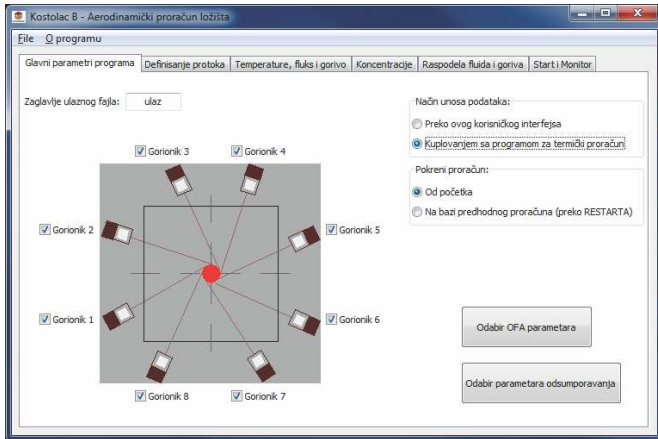
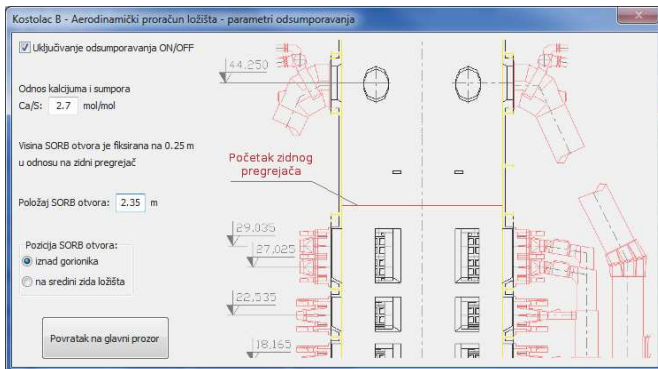


SOFTWARE TOOL FOR PREDICTION OF FURNACE PROCESSES AND THERMAL CALCULATION OF PULVERIZED COAL-FIRED BOILER



Main screen for data input in furnace combustion process simulation software

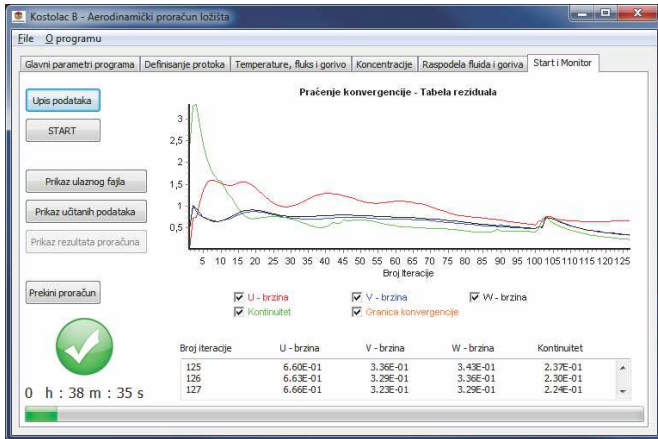


Screen for selection of parameters for desulfurization by injecting pulverized sorbent

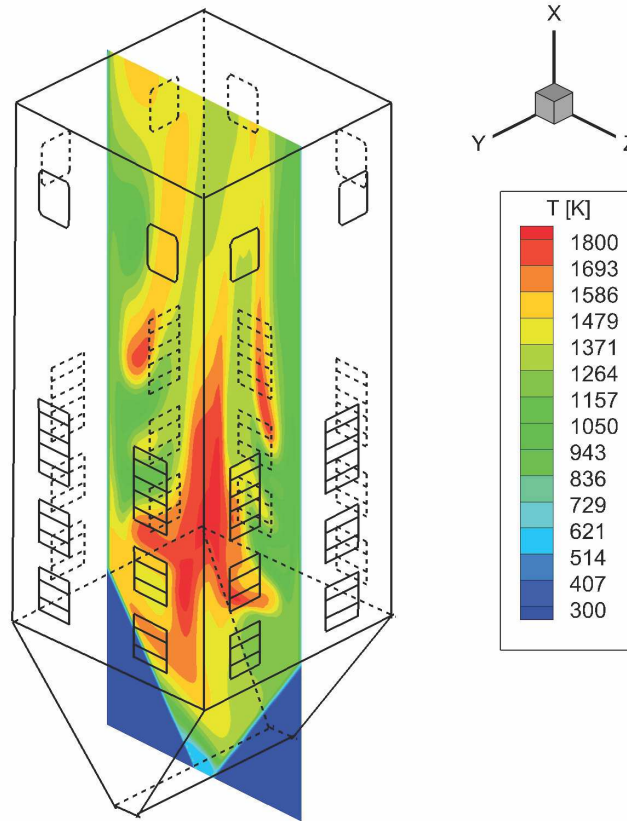
Mathematical model and software for prediction of thermal-flow processes in pulverized coal-fired utility boiler furnace and software tool for thermal calculation of the steam boiler were developed for the purpose of optimization of the boiler unit operation, with respect to energy efficiency and reduction of pollutants emission. 3D model for simulation of furnace processes provides velocity, temperature, heat flux and gas mixture components concentration fields in full-scale furnace geometry, as well as furnace exit gas temperatures, NO_x and SO₂ emissions. Numerical experiments enable to examine the influence of a number of input parameters and different combustion modifications on the operation situation in the furnace and NO_x emission, as well as to investigate the possibility of SO₂ emission reduction by means of direct injection of pulverized Ca-based sorbent into the furnace. Software tool for thermal calculation of the boiler provides an insight into the effect of different operating conditions on the steam boiler unit efficiency and safe operation of preheaters and reheaters. Application of developed software tools gives an opportunity for significant cost savings.

Application of software for combustion optimization makes it possible to increase boiler efficiency for more than 1% and decrease losses and emission, while the use of software for thermal calculation of the boiler enables specification of optimal operating parameters, resulting in further efficiency increase. On the basis of the exploitation experience with 350 MW_e boiler units, potential financial effects of 1.5-2% increase in the boiler efficiency could be estimated at over 2 million Euros per year. Potential ecological effects result from efficient numerical analysis of the possibility of pollutants emission reduction by modifying the operating conditions and applying different measures within the furnace, along with the assessment of their effect on the entire steam boiler unit operation.

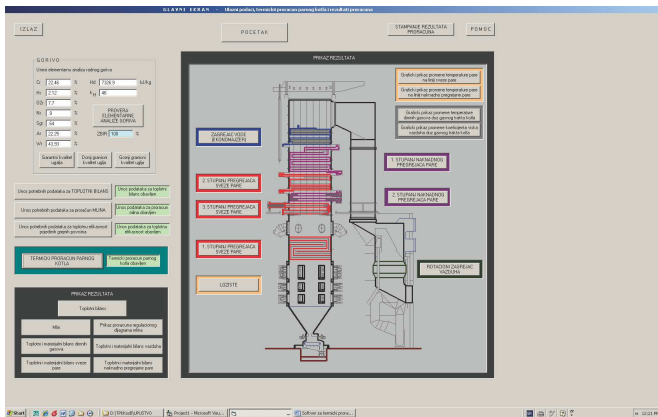
SOFTWARE TOOL FOR PREDICTION OF FURNACE PROCESSES AND THERMAL CALCULATION OF PULVERIZED COAL-FIRED BOILER



Screen for control and monitoring of convergence of numerical calculation



Temperature field and flame position inside of the furnace obtained by numerical simulations



Main screen of software for thermal calculation of steam boiler after finished calculation

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