Analysis Of Thermal Performance Of A Car Radiator

New materials, modern building wall technologies now available in the building marketplace, and unique, more accurate, methods of thermal analysis of wall systems create an opportunity to design and erect buildings where thermal envelopes that use masonry wall systems can be more efficient. Thermal performance of the six masonry wall systems is analyzed. Most existing masonry systems are modifications of technologies presented in this paper. Finite difference two-dimensional and three-dimensional computer modeling and unique methods of the clear wall and overall thermal analysis were used. In the design of thermally efficient masonry wall systems is t to know how effectively the insulation material is used and how the insulation shape and its location affect the wall thermal performance. Due to the incorrect shape of the insulation or structural components, hidden thermal shorts cause additional heat losses. In this study, the thermal analysis of the clear wall was enriched with the examination of the thermal properties of the wall details and the study of a quantity defined herein the Thermal Efficiency of the insulation material.

The Brazilian Nuclear Research Institute (IPEN) proposed a design for the disposal of Disused Sealed Radioactive Sources (DSRS) based on the IAEA Borehole Disposal of Sealed Radioactive Sources (BOSS) design that would allow the entirety of Brazil's inventory of DSRS to be disposed in a single borehole. The proposed IPEN design allows for 170 waste packages (WPs) containing DSRS (such as Co-60 and Cs-137) to be stacked on top of each other inside the borehole. The primary objective of this work was to evaluate the thermal performance of a conservative approach to the IPEN proposal with the equivalent of two WPs and two different inside configurations using Co-60 as the radioactive heat source. The current WP configuration (heterogeneous) for the IPEN proposal has 60% of the WP volume being occupied by a nuclear radioactive heat source and the remaining 40% as vacant space. The second configuration (homogeneous) considered for this project was a homogeneous case where 100% of the WP volume was occupied by a nuclear radioactive heat source. The computational models for the thermal analyses of the WP configurations with the Co-60 heat source considered three different cooling mechanisms (conduction, radiation, and convection) and the effect of mesh size on the results from the thermal analysis. The results of the analyses yielded maximum temperatures inside the WPs for both of the WP configurations and various mesh sizes. The heterogeneous WP considered the cooling mechanisms of conduction, convection, and radiation. The temperature results from the heterogeneous WP analysis suggest that the model is cooled predominantly by conduction with effect of radiation and natural convection on cooling being negligible. From the thermal analysis comparing the two WP configurations, the results suggest that either WP configuration could be used for the design. The mesh sensitivity results verify the meshes used and results obtained from the thermal analyses were close to being independent of mesh size. The results from the computational case and analytically-calculated case for the homogeneous WP in benchmarking were almost identical, which indicates that the computational approach used here was successfully verified by the analytical solution.

Investigation of the combined thermal performance of the stacks and vapor-cooled leads for the Mirror Fusion Test Facility-B (MFTF-B) demonstrates considerable interdependency. For instance, the heat transfer to the vapor-cooled lead (VCL) from warm bus heaters, environmental enclosure, and stack is a significant additional heat load to the joule heating in the leads, proportionately higher for the lower current leads that have fewer current-carrying, counter flow coolant copper tubes. Consequently, the specific coolant flow (G/sec-kA-lead pair) increases as the lead current decreases. The definition of this interdependency and the definition of necessary thermal management has required an integrated thermal model for the entire stack/VCL assemblies. Computer simulations based on finite difference thermal analyses computed all the heat interchanges of the six different stack/VCL configurations. These computer simulations verified that the heat load of the stacks beneficially alters the lead temperature profile to provide added stability against thermal runaway. Significant energy is transferred through low density foam filler in the stack from warm ambient sources to the vapor-cooled leads.

Analysis of Thermal Performance of Penetrated Multi-layer InsulationAnalysis of Thermal Performance of "Solaris" Water-trickle Solar CollectorAnalysis of Thermal Performance and Energy Usage at ABC Air, IncAnalysis of Thermal Performance Data Taken Under the Residential Standards Demonstration ProgramExpanded NBSLD (NBS Load Determination) Output for Analysis of Thermal Performance of Building Envelope ComponentsExpanded NBSLD Output for Analysis of Thermal Performance of Building Envelope ComponentsNumerical Analysis on Thermal Performance of Staggered Pin - Fin AssemblyAnalysis of the Factors Controlling the Thermal Performance of Curtian-wallsPreliminary Thermal Performance Analysis of the Solar Brayton Heat ReceiverThermal Performance Analysis/evaluation of Physical FormThe Thermal Performance of Earth Covered Buildings in Hot, Arid Regions

The thermal impacts of several variables related to earth integration of buildings in hot, arid regions have been studied using finite difference models and analysis by the computer program SPICE. Results indicate that berming or "burying" a structure to a depth of 2 meters or more and insulating the roof will provide the majority of benefits from ground-coupling. A low-energy concrete house was designed using passive solar strategies to consume 70% less heating and cooling energy than a base case that conformed to the 1996 Home Energy Rating System (HERS) and the 1995 Model Energy Code (MEC). The performance of this house was then evaluated using computer simulations and measured data. The house, Tierra I, was monitored from July 22, 1996, through October 14, 1997. A Short Term Energy Monitoring (STEM) test was done November 19 to December 10, 1996. Computer simulations of the house were done using SUNREL, an updated version of the hourly data simulation package SERI-RES. The SUNREL model of the house was calibrated using both short- and long-term data. The house achieved energy savings of 56%, below the goal of 70%. The lower than expected savings resulted from problems with the window modeling. As a result, during the design phase the solar gains were overestimated causing an underestimate in the level of insulation necessary to achieve the savings goal. For very low-energy passive solar buildings, it is apparent that very accurate window modeling is required. It also became apparent that accurate ground models are required as well because ground-heat loss accounts for a significant portion of the total heat loss in low-energy buildings.

Thermal performance of solar air heater found to be generally poor because of their inherently low heat transfer capability between the absorber plate and flowing air. Their thermal performance needs to be improved. Use of fins has been adopted by the researchers to improve the thermal performance of SAH. Their studies showed increment in thermal performance but fin optimization has not been addressed and optimization of fins parameters plays an important role in maximizing the thermal performance of collector. In this book single pass fin type solar air heater has been studied and optimized using CFD techniques to improve its thermal performance. During the study effect of air flow

rate, number of fins, fin height, and fin length have been analyzed and CFD results are validated with experimental data.
Several key attributes of a 3D integrated chip structure are analyzed in this chapter. Critical features related to the effect of the size of the substrate, heat sink, device layer, through silicon vias (TSVs), thermal interface material (TIM), and the pitch and arrangement of core processors and TSVs as well as variation of thermal conductivity and total heat dissipation and distribution of power within the device layers core processors are investigated in depth. The effect of variation of pertinent features of the 3D IC structure on thermal hotspots are established and the optimum route for its reduction is clarified. In addition, a revealing analysis of the effect of the number of layers in the 3D structure is presented. Furthermore, the features that have an insufficient effect on reduction of thermal hotspots are also established and discussed.