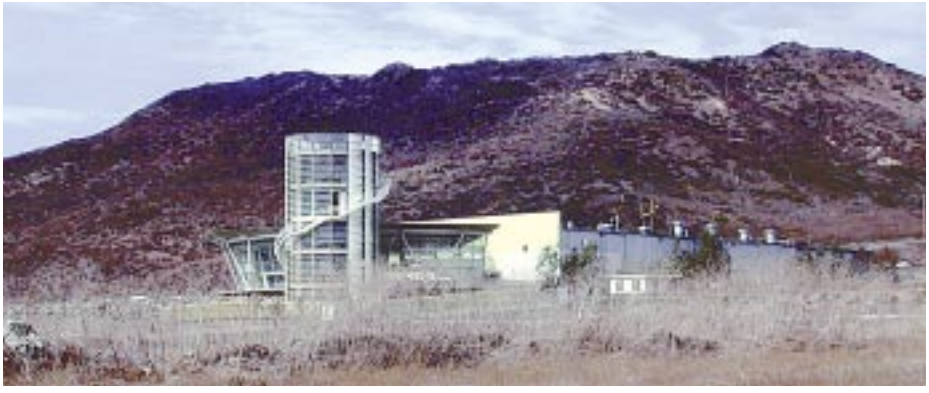
MERIT AWARD

LESS THAN $10M

Augen Optical Laboratories

ENSENADA, B.C. MEXICO



JUROR COMMENT:

Beautiful integration of structure and architecture—the cylindrical shell has a fantastic sculptural quality.

Augen Optical Laboratories is a wholly Mexican-owned company established for research and development of technologies for the fabrication of plastic optical lenses. This project consisted of an expansion of a currently existing facility producing plastic optical lenses formerly imported from the U.S.

Two principal buildings were designed for this expansion: one circular-shaped four-story research building and an office and laboratory building completely separate from the tower yet operationally integrated with it.

The tower is comprised of a cylindrical steel shell, 10 m (33′) in diameter, serving the two-fold purpose of carrying the vertical gravity loads as well providing the necessary strength to resist the horizontal seismic and wind forces. The city of Ensenada is located in a high-wind/seismic zone similar to the San Diego area, which lies about 65 miles north of Ensenada.

The structure of the cylindrical shell contains 16 W10×26 perimeter columns supporting wall panels made out of $^{3}/_{8}$″ plate which is curved and stiffened in order to provide interesting openings for natural light and ventilation, as well as the necessary strength.

Each floor consists of a series of radial horizontal beams meeting at the center of the circle and running in radial form, simply supported by the perimeter columns. All beams meet at

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SOFTWARE
SAP 2000

the center in a circular plate supporting a king post from which tension rods connect with clevises, forming a series of radial post-and-beam trusses.

A concrete slab was poured on top of these beams and acts compositely with the beams through the use of shear-connectors.

An external stairway provides the access to each floor, surrounding the building like a graceful spiral.

The natural ventilation and illumination of the tower was attained through the very ingenious architectural shape of the external steel shell in combination with horizontal plate-stiffeners, providing the necessary structural strength to support the horizontal and gravity forces. A SAP2000 model of the tower was used in its structural design.

The office and laboratory building has a semi-circular shape and consists of a concrete-roof supported by radial rigid frames incorporating lean-to columns. The external columns consist of circular tubes in a "V" arrangement.

The first high mezzanine is suspended from the roof-beams through tension rods creating large column-free areas. Likewise, the main floor is also structured with steel radial beams receiving secondary curved joist beams. The floor consists of steel metal deck with 5 cm (2") of concrete topping. A second lower mezzanine is suspended as well from the main floor beams, creating a partial-underground level.

Advantages of this structural system include:

- Meets the owner's need for large column-free areas with excellent natural lighting and ventilation to accommodate the special research laboratories and offices.
- Integrates the skin steel plates and vertical columns of the tower perimeter to give the necessary strength and stiffness to resist a high earthquake and wind loads of the region.
- Provides the necessary strength and serviceability (vibration, drift-control).
- Reduces construction cost due to the avoidance of special architectural finishes (floor, false ceilings, cladding, HVAC ducts, etc.)