



The Angel of the North, Gateshead

Turner Prize-winning sculptor Antony Gormley's Angel of the North is one of the most viewed pieces of art in the world, seen daily by more than 90,000 drivers on the A1 and also by passengers on the East Coast Main Line between London and Edinburgh. Sitting at the head of the Team Valley, this vast dominating statue 20m high by 54m wide in weathering steel is the largest sculpture in Britain and is believed to be the largest angel sculpture in the world.

The sculpture was designed as 'a material image of a spiritual subject' and created by using construction techniques from heavy industry and shipbuilding. Aeronautics and anatomy are combined in an exoskeleton of ribs and diaphragms and an inner body made of plate.

Both the body and wings consist of a skin and external vertical and horizontal ribs. The vertical ribs on the body and the horizontal ribs on the wings are the main structural elements carrying bending moments, due to wind loading of up to 125mph. The 'skin' provides stability to the ribs and carried shear and torsion.



Award

Sculptor: Antony Gormley
Structural Engineer: Ove Arup & Partners
Steelwork Contractor: Hartlepool Steel Fabrications Ltd
Main Contractor: Hartlepool Steel Fabrications Ltd
Owner: Gateshead Metropolitan Borough Council

The foundations consist of eight 750mm diameter bored piles end bearing on rock with mineworkings being grouted. The pilecap is 12m by 8m, ensuring all piles remain in compression even under extreme wind loads.

The final design was produced using a series of models, with engineering requirements and constraints integrated into the artistic development to produce the final 'shape'. The setting out for the vertical ribs was defined geometrically from a central vertical axis, ensuring that the ribs could all be cut from flat plate. The internal structure skin was to be formed from conical and flat sections, with the external skin formed from 6mm thick plate which could be bent to form the doubly curved sections required.

The wings' upper and lower sections were initially fabricated in four sections on the main horizontal diaphragms, then each pair of these sections was joined by the central section. Finally the main wing assembly, involving full-strength butt welds to the 50mm thick main diaphragms, was completed.

Fabrication of the body began with the inner core and horizontal diaphragms, with the vertical ribs then prepared by hand to match the angle of the core plates and fitted. Over 2,000 pieces of internal horizontal rib were then welded between the vertical ribs to form the template over which the cosmetic skin was fitted.

The site splice between the wings and the body was originally conceived using splice plates and bolts in shear, but concerns about handling the large splice plates, and problems with fitting during trial erection, led to a late change to an end plate connection using bolts in tension.

The three pieces of the Angel (body and two wings) travelled overnight to site. At first light the body was lifted into place and by dusk the second wing had been fully bolted up. When the permanent welded connection and infill skin panels were added, the Angel was completed.

