Forest EcoCentre

Building Name	**Forest EcoCentre**
Location	Scottsdale, Tasmania
Date Constructed	2001
Building function	Forestry Interpretation Centre, Offices for Forestry Tasmania; community and tourism facilities for local area
Architects	Robert Morris-Nunn and Peter Walker, Morris-Nunn & Associates, Hobart, Tasmania
Features	A building within a building, with the outer shell operating as a heating device
Thermal engineers	Advanced Environmental Concepts – Ché Wall and Nicholas Lander
Fire engineers	ARUPS – Per Ollson and Jan Ottosson
Environmental consultant	Advanced Environmental Concepts
Builder	Fairbrother – Chris Wilson and Brendan Crack
Structural consultant	Gandy and Roberts – Jim Gandy
Electrical and mechanical engineer	Tasmanian Building Services – John Calder and Gosta Blichfeldt
Cost Control/Project Management	Stanton Management Group – Patrick Stanton and Davis Langdon Aust.
Counter top	Celery Pine (*Phyllocladus aspleniifolius*)
Back of display unit	Myrtle (*Nothofagus cunninghamii*)
Inside panels on walls	Plantation Pine (*Pinus spp.*)
Back wall – wooden panel	Leatherwood (*Eucryphia lucida*), Myrtle (*Nothofagus cunninghamii*), Tas Oak (*Eucalyptus spp.)*
Main beams	Radiata Pine (*Pinus radiata*)
Curved timber wall near rear door	Leatherwood (*Eucryphia lucida)*, Myrtle (*Nothofagus cunninghamii*), Tas Oak (*Eucalyptus spp.*)
Exterior wall of offices within the building	Radiata Pine (*Pinus radiata*) strips veneer with Madison oil treatment
External walls - upper glazing	10mm thick twin-walled Polycarbonate
External walls – lower half	10mm thick arsenic-free Ecoply, locally produced with a Madison oil treatment
External timber beams	Laminated Frenchpine P/L Ecopine (non arsenic-based, treated pine)
Black Flooring material on ground floor	*Regupol* – recycled rubber
Roof membrane	Woven Fibreglass and Teflon coated

Design Intent

This tensioned, glazed structure, in its semi-rural siting in Scottsdale in Tasmania's northeast, has been compared with many other greenhouse-styled projects. These include the 'Biosphere II' project in Oracle, Arizona; the great, conceptual city-domes of Buckminster Fuller; and Thomas Herzog's use of the interstitial space between inner and outer skin in his houses at Regensburg (Johnston, 2001, p 85). Each of these is generally conceived, or built, at a larger scale than Robert Morris-Nunn's Forest EcoCentre, however, a second key difference may be seen in building's *demonstrated* effectiveness in climate control, through clever positioning, appropriate applications of material, and passive energy use. This effectiveness has been recognised through a wide range of awards for excellence in building, environmental architecture, structural innovation, and steel construction.

The Forest EcoCentre is a joint project between the (local) Dorset Council and Forestry Tasmania, supported by the Tasmanian State Government. The internal building contains three floors of Forestry Tasmania offices, which are not publicly accessible. The outer shell encloses the 'greenhouse style' interpretive centre on the ground floor; this centre contains displays that focus on local forest history, hardwood and softwood plantations, a café and retail outlet, and a Tasmanian Visitor Information Network (TVIN) point.

The visitor moves internally through the interpretative centre in a circular, clockwise direction, from the impressive Celery Top Pine (*Phyllocladus aspleniifolius*) bench at reception, past the café, through a lit tunnel (an ecologically-based 'Animal Walk'), to a series of timber framed display panels, and then back to the retail outlet at the reception point. For the visitor the journey is economical; easily navigated and repeated; informative and distinctly atypical in terms of tourist sites. Unlike their experience of most tourist buildings and interpretative centres, here the visitor is made aware of structure, environment and materials through transparency of design intent. Private and public zones are clearly articulated and very few visual clues are required to complete the journey through the interpretive centre.

Passive Climate Control

In Scottsdale, where winter temperatures frequently fall below zero (and frosts are common) and rise in summer to 20°C-30°C, this 'building within building' employs an internal buffer zone within the truncated oblique cone which comprises the outer shell. Rather than having a glasshouse next to a building, Morris-Nunn designed a glasshouse that surrounds the building; " … so the office building is actually immersed within this cocoon. So it's a sort of … an environmental envelope" (*GNT Future*, 23 June 2004), or what Johnston refers to as the "thermal-onion approach' (2001, p. 89).

The buffer zone contains native trees, shrubs and grasses that act as 'bio-mediators' – for passive oxygenation, cooling and heating, and for improving indoor air quality; notwithstanding the obvious attraction or tourists of experiencing a forest by proxy, while learning about it. This planting of species from the major forest communities of Northeast Tasmania is well advanced and healthy in its enclosed environment, three years from construction.

The building is naturally ventilated (no mechanical system is employed), through the 'stack effect'; whereby hot air rises and escapes, drawing up cool air, in each case through high and low metal louvres (in banks of about 30 sq. m). The movement of air through the building is specific to the season. The secondary office structure contains a thermal chimney (enclosed as a fabric 'tunnel') which punctures the three floors and which allows warm air (in winter) to be directed downwards from a top mounted low-velocity fan. In summer, cool external air is sucked in through the low level louvres, across the ground floor and up the centre of the office building through the fabric chimney. The chimney also draws up unwanted warm air through ceiling-level vents and directs it to escape through the higher louvres.

External vents open only when fresh air is required; the external louvre vents are partly sensor- (all sensors are wired to a central computer which measures temperatures and rate of airflow at various levels internally) and partly occupant-controlled. Electrical heaters can be pre-set by occupants to turn on in the internal offices on cold winter

mornings, until the sun warms the buffer zone; the same pre-set option exists for lighting within the work spaces.

External Structure

The conical external structure uses plantation pine softwood ribs – Morris-Nunn is doggedly specific when seeking timber from renewable resources, whether it is for cabinetry or framing. The inclined ribs of 300mm x 70mm glued-laminated eco-pine are treated with a non-arsenic based preservative. The walls are clad externally with 10mm thick arsenic-free Ecoply (locally produced with a Madison oil treatment) and 10mm thick twin-walled translucent polycarbonate sheet. The polycarbonate acts as double-glazing to reduce heat loss in winter, without the weight of conventional glazing. Stretched over the conical frame is a tension membrane made of fireproof 'Teflon' coated fibreglass, also with a twin skin to minimise winter heat loss. A central flying mast holds this membrane taut and apart.

Externally, the tension to the membrane roof is provide by an exposed system of 'laced' stainless steel wires in a double spiral pattern (inspired by the 'Fibonnaci series' spirals within a *Pinus radiata* cone). Rigidity is imparted to the exterior through galvanised steel strip pipes fastened at intervals of 90° to the Glulam ribs and braced with the steel tension wires that are anchored to exposed concrete footings. This lacing forms a highly aesthetic 'corset' that serves to constrain the ribs of the conical outer shell.

Internal Structure

Inside the rectilinear secondary three-storey structure constructed from an exposed primary frame of steel and hardwood flitch beams, laminated timber floor framing and cruciform flitch columns are the offices, including a 'roof' terrace. Much like a normal office building, this internal structure has fixed glass walls. These walls are set with operable sliding glass vents that open into the forested buffer zone. Set parallel to the glass vents are panels of timber slats, for privacy from below. However, unlike most office buildings the spaces are comfortably and naturally ventilated. Built at an equivalent cost to more conventional building with a similar function, the Forest

EcoCentre is designed to use 50% of standard operating energy (Dorset Municipality, c. 2003, p. 2).

Use of Timber

Morris-Nunn has used locally grown plantation timber for the structural components of this building, and recycled, endemic forest species for feature cabinetry, such as the reception desk, shelving, and the frames of display panels. The life of the timbers in this building is extended with the use of non-arsenic preservatives and sealants. This practice, in addition to the planted buffer zone, serves to ensure good indoor air quality. The base of the curved internal wall is clad in the warm tones of Leatherwood (*Eucryphia lucida*), Myrtle (*Nothofagus cunninghamii*), Tas Oak (*Eucalyptus spp.*) and timber details are employed, subtly, throughout the interpretive centre, reinforcing the two central tenets of this project and its progenitors: acknowledgement of the long tradition of the timber industry in this region; and the need to now responsibly and sustainably manage the production of timber and to rebuild and maintain Tasmanian forests and ecosystems.

Conclusion

This building is a best practice exemplar of what can be achieved if consideration of passive cooling and heating systems is done from the initiation of the project, rather that as a secondary and token effort. The building has many experimental aspects; the testing of these ideas and materials, in a 'real-world' setting, will provide valuable data for successive designers, and builders, particularly in terms of building in cooler climates, where the automatic response is to heat non-passively.

The motivation behind this project is best summed by Robert Morris-Nunn who acknowledges "the future must be creating new buildings that incorporate the wonderful historic environment that we've inherited, along with an increasing understating of all the environmental issues". If these two factors can be merged, he notes, "then these buildings, hopefully, are going to become catalysts to show others what is possible" (*GNT Future*, 23 June 2004).

References

'Award for Sustainable Architecture: Jury Citation for Forest EcoCentre Morris-Nunn& Associates', *Architecture Australia*, November/December 2003.
Dorset Municipality/ Forestry Tasmania, (c. 2003) *Forest EcoCentre: Your Guide*, Tasmania Visitor Information Network.
Johnston, L. (2001) 'Greenhouse perfect', *Architectural Review*, no. 75, pp. 84-89. c
Norrie, H. (2003) 'Forest EcoCentre', *Architecture Australia*, September/October.
'Robert Morris-Nunn, Preserving Heritage', *GNT Future*, ABC TV, Broadcast transcription: 6.30pm, 23 June 2004, Available at: http://www.abc.net.au/gnt/future/Transcripts/s1139109.htm, 4 October 2004.
Taggart, J. (c. 2003) 'Forest Eco-Center', *Wood Design & Building*, Available at: http://www.woodmags.com/wdb/mgazine_rack/2003_winter_26/ecocenter/index.php3, 1 October 2004.

On the Internet

ecocentre@forestrytas.com.au

Regupol: www.regupol.com.au/

Madison Oil timber treatment, see:
http://www.mabonstimberprotect.com.au/cellafaq.htm

Ronstan products: Forest Eco Centre [sic], Tasmania, Available at:
http://www.ronstan.com/arch/story.asp?story=676&section=gallery

Awards

2003 RAIA Tasmanian Architecture Awards

- Morris-Nunn & Associates: Winner of the Commercial Architecture Award
- Morris-Nunn & Associates: Winner of the Environmental Steel Award
- Morris-Nunn & Associates: Winner of the BHP Colorbond® Steel Award for the most innovative use of steel in architecture
- Morris-Nunn & Associates: Jury Citation for Sustainable Architecture

2002 Australian Timber Design Awards

- Morris-Nunn & Associates: Winner of the Public and Commercial Buildings 2002
- Morris-Nunn & Associates: Winner of Australian Timber Design Award 2002

2002 Lightweight Structures Association of Australasia Awards

- Morris-Nunn & Associates: Winner of Award for Excellence – medium structure between $1 million and $10 million

2002 Master Builders Association Awards

- Fairbrother: Winner State Award for Commercial Building less than $10 million
- Fairbrother: Winner National Award for Commercial Building less than $10 million