

Downland Gridshell

Location: Nr. Chichester, West Sussex, UK
Client: Weald and Downland Living Museum
Completed: May 2002
Size: 1,200 sqm
Construction cost: £1.35M

Awards:

- RIBA Award
- Stirling Prize Finalist
- BCI Award
- Civic Trust Award
- AIA Excellence in Design Award
- Wood Awards Gold Medal
- Wood Awards Structural Award
- Sussex Heritage Award
- European Wooden Facade Award



Downland Gridshell

The **inventive design and construction** of the Downland Gridshell – a complex weave of curving oak laths – suits the legacy of traditional rural life well.

The design, engineering and carpentry of the Downland Gridshell is groundbreaking. Yet its gently curving form and natural materials sit beautifully in the surrounding South Downs landscape of the Weald and Downland Living Museum where the buildings and artefacts of traditional rural life are brought to life.

The Gridshell is both a workshop for conservation, restoration and training, and an archive store for tools and artefacts spanning six centuries. In the large open space of the upper level, the Museum's carpenters can work on historic timber frames. It is also an ideal space for educational activities and events.

Below, sunken into the ground, an environmentally controlled store ensures long-term care of the collections, and 200 English vernacular wooden chairs are on display.

Context

The Downland Gridshell sits in an elevated position in an area of outstanding natural beauty on the South Downs.

Timber was a natural choice for a structure to support the preservation of historic timber-framed buildings. While drawing on modern design and technology, the Downland Gridshell also celebrates traditional carpentry and building techniques.

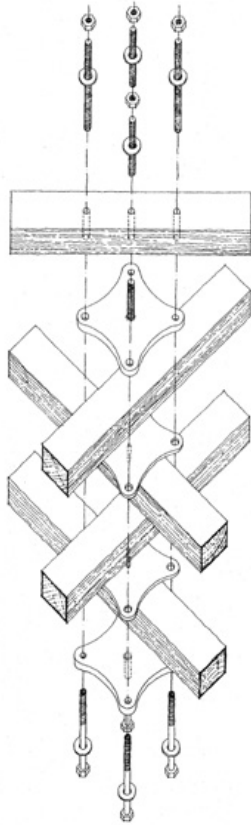
Visitors approach the Downland Gridshell along a steep footpath shaded by mature beech and ash trees. Timber steps lead up to the entrance through one of the fully glazed ends, with a dramatic canopy that extends overhead from the timber side cladding beneath the roof.

With the natural weathering of its cedar cladding, the building has matured well into the landscape.

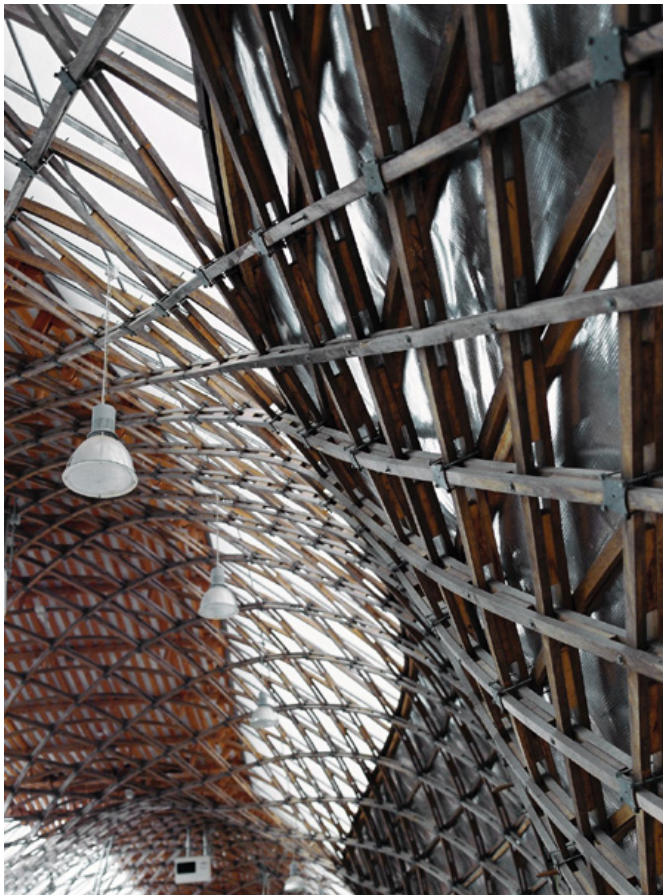
Collaboration

This was a complex project and would not have been possible without an inspired client and close consultation with Buro Happold, Boxall Sayer and the Green Oak Carpentry Company.

Exchange of ideas and expertise early in the process helped to provide clarity of vision, develop the design and devise ways in which this unique structure could be created. Right from the start, the carpenters sat around the table with the architects and engineers to design the details of the building.



Above: The design of the Gridshell is a fully integrated team effort and the patent for the steel node is held jointly in the names of the museum, the architects, the engineers and the carpenters.



Creativity

The Downland Gridshell was the first of its kind to be built in Britain. Its structure was a technical challenge for the architects, engineers and carpenters and new techniques had to be researched and developed.

The workshop space was built of green oak strips joined together to form long laths. A diagonal grid of these laths was initially formed flat on top of a supporting scaffold. Using gravity, the edges of the grid were then lowered gradually – a few centimetres each day – into a three-dimensional shape resembling a three-nut peanut shell. This was secured to the edges of the timber platform above the lower level. Cladding, roofing and installation of the ventilation system were then added.

The Downland Gridshell is clad with hardwood planks and glazing. Natural light enters through two continuous strips of polycarbonate clerestory windows two thirds of the way up the building.

A high degree of carpentry skill went into the Downland Gridshell's construction, emulating but not imitating the Museum's traditional timber-framed buildings. The green jointing of the laths from freshly sawn oak is unique: the timber was more supple and therefore more easily formed. The laths are connected at the nodes of the grid with a specially designed and patented system of steel plates and bolts.

Environmental control was necessary to respond to the physical working demands of the museum, especially the storage of fragile artefacts.

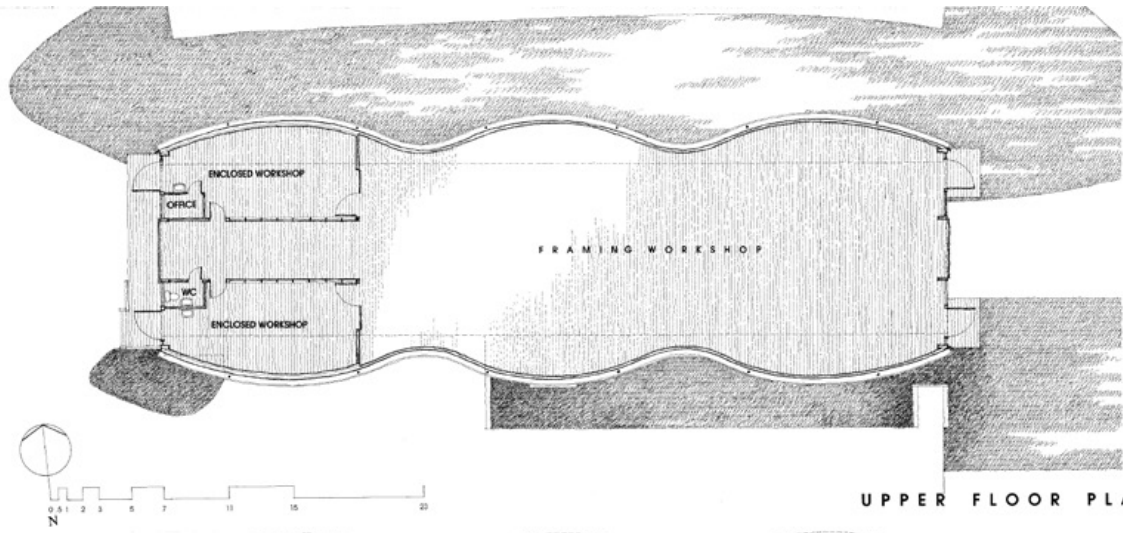
The lower level archive is sunk into the sloping chalk landscape to protect its valuable contents from natural, but potentially damaging, changes in the weather and sunlight. Maintaining fairly constant temperatures and humidity levels is achieved using very small amounts of energy.

Climate

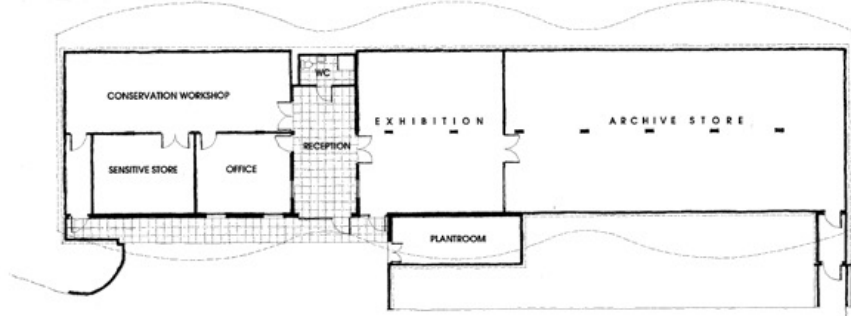
Environmental sustainability was critical in the design of the Downland Gridshell. Its embodied carbon is only 3 per cent of that of an equivalent steel or concrete structure.

Materials and skills were sourced as locally as possible. Although the timber slats had to be brought from Normandy, most of the other timber used, including the Western Red Cedar cladding, came from within 25 miles of the site.

The building runs on minimum supplies of energy. To reduce loads on water and power supplies, the building and site systems took advantage of natural features such as earth mass heating, with heat sourced from digging into the ground, and rainwater collection.



UPPER FLOOR PLAN



LOWER FLOOR PLAN



Above: The Gridshell was constructed as a flat carpet on a scaffolding about seven metres above the ground. The support was then taken away around the edges allowing the shape to drop towards an arched cross section. The sides were then pulled down and bolted to the edge beam, attached to a timber frame structure partially sunk into the ground.

