

New horizons for London's tigers

ZSL London Zoo is often noted for its architecture as well as its animals. A revolutionary new enclosure, built from molybdenum-containing stainless steel mesh, maintains the Zoo's proud tradition of innovation. It creates a bespoke environment for Sumatran tigers, meeting all the big cats' needs.

The Zoo is one of the world's oldest. Founded in 1828 for scientific study, it was eventually opened to the public in 1847. Run by the Zoological Society of London (ZSL), it is part of a charity devoted to the worldwide conservation of animals and their habitats. It currently houses over 700 species.

Many leading architects have contributed to the built environment at the Zoo. Berthold Lubetkin, as an example, designed the world-famous penguin pool. Over the years, the emphasis has shifted from architectural masterpieces to innovative designs which put animal welfare and conservation first. ZSL is firmly committed to creating the best environment for its animals, while giving the public the chance to experience some of the world's most endangered species at close quarters.

This was the brief for the architects commissioned to design 'Tiger Territory', a new £3.6m enclosure for the zoo's Sumatran tigers. Five times the size of the previous compound, the new exhibit was designed with ZSL's team of tiger keepers, conservationists and experts to ensure that it perfectly matched the needs of these magnificent creatures.

Combining strength with transparency

One of the most important requirements was that the roof of the enclosure covering the 2,500 square meters of exterior habitat be transparent. Tigers in the wild like to observe their terrain from a high vantage point with uninterrupted views to the horizon. Working with structural engineers and specialist subcontractors, the design



The superstrong mesh is virtually transparent, allowing tigers to survey their territory all the way to the horizon as they would do in the wild. © ZSL London Zoo

team was able to realise a concept incorporating a ground-breaking, virtually transparent 'roof' made from an ultra-strong and super-lightweight material – woven Type 316 stainless steel mesh. The 'roof' reaches 17 meters high in places to accommodate the tall trees and feeding poles, set at a height to encourage natural climbing behaviours.

Sophisticated computer modelling made it possible to provide the required strength while minimizing the dimension of the stainless steel wire and maximizing the mesh size. The resulting product was manufactured from Type 316 stainless steel wires just 3 millimeter in diameter with remarkably large holes. The combination of thin wires and an open gauge results in a mesh that is nearly transparent, yet is immensely strong.

The 'roof' was created by stitching together large pieces of mesh with the same 3 millimeter diameter wire to cover the entire enclosure, held in tension by poles which are anchored in the ground. In some areas, the mesh attaches to viewing galleries where floor-to-ceiling glass windows allow visitors to come face to face with the tigers.

Unlike a standard square mesh, this mesh is able to stretch horizontally and vertically due to its rhombus-shaped weave. The mesh is therefore able to 'drape' around the enclosure and the support poles, creating a flowing organic shape, which fits with the natural environment below.

A lasting home for conservation

Thanks to the high strength and ductility of the stainless steel wire, the mesh is capable of withstanding both the full impact of a tiger (an average size animal can exert some 500 kilograms per square centimeter) and the effects of a 1-in-100 year London winter, including the loading weight of significant snowfall. The 2% molybdenum addition in Type 316 stainless steel greatly increases its corrosion resistance, helping to protect it from the effects of city centre pollution for the length of its design life.

Opened in 2013, Tiger Territory is now the central hub for ZSL's tiger conservation work, providing the perfect environment for their specialists to learn more about these elusive animals and apply that learning to conservation projects in the

field. Both the European Endangered Species Breeding Programme and the Global Species Management Programme for Sumatran tigers are coordinated from ZSL London Zoo.

It seems that the tigers' new home is conducive to breeding this critically endangered species, with a trio of cubs – Nakal, Budi and Cinta – born to parents Jae Jae and Melati in February 2014. With Sumatran tiger numbers estimated to be as low as 300 in the wild, this was a huge achievement for ZSL London Zoo and the global breeding programs. A further two cubs – as yet unnamed – were born in June 2016.

Molybdenum is found in a surprising number of applications around the world, many of which make a contribution to sustainable development. By playing a part in creating an optimal breeding environment for these tigers, this enclosure is one more example of how molybdenum's unique properties are being harnessed to contribute to a more sustainable future for the planet. (Alan Hughes)