS Maxwell
- One-way and two-way electromagnetic–thermal coupling simulations

KAZAKH engineering

Specialized Course.
Electromagnet Simulation in ANSYS Maxwell

Duration – 4 days

The course requires knowledge at the level of a basic course in electromagnetic field simulation using ANSYS Maxwell 2D/3D.

It is dedicated to modeling electromagnetic fields of electromagnets in axisymmetric and full 3D formulations. The course covers both steady-state and transient magnetic analyses, including problems involving motion, with the use of post-processing tools for result evaluation.

Topics also include material properties, boundary conditions, solver settings, and post-processing tools.

The course is recommended for users familiar with simulation methodologies.

Course Outline:

- General approaches to electromagnet modeling
- Magnetic problems with moving armature
- Methods for defining loads and springs for the armature
- Eddy current effects in solid ferromagnetic materials
- Lateral forces acting on the armature
- Automation of electromagnet coil definition
- Residual magnetization of electrical steel
- Optimization of geometric dimensions

KAZAKH engineering

Specialized Course.
Induction Heating Simulation Using ANSYS System Coupling

Duration – 3 days

The course requires knowledge at the level of a basic course in electromagnetic field simulation using ANSYS Maxwell 2D/3D, as well as thermal analysis using ANSYS Mechanical (Transient) or ANSYS Fluent.

The course focuses on simulating alternating electromagnetic fields in a 3D formulation and their effect on heating ferromagnetic materials. It includes solving harmonic magnetic problems, determining induced currents, and calculating volumetric heat generation in the inductor and the ferromagnetic workpiece. The ANSYS System Coupling environment is used to couple the electromagnetic solver with a transient thermal solver, enabling accurate time-dependent analysis of the heating process under strong variations in material properties.

The course is recommended for users familiar with simulation methodologies.

Course Outline:

- Harmonic magnetic analysis in ANSYS Maxwell
- Temperature-dependent material properties
- Thermal model setup in ANSYS Transient Thermal
- Setting up synchronization variables for time-dependent changes in current, frequency, and inductor position
- Configuration of ANSYS System Coupling for multiphysics simulations

KAZAKH engineering

Specialized Course.
Electric Machine Simulation in ANSYS Maxwell 2D/3D

Duration – 5 days

The course requires knowledge at the level of a basic course in electric machine simulation using ANSYS Maxwell 2D/3D.

It focuses on electromagnetic field simulation of electric machines in 2D and 3D formulations. The course covers steady-state and transient magnetic analyses, along with post-processing techniques for evaluating results. It also addresses material properties, boundary conditions, solver settings, and post-processing tools. Transient simulations with motion are included.

In the extended version of the course, the ANSYS optiSLang tool is used for optimization, along with ACT-based custom applications for generating efficiency maps of electric machines.

The course is recommended for users familiar with simulation methodologies.

Course Outline:

- Building geometric models of electric machines using the UDP (User-Defined Primitives) library
- Evaluation of cogging torque effects on torque quality
- Mesh operations for discretization of simulation models
- Power balance in an electric machine
- Optimization of the magnetic system using ANSYS optiSLang
- Creation of a reduced-order model (ROM) of a permanent magnet synchronous machine
- Demagnetization of permanent magnets
- Fast convergence to steady-state for induction motors
- Electric Machine Toolkit tools for generating efficiency maps

About us

- **KazakhEngineering** is a certified official partner of **ANSYS** in the Republic of Kazakhstan.
- We implement advanced digital engineering technologies, develop and adapt solutions tailored to the specific needs of each enterprise, enhancing the efficiency of simulation, modeling, and technical decision-making.
- We also provide specialist training and comprehensive support at every stage of using engineering software.

Ansys part of SYNOPSYS®

KAZAKH engineering

Контакты

ТОО «КазахИнжиниринг»
Алматы, ул. Гоголя, 73
+7 (778) 372-01-52
reception@kz-engineering.com