BEST PRACTICES 2012

A New Dining Center for the California Maritime Academy

A careful integrated design process combined the school's core values of integrity and community with a focus on the energy systems particular to a dining service facility. The project exceeded CSU's energy and life-cycle cost guidelines while advancing an energy-intensive building type.

The California Maritime Academy, located on the shore of the San Francisco Bay in Vallejo, prides itself for having a strong sense of community identity and a commitment to quality instruction in engineering, science, and technology. A new dining center will be the first core campus building to provide a place for students to gather, and it will occupy the last available site on campus with full views of the bay.

The dining center features a sweeping, shaded glazed facade that connects the dining hall to views of the San Francisco Bay. Image: Flad Architects.

"We really wanted to make this a special place," remarked Warren Jacobs, the university architect. The design process was guided by a commitment to high functionality, especially regarding the project's two essential objectives: to enhance the site's spectacular views, and to address the complex, energy-intensive nature of a food service building. The project was not led by any certification requirement other than to simply be "as sustainable as possible."

The central feature of the building is a double-height dining room that opens to bay views via a generous, shaded glass facade. Because the climate is generally cold and wet during much of the academic year, an open yet protected gathering space was an important priority.

The building configuration was designed not just to build community, but also to aid natural ventilation. Air is drawn through "trickle vents" located at the south perimeter, and driven upwards through the open interior with mechanical assistance of fans.

To support alternative cooling strategies, exterior shading needed to be integral to the project. Not only were shades important to block solar gain, but the campus had learned from their experience with another recent building, also situated to take advantage of the view, that had been severely impacted by glare from reflections off of the bay.

Determined to avoid a costly "band-aid" retrofit of internal shades that would undermine the key design concept, the campus encouraged the architect to conduct parametric analyses of the external shade configuration to optimize for glare, solar gain and desired daylight levels. The result was a series of louvers that would block 80 percent of the sun's direct rays.

From the very early stages of the project, programmatic objectives were integrated with considerations about low-energy cooling strategies and the latest in food service technology.

Overall, this project offers a particularly good example of integrated design. The campus staff, architect, mechanical engineer, contractor, commercial kitchen consultants and food service operator, all contributed to decision-making throughout the design process.

Very early in the process, the mechanical designer vetted alternate options for the building's HVAC system, initially based on experience and intuition about the building type, followed later by energy and cost models.

Award Category

Overall Sustainable Design

Green Features

Optimized exterior shading

Natural ventilation with trickle vents and fan assist

Radiant cooling

Direct digital controls

Waste dehydration and greywater recycling

Energy efficient kitchen technologies

Size

26,200 ft^2

Annual Energy and Cost Savings

Electricity: 179,600 kWh

Natural gas: 4,400 therms

$15,000

Cost

$11,000,000 (before incentives)

Completion Date

August 2013

2012

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Contacts

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Project Team

Architect: Flad Architects

Civil Engineer: Sandis Civil Engineers

Structural Engineer: Forell/Elsesser Engineers, Inc.

MEP, Lighting and Energy Simulation: Interface Engineering

AV Engineer: TEECOM

Landscape: Conger Moss Guillard

Contractor: McCarthy Construction

More Information

http://www.csum.edu/web/about/dining-center-groundbreaking

Through this process, a strategy that seemed reasonable at first — using a ground-source heat pump — was discarded for its inability to provide heat quickly enough in a space with transient, intermittent occupancy. Radiant cooling was ultimately deemed to be a more cost-effective and energy-efficient option.

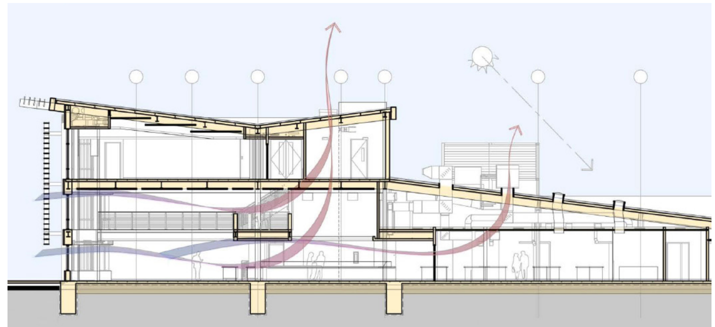
The energy and water demands of a dining hall are significant, so the food service consultant was asked to bring the latest advances in commercial kitchens to the table. The biggest efficiency gains were found using established yet underutilized technologies, such as variable-air-volume range hoods, condensing gas boilers, and highly efficient lighting.

However commercial kitchens also generate an impressive amount of waste. As an innovative approach to managing this waste, the team decided to install a food waste pulper, which extracts water from outgoing waste, reducing garbage volume by 80 percent and allowing the water to be recirculated for greywater purposes.

What makes this project stand out is a commitment to balancing innovation and simplicity, with a watchful eye on potential maintenance down the road.

All measures considered, the building is expected to provide savings of 22 percent compared to the Title-24 baseline, and annual estimated energy cost savings of $15,000. As Jacobs puts it, “perhaps the most important feature of this dining hall is that the technologies actually work, and they are cost-effective.”

Cost-effectiveness was managed under the “construction manager at risk” model, in which the general contractor was responsible for using cost-estimating tools throughout the process to ensure that design ideas would not get ahead of implementation and cost obstacles. Life-cycle assessment for building materials and systems, as prescribed by the CSU Sustainability Policy, also helped make the case for many of the project's initiatives.



The design team worked to integrate the form of the building with alternative cooling strategies. Image: Flad Architects.

A few inherent advantages of the program and site contributed to this success, for example, occupant schedules in a dining hall are fairly predictable and transient, reducing the risk of under-sizing major HVAC equipment.

LESSONS LEARNED

Understanding the complexity of the project before starting design, and addressing technical issues as a driver for decision-making early on, was discovered to be critical to achieving a simple, energy-efficient design.

All the technology that goes into a dining facility “needs a good supporting team,” says Jacobs. If a design for such a facility proceeds without early testing of basic ideas and assumptions, central ideas for the project can end up conflicting with the design of building systems. Starting with genuine considerations for the users and system requirements, and iterating the design using simulation and cost-estimation tools, resulted in a highly successful design outcome.

Best Practices case studies are coordinated by the Green Building Research Center, at the University of California, Berkeley.

The Best Practices Competition showcases successful projects on UC and CSU campuses to assist campuses in achieving energy efficiency and sustainability goals. Funding for *Best Practices* is provided by the UC/CSU/IOU Energy Efficiency Partnership.