



COURSE TITLE: Steam Boilers

Number of contact hours: 45

Duration: 1 semester (spring)

ECTS credits: 3

Programme description:

The aim of the course is to familiarize students with the construction and operation of steam boilers, with the thermal and flow conditions occurring in the power boiler. The student has the ability to prepare a heat balance of devices used in the power boiler, to determine the efficiency of steam boilers using the direct and indirect method.

Course outline

General classification of boilers. Operating principle and construction of a steam boiler. Heat balance of the combustion chamber. Methods of combustion chamber calculation: CKTI method and zone method. Boiler installations of grate boilers and steam boilers fired by pulverized coal. Construction of swirl, jet and oil burners. Combustion in fluidised bed boilers. Types of fluidised bed boilers. Constructions of fluidised bed boilers. Examples of fluidised bed boilers for supercritical parameters of steam. Types of power boilers. Typical constructions of power boilers. Boilers for supercritical parameters of steam. Boiler evaporator: drum, riser tubes, water-walls. Structure of steam-water mixture flow in vertical and spiral tube channel. Pressure losses in two-phase flows. Steam superheaters. Methods of controlling the temperature of superheated steam. Water heaters. Air heaters.

Course type: lectures (15), project (30)

Literature:

1. K. Rayaprolu, Boilers for Power and Process, Boca Raton, 2009, CRC Press
2. V. Ganapathy, Steam Generators and Waste Heat Boilers: For Process and Plant Engineers, Boca Raton, 2015, CRC Press
3. X. Liu, R. Bansal, Thermal Power Plants: Modeling, Control, and Efficiency Improvement, Boca Raton, 2016, CRC Press

Assessment method: Defense of an individual project

Lecturer: Prof. Sławomir Grądziel

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