CASE STUDY OF VENTILATION AND AIR CONDITIONING SYSTEM DEVELOPMENT FOR ARCHIVE PREMISES

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ABSTRACT

This paper describes ventilation, the air conditioning and its control system's development for archive premises in Riga, Latvia. Archive premises are located in two floors; one floor is in basement. The ventilation and air conditioning system in the archive premises is developed according to standard VDI 6022. The air handling unit's technical data, energy consumption, and sequence of operation and control systems development is analysed according to average meteorological year of Latvia.

The main objective for HVAC and control designers was to maintain 19 - 21°C indoor air temperature and 45 - 55% indoor air humidity all year round using two air handling units. First air handling unit is equipped with recirculation section, water heating and cooling coils, air humidifier, supply and exhaust fans. Air exchange rate is regulated with frequency converters. Second air handling unit is air-drying and conditioning unit and it works with 100% recirculation air. Both air handling units are connected in parallel to the same supply and exhaust air ducts. Each archive floor has variable air volume valves, which allows to control air temperature and humidity equal between floors.

Algorithm of air handling unit parallel work condition is analysed with "Simulink" simulation software. Simulation results are implemented in control system development for control of air handling units. Second air handling unit is equipped with factory installed control system. First air handling unit control system is responsible for achieved climate in archive premises. Data exchange between air handling units is done with BACnet communication protocol.

Results of achieved climate is analysed with trendlogs, which are saved by control system. Paper results can be used for ventilation and air conditioning development for other archive premises.