



Steel:

the sustainable bridge solution

Gateshead Millennium Bridge

Environmental Bridge floated in: minimum impact of construction on local community

Social Landmark structure linking Newcastle and Gateshead, and regeneration / development of East Gateshead

Economic Offsite construction minimised disruption to river traffic

Steel is the most sustainable construction material. The basic raw material – iron – is the most abundant of all the earth's elements. It is an infinite resource as steel can be recycled indefinitely without any loss of property or performance.

Sustainability demands that we satisfy crucial economic and social as well as environmental criteria – the 'triple bottom line' – and steel bridges allow all those boxes to be ticked.

Sustainability is built into steel all along the supply chain, from responsible sourcing of raw materials through a manufacturing process dedicated to continuous improvement to the production of modern and efficient bridges.

Steel unarguably provides the most sustainable choice for bridges. Steel solutions score highest on all the sustainability measures, whether the design calls for a landmark structure like the Gateshead Millennium bridge, a short or long span highway or railway structure, a lightweight moving bridge to open up a residential or commercial development or regeneration, or a temporary, demountable bridge.



Environmental

Steel is the most recycled construction material and choosing it for bridges represents a sustainable management of natural resources. Some 99% of structural steel either finds its way back into the steelmaking process where it is used to create new steel products, or is re-used. There is no degradation in the performance of recycled steel, it is multicycled. Component parts of bridges can be re-used in other structures; entire bridges have been relocated and bridges can be designed with ease of future relocation in mind.

Steel minimises the impact of construction on local communities as there is much less site traffic.

Newport City Footbridge

Environmental Lightweight steel deck avoided any works in the tidal river thus avoiding impact on the local river ecology

Social Location of major support structure on the west bank kept work away from nearby dwellings on the East side

Economic Landmark structure delivered within tight cost and time constraints

Social

Society gains in many ways from the benefits delivered by steel bridge solutions. Landmark steel bridges that embody good design, are economical, and quickly built, have stimulated regeneration of many former industrial, dock and canal-side areas.

Disruption to road and railway users is minimised, if not eliminated, by taking advantage of the ability of steel bridges to be installed with minimal fuss. Offsite fabrication also means far fewer site visits from heavy vehicles, benefiting local communities. The typically rapid construction period for a steel bridge means that unavoidable impacts on local people and businesses will be as short as possible.

Steel bridges represent the superior option when health and safety is considered. Offsite fabrication means steel is safely manufactured in factory conditions. Automated production, using robotic welders for example, makes for safer working environments. Work on site is inherently safer, with far fewer trades and operatives involved and, because steel is speedily erected, less pressure of time.

The steelwork contractor's trade association, the British Constructional Steelwork Association, has a continuous programme of research, education and publications aimed at improving the already highly creditable safety performance of the steel construction industry. The BCSA's Safe Site Handover Certificate is an outstanding example of a modern safe working

practice, and its Sustainability Charter, which all member companies can sign up to, represents another best practice initiative from the steel construction sector.

Training of the specialist workforce is easier in a factory type environment, ensuring an increasingly skilled workforce. Steel construction involves workers in far fewer journeys to work than those involved in other forms of construction. The skilled steel construction workforce, being mostly factory based, is less itinerant than other parts of construction, benefiting family life.

Hunslett Viaduct

Environmental Offsite production in modern fabrication plants minimised waste

Social Weathering steel celebrates the industrial heritage of the area

Economic Efficient use of resources, a durable solution with minimum future maintenance



Environmental

- CO² and energy
- Recycling and reuse
- Lightweight construction
- Minimising waste

Social priorities

- Factory production
- Skills development
- Health and safety
- Appearance

Selecting steel for bridges is a good way of reducing energy

	Steel sections	Steel plate
Embodied CO ₂	0.762 tCO ₂ /t	0.919 tCO ₂ /t
Embodied energy	13.12 GJ/t	17.37 GJ/t

consumption and the level of CO₂ emissions. Figures based on World Steel Association data show that steel scores convincingly on these two key sustainability measures (see table).

Offsite production in modern fabrication plants using state-of-the-art CNC machinery integrated with CAD software ensures that waste is minimised, both during manufacture of steel sections and on site. Waste minimisation is promoted by good designs that minimise use of materials; Corus provides a full range of technical back up for designers to promote this aim.

Sheppey Crossing

Environmental Launched over the Swale to minimise the impact on the river

Social Provides much needed improved access to the Isle of Sheppey

Economic Cost effective solution to a major DBFO contract



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 re-use
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Economic

Steel is recognised as the economical and most sustainable option for an increasingly wide range of bridges. Dominant in the long span and railway bridge markets, steel is now the choice for shorter span and highway structures as well.

Steel bridges represent an efficient use of resources and are readily adaptable to changing road configurations and increased loading, which would render other types of structure obsolete ahead of their original design lives. Bridge owners also increasingly value steel for its durability – a proven life span of at least 100 years - and low-maintenance advantages.

Being inherently durable and lightweight compared to alternative materials helps make steel the most economical option, minimising substructure costs, especially in poor ground. Because of steel's minimum self-weight bridge sections are transported to site only when needed, and easily handled once there. Most work is carried out offsite resulting in shorter and more predictable construction programmes.

Steel bridges can also be assembled adjacent to their final location and quickly lifted into position, minimising the need for costly possessions of highways and railway track. The approach to bridge construction made possible by steel allows disruption to road and rail users to be kept to a minimum, if not eliminated, with significant positive knock-on effects for the UK economy.

A2/A282 Viaducts

Environmental Reduced site traffic minimises impact of construction on local communities

Social Use of weathering steel minimises future maintenance / disruption and brings H&S benefits

Economic Lightweight steel lifted into position during night closures to minimise disruption during construction

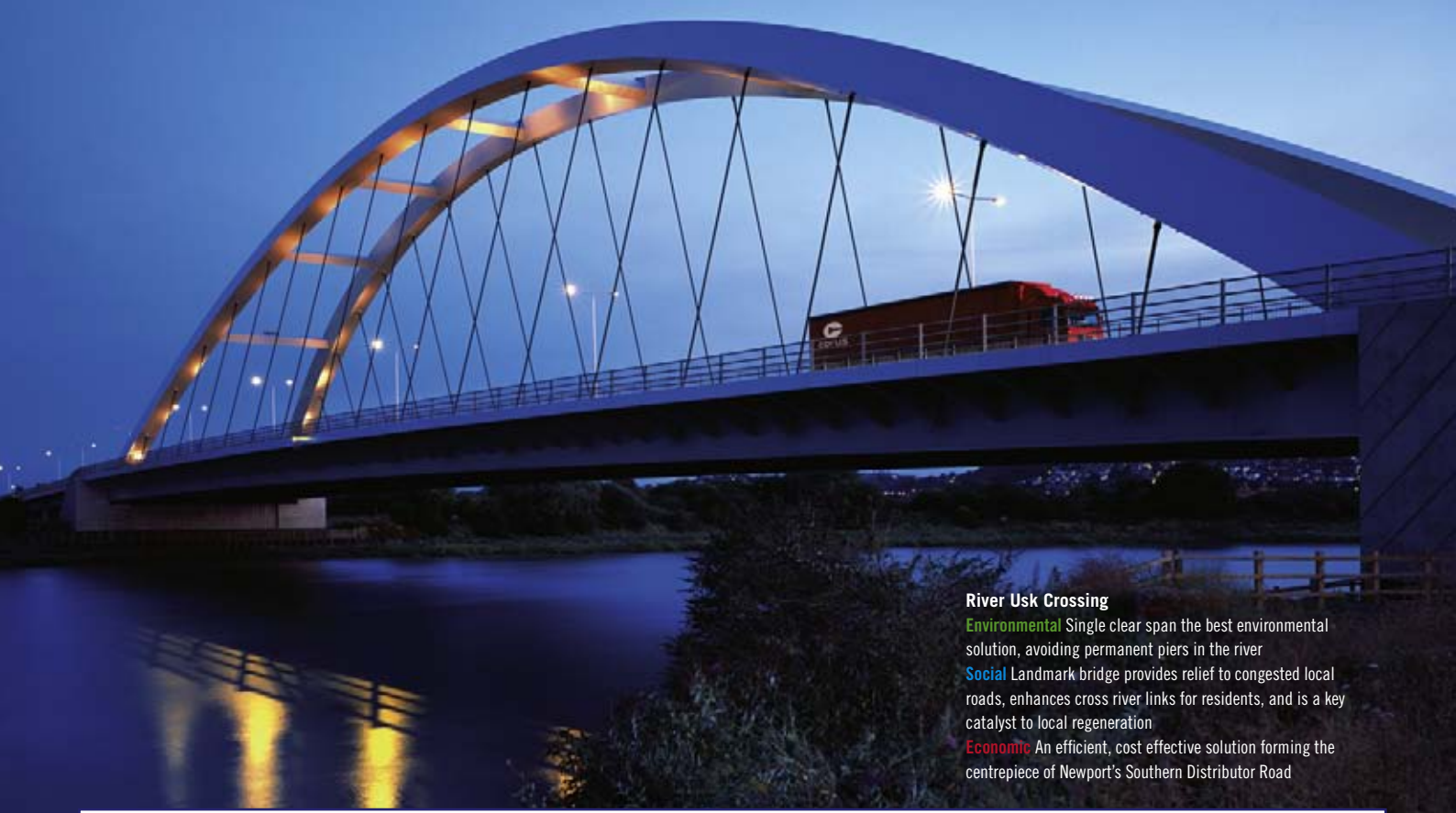
Protective, long-life coatings can easily be applied at the fabrication plant. Use of weathering steel, which needs no protective or other coatings, is increasingly popular, for aesthetic reasons as well as minimising the need for future maintenance and associated road closures. Steel bridges lend themselves to easy and rapid strengthening or repair in the event of accidents, with well proven techniques like heat straightening ensuring that damaged structures are soon back in use.

High quality, defect-free structures are best assured by using steel for bridges. Bridge owners have the reassurance that the long term performance of a steel structure's elements is easily assessed from visual inspection – there are no structural elements hidden in ducts and other areas where visual inspection is not possible.



Economic priorities

- Efficient use of resources
- Adaptability
- Durability
- Minimal disruption



River Usk Crossing

Environmental Single clear span the best environmental solution, avoiding permanent piers in the river
Social Landmark bridge provides relief to congested local roads, enhances cross river links for residents, and is a key catalyst to local regeneration
Economic An efficient, cost effective solution forming the centrepiece of Newport's Southern Distributor Road

Steel Construction Sustainability Charter

The British Constructional Steelwork Association has developed a Sustainability Charter for steelwork contractors, setting out a coherent strategy of prioritised sustainable development objectives against which progress is annually reviewed. Signatories to the Charter commit to a wide range of sustainable practices across their operations and agree to an annual assessment of performance against the commitments made.

The Charter aims to develop steel as a sustainable form of construction in terms of the triple sustainability objectives of economic viability, social progress and environmental responsibility.

Sustainability Charter Members make formal declarations on a range of measures designed to drive a continuous improvement in sustainability performance. For example, they commit to operate their businesses in efficient and financially sustainable ways.

They work to optimise the impact of manufacturing and construction activities on the eco-efficiency of steel construction through its life cycle, and to increase the efficiency of use of resources and energy in steel construction by promoting the recovery, reuse and recycling of steel.



A34 Chieveley

Environmental Offsite fabrication minimised the impact of construction on the local community
Social Minimum future maintenance brings health and safety benefits
Economic Minimum capital cost, minimum whole life cost, and quickest to build

Meeting the Highways Agency's sustainability goals

The Highways Agency's approach to sustainable construction and maintenance is contained in its document 'Building Better Roads: Towards Sustainable Construction'. Steel bridges allow all of the agency's goals in relation to structures to be easily met.

For example, the aim of promoting re-use of structures can only be met by turning to the demountability potential of steel, and the fact that all steel can be recycled means all the steel will be re-used.

The objective of designing for minimum waste hardly need trouble those designing in steel, as waste minimisation is built into the steel construction process. Fabrication is highly automated and efficient and there is virtually no waste arising on site. UK steel bridge designers are recognised world leaders in achieving economic solutions by optimising girder components for minimum weight, leading to lean construction in both the superstructure and substructure.

Corus corporate responsibility

Corus is a socially responsible steel supplier committed to continuous improvement of all its own processes, as well as supporting the developing sustainability objectives of the whole steel construction supply chain.

Corus has a long-term commitment to research and development that will help the construction industry achieve sustainability aims, and has pledged to continue this tradition as new challenges arise to our world's sustainable future.



The British Constructional Steelwork Association

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