The Bonderson Projects Center serves as a place for students from the College of Engineering to create and design their senior projects as well as to display past and present projects. It includes approximately 19,000 square feet of space for a telecommunications laboratory, a networking laboratory, a robotics lab, a mechanical device lab, an environmental lab, and computer modeling and systems labs. Located in the northwest area of the campus core, the Bonderson Projects Center anchors the south side of the Engineering Plaza in a cluster including the Engineering IV Building, the Advanced Technology Laboratories, the Kennedy Library and Agricultural Sciences. The form of the building has been oriented along an east-west axis, naturally shielding outdoor work areas of the building from north winds, while allowing good solar exposure sunlight from the south. The site is also close to public transportation, surrounded by intensive development with an environment that allows water to percolate into soil. Thus, landscaping can use recycled water for irrigation.

The building’s covered outdoor spaces can be adapted to students’ project needs.

The project was designed from its outset to reduce its ecological footprint by taking advantage of an existing asphalt parking lot. Excavated material from the lot was used for another campus project as part of an effort which diverts as much waste from the landfill as possible. Structural components utilized recycled steel for building columns, while flooring materials include sealed concrete with a high volume of fly ash in workshop areas, and carpet tiles with recycled content in lab areas.

The acoustical wall product is composed of agricultural waste, and was left in its natural state. To create a safe and healthy working environment for students, several air quality strategies were incorporated in the building. Paints, coatings, and carpeting were specified to be low or no-VOC products. In addition, the ventilation system was specially designed to ensure proper filtering of wood dust and welding fumes—inevitable pollutants from student fabrication projects. Indoor air quality is enhanced through the use of the economizer, which circulates filtered air. Also, the absence of carpet and dearth of floor coverings and the use of integral walk-off mats at doors can increase air quality. One of the most exciting aspects of the building is the ability of students to work in flexible space with sectional doors that allow students to open their workspaces to the outside environment. These outdoor areas are shielded from wind and rain, while still allowing for high levels of ventilation and daylight. Many of the interior spaces also bring in and maximize daylight: interior corridors incorporate skylights, while project rooms contain overhead rolling doors with acrylic windows to admit daylight. South-facing glass and adjacent outdoor work areas are under a broad overhang, while concrete is used in the east, west, and south building areas, keeping the building cool in the summer. Exterior features and landscaping are

**Award Category**
Best Overall Sustainable Design

**Green Features**
- Low-e window glazing, deep overhangs and sun screens to decrease solar gains
- Lighting fixtures use metal halide lamps, occupant sensors
- Recycled and low-VOC materials
- Two-foot deep concrete floor slabs for thermal mass

**Size**
19,000 ft²

**Cost**
$7.5 million

**Completion Date**
2006
integral parts of the project. A legacy American Elm unique to California was retained and protected on the site, and native grasses and other drought tolerant species were used. Energy Star-compliant high-albedo thermoplastic (TPO) roofing, light-colored reflective exterior paint, and trees planed to the south of the building decrease solar gains, reduce cooling loads and reduce the urban heat island effect of the building. The light-colored roof serves as a light shelf to bounce south light into the two-story work space. The use of high-performance, low-e glazing and external shading of windows further reduce heat gain to the interior. In addition, a two-foot deep concrete slab provides a large amount of thermal mass to moderate diurnal temperature swings. In terms of recycled materials, the sound insulation boards incorporate agricultural waste, while irrigation water is recycled. Also, the structural steel came from a US mini-mill that uses almost entirely scrap for its raw material.

The Bonderson Projects Center’s mechanical and lighting systems were designed to significantly reduce operational costs. High-efficiency fluorescent and metal halide lighting is used throughout the building. Occupancy sensor controls turn lights off when spaces are vacant, and a sweep system turns lights off at programmed intervals. For the safety of people operating equipment in fabrication areas, lights flash off and on before shutting off, allowing users to toggle light switches if lights must be kept on. The Bonderson Projects Center incorporates an energy efficient VAV system with a 100 percent economizer mode. Chilled water is provided by the campus-cooling tower, decreasing peak energy load by taking advantage of campus-wide variations in cooling needs.

LESSONS LEARNED

John Trautmann, project architect and owner of John Trautmann Architects, states “working with dedicated clients, both the Bondersons who donated the money for construction and Cal Poly who was committed to having a sustainable campus, made it practically second nature to make the right decisions throughout the design process.” Mr. Trautmann states that it was rewarding “seeing the engineering students showing off their senior projects that they had created in the building even before it had been fully moved into. The Bonderson Project Center was made especially to encourage the free-wheeling, interdisciplinary discovery that was in evidence.” The design and construction team overcame a number of obstacles to complete the project. As a result of uneven soil conditions, the team decided to excavate, re-compact the top several feet of soil, and pour a mat foundation instead of driving expensive piles. The mat foundation has not only provided adequate structural support, but also serves as thermal mass to help cool the building in summer and warm it in the winter, decreasing heating and cooling costs.

- Mangala Gopal