

# **ENERGY EFFICIENT BUILDING MANAGEMENT SYSTEM DEVELOPMENT FOR HEATING, VENTILATION AND AIR CONDITIONING EQUIPMENT IN BUILDINGS**

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## **ABSTRACT**

This paper describes energy efficient building management system development for heating, ventilation and air conditioning equipment in buildings. Building management system has survived three development stages: a) decrease of necessary labour amount; b) decrease of necessary time for fault diagnostics and maintenance; c) energy efficiency. A lot of objects in Latvia are built with building management system (BMS), but just few of them correspond to all requirements. Very important is BMS user interface for effective control of units, which includes control parameters (on/off, time schedules, setpoints), regulation parameters (PID regulators coefficients, min / max values), trendlogs and event messages.

We have done research in three objects in Latvia, two of them are trading centres (located in Riga and Madona); one object is office building (located in Riga). Our experience in Shopping centre in Riga showed, that BMS work efficiency depends not only from controllers producer (Trend control systems), but from installation company and programmers work quality. We were invited to analyse reasons of high temperature in premises during a winter (more than 23 degrees Celsius) and high-energy consumption (more than in another similar shops). Our investigation showed that BMS did not corresponds to any above mentioned requirement of BMS, and due to Trend dealer inability to fix all mistakes, we made replacement of existing control system to DEOS controllers and software. After 8-month operation, energy consumption in shopping centre was decreased by 25%.

Our experience in office building in Riga showed that corresponding usage of BMS functions (time schedules, energy management) is very important for homeowner. From year 2007 – 2008 BMS was used to achieve very good comfort in premises without caring about energy consumption and unit working hours. After economical crises in Latvia (middle of 2008), office-building owner invite us to help limit energy consumption, but still required good comfort conditions in office building during of working hours. We made corrections to time schedules, heating and cooling systems control algorithms (BMS is done with Alerton controllers). Energy consumption analyse (2007 – 2009) showed, that energy consumption after all improvements in BMS can be decreased by 20 %.

Results of our investigations are definition of all necessary BMS functions and unit control algorithms. Paper results can be used for installation of new BMS in office and trading centre buildings. According to our investigation results, we made appropriate BMS for Madona trading centre.