

OPTIMAL LIFE CYCLE COST DESIGN  
FOR AN ENERGY EFFICIENT MANUFACTURING FACILITY

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ABSTRACT

Over the past twelve years, Texas Instruments has developed extensive energy management programs that have enabled them to reduce energy usage by 42%. Typically, these reductions have been a result of the application of microprocessor based energy management systems in existing facilities. Because of the nature of the electronics industry, i.e., light manufacturing and the continued use of more energy intensive technologies, it has become economically advantageous to take a more active role in the architectural design of new facilities. The goal is to incorporate those energy conservation features into the design having the lowest life cycle costs.

This paper will present the results of an evaluation on several design considerations using the Building Loads Analysis and Systems Thermodynamics (BLAST) program for a two-story manufacturing facility located in the North Texas area. The facility to be modeled exhibits characteristics that are commonplace at many industrial sites, such as administrative areas, manufacturing areas, computer rooms, and three shift operating schedules. Each topic to be discussed will be categorized as follows:

- o Envelope construction
- o HVAC equipment selection
- o Layout of chilled water and condenser water distribution systems
- o Control systems and strategies

After all considerations are evaluated from a global energy consumption viewpoint, a comprehensive life cycle cost analysis using 1985 cost data will be performed. The result will be a list of options that should be considered from the onset of facility design.