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## Case Study – Kettering University

EDUCATION / HEALTH CARE / LODGING / MANUFACTURING / OFFICE BUILDING / RETAIL / SPECIAL



### Kettering Dorm Beats the Heat With Innovative Carrier System

#### Project Objectives

Kettering University, in Flint, MI, is one of the nation's top-ranked specialty schools, with a year-round program combining academics with co-op work experience. While most of the campus was air conditioned, the university's one dormitory wasn't — causing recruitment concerns and summer resident discomfort. Faced with significant space, design and scheduling challenges, school officials were looking for an HVAC expert to help them come up with a creative solution.

#### Solution



The Carrier team worked closely with the university to design a system that would deliver comfort cooling, while meeting code requirements for outside air. Rooftop air handlers and an air-cooled chiller provided the answer to mechanical room space constraints and the prohibitive cost of demolition, given the building's concrete and brick construction. The use of individual room induction units addressed both ventilation and aesthetic requirements. Direct digital controls (DDC) were added to coordinate chiller and air distribution functions. The project was successfully completed with no disruption to students and on a very challenging schedule — during only two brief, unoccupied vacation periods.

*The winning design met the project's challenges of time, space constraints, ventilation and aesthetics, while providing the best total cost of ownership (TCO).*



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*"This project was so challenging that no one else would engineer it. Carrier did a great job helping us explore our options and arrive at a long-term cost-effective solution. With a small window of opportunity, they completed the installation within our scheduling constraints. We're very pleased with the results."*

Susan Bolt  
vice president for  
administration & finance,  
Kettering University

AIRSIDE / APPLIED / CONTROLS / SERVICE / SPECIAL SOLUTION / TOTAL SYSTEM / UNITARY

## Case Study – Kettering University continued

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### Project Synopsis

Kettering University's high rating and unique program were very attractive to prospective students. A drawback, however, was the lack of air conditioning in the school's residence hall. The university knew that to provide competitive housing and keep students comfortable, a cooling system would have to be added. School officials turned to Carrier experts for a solution that would meet the many challenges they faced, in both design and scheduling.

With a comprehensive engineering analysis, the Carrier team examined regulatory issues, building requirements and a variety of mechanical system designs. Working closely with university personnel, they evaluated several systems for feasibility as well as total cost of ownership (TCO).

The winning system used induction technology to creatively address space constraints, outside air ventilation requirements and aesthetic issues. An individually-fed induction unit was installed in each of 480 rooms, with in-ceiling piping and barely-noticeable air ducts. And with no moving parts, extra-quiet operation was an added bonus.

Rooftop installation of the 231-ton air-cooled chiller and two air handling units overcame lack of space in the mechanical room, as well as eliminating the need for costly demolition of walls and floors in the brick and block building. A direct digital controls (DDC) system with the Carrier Comfort Network® (CCN) was added to link and efficiently control the chiller and air distribution systems.

Because the dormitory houses students year-round, scheduling was tight. Major construction work had to be completed during brief vacation periods — two weeks in winter and three weeks in summer. There was little time for adjustment and no room for mistakes. During occupied periods, the team worked around student quiet times and special events, such as graduation, to avoid disruption.

The challenging design and installation were accomplished with collaboration, cooperation, engineering expertise and technical ingenuity. The system was commissioned during a hot, humid spell in July. And when students returned after the July 4th weekend, they actually found the building too cold. That was a complaint school staff was happy to respond to.

### Project Summary

**Location:** Flint, Michigan

**Building Age:** 20 years

**Project Type:** New system

**Building Type/Size:** Brick and block, 4-story / 125,000 sq. ft.

**Building Usage:** Dormitory rooms, study lounges

**Objectives:** Improve comfort

**Major Decision Drivers:**  
Carrier design and installation expertise, best TCO

**Design Considerations:**  
Space constraints, aesthetics, scheduling limitations

**Total Cooling Tons:** 231

**Total CFM:** 20,000

**HVAC Equipment:** One model 30GXR 231-ton air-cooled, rooftop chiller; two model 39NC-21 AHUs; 480 model 36RH induction units; DDC system with CCN

**Unique Features:** Creative use of induction units; staged installation to avoid occupant disruption

**Project Cost Range:**  
\$1 million to \$5 million

**Installation Date:** July, 2001

**Consulting Engineer:**  
Kors Engineering

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