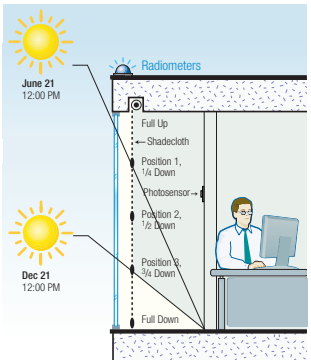
SolarTrac®

The WindowManagement® Solution to Daylighting

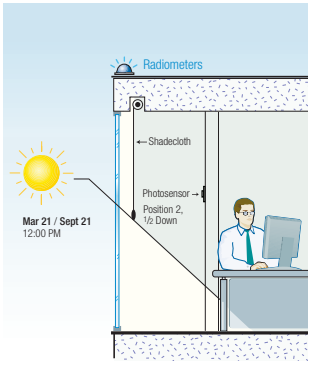
MechoShade Systems
The Architect's Choice™

SolarTrac®

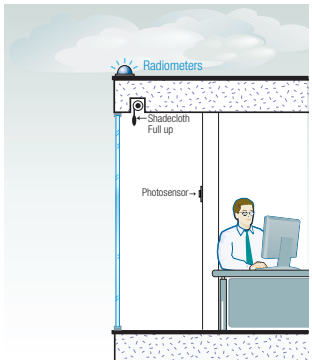
MechoShade Systems' SolarTrac® is a unique WindowManagement® daylighting system that automatically adjusts the position of the shades incrementally throughout a building. The system tracks the sun and the microclimatic sky conditions, adjusting the shades to various positions on the window according to the sun's position in the sky, the direction of the solar ray and the sun's intensity. When direct solar penetration occurs, the configuration maximizes the daylighting while offering a view to the outside.



Allowable solar penetration summer/winter: June 21/Dec. 21
Peak solar altitudes during the year on the south elevation 40°. North latitude with the SolarTrac® system preset to 6 or more positions plus user-defined solar penetration (3 ft./91 cm shown here).



Allowable solar penetration spring/fall: Mar. 21/Sept. 21
Pre-defined shade position is set for the sun angle in the spring or the fall at 5 ft./152 cm.



Overcast-sky condition
In the glare mode, the shade provides protection from the glare of a bright sky while offering a view to the outside.

SolarTrac® Daylighting Program

Automatic Solar-Shading System

The system protects occupants in the interior from direct solar rays, maximizes the view and increases daylight opportunities.

Brightness-Override Module (optional)

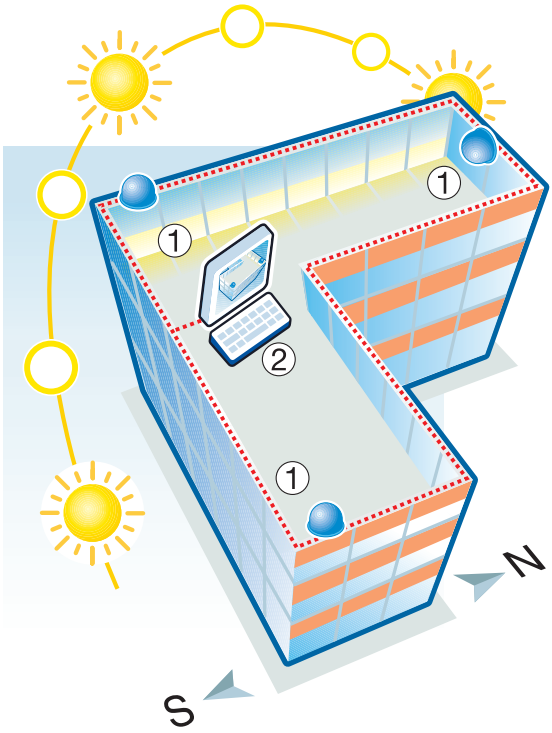
Incrementally, shades move down automatically, overriding the solar position to reduce excessive glare and brightness, which are debilitating to occupants.

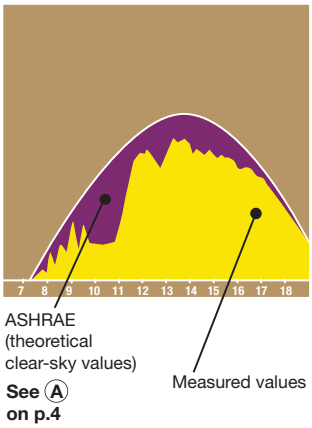
Shadow-Override Module (optional)

When shade-motor zones are in shadow from adjacent buildings, trees, etc., for 20 minutes or more, the shades will rise automatically to maximize the natural daylight and view. A 3-D model of the cityscape is incorporated into the SolarTrac® program.

Roof-Mounted Radiometers

Solar radiometers monitor actual sky radiation in real time. SolarTrac® creates a sky model of the microclimatic condition of the moment and also over time—either as a clear/sunny or cloudy condition. When cloudy, the shades remain fully raised. When sunny, the system lowers the shades incrementally by solar penetration zones on the window. This happens according to year-day sun angles and user-defined zone parameters and may be subject to other overrides.





See Ⓐ on p.4

Solar Path

① 3 roof-mounted radiometers monitor sky conditions in real time. (See #1 positions above.)

② SolarTrac® utilizes proprietary algorithms, which translate raw solar-sensor data to determine the sky condition—clear or cloudy. When cloudy, the shades are raised. When clear, the shade's position is adjusted according to the sun's angle in the sky. (See #2 above.)

The solar tracking for any zone takes into account the latitude plus solar orientation of each window, the physical window and its profile. For example, there may be overhangs, fins, etc.

User-defined incremental shade positions on the window are programmed, along with the allowable solar penetration.

The SolarTrac® system monitors the solar path for all windows and adjusts the shade position on the window according to the year-day solar angle plus the microclimatic condition of a clear or cloudy sky.

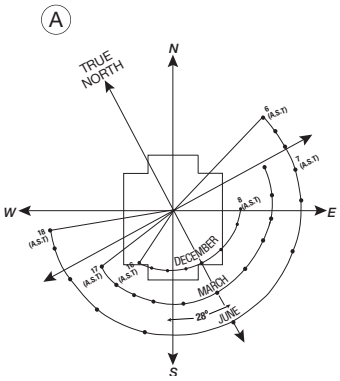
Radiation Curve

From sunrise to sunset, the SolarTrac® system creates a theoretical radiation curve (indicated by the purple area above). Radiometers measure the actual radiation.

The SolarTrac® system compares the actual radiation with the theoretical radiation and using a sky algorithm, determines if the sky condition is clear or cloudy. This will occur many times a minute throughout the year-day.

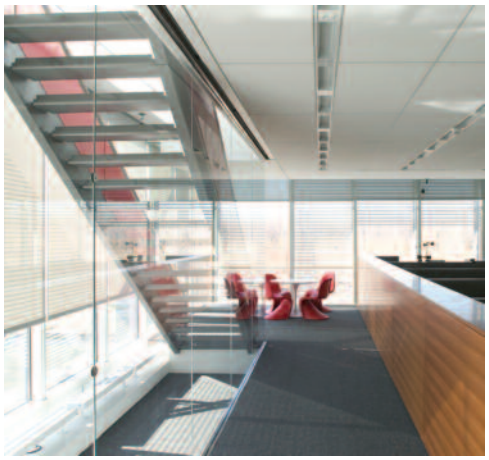
The New York Times Building Mock-Up

The architecture of the The New York Times headquarters building (cover and below) is by the Renzo Piano Building Workshop with FXFowle Architects and the interior architecture by Gensler. Prior to construction, the Times built a 4,000 sq. ft. (372 sq. m.) mock-up facility in Queens, New York, for an energy study and systems evaluation. The Lawrence Berkeley National Laboratory, funded by NYSERDA, monitored the SolarTrac® system and time photographed the test site.



Footprint of The New York Times Building mock-up, rotated 28° east of north.

SolarTrac® on a Typical Day

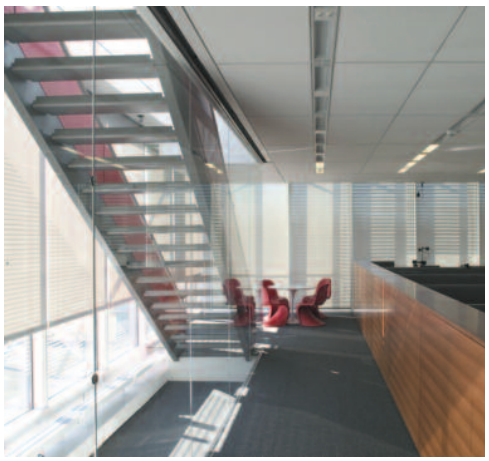


2:40 p.m.

SolarTrac® lowers the shades in reaction to the sun's shift to the west elevation of the mock-up. The light-dimming system senses enough daylight for the overhead lights to remain off.

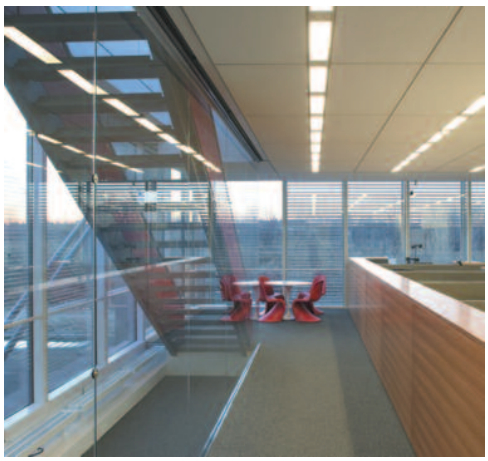
3:20 p.m.

SolarTrac® lowers the shades on the west elevation to the 3rd-position level (or 3/4 down). When the sun angle becomes lower in the west, the lights will begin to turn on.



4:35 p.m.

SolarTrac®—reacting to the solar-gain and glare conditions which occur when the sun sets—lowers the shades on the west elevation (in the background here) to the full-down position. The light-dimming system turns on some of the lights while leaving others off. This is based on the light levels which have been detected in each area.



5:45 p.m.

At approximately dusk, the sun is below the horizon. SolarTrac® reacts by raising the shades to the full-up position, offering maximum view and allowing natural daylight to penetrate the interior.

Shade-Systems Protocol

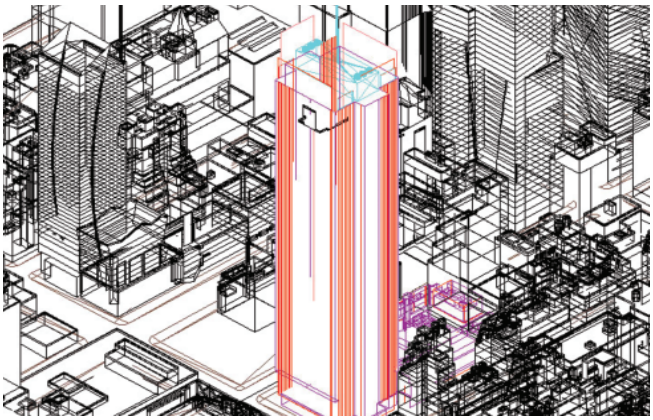
The New York Times Building utilizes MechoShade Systems' I-Con® program with LonWorks® protocol by Echelon. Its technologically advanced features include:

- Robust design
- 2-way communication
- Free topology which decreases wiring costs
- Intelligent, encoded 2-way communication motors
- Individual addressability
- Multiple addresses in each motor to permit overlapping of control zones

Touchscreen Switching

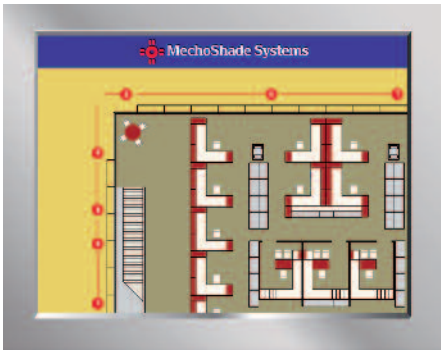
For special requirements or needs, the touchscreen feature makes it possible to:

- temporarily reprogram shade positions in a local zone
- adjust shades zone-by-zone and be manually overridden to a new position
- allow access into the database to survey solar data, zone brightness and the history of shade movements
- offer easy navigation for local shade-override control



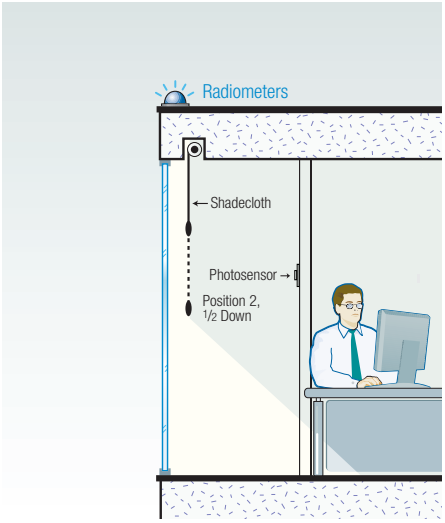
Shadow-Override Module

A 3-D model (example above) of a building and the adjacent cityscape can be optionally integrated into the SolarTrac® system. When a zone becomes in shadow for 15 to 30 minutes (time length to be user-determined), the shades are raised to maximize the daylight. However, if there is excessive brightness, the Brightness-Override Module brings the shades down, increment by increment, until the default is met.

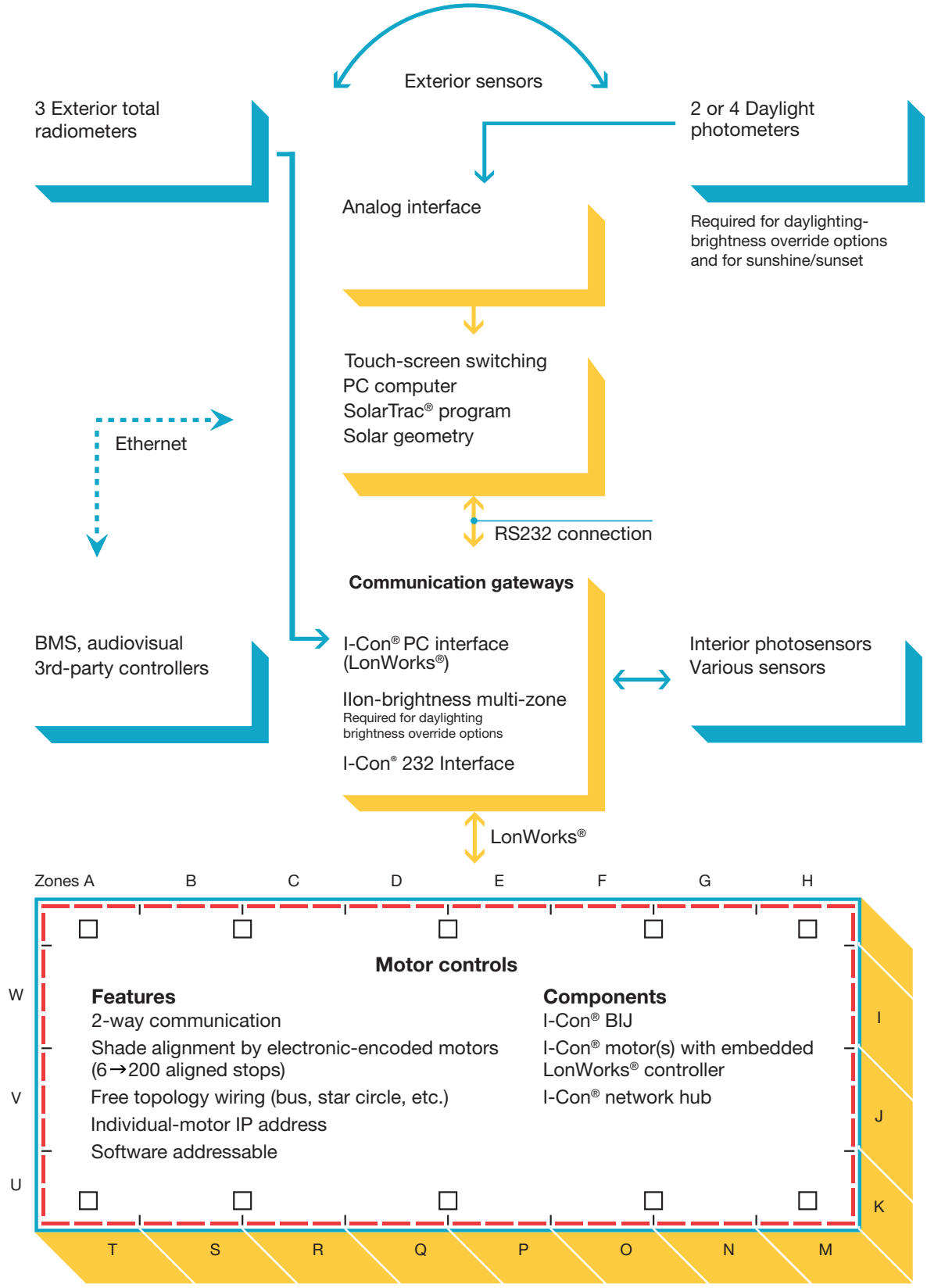


Brightness-Override Module

As an optional feature, SolarTrac® adjusts shades to the appropriate position at the window to control the depth of the solar penetration across the floor into the interior space. In the event of excessive sky glare, such as when the sky is overcast but bright, the photosensors recognize and communicate the brightness level to the SolarTrac® system. The shades are then brought downward until the brightness default is met.



SolarTrac® Block Schematic
I-Con® Motor / LonWorks® System 2-Way Communication



One of the numerous features of the SolarTrac® system is its ability to adjust individual shade heights uniformly for an interior- and exterior-view aesthetic. It also offers solar protection with a view where needed.

Over time, the system learns the solar and brightness needs of the occupant to provide effective solar and brightness control while maximizing daylighting opportunities. (The New York Times mock-up interior shown.)

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