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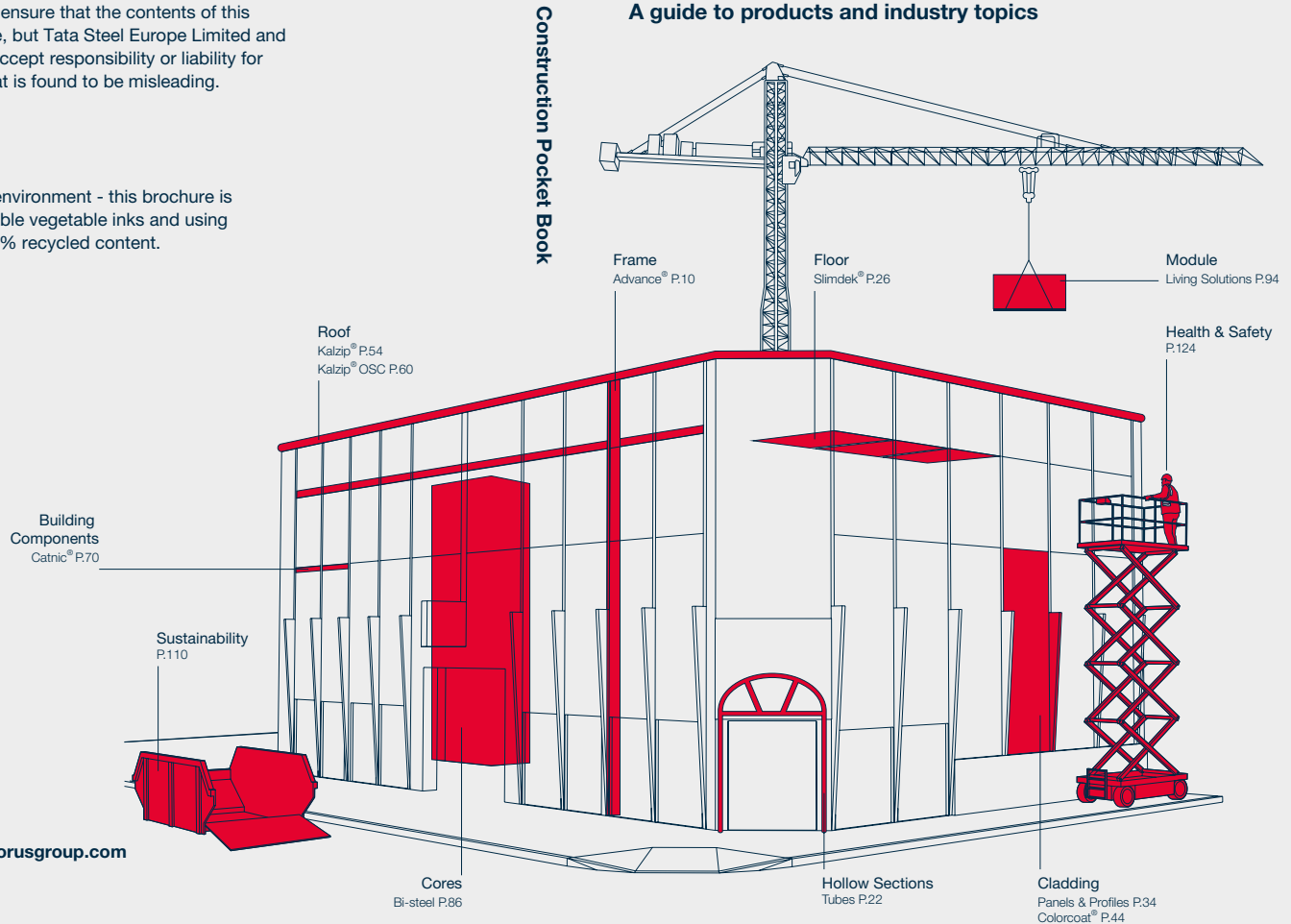
Construction Pocket Book

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Corus

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A guide to products and industry topics



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Foreword

We are delighted to welcome you to our new construction pocket book, which provides quick and easy reference to our leading construction products and some of the issues facing the industry at this time.

As you will see, Corus has a wide portfolio of products that all share the common characteristics of quality, sustainability and ease of use. All steel construction products are engineered off-site to facilitate safety, speed of installation and the minimisation of rework and waste. These benefits have real value so the construction industry is increasing its use of off-site technologies. They are often referred to as 'modern methods', but steel construction products have always been delivered this way.

Here at Corus, we are dedicated to continuous improvement and innovation in everything we do. We have developed a tremendous knowledge of steel and its various applications, but we are constantly researching ways that our versatile and reliable material can be put to further good use. We are always happy to share our knowledge, so that you can take it and apply it to achieve your aims. That is the spirit in which we present you with this pocket book of our construction products.

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Corus steel construction

Welcome to the construction pocket book; designed to give you a useful guide to Corus construction products, along with valuable information on the role and importance of steel in the construction industry.



Building for a better future

At Corus we are proud of our manufacturing excellence and of our long and positive association with the construction industry. Construction is the largest single market for Corus products, representing well over 30% of our turnover, and we produce a wide range of steel construction products and systems, all manufactured to the same high quality.

The enduring popularity of steel derives from the many advantages that flow from its use. Aesthetically, steel-framed buildings incorporating steel-based cladding systems or tubular steel as architectural features strike a modern note. At the same time, constructing in steel is one of the best ways of building for a better future; steel retains its modern feel and look far longer than any other construction materials, so buildings made with steel have a longer life span before needing to be refurbished.

Another reason for steel's prominence at the centre of many truly sustainable developments is its off-site capabilities. This modern method of construction continues to grow for many reasons, not least because of the benefits it brings to both sustainable construction and health and safety, which are two of the highest priorities for the construction industry and for Corus.

It's hard to imagine a world without steel

Corus is the UK's largest steel maker and a subsidiary of Tata Steel, one of the world's top ten steel producers. An international manufacturer, processor and distributor of steel and aluminium products, we also provide related services in design, technology and consultancy; all from our manufacturing operations, sales offices and service centres across the globe.

Unbeatable breadth of range

Construction is the largest single market sector for Corus products. As well as our *Advance* structural sections range, Corus manufactures structural plate and hollow sections including ovals, composite steel floor decking; a full range of cladding and roofing products including Colorcoat and Kalzip; a variety of other building products including Catnic lintels; and systems such as light-steel framing and modular construction.

Listening to customer needs

Market driven development has been key to the ongoing success of structural steel in the UK. By working closely with our customers and designers we have been able to develop a range of products and systems such as Slimdek, Slimflor and Bi-Steel that answer specific customer needs.

Investing in research and development

Corus is committed to improving the effective application of steel in construction. Long-term investment in developments such as plastic design, structural fire engineering and composite construction has helped position structural steel as the preferred first choice for the structural frame of industrial and commercial buildings in the UK.

A driving force for innovation

Products made off-site are becoming crucial to many construction projects, and Corus is constantly driving for better and more innovative products and systems. For example, Catnic continues to expand its range and is now producing even wider lintels than before. Meanwhile, the OSC roofing system produced by Kalzip is a lightweight roof assembled onto a steel frame, which can be assembled quickly and with minimal on site disruption - of huge benefit where time and space are limited.

Research work on acoustics and vibration performance is now showing steel to be an effective choice in the health and residential markets. Plus, significant work on steel's contribution to sustainable

development is ongoing, along with the production of application guidance to help with the introduction of harmonised European design codes and to ensure that construction clients, customers and designers continue to make the most effective use of steel.



201 Bishopsgate and The Broadgate Tower, London

(William Hare Group Ltd. Photography: Mike O'Dwyer)

Investing in manufacturing

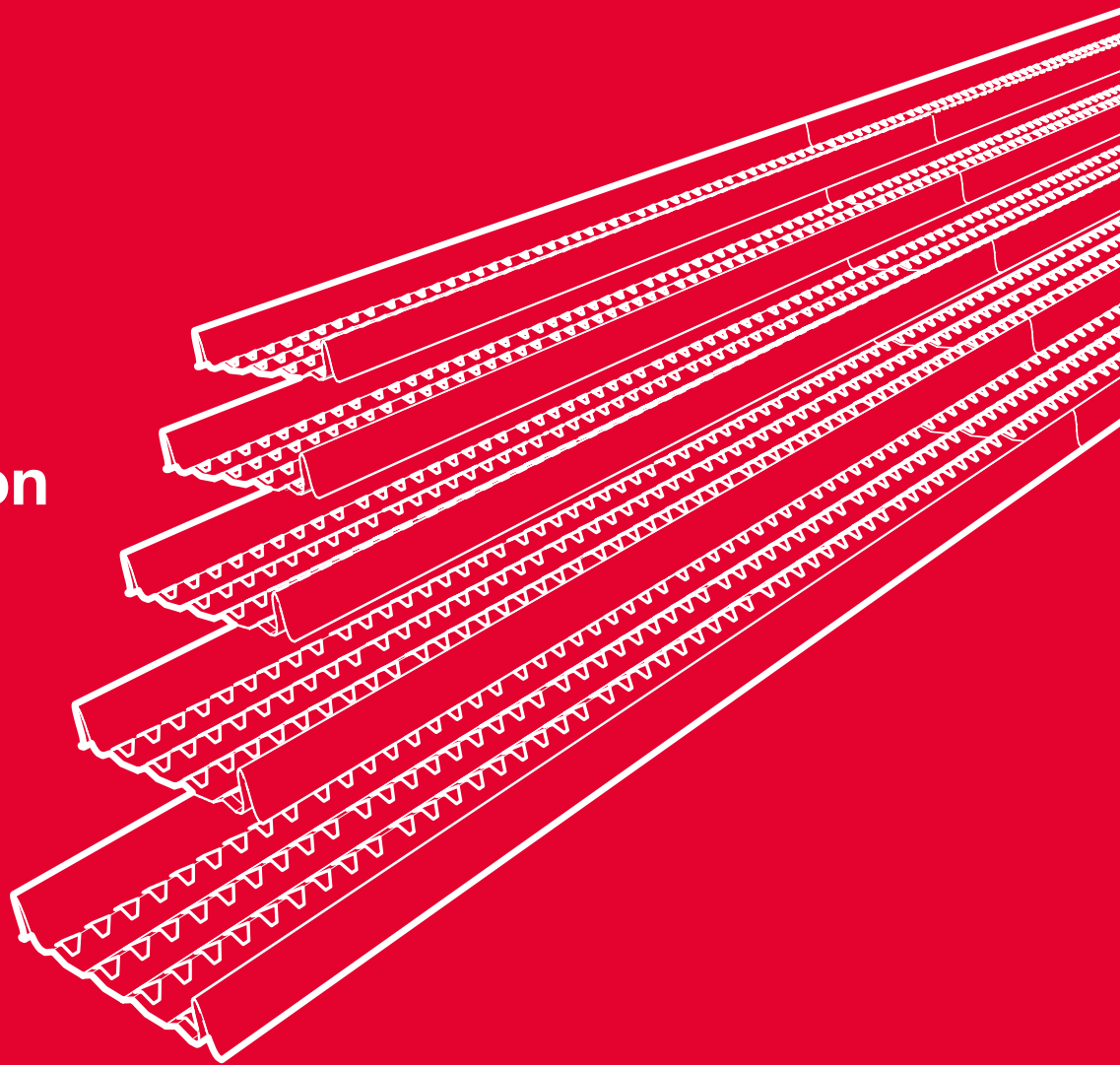
At Corus we are committed to the continuous improvement of our processes and the effective application of steel in construction, and since the late 1970s we have worked closely with our customers and designers to develop the UK as the unrivalled world leader in the use of steel in construction.

Continued major investment in our manufacturing capabilities has raised our game, enabling us to provide world-class processes that will help us meet customers' future expectations. Today, we also offer a free technical advisory service that assists with all aspects of the use of our products - from initial selection

of material through to structural design and associated issues, including fire engineering, durability, acoustics and vibration performance. This improved understanding of our customers needs has put us at the forefront of service leadership.

This construction pocket book is aimed at giving you a greater understanding of the vast range of steel construction products and systems available from Corus. We hope it will also provide a basis for demonstrating the importance of steel in the construction industry.

Construction product groups



Advance® structural sections

The world-class solution



Vulcan House, Sheffield

Guaranteed to comply with European legislation

The *Advance* section range was introduced in September 2006. A key driver behind their introduction was the need for all structural sections used in the UK and the rest of Europe to comply with the Construction Products Directive (CPD 89/106/EEC). Specifying sizes from the *Advance* range guarantees structural sections that are compliant with the CPD.



Watermark Place, London

Your at-a-glance guide to Advance

The Advance range of sections, rolled from mills in Scunthorpe and Teesside, includes beams (UKB) in

sizes up to 1016mm deep, columns (UKC), bearing piles (UKBP), parallel flange channels (UKPFC) and angles (UKA).

The tables below give an at-a-glance indication of some of the most popular *Advance* section beam and column sizes available.

**'At a glance' Advance UK Beams**The full *Advance* sections range can be found at www.corusconstruction.com/pocketbook

Designation												Ratios for local buckling		Second moment of area		Radius of gyration		Elastic modulus		Plastic modulus		Buckling parameter	Torsional index	Warping constant	Torsional constant	Area of section	Indicative values for Advance275		
Serial size	Mass per metre	Depth of section	Width of section	Thickness of web	Thickness of flange	Root radius	Depth between fillets	Flange	Web	Axis	Axis	Axis	Axis	Axis	Axis	Axis	Axis	Axis	Axis	Axis	Axis	u	x	H	J	cm ²	M _{cx} kNm	P _{cy} * for L _e =3.5m	
	kg/m	D mm	B mm	t mm	T mm	r mm	d mm	B/2T	d/t	x-x cm ⁴	y-y cm ⁴	x-x cm	y-y cm	x-x cm ³	y-y cm ³	x-x cm ³	y-y cm ³	x-x cm ³	y-y cm ³	x-x cm ³	y-y cm ³			dm ⁶	cm ⁴		M _{cx} kNm	kN	
762x267	134	133.9	750.0	264.4	12.0	15.5	16.5	686.0	8.53	57.2	150692	4788					29.7	5.30	4018	362	4644	570	0.854	49.8	6.46	119	171	1280	3200
610x229	113	113.0	607.6	228.2	11.1	17.3	12.7	547.6	6.60	49.3	87318	3434					24.6	4.88	2874	301	3281	469	0.870	38.0	2.99	111	144	869	2780
	101	101.2	602.6	227.6	10.5	14.8	12.7	547.6	7.69	52.2	75780	2915					24.2	4.75	2515	256	2881	400	0.864	43.1	2.52	77.0	129	792	2340
533x210	92	92.1	533.1	209.3	10.1	15.6	12.7	476.5	6.71	47.2	55227	2389					21.7	4.51	2072	228	2360	355	0.872	36.5	1.60	75.7	117	649	2180
	82	82.2	528.3	208.8	9.6	13.2	12.7	476.5	7.91	49.6	47539	2007					21.3	4.38	1800	192	2059	300	0.864	41.6	1.33	51.5	105	566	1910
305x165	46	46.1	306.6	165.7	6.7	11.8	8.9	265.2	7.02	39.6	9899	896					13.0	3.90	646	108	720	166	0.891	27.1	0.195	22.2	58.7	198	945
	40	40.3	303.4	165.0	6.0	10.2	8.9	265.2	8.09	44.2	8503	764					12.9	3.86	560	93	623	142	0.889	31.0	0.164	14.7	51.3	171	816
305x102	25	24.8	305.1	101.6	5.8	7.0	7.6	275.9	7.26	47.6	4455	123					11.9	1.97	292	24	342	39	0.846	43.4	0.0273	4.77	31.6	94.1	174
254x146	31	31.1	251.4	146.1	6.0	8.6	7.6	219.0	8.49	36.5	4413	448					10.5	3.36	351	61	393	94	0.880	29.6	0.0660	8.55	39.7	108	529
203x133	25	25.1	203.2	133.2	5.7	7.8	7.6	172.4	8.54	30.2	2340	308					8.56	3.10	230	46	258	71	0.877	25.6	0.0294	5.96	32.0	70.9	379
203x102	23	23.1	203.2	101.8	5.4	9.3	7.6	169.4	5.47	31.4	2105	164					8.46	2.36	207	32	234	50	0.888	22.5	0.0154	7.02	29.4	64.4	223

Dimensions and properties to BS4-1:2005

*Sections in italics may become slender under axial compression

**'At a glance' Advance UK Columns**The full *Advance* sections range can be found at www.corusconstruction.com/pocketbook

Designation												Ratios for local buckling		Second moment of area		Radius of gyration		Elastic modulus		Plastic modulus		Buckling parameter	Torsional index	Warping constant	Torsional constant	Area of section	Indicative values for Advance275	
Serial size	Mass per metre	Depth of setion	Width of section	Thickness of web	Thickness of flange	Root radius	Depth between fillets	Flange	Web	Axis	Axis					Axis	Axis	Axis	Axis	Axis	Axis							P _{cy} for L _e = 3.5m
	kg/m	D mm	B mm	t mm	T mm	r mm	d mm	B/2T	d/t	x-x cm ⁴	y-y cm ⁴					x-x cm	y-y cm	x-x cm ³	y-y cm ³	x-x cm ³	y-y cm ³	u	x	H dm ⁶	J cm ⁴	cm ²	M _{cx} kNm	kN
254x254	89	88.9	260.3	256.3	10.3	17.3	12.7	200.3	7.41	19.4	14268	4857				11.2	6.55	1096	379	1224	575	0.850	14.5	0.717	102	113	324	2340
	73	73.1	254.1	254.6	8.6	14.2	12.7	200.3	8.96	23.3	11407	3908				11.1	6.48	898	307	992	465	0.849	17.3	0.562	57.6	93.1	273	1980
203x203	60	60.0	209.6	205.8	9.4	14.2	10.2	160.8	7.25	17.1	6125	2065				8.96	5.20	584	201	656	305	0.846	14.1	0.197	47.2	76.4	180	1430
	46	46.1	203.2	203.6	7.2	11.0	10.2	160.8	9.25	22.3	4568	1548				8.82	5.13	450	152	497	231	0.847	17.7	0.143	22.2	58.7	137	1080
152x152	30	30.0	157.6	152.9	6.5	9.4	7.6	123.6	8.13	19.0	1748	560				6.76	3.83	222	73	248	112	0.849	16.0	0.0308	10.5	38.3	68.1	536
	23	23.0	152.4	152.2	5.8	6.8	7.6	123.6	11.2	21.3	1250	400				6.54	3.70	164	53	182	80	0.840	20.7	0.0212	4.63	29.2	48.4	392

Dimensions and properties to BS4-1:2005

Steel properties

Steel sections used in the UK should comply with EN 10025:2004: Part 2 – technical delivery conditions for non-alloy structural steels. The table below shows the typical UK grades and properties for structural sections to EN10025:2004: Part 2, and how these relate to *Advance* sections from Corus.

Comparison of grades for *Advance* sections, EN10025: Part 2:2004 and BS4360:1990

Advance sections		EN10025: Part 2:2004				BS4360:1990
Grade	Grade	Yield (R_{eH}) min	Tensile (R_m)	Charpy v-notch longitudinal Temp (°C)	Energy (J) t=16mm	Grade
		Strength at t=16mm (N/mm ²)				
Advance 275JR	S275JR	275	410/560	20	27	43B
Advance 275J0	S275J0	275	410/560	0	27	43C
Advance 275J2	S275J2	275	410/560	-20	27	43D
Advance 355JR	S355JR	355	470/630	20	27	50B
Advance 355J0	S355J0	355	470/630	0	27	50C
Advance 355J2	S355J2	355	470/630	-20	27	50D
Advance 355K2	S355K2	355	470/630	-20	40	50DD

Example - EN10025: Part 2:2004 - S275JR becomes *Advance* 275JR

Steel limiting thickness

This table indicates the limiting thickness (t_l) for the common situations of steel used in an internal environment and as exposed steelwork. These values have been extracted from Table 4 of BS5950-1:2000 which also covers much colder temperatures, such as those found in refrigerated stores,

and other steelwork such as plates and hollow sections, the sub-grade designation indicates the Charpy impact value, which is a measure of toughness (a combination of strength and ductility).

Limiting thickness (t_l) for different grades and sub-grades

Steel grade and quality	Maximum thickness t_l (mm) when $K=1$ according to minimum service temperature T_{min}	
	Normal temperature	
	Internal -5°C	External -15°C
Advance 275JR	36	20
Advance 275J0	65	54
Advance 275J2	94	78
Advance 355JR	25	14
Advance 355J0	46	38
Advance 355J2	66	55
Advance 355K2	79	66

The benefits of steel construction

For many years, steel has provided a cost-effective form of construction for both industrial and commercial buildings.

The creation of new, exciting buildings brings architectural demands which are constantly stretching the performance of the structural elements and the ingenuity of engineers. Whether the requirement is for an open structure, a curved façade or a long span, steel meets the challenge with spectacular results.

Construction methods and details have been developed to ensure that steel is able to economically meet the strict acoustic and thermal regulations contained within the Building Regulations. However, many factors contribute to cost effectiveness and whilst the weight of steel can give a crude measurement of efficiency, it doesn't take into account the reduced costs of fire protection and cladding and the ease of service installation, which can provide substantial benefits.

The economics of construction suggest that the ratio of capital cost: operational costs: business generated is 1:5:200 so provision of a flexible solution for changing business needs – which have a much shorter life cycle than the building – makes sound economic sense.

Key benefits offered by steel construction are:

- **Speed on site**
- **Economy**
- **Flexibility**
- **Adaptability**
- **Predictability**
- **Precision**
- **Health and safety**
- **Known performance in fire**
- **Sustainability**
- **Recyclability**
- **Lightness of structure**
- **Long span.**

Speed and cost of construction

All steel construction uses prefabricated components that can be rapidly installed to give the construction programme predictability and allow the client to benefit sooner from earlier business activity, sales or rental income. The reduced construction period can lead to a reduction in the cost of site preliminaries and the cost of management, resulting in a cost saving of up to two per cent of

the finished building cost. Faster construction reduces the cost of finance, since a shorter construction period reduces the time during which interest has to be paid. The rapid completion of a building also brings an earlier return on investment as new tenants can move in sooner, offsetting the cost of borrowing.





Flexibility and adaptability

The ease with which a building can be extended can be an important factor in responding to the changing needs of a building owner or occupier. The most sustainable solutions ensure that buildings can be simply and easily adapted and that, if necessary, additional members can be attached to an existing frame with minimum disturbance and cost. Steel frames are easier to alter than the alternatives if the building use changes. Long-span steel construction reduces the number of vertical columns in a building and offers complete flexibility of internal layout. It means that a building can be configured to incorporate any combination of large open-plan areas, individual rooms and corridors. For all steel systems, internal walls can be repositioned, allowing buildings to be adapted endlessly to suit the changing needs of their occupants.

For spans up to 12m, shallow floor solutions can be used to reduce floor depth and provide a flat soffit with complete flexibility of layout.

The integration of services within the structural elements of buildings gives designers the opportunity to reduce storey height. This provides the double benefit of reducing the amount of cladding required and reducing heat loss through the envelope.



Reduced disruption

Steel construction can dramatically reduce the impact of building activities on the surrounding area. This is particularly important in inner city locations or sites close to residential areas. Steel construction minimises noise and dust, shortens the construction period and reduces the amount of waste generated. Deliveries are fewer and can be timed to suit local traffic conditions. Steel offers lighter construction and consequently requires smaller foundations, which all contributes to the reduced construction period and disruption to the area around the site.



Fire safety and fire engineering

The need for safe and efficient buildings has meant that steel systems have been subjected to detailed research over many years to ensure that the effects of fire on the material and components is fully understood. The result of this research is the ability to fire engineer a steel structure to ensure that it meets the legislative requirements at the minimum of cost, without compromising safety – in some circumstances without applied fire protection.

Fire protection is often on the critical path so off-site application has significant benefits in terms of increased speed of construction.

Sustainability

Steel-framed buildings are flexible in layout and adaptable. Steel is demountable and the elements can be revised. Steel offers a clean, efficient and rapid construction method, which reduces the impact of building activities on the environment. All steel construction is produced efficiently and the prefabrication process minimises abortive activities and waste.

The small amount of waste produced during manufacture and fabrication is collected and recycled. Steel can be recycled time and again without detriment to its properties or performance. Other structural materials do not offer the same scope for recycling as, in the main, they can only be downgraded. 40 per cent of world steel production is from recycled material but overall global demand cannot be satisfied by recycled material alone.

Aesthetics

The nature of steel construction expands the possibilities for architectural expression. Opportunities arise through the use of features such as shallow floor construction, storey high glazing, columns within separating walls and long-span internal structures. The versatility of steel construction allows complex geometries to be used that satisfy the architectural concept and create landmark designs with exposed steelwork and large, open spaces.



Built-in quality

Off-site fabrication improves the quality of the building frame, since the majority of work is carried out under closely controlled factory conditions – where it is not affected by on-site trades or the weather. The ability to design and draw the proposed structure in three-dimensions gives designers and steelwork contractors the opportunity to develop details and check for clashes, leading to high accuracy, no defects and a “right-first-time” build with minimised time and disruption on site.

Steel does not suffer from creep or shrinkage and, when properly protected, does not rot or decay.



Support

The competitive nature of the construction market means that the steel industry is constantly striving for better solutions for the client. The steel industry has an excellent track record for innovation, whether it is in the form of new products backed up by sound research or improved methods of working. As well as looking to the future, the industry provides unrivalled support to users of steel through the network of Corus Regional Technical Managers and organisations such as The British Constructional Steelwork Association (BCSA) and the Steel Construction Institute (SCI).

Safety

Safety is of paramount importance in any construction project. Experienced personnel working for responsible contractors carrying out tasks for which they have been trained will reduce the potential for accidents. There is no easier way of selecting steelwork contractors for tender lists

than using the membership list of the British Constructional Steelwork Association, or The Register of Qualified Steelwork Contractors Scheme for Bridgeworks (RQSC). There are over 130 steelwork contractors on the lists, and using the lists is a good way of selecting a steelwork contractor who has the special skills to suit your project. Each company must be regularly assessed on its capabilities by specialist steelwork auditors who check the company's financial resources, technical expertise and track record. The result is categorisation of the company in terms of the work it can execute technically and classification of the company in terms of the maximum size of contract it should handle.

**For more information
please contact or visit:**

Tel: +44 (0) 1724 405060
www.corusconstruction.com

Corus Tubes - Celsius® and Hybox®

Designed for all structural and mechanical applications



Leith Street, Edinburgh

Corus Tubes is one of Europe's leading manufacturers of welded steel tubes

Supplying international markets over many years has given the tubes business the knowledge, expertise and ability to give the customer what they want, when they want it. There are manufacturing sites and sales offices in the UK, the Netherlands, Germany, France, Norway and Belgium. Corus also has a global network of sales offices and service centers enabling us to offer highly focused customer service as well as providing our customers with competitive, quality products.

Our extensive product range includes structural hollow sections, large diameter pipe, precision tubes and coated tubes. We are able to offer a variety of wall thickness and grades of steel, whatever your requirements – construction projects, steel structures and more.

Product specification

Corus Tubes manufactures hot finished and cold formed structural hollow sections (SHS). Both are high quality steel tubes and can be used for a variety of applications:

Celsius 355

■ Celsius 355 has been fully normalised, meaning that it is fully stress relieved and is supplied as a standard grade of S355 J2H. This gives you the peace of mind that it is suitable for all structural and mechanical applications. Celsius 355 exceeds the requirements of EN 10210:2006.



Terminal 5, Heathrow



Terminal 5, Heathrow

Hybox 355

- Hybox 355 is a high strength, cold formed hollow section, supplied as a standard grade of S355 J2H. Hybox 355 is designed for use within the construction, mechanical and manufactured goods sectors and exceeds the requirements of EN 10219:2006.

All Celsius 355 and Hybox 355 tubes are supplied with:

- A CE mark in accordance with the Construction Products Directive
- A test certification (type 3.1) specific to the cast of steel supplied, providing a high level of quality assurance and traceability.

Celsius 355 and Hybox 355 are available in a variety of shapes, sizes and lengths. The maximum sizes we supply our products in are:

Celsius 355

- Circular sizes up to 508mm and thickness of 16mm (larger circular sizes from 508mm up to and including a diameter of 2134mm)
- Square sizes up to 400 x 400 and 20mm thickness
- Rectangular sizes up to 500 x 300 and 20mm thickness
- Oval sizes up to 500 x 250 and 16mm thickness



Leith Street, Edinburgh

- 'Jumbo' sizes are also available on request with a size range of up to a square size of 750 x 750 and 70mm thickness.

Hybox 355

- Circular sizes up to 508mm and thickness of 12.5mm
- Squares up to 400 x 400 and 12.5mm thickness
- Rectangles up to 400 x 200 and 12.5mm thickness.

For more information on technical capabilities, size range or any other enquiry please contact the Technical Hotline or visit:

Tel: +44 (0) 1724 405060

www.corusconstruction.com

Slimdek®

Innovative flooring system



Slimdek flooring system at St Richard's Hospital, Chichester

Significant cost and build-time savings

Adding another dimension to the range of cost effective steel options available for modern buildings, Slimdek is an engineered flooring solution that results in a minimal depth floor, designed for use in steel-framed buildings.

Slimdek combines ease of planning and servicing with a reduction in building height, giving cost and build-time savings; a significant advantage over reinforced concrete flat slab structures. In addition, the lightweight Slimdek structure saves on frame and foundation costs for even greater effectiveness.



Zero4, Plymouth

Key benefits:

- Shallow composite slab achieves excellent load capacity, diaphragm action and robustness
- Asymmetric Slimflor Beams (ASBs) give efficient composite action without shear studs
- Asymmetric Slimflor Beam Fire Engineered (ASB FE) sections provide 60 minutes inherent fire resistance
- Lighter, thinner web ASBs may be used unprotected in buildings requiring up to 30 minutes fire resistance, in fire protected applications or where the web accommodates service penetrations
- ComFlor 225 decking spans up to 6.5m without propping (dependent on slab weight)
- Construction is lightweight
- Services can be integrated between the decking ribs passing through openings in the ASB.

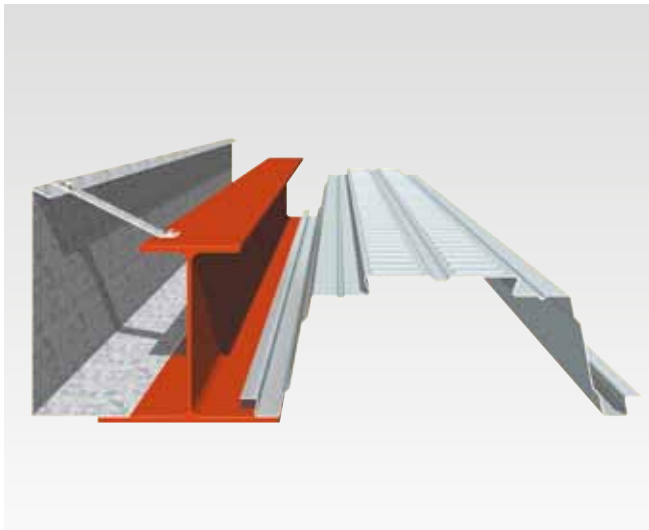
Slimdek components

The Slimdek engineered flooring system is formed with ComFlor 225 deep decking spanning between Asymmetric Slimflor Beams (ASBs) and/or Rectangular Hollow Slimflor Beams (RHSFBs).

ComFlor® 225 decking

ComFlor 225 decking is cold formed from 1.25mm thick, zinc-coated steel to BS EN 10326-S350GD+Z275, with a design yield strength of 350N/mm². The minimum zinc coating mass for both sides is 275g/m² in total.

The product can achieve spans of up to 6.5m unpropped and up to 9.6m when propped during construction. The profile has re-entrant sections at the top of the crest and the bottom of the trough.



ComFlor 225 deck profile

Special hangers have been developed to facilitate services and fixing of ceilings. Services can also be attached using conventional fixings. The minimum bearing requirement is 50mm on steelwork and the deep decking must be centred to provide an equal bearing at each end.

Additional structural support is usually required to the web of columns to take the end bearing of the decking sheet and close off gaps. A range of end and side closures, edge trim and accessories is available to complete deck installation.

Asymmetric Slimflor® Beams

ASBs are an integral part of the *Advance* sections range (see page 30-31) and are manufactured to the exacting standards demanded for CE-Marked products.

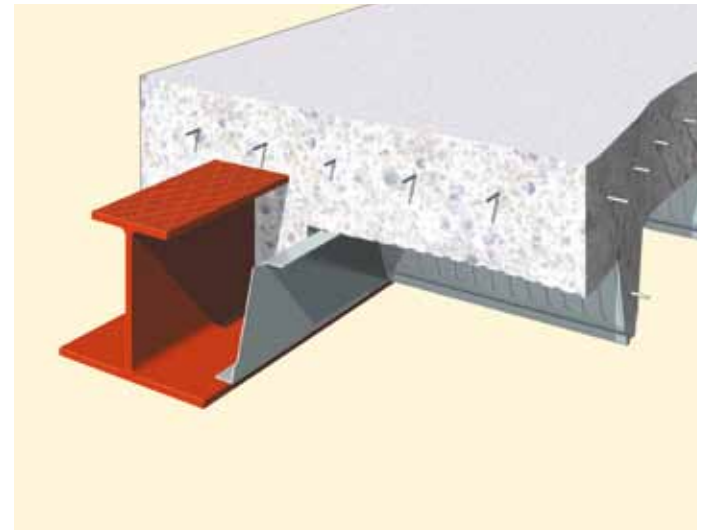
Produced by hot rolling, the top flange is approximately 60% of the width of the bottom flange. The top flange is embossed to enhance composite action with the concrete encasement.

Design rules for normal and fire conditions are based on composite action, established from full scale tests. ASBs are specifically designed for use with deep decking, see diagram below, to create a ribbed slab of 290 to 370mm depth. They are capable of spanning

in excess of 10m, depending on loading and grid proportions, although a 9x9m grid has been shown to be a reasonable and practicable maximum. The structural engineer must decide which type of section is most economic for a given design situation.

Guidance is available from Corus. For more information or the Slimdek manual, call the number or go to web address below

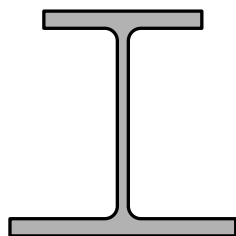
Tel: +44 (0) 1724 405060
www.corusconstruction.com



Typical Asymmetric Slimflor Beam

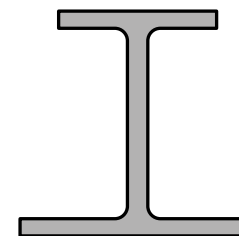
There are two types of ASB section (shown below and right), available in S355JR, J0 and J2 steel to BS EN 10025-2:

1. ASB - asymmetric sections with thin webs that require fire protection to the exposed bottom flange to achieve more than 30 minutes fire resistance, or where the web accommodates web penetrations.

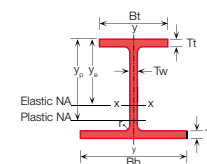


Asymmetric Slimflor Beam (ASB) section

2. ASB(FE) - asymmetric sections that are engineered for optimum characteristics in normal and fire conditions. The beams have a web thickness greater than that found in rolled sections to achieve a fire resistance up to 60 minutes when unprotected, assuming that the integrity of the web is not breached.



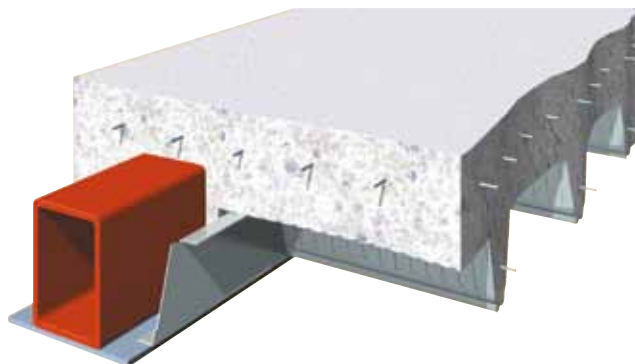
Asymmetric Slimflor Beam Fire Engineered (ASB FE) section



Asymmetric Slimflor Beams (ASB) properties

Designation	Mass	Second moment of area		Radius of gyration		Elastic neutral axis	Elastic modulus			Plastic neutral axis	Plastic modulus		Buckling parameter	Torsional index	Warping constant	Torsional constant	Area of section
Serial size	kg/m	I_x cm ⁴	I_y cm ⁴	r_x cm	r_y cm	y_e cm	Z_x Top cm ³	Z_x Bottom cm ³	Z_y cm ³	y_p cm	S_x cm ³	S_y cm ³	u -	x -	H cm ⁶	J cm ⁴	A cm ²
300ASB(FE) 249	249.2	52920	13194	12.9	6.45	19.2	2757	3528	843	22.6	3761	1512	0.825	6.80	1998105	2004	317
300ASB 196	195.5	45871	10463	13.6	6.48	19.8	2321	3185	714	28.1	3055	1229	0.845	7.86	1498135	1177	249
300ASB(FE) 185	184.6	35657	8752	12.3	6.10	18.0	1984	2547	574	21.0	2658	1030	0.822	8.56	1203025	871	235
300ASB 155	155.4	34514	7989	13.2	6.35	18.9	1825	2519	553	27.3	2361	949	0.843	9.40	1068165	620	198
300ASB(FE) 153	152.8	28398	6840	12.1	5.93	17.4	1628	2088	456	20.4	2160	816	0.822	9.97	894772	513	195
280ASB(FE) 136	136.4	22216	6256	11.3	6.00	16.3	1367	1777	417	19.2	1806	740	0.814	10.19	709504	379	174
280ASB 124	123.9	23453	6410	12.2	6.37	17.2	1360	1891	445	25.8	1730	761	0.832	10.54	720657	332	158
280ASB 105	104.7	19249	5298	12.0	6.30	16.8	1145	1604	370	25.4	1441	632	0.831	12.08	573540	207	133
280ASB(FE) 100	100.3	15506	4245	11.0	5.76	15.6	995	1292	289	18.4	1295	510	0.815	13.13	450943	160	128
280ASB 74	73.6	12191	3334	11.4	5.96	15.7	776	1060	234	21.3	979	402	0.830	16.63	337956	72.2	93.7

Note: ASB(FE) are fire engineered sections.

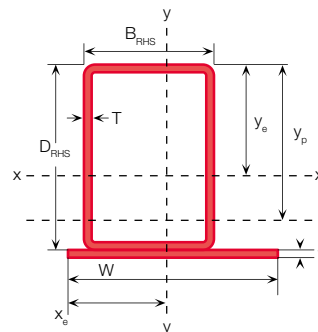


Typical RHS Edge Beam

Rectangular Hollow Slimflor Beams (RHSFB)

At the perimeter of the building, it is often structurally more efficient and architecturally desirable to use a Rectangular Hollow Section (RHS) which can resist torsional forces caused by eccentric loading on the beam, as shown right.

RHSFBs comprise a Corus Celsius hot-rolled RHS in S355J2H steel to BS EN 10210, with a 15mm thick S355 steel plate welded to the underside. They can achieve 60 minutes fire resistance without protection to the bottom plate where the bare outer face of the RHS is fire protected by the fire stopping required to ensure integrity of the compartmentation.



Rectangular Hollow Slimflor Beams (RHSFB) dimensions and properties

Designation	Thickness	Mass	Second moment of area		Radius of gyration		Elastic neutral axis		Elastic modulus				Plastic neutral axis	Plastic modulus	Torsional constant	Area of section
$D_{RHS} \times B_{RHS}$ (W x t)	T		I_x	I_y	r_x	r_y	x_e	y_e	Z_x Top cm ³	Z_x Bottom cm ³	Z_y Left cm ³	Z_y Right cm ³	y_p	S_x	J	A
	mm	kg/m	cm ⁴	cm ⁴	cm	cm	cm	cm					cm ³	cm ³	cm ⁴	cm ²
200 x 150 (240 x 15)	8.0	69.7	5451	4055	7.8	6.8	9.3	14.4	380	763	435	276	19.4	549	3670	88.8
	10.0	79.3	6251	4461	7.9	6.6	9.1	13.8	452	816	490	300	18.9	661	4436	100.9
	12.5	90.8	7107	4903	7.8	6.5	8.9	13.3	532	872	551	325	17.2	783	5314	115.6
250 x 150 (240 x 15)	8.0	76.0	9087	4484	9.7	6.8	9.2	17.4	521	1002	489	302	23.7	775	5048	96.8
	10.0	87.1	10449	4975	9.7	6.7	9.0	16.8	622	1077	555	331	21.5	926	6117	110.9
	12.5	100.6	11938	5517	9.7	6.6	8.8	16.2	736	1162	629	362	19.7	1087	7353	128.1
300 x 200 (290 x 15)	8.0	94.4	16614	8795	11.8	8.6	11.6	20.7	803	1538	756	506	28.6	1169	10595	120.3
	10.0	108.6	19226	9931	11.8	8.5	11.4	20.0	964	1665	870	565	25.9	1404	12941	138.4
	12.5	126.0	22147	11228	11.7	8.4	11.2	19.3	1149	1811	1001	631	23.7	1661	15710	160.5
400 x 200 (290 x 15)	8.0	106.9	32322	10308	15.4	8.7	11.4	26.6	1214	2173	901	587	33.6	1810	15768	136.3
	10.0	124.3	37511	11772	15.4	8.6	11.2	25.7	1460	2373	1048	663	30.9	2146	19292	158.5
	12.5	146.1	43409	13461	15.3	8.5	11.1	24.9	1746	2610	1218	750	28.7	2507	23471	185.5
450 x 250 (340 x 15)	8.0	125.4	48873	17759	17.5	10.5	13.9	29.9	1634	2946	1274	885	38.4	2401	27121	160.0
	10.0	146.0	56914	20482	17.5	10.5	13.7	28.8	1971	3229	1491	1011	35.2	2861	33322	186.0
	12.5	171.0	66155	23677	17.4	10.4	13.6	27.9	2368	3564	1747	1158	32.7	3383	40757	218.0

Notes: A full list of available sections is included in the SIDS software package.

Section properties are based on a plate extending 90mm beyond the RHS.

Panels & Profiles

The most comprehensive range of Building Envelope and Structural Products



Barton Business Park

Providing performance and quality backed by excellence in service and support

Corus Panels and Profiles is the only company able to offer the construction market a comprehensive range of Building Envelope and Structural Products from one UK source.

Building Envelope systems comprise of an extensive range of metal cladding systems, comprising of insulated panels and built-up engineered cladding, roofing and façade solutions. Structural Products comprise of the widest range of shallow and deep composite floor systems and roof decking solutions.

Our Building Envelope and Structural Products solutions provide ultimate design flexibility. With such a diverse product portfolio, we are uniquely able to offer the specifier an unbiased solution to meet the design criteria for any project, providing the designer and client alike with the essential reassurance that the building will meet the necessary regulations, not only at the time of installation but also, critically, throughout its life.

Key benefits:

- The most comprehensive range of insulated panels, built-up systems, façades, structural roof and floor decking profiles from one single UK source
- Operations across a single site with Corus Colors, manufacturer of Colorcoat pre-finished steel, providing a unique integrated Corus supply chain resulting in consistency in the quality of material used and ensuring a lower carbon footprint
- Steel elements produced within the UK by Corus steel production, strip processing, galvanising, coating and profiling facilities
- Creation of a Supply Chain Team providing excellence in customer service, technical and on-site support
- Building Envelope systems available with the free Corus Platinum System Warranty, which covers materials and workmanship for a period of up to 25 years.



Hambleside, Danelaw

Building Envelope

Building Envelope range of products are closely aligned to the needs of the metal roofing and cladding contractor, and offer the UK's widest range of building envelope solutions including a comprehensive range of factory produced insulated panels, built-up systems, façades and fabrications.

Colorcoat® products and services

Using Colorcoat pre-finished steel products as standard, all the products offer long term performance with the assurance of quality and service developed over four decades. Colorcoat pre-finished steel products provide peace of mind for up to 40 years.

Insulated panel systems

Trisomet® 333 System

The Corus Trisomet 333 System is an insulated roof and wall panel system comprising of a straightforward side lapping detail allowing faster installation and a wider spaced trapezoidal steel external skin, providing optimum performance for water drainage, strength and walkability. Its auto-hesively bonded polyisocyanurate (PIR) insulation core uses the latest foam technology providing enhanced environmental benefits, together with fire performance approved by LPCB.



Trisomet 333 System

Trimapanel® System

The Corus Trimapanel System is an insulated, secret-fix architectural wall-cladding system. Comprising of a lightly profiled steel lining skin, an auto-hesively bonded polyisocyanurate (PIR) insulation core and a micro-rib or plank profiled external skin. The system is available in three cover widths, a choice of external profile and a wide variety of colours and finishes. These options, along with the system's architectural appearance and design flexibility, enable architects to create unique and modern design solutions.



Trimapanel System

Corus Built-Up Roof and Wall Systems



Hoo Farm Industrial Estate

Corus Built-Up Roof and Wall Systems comprise of a pre-finished steel trapezoidal liner, the Corus Instaloc System, an insulation layer and a Colorcoat pre-finished steel external weathering profile.

The systems provide design flexibility that offer outstanding benefits that enable the designer to meet all building regulation requirements whilst being able to specify attractive aesthetically pleasing solutions.

- Fire resistance performance of up to 30 mins insulation and four hours integrity are achievable
- Low levels of air permeability and good thermal performance over the life of the building, reducing energy costs, carbon emission rates and facilitates compliance with Building Regulations
- Colorcoat pre-finished steel products are used as standard in Corus Built-Up Systems offering long term performance and the Confidex Guarantee, providing peace of mind for up to 40 years
- The internal and external Colorcoat pre-finished steel products tested in accordance with BS EN 14782 providing the specifier with the peace of mind of proven performance
- The structural capabilities of all profiles have been independently calculated by the Steel Construction Institute and carry the 'SCI Assessed' approval mark. All profiles are also CE marked
- Loss Prevention Certification Board (LPCB) approval to LPS 1181 part 1 for fire performance, helps to lower insurance premiums.

Façade systems and Fabrications



Dakota Hotel

Façade systems

Corus Stratascreen System is a flat composite system façade panel system with recessed edges offering a choice of bespoke wall solutions.

The rainscreen system comprises of a honeycomb aluminium core and has the flexibility to incorporate louvers and windows.

Fabrications

Corus Panels and Profiles offer a choice of fabrications to compliment the wide range of built-up system solutions offering weatherproof and air-tight connections with the apex, eaves and corners of the building envelope, as well as at the windows, doors, rooflights and junctions. Weatherproof and air-tight connections must be made with the apex, eaves and corners of the building envelope, as well as at windows, doors, rooflights and junctions.

Structural Products

Structural Products range of products include ComFlor, the technically advanced composite floor deck range, in addition to supplying the

UK's widest range of structural roof decking, providing a true one-stop shop to flat roofing contractors and specialist steel flooring contractors alike.



Denny High School

ComFlor®, the technically advanced composite floor deck range

ComFlor 46

Typical span 2.8m -> 3.2m

ComFlor 46 is a simple trapezoidal composite floor deck with a strong and reliable shear bond performance. The profile is economic and nestable, reducing transport and handling costs.

ComFlor 51

Typical span 3.2m -> 3.5m

ComFlor 51 is a traditional dovetail re-entrant composite floor deck. The profile presents a virtually flat soffit and a relatively thin slab is required to meet fire design requirements.

ComFlor 60

Typical span 3.9m -> 4.5m

ComFlor 60 composite floor profile, engineered with optional closed ends, offers the ultimate in lightweight steel decking for all multi-rise buildings. It combines exceptional spanning capabilities, excellent acoustic performance and fire protection with reduced concrete usage. Available with a Colorcoat pre-finished steel coated underside giving a durable and attractive appearance and minimising future maintenance.

ComFlor 80

Typical span 4.5m -> 5.2m

ComFlor 80 combines excellent shear stud performance with extra long spanning capability. The large corner curvature detail provides a very efficient profile. The large spans achievable means less structural steel and thus cost saving in the overall construction cost. Available with a Colorcoat pre-finished steel coated underside giving a durable and attractive appearance and minimising future maintenance.



Comflor 60



Comflor 80 with Colorcoat coated underside

ComFlor 225

Typical span 6.0m -> 9.0m

ComFlor 225 is designed to be used with the Corus Slimdek system, which uses Asymmetric beams. The floor deck sits on the wider bottom flange of the Asymmetric beam. This results in a minimal overall floor depth, the concrete that surrounds the beam provides composite action without the need for shear studs, and fire protection to the beam.

ComFlor key benefits:

- ComFlor offers the widest range of composite floor decks from 46mm to 225mm, suitable for spans 2m to 9m
- Professional support with comprehensive technical advice, completely free of charge to enable the correct specification for your application
- Available with FibreFlor a certified composite floor deck system, that eliminates the need for traditional steel wire fabric, using both polypropylene and steel fibres
- Colorcoat soffits available with ComFlor 60 and ComFlor 80 giving an attractive finish for any exposed soffit applications
- ComFlor 60 is available with closed ends to permit pre studding of beams in special applications.

Structural Roof Decking



Adnams Brewery

Structural roof deck profile range

Corus Panels and Profiles offer the widest range of structural roof decking manufactured in the UK, with decks ranging from 19mm to 210mm deep.

We support all types of insulated roof systems:

- Single ply membrane
- Metal standing seams
- Green roofs
- Slates and tiles
- Three ply felt
- Asphalt.



Terminal 5, Heathrow

Structural liner tray HL600/130

The HL130/600 structural liner tray provides a neat planar inner surface, flat except for the stiffening ribs. It is suitable for both roof and wall cladding applications spanning across the main steels and omitting the need for purlins or cladding rails.

Acoustic structural deck range and structural liner tray

The acoustic structural deck range and structural liner tray are available with perforated webs to provide acoustic absorption.

Tested acoustic systems

Structural decking acoustic systems are available with Rockwool insulation for sound absorption and noise reduction and with Kingspan insulation for noise reduction only.

Structural design

Corus Panels and Profiles technical department offer an excellent structural design service providing diaphragm design for decks and full support calculations for all profiles.

Full load tables are available from our website or our technical department. Please call or visit:

Tel: +44 (0) 845 30 88 330
www.coruspanelsandprofiles.co.uk

Colorcoat® Exterior Products

Pre-finished steel products with unique coating formulations



The Niekke Centre School of Education for Technology & Economics using Colorcoat HPS200 Ultra

What is pre-finished steel

Pre-finished steel is made up of a number of paint layers and treatments applied to the galvanised strip of steel in an automated and carefully controlled manufacturing process. Each layer has a particular function and the performance of pre-finished steel products is greatly influenced by them.

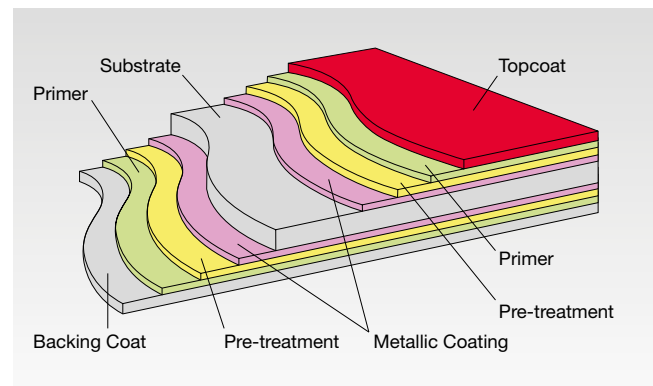
Pre-finished steel is manufactured by Corus within a continuous process, which guarantees high quality standards through controlling the coating thickness, colour and gloss, adhesion and corrosion resistance.

Colorcoat products

A perfect marriage of style and performance.

Colorcoat products have been developed specifically to support the aesthetic and functional requirements of modern architecture. Colorcoat includes pre-finished steel products with unique coating formulations offering long-term performance and the most comprehensive guarantees available.

Colorcoat building envelope products are produced in the UK using an ISO 14001 approved supply chain, providing reassurance of responsible sourcing and full life cycle analysis.



Colorcoat HPS200 Ultra®

The latest generation product for roof and wall cladding, Colorcoat HPS200 Ultra offers an exciting new colour range, dramatically improved colour and gloss performance and a significantly extended Confidex Guarantee for up to 40 years.

This new and improved product is the result of sustained evolution and revolutionary coating technology, allowing Colorcoat HPS200 Ultra to combine outstanding performance and unrivalled reliability with impressive sustainability credentials.



Cardiff City Stadium using Colorcoat HPS200 Ultra and Colorcoat Prisma



Colorcoat HPS200 Ultra colours

Key benefits:

- Colour range inspired by architects with twice the colour and gloss retention of standard plastisols
- Unique Scintilla® emboss designed to trap less dirt than old fashioned leathergrain embosses
- Bespoke colours available through Repertoire Colour Consultancy on orders over 200m²
- Optimised Galvalloy® metallic substrate for ultimate corrosion resistance and cut-edge protection
- Confidex guaranteed for up to 40 years with no maintenance or inspections required to maintain the validity of the guarantee
- Available with Confidex Sustain to offer the world's first Carbon Neutral building envelope
- Environmentally harmful elements removed
- 100% recyclable
- Responsibly sourced with fully traceable manufacture in the UK
- Supplied on short production lead times.

Colorcoat Prisma®

Colorcoat Prisma delivers eye-catching buildings that stand the test of time. Technically and aesthetically superior to PVDF (PvF2), it is a robust product readily available in the most popular colours. We also offer a bespoke colour-matching service to tailor building aesthetics to your exact needs.



Seabreas using Colorcoat Prisma for walls



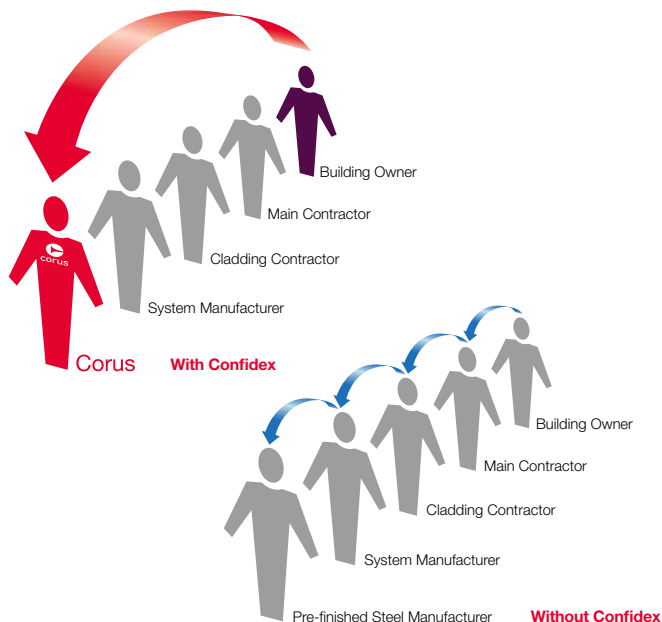
Chatterley Valley using Colorcoat Prisma

Key benefits:

- Popular solid and metallic colours with outstanding colour and gloss retention as standard
- Bespoke colours available through Repertoire Colour Consultancy
- Optimised Galvalloy® metallic substrate for ultimate corrosion resistance and cut-edge protection
- Comprehensive Confidex Guarantee of up to 25 years for total peace of mind
- Available with Confidex Sustain to offer the world's first CarbonNeutral building envelope
- Robust and durable product for easier handling and processing
- 100% recyclable
- Responsibly sourced with fully traceable manufacture in the UK
- Supplied on short production lead times.

The Confidex® Guarantee

The Confidex Guarantee is available for all non-domestic buildings using Colorcoat HPS200 Ultra or Colorcoat Prisma. Registering for a Confidex Guarantee, gives peace of mind that the performance of Colorcoat HPS200 Ultra or Colorcoat Prisma is guaranteed for up to 40 years, including the cut edges. With no mandatory inspections or maintenance, we remove the need to go on the roof to maintain the validity of the guarantee – Confidex is the only pre-finished steel guarantee on the market that offers this.



The Confidex Guarantee is direct with the building owner meaning that in the case of a claim the contact with Corus is direct rather than having to go through the supply chain saving time and money. What's more this is transferable should the building owner change by simply filling in the form at the bottom of the guarantee.

Who registers?

Usually the cladding contractor or the cladding system manufacturer, but anyone can apply – if you want to check if your building has been registered contact the Colorcoat Connection helpline on +44 (0) 1244 892434.

Confidex Sustain®

Confidex Sustain is an enhancement of the Confidex Guarantee. As well as covering the performance of the Colorcoat HPS200 Ultra or Colorcoat Prisma used on your building, it offsets the unavoidable CO₂ emitted during the production of the whole cladding system, including the panel and fixings.

Cradle to cradle analysis

The cradle to cradle analysis covers all life cycle stages.

① End of life

Includes impacts from:

- built-up system steel content 79% recycled, 15% re-used, 6% landfill
- composite panel steel content
- 100% recycled, 0% re-used, 0% landfill
- all insulation to landfill (foam and mineral wool). Although they have the potential to be recycled current practice for demolition, and other limitations, results in most insulants being landfilled
- 95% recovery of foam filled composite panel blowing agent by fridge recycling process.

② Production of system components

Includes impacts from:

- production of pre-finished steel and spacer bars
- production of insulation
- production of fixings and plastic components.

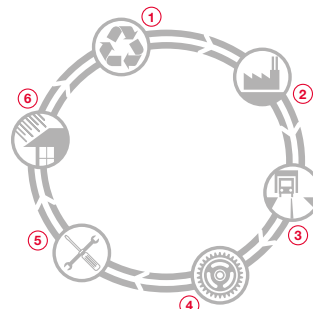
③ Transport

Includes impacts from:

- delivery from Corus to system manufacturer
- delivery to site
- delivery of insulation and other system components to site.

The difference between the number of vehicles required to transport built-up and composite systems to site is also accounted for.

For a list of assessed cladding systems, to pre-register your projects, or for more information on Confidex Sustain, please visit www.colorcoat-online.com/sustain, or call the Colorcoat Connection helpline on +44 (0) 1244 892434.



④ System manufacture

Includes impacts from:

- profiling of pre-finished steel for cladding
- composite panel manufacture (foam and mineral wool)
- 6% of foam filled composite panel blowing agent lost in manufacture.

⑤ System installation

Includes impacts from:

- allowances made for cladding side and end-laps.

⑥ Use

As Colorcoat HPS200 Ultra and Colorcoat Prisma are maintenance free, no significant environmental exchanges occur during the building lifetime.



Vodafone call centre, Stoke using Colorcoat HPS200 Ultra, Colorcoat Prisma and Colorcoat LG

Other Colorcoat products

Colorcoat Verso®

A superior alternative to leathergrain plastisol. Using a Corus unique coating formulation and emboss, Colorcoat Verso provides improved durability and performance over leathergrain products. Available with a 30 year guarantee offered through the Colorcoat supply chain partners.

Colorcoat LG

A leathergrain plastisol product suitable for roof and wall cladding applications where good performance is required at a competitive price. Available with a 25 year performance guarantee.

Colorcoat PVDF

A thin solution coating product, Colorcoat PVDF offers good colour retention and stability and is

particularly suited to wall cladding for undemanding applications.

Colorcoat PE 15

Developed specifically as the interior liner of built-up and composite roof and wall cladding systems, Colorcoat PE 15 is supplied in white to ensure light reflectivity in the internal environment.

Colorfarm®

The unique topcoat and substrate combination of Colorfarm make this product particularly well suited to roof and wall applications on general and high-humidity farm buildings. Available in 15 and 20 year guarantee versions.



Colorcoat Technical Papers

Colorcoat support

The Colorcoat brand provides the recognised mark of quality and metal envelope expertise exclusively from Corus.

Repertoire®

Colorcoat HPS200 Ultra and Colorcoat Prisma provide the widest colour choice available on the market. Whether you want your building to stand out, or blend with surroundings. We can create a unique identity for your building. Repertoire Colour Consultancy service for roofs and walls over 2000m², can match almost any solid colour for your building from either physical swatches or reference standards.

Colorcoat Specification Wizard

Corus has developed a quick and easy on-line tool allowing you to create an optimum NBS specification for the pre-finished steel and cladding system in just a few clicks. Specify Colorcoat products and cladding systems in just a few clicks at: www.colorcoat-online.com/specwizard

Colorcoat Technical Papers

Working closely with Oxford Brookes University and the Steel Construction Institute, Corus has produced a number of RIBA and RIAI approved Technical Papers. These address key construction issues such as the creation of an air-tight building envelope and end of life options for pre-finished steel cladding systems. For full details of the Technical Papers available please visit: www.colorcoat-online.com/technical

Colorcoat Connection® Helpline

A dedicated helpline offering advice and guidance on a wide range of construction issues such as building regulations and where to source complementary products. Metal hand samples are available in all colours and can be ordered through the Colorcoat Connection helpline on +44 (0) 1244 892434 in the UK and on +353 (0) 16310615 in Ireland. Alternatively, metal samples can be ordered on line at: www.colorcoat-online.com/services

Advantica®

Pre-finished steel products for the manufactured goods sector



Loseley Ice Cream Factory, Cwmbran

From ceilings, doors and windows to controlled environments and rainwater goods

Advantica from Corus is a range of pre-finished steel products specifically formulated for the manufactured goods sector including HEVAC, teletronics, lighting, and office furniture. The result of over 30 years experience, the Advantica product range provides superior solutions to best meet your needs.

Corus has developed a range of specialist pre-finished steel products that can be used in the following sectors:

Controlled environments

Meeting the stringent requirements of controlled environments, Advantica provides surfaces that help to maintain clean and safe environments; surfaces that are taint-free, cleanable and, where necessary, safe for direct food contact.

These surfaces are ideal for applications such as food processing and preparation, cold storage and packaging, pharmaceutical clean rooms and medical environments (operating theatres, treatment rooms and wards).

Ceilings

Advantica products can be used for panels, boards and framework, including webbing, t-bars and strips.

Rainwater goods

End applications for these products include down pipes, gutters, brackets and deep drawn accessories. Corus can provide the most appropriate pre-finished steel product to meet the needs of the specific part being manufactured.

Doors and windows

Advantica has a wide range of products for this sector, including: Domestic doors, heavy-use industrial doors and doorframes with special requirements in terms of: surface appearance or very narrow tolerances.

For more information please contact or visit:

Corus Colors, Tafarnaubach Works,
Tafarnaubach Industrial Estate,
Tredegar NP22 3AA
Tel: +44 01495 724321
www.corusmanufacturedgoods.com



Almere Fashion Centre, The Netherlands

The sophisticated, lightweight building system

Kalzip is the international market-leading manufacturer for aluminium standing seam roofing and cladding systems. Low weight, malleability, strength and durability are all factors that have helped to make Kalzip a world-leading building product.

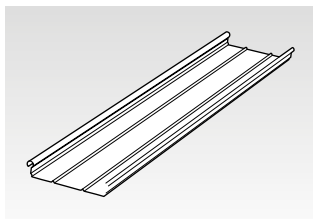
Taking responsibility for the complete system – from structural deck or liner, through the vapour control and insulation areas to the outer weathering sheet, fabrications and all associated safety and access equipment – Kalzip delivers a system that performs acoustically, thermally and structurally.

Key benefits:

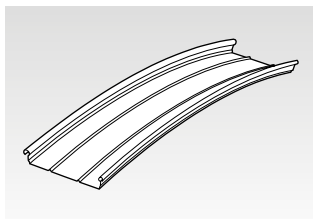
- Highly flexible, Kalzip can be precisely tailored to suit the individual requirements of the building
- Low weight, strong, malleable and durable
- Complete system offers superb acoustic, thermal and structural performance
- Available in a myriad of shapes, colours and finishes to enhance the appearance of any building
- Comprises a fully comprehensive range of quality fabrications and truly sustainable features, such as Kalzip Solar Solutions and Kalzip Nature Roof
- The Kalzip roof system in its entirety has successfully achieved:

Third-party certification by the British Board of Agrément (BBA) in the UK

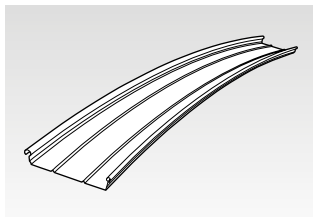
Global recognition by the German Zulassung, French Avis Technique and Factory Mutual quality standards.



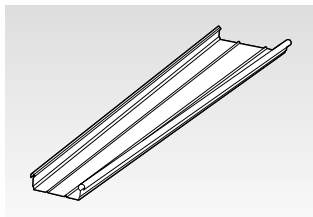
Straight



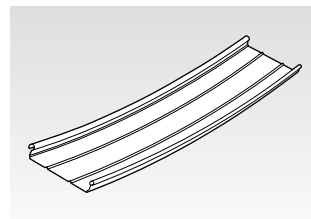
Convex curved



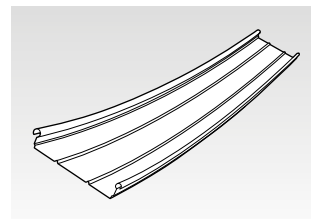
Tapered convex curved



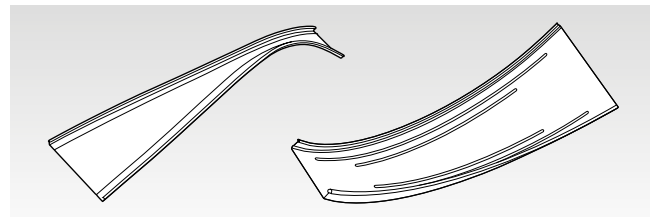
Tapered



Concave curved



Tapered concave curved



XT Profiles: XT Freeform and Hyperbolically curved

Unlimited application potential

- Suitable for warm and cold roof constructions in all shapes and with roof pitches from 1.5°, catering for all types of supporting structures
- Can be flexibly adjusted to suit the layout, geometry and dimensions of any building
- Extremely strong and lightweight
- Ideal for large spans and renovating old roofs
- Continuous lengths of 150 metres and more, when production takes place on-site.

Superior thermal and acoustic insulation

- By choosing the appropriate thickness of insulating material, the roof structure can be adapted to suit the precise requirements of the building

- Highly efficient thermal performance can be achieved by means of constructive measures, helping to minimise whole lifecycle costs and achieve U-values as low as 0.1 W/m²/K
- A series of acoustic tests and appreciation of the demanding requirements for noise control within buildings helps to create optimum internal conditions.

A high level of safety throughout the entire service life

- Non-penetrative patented clips attach the sheets to the substructure. These are locked into the seam to ensure smooth thermal cycling of the external sheet over the clip head whilst facilitating outstanding spanning capacity under high wind loading



Taipei Arena, Taiwan

- Mechanical zipping of the seams produces a load-bearing, permanent connection
- Pressure and suction loads are safely transmitted
- Weather-tight seams also permit any residual moisture in the insulating layer to evaporate through the seam allowing the roof to breathe naturally
- Sophisticated detailed solutions for roof penetrations, joints and gable ends
- Non-flammable. Resistant to flying sparks and radiant heat
- Kalzip aluminium sheets can be used as a lightning conductor in accordance with International Standard ENV 61024-1.



Würth Offices, Den Bosch, The Netherlands

Durability and economy

- Highly resistant to corrosion
- Non-sensitive to UV rays, resistant to microorganisms and 'ageing'.

Valuable ecological and sustainable properties

- The raw material that contains aluminium – bauxite – is the third most commonly occurring element in the earth's crust with at least 300 years of current reserves left at the present rates of usage – a figure that is improved by the increasing amount of aluminium that is being recycled
- Over 60% of all aluminium is produced using hydroelectric power, which is clean, CO₂ free and renewable
- Aluminium is a closed loop process; once produced, it can be recycled infinitely with no loss of performance
- Kalzip is a fully demountable system which, at the end of the building's life, can be unzipped and reused or recycled without limitation
- Up to 95% of the energy required to manufacture the original aluminium material is saved through recycling



Science Museum, Valencia, Spain

- A study by Delft University, supported by the European Aluminium Association through the Aluminium for Future Generations programme, found that the general collection rates of aluminium from individual buildings was between 93 and 98% – almost total recovery
- An insulated Kalzip roof structure contributes significantly to emissions reduction.

For more information please contact or visit:

Kalzip Ltd, Haydock Lane, Haydock,
St Helens, Merseyside WA11 9TY
Tel: +44 01942 295500
Email: enquiries.uk@kalzip.com
www.kalzip.com

Kalzip® OSC

Kalzip's off-site roofing system



Snowdon Visitor Centre, Wales

Designed for fast-track building projects

Kalzip OSC is a modular roofing system, developed specifically to suit today's fast-track building projects. Unique in its use of lightweight steel frames and lifting techniques, it has an entirely different delivery mechanism that sees construction as a design and manufacturing process.

Kalzip OSC involves the provision of roofing modules through a single source service that includes an innovative project specific solution to meet customer requirements. Meanwhile, off-site manufacture addresses the major challenges facing the construction industry today – in terms of speed of construction, health and safety, cost, environmental issues and sustainability – paving the way for more innovative methods of building.

Key benefits:

- Fabrication within factory controlled conditions results in high quality of manufacture
- More efficient construction programmes
- Off-site construction results in improved:
 - speed of construction
 - health and safety
 - site traffic
- Innovative project-specific solutions meet customer needs exactly.

Kalzip OSC product range

Kalzip OSC can be broken down into two elements: structure and roof covering, both of which can be developed in a number of ways to provide flexibility to clients and allow units to range in size, configuration and aesthetics to suit specific requirements.

Structure

Modular frame solutions

The development of Kalzip OSC has led to three unique solutions that can be tailored to suit the project.

Hybrid systems

A combination of 2D and 3D systems. They allow more complex shapes and designs to be generated for project specific solutions. Typically a 2D frame is utilised as a base support structure, which will allow the system to span between 2 distinct points. The 3D frame is then pre-installed onto the 2D frame to generate the roof geometry required.



Hybrid frame Ideally suited to schemes with more complex designs

3D frame solutions

Comprising a pitched, pre-designed frame with a secondary structure to support the roof coverings (generally in the form of purlins or timber bearers).

3D solutions are typically dead load systems and as such need to be supported along the base cords. They can generate three distinct forms:



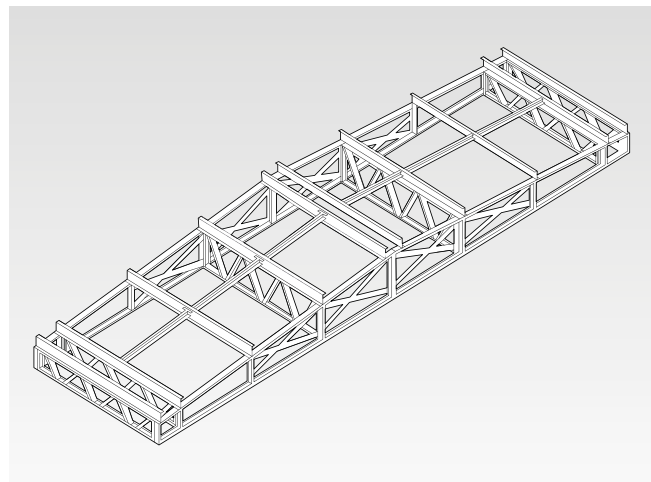
Mono pitch



Duo pitch



Barrel vault



3D frame: Ideally suited to flat to pitch conversions that house flat topped steel, concrete or volumetric modular buildings

The pitched frame is manufactured from cold rolled, lightweight, galvanized steel sections in the form of lipped and open channels.

The cold rolled sections are dimensionally accurate, extremely robust, non-combustible, and can be installed very quickly.

The secondary structure is designed to span between the pitched frames providing a structural support for the required roof covering.

2D frame solutions

Generated by forming a ladder frame from cold rolled structural steel. The side channels provide the spanning characteristics of the system, while the connecting purlins form ties and a structural support for the roof covering.

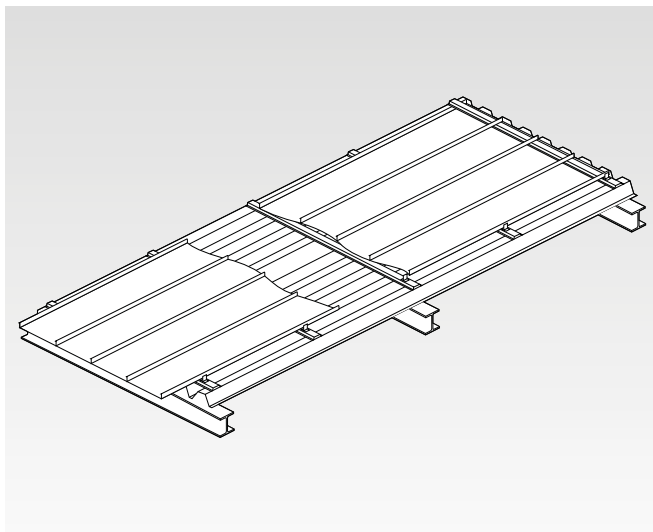
A 2D solution requires a pre-determined structure to enable the formation of a roof design with a profile of either:

- Mono pitch
- Duo pitch

The depth of the ladder is determined by the spans between connection points and specific building requirements.



2D frame solution



2D frame Ideally suited to large scale repeatable production or design

Roof covering

The vast array of roofing products that can be utilised as a roof covering make the Kalzip OSC system extremely flexible. This provides clients with the ability to install roofing materials in an off-site application that they would use in a traditional build.

Renewable solar energy – photovoltaics

Kalzip is able to provide solar solutions to roofing systems which, in most cases, can be pre-designed and installed prior to lifting. The design and installation of these systems is undertaken by Kalzip working in close co-operation with our approved roofing and solar solution specialists.



Energus Nuclear Academy, Cumbria

Green roofs

Kalzip's advanced green roof system, Nature Roof, provides measurable environmental benefits and further enhances the already considerable green credentials of the standard Kalzip system. Kalzip Nature Roof is covered with low growing, self-regenerating, drought resistant plant cover.

As well as creating a blaze of natural colour on the rooftop it recycles CO₂ into O₂ and generates a healthy micro-climate around the building, locking up airborne pollutants and dramatically improving air quality. Nature Roof also soaks up rainwater, releasing it gradually to help prevent possible flooding, and adds sound-absorbing mass to the system to create dramatic dB reductions. A perfectly balanced and complete solution – Kalzip Nature Roof not only meets high environmental, technical and design requirements, but also enhances the aesthetic appeal of a building.



Pizza Hut, Jersey

Design and manufacture

Kalzip OSC benefits from a cradle-to-grave design, manufacture and delivery service, ensuring the chosen solution provides optimum performance and fulfills specific project requirements.

Kalzip's dedicated design and engineering teams liaise directly with clients, architects and engineers to develop the best and most appropriate solutions for individual projects. Early involvement of these teams can be critical to the successful introduction of off-site solutions.

With the unique structural properties of the Kalzip OSC system this can lead to the reduction of secondary structural steelwork requirements, benefiting the overall cost plan. The successful procurement of Kalzip OSC depends upon the integration of the design team, specialists and main contractor to achieve maximum benefit from the technology. Tight liaison between the project and process teams is essential to ensure that plans are tailored to specifically match the method of construction.

A disciplined programme, including design freeze dates, lead-in times for manufacture, sequencing of on-site works and a structured delivery schedule, is critical.

Once the design and engineering is complete production commences at a dedicated manufacturing facility in Haydock. Alternatively facilities can be set up on site or in locations more suited to specific site or contract requirements.

Technical and design

Kalzip's technical and design teams undertake the full design of roofing systems. Using internal CAD design resources and approved external engineers, the Kalzip OSC team is able to offer a bespoke service from early project preliminary proposals, through to GA and schedule drawings for construction.

The design team can tailor the Kalzip OSC offer to exacting client requirements while still designing systems and materials to accommodate all British and European standards:

- BS 6399 Part 1 1996: Dead and imposed loads
- BS 6399 Part 2 1997: Wind loads
- BS 6399 Part 3 1998: Imposed roof loads
- BS 5950 Part 5 2001: Design of cold rolled thin gauge sections
- All pre-galvanized materials conform to BS EN 10147 1992 and BS EN 10143 1993.

Structures are designed to accommodate the unique loadings that lifting units place upon the system along with the long term loadings required in the final fixed position.

Thermal and acoustic

Kalzip designers have the ability to adapt the unique roofing products and systems available to meet project specific U-Value and acoustic requirements.

U-Values

Kalzip OSC can accommodate composite and built up roofing systems. Each has its own unique thermal and U-Value properties, which may influence the type of system used. Kalzip is able to tailor systems to meet specific client requirements – to date solutions have been developed with **specific thermal performance levels**, single skin metal applications, through to highly insulated offers with U-Values as low as 0.06W/m²/K.

Acoustics

Similarly, roofing systems also have unique acoustic properties. Kalzip OSC is able to offer advice and solutions for the following acoustic requirements:

■ Sound absorption

Achieved by perforating the metal internal liner and incorporating a 'soft' absorbing material behind it. Different combinations of perforations and levels of insulation will give varying results of absorption

■ Airborne sound reduction

All roofing materials provide some level of weight sound reduction – the exact level depends upon the system used. The Rw can be increased by varying the number and the density of insulation layers as well as adding mass into the construction.



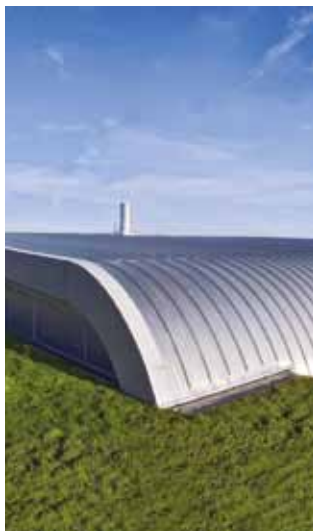
Aquatics Centre, Manchester

Durability

Kalzip OSC is able to offer solutions to meet specific contract requirements and life spans. Roofing products are constructed from differing materials to provide various aesthetic requirements, however all of these materials have different levels of durability and life span depending on the environmental conditions that the product is exposed to.

Kalzip aluminum standing seam, for example, has a BBA Certificate with a service life of 40 years in a suburban/rural environment or 25 years in an industrial/marine environment.

For further information on life spans and specifications of specific roofing systems please contact the Kalzip technical team.



Lough Road Recycling Plant, London



Levenshulme High School, Manchester

On-site assistance and requirements

Kalzip OSC offers various options regarding production and delivery. Each of these options has specific site requirements per project which can be addressed with the Kalzip technical and site support teams. The following services are available:

Factory production

The design, procurement and manufacture of components into pre-delivered units takes place in a dedicated production facility in Haydock or, where appropriate, secondary production facilities close to a project's location can be arranged.

The completed units are loaded onto the delivery vehicle and transported to site for off loading, by crane, and lifting direct to roof level for installation. The number of vehicle movements and units delivered at any one time depends on the frame design.

Kalzip can also offer solutions where the design and procurement of materials occurs off-site, with the construction of the components taking place on site but off the critical path. This allows larger (non-transportable) and more economical modules to be constructed, although a large surface area on or around the construction site is required.

On site assistance

The Kalzip design team provides a project specific installation guide which covers a wide range of topics, from using lifting beams correctly, to the actual installation method

and requirements. This document formalises procedures and can form part of the installers' Health and Safety method statements.

Along with installation guides, Kalzip has a dedicated team of personnel who regularly visit site and can not only provide guidance and assistance to the installing contractor, but can also provide reports and information to client representatives.

Applications

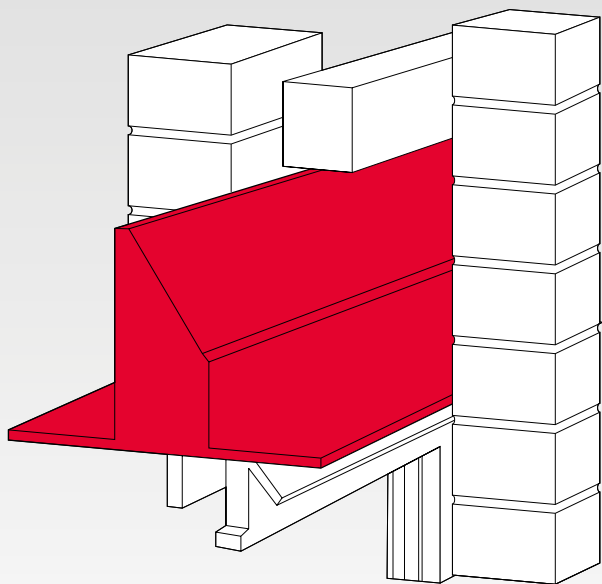
Kalzip OSC can be applied across all sectors of the industry, and we have recently completed projects within the custodial, military, education, and residential arenas. The schemes have ranged from simple mono / duo pitched roofs to the Snowdon Summit Building, a challenging project not just from its complex geometry but also for its challenging delivery location!

For more information please contact or visit:

Kalzip Ltd, Haydock Lane, Haydock,
St Helens, Merseyside WA11 9TY
Tel: +44 01942 295500
Email: offsite@kalzip.com
www.kalzip.com

Catnic®

Pioneering steel lintels and building components



Cavity wall lintel

Superior quality, reliability, service and support

Pioneers of the steel lintel for more than three generations, at Catnic we pride ourselves on our ability to design, manufacture and supply the construction industry with technically superior products.

Recognised as a leading brand in the building products sector, Catnic has a reputation for superior quality and reliability that is backed by excellent service and technical support. We also have a record of introducing new and improved products to help the building industry meet the ever-changing environmental, legislative and economic demands.

The comprehensive product range is sold throughout the UK by a network of builder's merchants, DIY outlets and garden centres. Catnic also supplies many UK leading national housing developers. The German market is serviced by Catnic GmbH, and in the rest of Europe, the Middle East and the Far East by a network of independent distributors.

Product range

The Catnic range of products includes:

- Steel lintels and special lintels
- Building components - expanded metal, plaster beads, wall starters and wall ties
- Fence support systems – QwikPost
- Permanent formwork for concrete - RIB21
- Juliet Balconies.

Catnic lintels

With over 10,000 variations available to choose from, there's a design to suit any size, shape, length, breadth and depth of doorway, archway, window or aperture.

An extensive range of products:

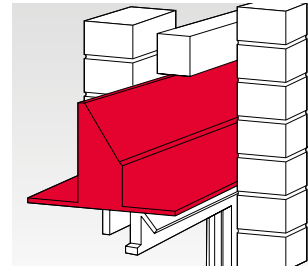
- Over 850 lintel products available from stock
- Over 10,000 lintel product variations to choose from
- Designs available to suit any size, shape, length, breadth or depth.

Fast, reliable delivery service:

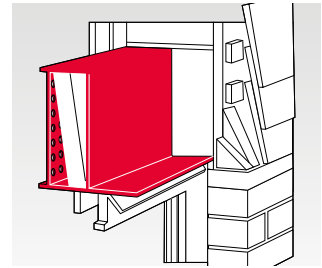
- Next day delivery available on stock items
- Special and fabricated lintels available in ten working days
- The most reliable delivery performance in the industry.

First class customer support service:

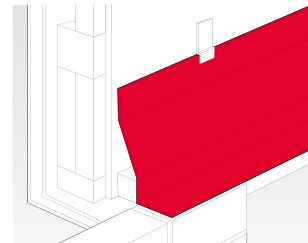
- Online product selector available via www.catnic.com
- Dedicated technical hotline
- On-site consultation available on request.

**Cavity wall lintel****Cavity wall lintels**

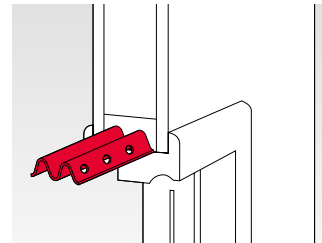
Designed for use in cavity wall construction to suit cavity widths from 50mm to 150mm

**External solid walls**

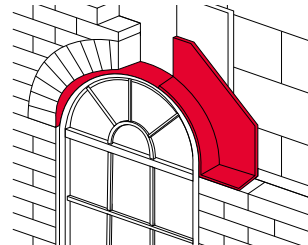
Available to suit single leaf brickwork, two separate leaves of fairface brickwork and solid block walls

**Timber frame lintels**

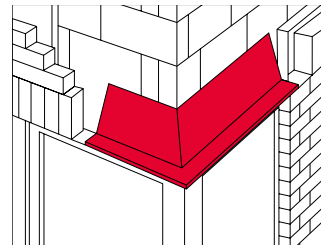
Designed for use in timber frame construction to suit cavity widths from 50mm to 150mm

**Internal wall lintels**

Designed for use in internal partitions and load-bearing walls

**Special lintels - arches**

Bespoke designs available in semi-circular arches, gothic arches and Venetian arches

**Special lintels - mitre and welded**

Bespoke designs to suit corner lintels, bay window lintels and curved lintels

Catnic building components

Catnic building components combine plastering accessories and builder's metalwork to form a comprehensive range of precision made, high quality building products.

Our building components come complete with comprehensive technical and specification details assuring peace of mind, complete satisfaction and confidence in the finished job from a name that you can trust.



Cavity wall ties

High quality stainless steel ties used to fasten inner and outer leaves of wall construction



Plaster beads

Precision engineered beads used to generate arises, edges, corners and joints in plaster/render applications



PVCu plaster beads

Cost effective alternative to stainless steel plaster beads



Expanded metal lath

Easy to fix and provides a secure key for plaster/render applications including joint and crack reinforcement and refurbishment work



Wall starter kits

Simple yet effective system for tying new masonry walls to existing walls



Coil mesh

High quality expanded galvanised or stainless steel mesh for use primarily as anti-cracking reinforcement in the construction of brick and block masonry.

Other Catnic products

Qwikpost®

The quick and easy way to erect fence posts. Erecting a new boundary or repairing a gale damaged fence has never been easier with Catnic's durable and affordable fence support systems. With no digging and no fence post hammering, QwikPost can be used with a variety of ground types including patios and soil.

Bolt down support

Used for fixing against a flush surface such as patios, driveways, decking, car ports, fixing timber fences to walls or mounting.

Concrete-in post

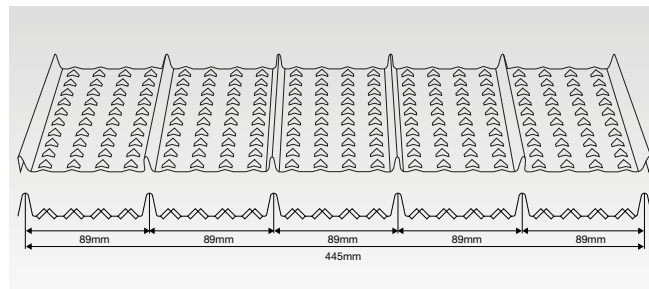
Designed for hard-standing areas, where ground conditions prevent the use of a spike. Ideal for car ports and raised decks.

Spike

Designed to hold fence posts above ground level in normal soil conditions.



Spike



RIB21

RIB21 Profile

An expanded metal sheet product used in permanent formwork for concrete. The precision engineered open-mesh profile enables the development of dense concrete indentations on the face of the ribs, creating a superior key for the second-phase pour. Primarily used in construction joint applications and stop-ends, RIB21 can also be used to form wall, beam and column surfaces.

For more information or to discuss your specific requirements, call Catnic Technical Services on or go to:

Tel: +44 (0) 29 2033 7900
www.catnic.com

Juliet Balconies

The Juliet Balcony is designed to provide a safety barrier in front of French windows, it is a popular feature for apartment schemes or 3 storey townhouses.



Construction & Engineering Products

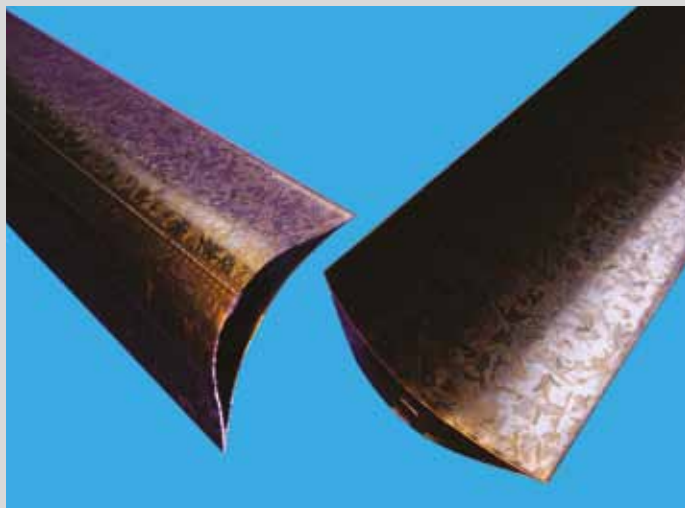
High quality, precision engineered sections

Choice, quality and tailored solutions

At Corus Construction and Engineering Products (CEP) we have the knowledge and expertise to design, manufacture and supply a multitude of products direct to the construction and highways engineering industry.

Clients from around the world put their trust in our 50 years' experience in designing and manufacturing cold formed sections.

During this time we have created a vast range of high quality, precision engineered products that include, but are not limited to, construction steel decking, non-proprietary and proprietary road safety barriers, trench sheet piling, cold formed sections and channels for the Heating Ventilation & Air Conditioning (HVAC) and building services industry.



Cold rolled sections

As a global steel supplier, Corus can fully trace the material used in rolling. In addition, engineering expertise enables us to design and manufacture roll form tooling in-house. We maintain total control over the supply chain, from the material quality and engineering design, to the manufacturing process and accuracy of the sections that are produced.

- Corus works closely with customers to understand individual needs and provide tailored solutions, including:
- Customised packaging for bespoke sections
 - Flexible, responsive delivery service
 - Cost effective solutions
 - Full traceability through the supply chain
 - First class service and support from a global manufacturer.

Corus cold rolled or cold formed sections have a wide range of applications, including the following uses within the construction, transport and manufacturing industries:

- Modular housing
- Ductwork jointing system
- Conductor rail
- Slotted channel for heating and ventilating and electrical installation
- Heavy duty sections for temporary bridges
- Light steel framing.

Service

Corus offers quality, customised products and an individual service that includes:

- Technical advice on bespoke section design
- In-house tooling design and manufacture
- In-line piercing
- Widths and lengths tailored to specific needs.

Material and finish

Corus sections are available in a wide variety of finishes, including:

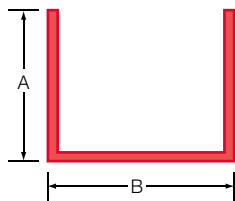
- Galvanised
- Stainless
- Self-coloured steel
- Plastisol.

Technical Information

With over 150 in-house roll sets, Corus can offer a full scope of widths, steel gauge and lengths tailored to individual needs:

- Normal size ranges within the following limits for coil strip widths:
 - 1325mm wide up to a thickness of 1.5mm
 - 650mm wide up to a thickness of 7.5mm*
- Tolerance on profile dimensions are generally $\pm 0.4\text{mm}$; custom tolerances can be agreed for certain requirements
- There are virtually no length restrictions
- Corus cold rolled sections are quality assured to ISO 9001:2008
- Sections can be 100% recycled.

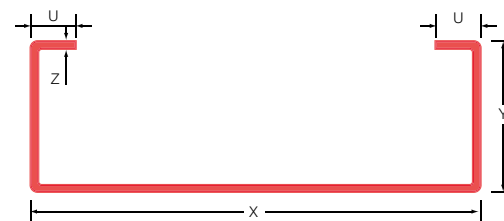
**depending on width, depth and form of profile*

**Cold Formed Sections**

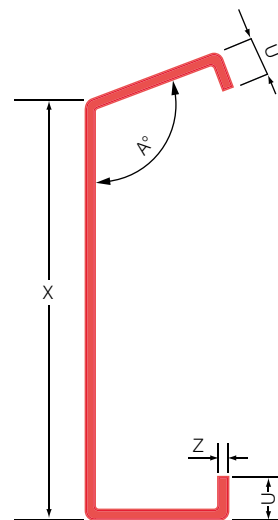
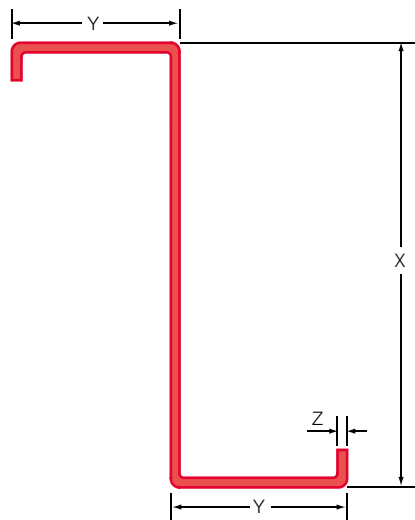
Line	A	B	Max Strip Width	Gauge
	(mm)	(mm)	(mm)	(mm)
R15	100	370	400	2-6
R16	100	300	450	0.8-2.5
20 std	150	400	680	1.6-8



Structural cold formed sections in use

**Lipped Structural C Sections**

Steel Grade	X	Gauge Range					Y	U
		1.3	1.5	1.8	2.0	2.5		
Z45	100	✓	✓	✓	✓		50,55,65	15
Z45	125	✓	✓	✓	✓		50,55,65	15
Z45	150	✓	✓	✓	✓		50,55,65	15
Z45	200		✓	✓	✓	✓	65	15
Z45	250		✓	✓	✓	✓	65	15
Z45	300		✓	✓	✓	✓	90	15



Structural Z Sections

Steel Grade	X	Gauge Range (Z)					Y	U
		1.3	1.5	1.8	2.0	2.5		
Z45	100	✓	✓	✓	✓		65/60	18/17
Z45	125	✓	✓	✓	✓		65/60	18/17
Z45	150	✓	✓	✓	✓		65/60	18/17
Z45	200		✓	✓	✓	✓	65/60	18/17
Z45	250		✓	✓	✓	✓	65/60	18/17
Z45	300		✓	✓	✓	✓	90/82	18/17

Structural Eaves Beams

Steel Grade	X	Gauge Range (Z)					A°	Y	U
		1.3	1.5	1.8	2.0	2.5			
Z45	100	✓	✓	✓	✓		3°	65/60	18/17
Z45	125	✓	✓	✓	✓			65/60	18/17
Z45	150	✓	✓	✓	✓			65/60	18/17
Z45	200		✓	✓	✓	✓	10°	65/60	18/17
Z45	250		✓	✓	✓	✓	15°	65/60	18/17
Z45	300		✓	✓	✓	✓		90/82	18/17

Vetex safety barrier systems

Backed by 40 years experience, Corus has developed a suite of steel barrier systems for modern highways. The Vetex range includes normal containment, higher containment and P1 end terminal. All systems combine safety performance with installation benefits, providing a cost effective solution for safety barrier applications:

- Suitable for high speed roads
- Untensioned for low maintenance
- Increased post spacing and longer beams
- Fully compatible with existing UK steel barrier
- Familiar components
- LANTRA approved installation training available.

The Corus transition has been precision engineered to gradually strengthen on approach to the parapet, and direction the vehicle on impact in a safe, controlled manner. HA approved, the Vetex parapet transition is the shortest of its type offering massive savings to the Highways Industry without compromising safety.

Simulation technology

Safety is at the heart of our system designs, and with pioneering use of advanced simulation technology, Corus can satisfy the future safety demands of road design. Corus barrier systems have been subjected to rigorous physical tests using modern vehicles, and developed to meet and exceed the requirements of EN1317.

Vetex normal containment safety barrier (N2)

Vetex N2 is an innovative, cost effective solution for safety barrier applications that is:

- EN1317 accredited
- An untensioned system, suitable for all high speed applications
- Fast and easy to install
- Low maintenance
- Fully compatible with existing UK steel barrier.

Vetex N2 is suitable for all high-speed road applications, where normal containment is required. It provides a robust solution for new build projects and can be used with Vetex higher containment (H2) and Vetex end terminals, to offer a complete barrier system. It has also been specifically designed to fully integrate with traditional barriers. This makes Vetex effective and efficient for maintenance, repair and barrier extensions.

Installation is faster and simpler, with increased post spacing and longer beams creating installation efficiencies compared to traditional systems. Re-tensioning is not required which greatly reduces maintenance.

Trench sheeting

CEP is the leading manufacturer of trench sheeting in the country. Our sheets are produced from Corus steel and are manufactured at Llanwern, South Wales. We provide a highly responsive, complete service – from initial consultation to the supply of manufactured components – backed by the sort of product processing and technical resources that only a major player can offer.

Our unrivalled range of trench sheeting and advanced services is designed to fulfill the highest

performance requirements. The strength, speed and flexibility of trench sheeting makes it ideal for all forms of temporary and permanent works. The durability and ease of extraction also means that these sheets can be re-used in sustainable construction.

In many cases the use of a steel sheet structure can actually eliminate the need for temporary works, with the trench sheet performing the permanent function concerned, eg canals, basement walls, cofferdams, etc.

Trench Sheeting Properties

	Width (mm)	Depth (mm)	Thickness (mm)	Modulus (cm ³ /m)	Moment of Inertia (cm ⁴ /m)	Weight (kg/m ²)
Standard Lap	330	35	3.4	48.3	81.7	32.9
Standard Lap	330	36.6	5	71.2	119.7	47.7
L8	432	35	3.4	51.5	84.9	33.6
KD4	400	50	6	101	250	55.2

Accessories

Alongside the main trench sheet profiles forming the Corus CEP offering, we also offer a wide range of accessories for a complete solution.

For more information please contact or visit:

Tel: +44 (0) 1724 405060
www.corusconstruction.com

Bi-Steel

The high performance alternative to reinforced concrete



London School of Economics



St. Paul's Square, Liverpool

The high performance alternative to reinforced concrete

Bi-Steel is an innovative, modular, steel/concrete composite construction material, patented to Corus, that is designed specifically for high-performance applications that require strength and structural rigidity. It is a more effective alternative to reinforced concrete that enhances speed of construction, improves accuracy and increases efficiency.

The Bi-Steel panel itself comprises two steel plates that are permanently connected together to form panels by an array of friction welded transverse bars. These panels are then filled with concrete to create a construction material with outstanding strength.

Key benefits:

- Production in a quality controlled factory environment ensures the highest standards of off-site manufacturing
- High quality welds can take the additional stress of severe loading
- Weld quality is monitored as each panel is produced and all processes are quality assured
- Panels can be supplied straight or curved, in various thicknesses, and are lighter and thinner than equivalent strength concrete panels
- Assembly on-site is fast, accuracy is assured and build efficiency is enhanced
- Bi-Steel fully realises the benefits of modular off-site construction techniques.

Bi-Steel applications

Construction and industrial

Bi-Steel's Corefast system is increasingly specified for structural building cores as a superior construction alternative to reinforced concrete cores. It can also be used in the construction of shear walls, blast chambers, as a tunnel and trench lining and as an alternative to concrete retaining walls in specialist applications.

Security and defence

Bi-Steel is used in the construction of high integrity blast protection buildings, which require superior levels of physical security to protect against terrorist bomb attack. Bi-Steel's anti-attack vehicle barrier system, comprising security barriers, bollards and walls, has also been developed to deny access and provide perimeter security in the event of a terrorist bomb attack on a security sensitive area.



Bi-Steel is ideal for blast protective structures

Corefast lift/stair cores

Corefast is an innovative modular construction system that enables structural cores in multi-storey buildings to be created in Bi-Steel up to six times faster than reinforced concrete.

Bi-Steel panels are manufactured and fabricated into Corefast modules off-site, then transported to the project site where they are quickly and accurately assembled to form the core. Once in position, the panels are filled with concrete to create a robust structure with outstanding strength and stiffness.

Suitable for cores from eight storeys to over 100 storeys, Corefast is a proven technology that is currently delivering benefits to all members of the construction project team in retail, commercial and residential schemes throughout the UK.



Dundrum Town Centre, near Dublin

How Corefast is created

Corefast is created by combining Bi-Steel panels into modules off-site, before transporting them to the construction site and erecting them to form the core.

Modules are manufactured by Corus approved steel fabricators to Bi-Steel specifications. They are typically 8-12 metres long and weigh in the region of four to six tonnes. This makes them easier to transport by road and install by crane on site.

The off-site fabrication can include door, window and service openings, plus the fixing of fin plates and floor angles for beam and slab connections. At this stage connections for lift and stair units can also be included.

Once erected on-site, the modules are filled with concrete to create the full strength structure.



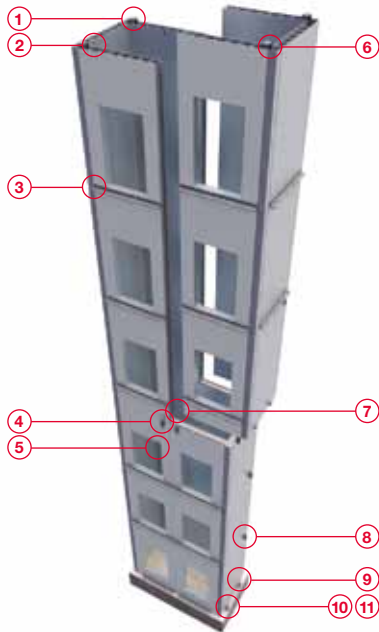
Southgate, Glasgow

Key benefits:

- **Faster to build**
up to six times faster to construct than an equivalent concrete core
- **Highly flexible**
each solution is designed to meet specific requirements
- **Improved efficiency**
due to better build sequence and reduced site congestion
- **Enhanced site safety**
no formwork required, resulting in fewer hours working at height
- **Greater accuracy**
improved interface with adjoining steelwork
- **Increased capital values**
slimmer walls can release additional lettable floor space.

Bi-Steel – at the heart of Corefast

Bi-Steel is a Corus-patented steel/concrete composite construction material for applications where superior performance is required. The material comprises two steel plates connected together to form panels by an array of friction welded bars. This process provides high quality, reliable welds and is typically used when it is anticipated that the components will be severely loaded. Weld quality is monitored as each panel is produced and all the processes are quality assured. Curved or flat panels can be supplied. Bi-Steel panels are filled with concrete once installed on-site to create a construction material with outstanding strength and performance.



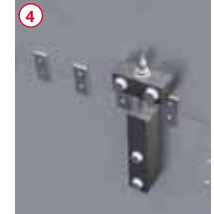
Stubs for incoming columns



Lifting hole with stiffener plate



Shelf angles with shear studs attached as required



Corefast temporary adjuster assemblies allow vertical adjustment of Bi-Steel modules



Door opening with 8mm closure plates to all faces



Pressed angle welded to 2 Bi-Steel panels to form corner module



Modules are bolted together using splice plates



Welded T-fin plate (standard fin plates can also be used)



Rebar set into foundation (by others), centered between Bi-Steel connecting bars



Adjuster blocks provide vertical tolerance at foundation level



Angle welded to Bi-Steel panel to accept temporary holding down bolts cast into the foundation



Once erected on-site, the Bi-Steel panels are filled with C40 grade pump-able mix concrete

Case studies

**49 Park Lane, London**

This tower crane, mounted on top of a Corus Corefast building core, has been used to erect a second Corefast structural core as well as the main steelwork frame on this landmark office scheme. Using this modular off-site core construction technique will enable construction manager Mace to save an estimated eight weeks on the project programme.

**Birmingham 1, Birmingham**

Birmingham 1 is an impressive student halls of residence scheme which houses over 600 students. The dramatic, state-of-the-art, 18-storey tower – the centrepiece of the Birmingham 1 development – incorporates Corefast which was used to construct the central lift/stair core. In addition to saving six weeks on the construction programme, Bi-Steel's high strength and rigidity, meant that the four reinforced concrete cores originally specified could be replaced by a single Corefast core and supplementary conventional vertical bracing. Corefast also offered health and safety benefits by eliminating the need for temporary formwork and facilitating safe, enclosed access to the working levels.

**One Basinghall Avenue, London**

Corefast enabled the structural core of a landmark office building to be completed five times faster than a traditional concrete core. The first Corefast project to be undertaken in the City of London uses Corefast to provide the central lift core in this 12-storey steel-framed structure, located adjacent to an existing property with limited access for installation. Corefast was selected as its speed, accuracy, cost effectiveness and contribution to enhanced site safety impressed all members of the construction team.

Bi-Steel shear walls

Where the positioning of building cores requires additional stability, isolated shear walls are the perfect solution. They are also extremely quick to install, thanks to the fact that Bi-Steel can be erected in tandem with the main steel frame.

The design and construction of Bi-Steel shear walls follows the same design rules and construction techniques developed for Corefast. Bi-Steel panels are manufactured and fabricated into shear wall modules off-site, then transported to the project site where they are quickly and accurately assembled. Once in position, the panels are filled with concrete to create a robust structure with outstanding strength and stiffness.

For more information please contact or visit:

Tel: +44 (0) 1724 405060

www.corusconstruction.com

Living Solutions

Steel framed modular accommodation



CitizenM Hotel, Glasgow

Single person or multi-roomed living solutions

Corus Living Solutions (CLS) manufactures steel framed modular accommodation for the single living accommodation sector (MOD, hotel and student) and the multi-roomed residential sector (residential apartments and homes).

The CLS modern production line is capable of producing up to 4500 modules a year, all of which can be fully finished to meet our customers' exacting requirements.



Build process on-site

Key benefits:

- Modules can be used for single person accommodation where the module is a fully finished room, such as hotel or student accommodation
- They can also be joined together to form multi-roomed residential apartments and care home accommodation
- Modules are structurally stiff with a light steel frame and hot rolled elements as required for structural stability
- The walls are fully boarded to provide the required thermal and acoustic performance and fire rating
- Finishing can include all aspects of the Mechanical and Electrical (M&E) fit-out of the room, bathrooms and all furniture items.

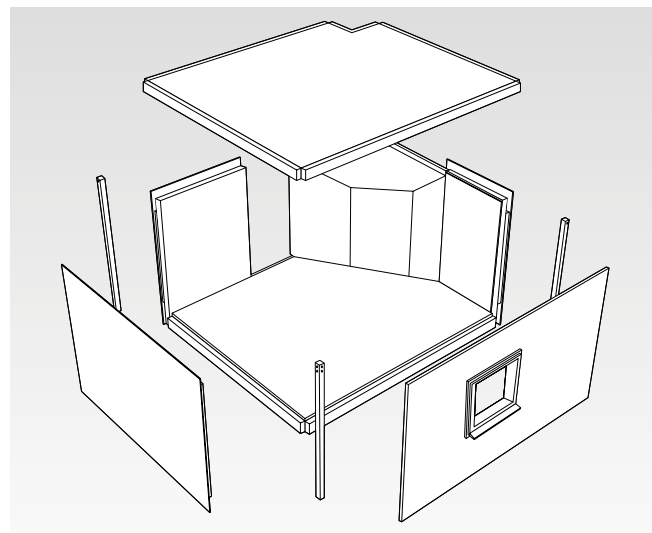


Light steel framed module

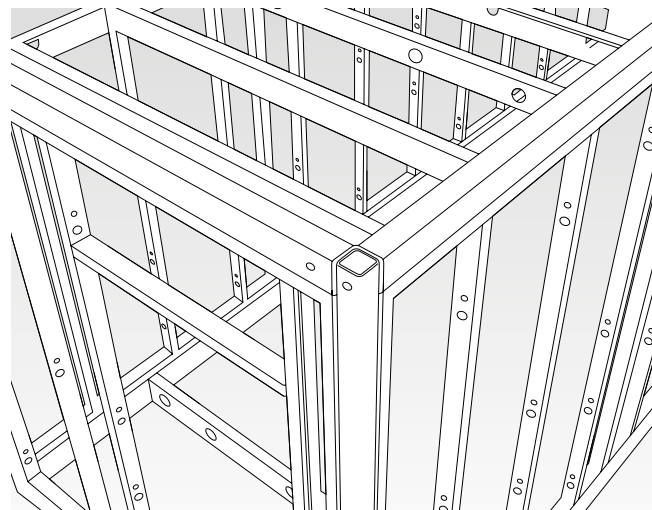
Module construction

The module is constructed of light steel framing with hot rolled elements for strength where required by our structural engineers. All modules are internally boarded and finished using reinforced gypsum board (using recycled materials). Virtually any module size is feasible up to a maximum of 8m long, 4m wide and 3m high (internal dimensions).

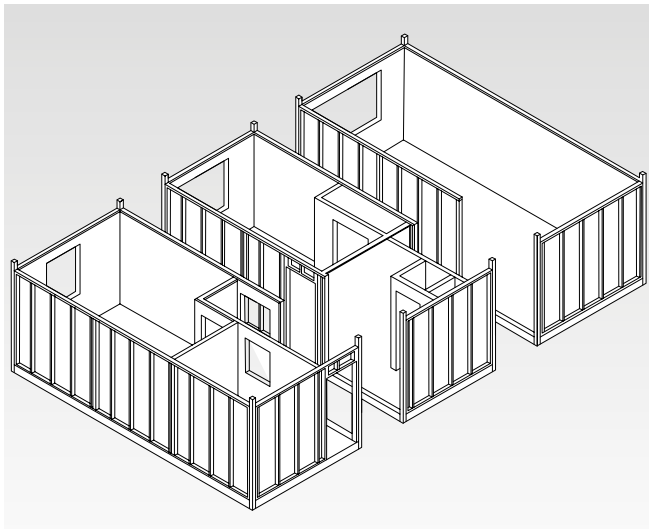
- The modules can be linked to form multi-room apartments providing a flexible living space
- Open-sided modules can be used to provide larger open spaces, such as public areas in hotels and open-plan residential apartments
- Up to 12 storeys of modules can be stacked using additional stability cores, for example, lift and stair cores and shear walls. Taller buildings are feasible on a project-by-project basis subject to structural engineer approval



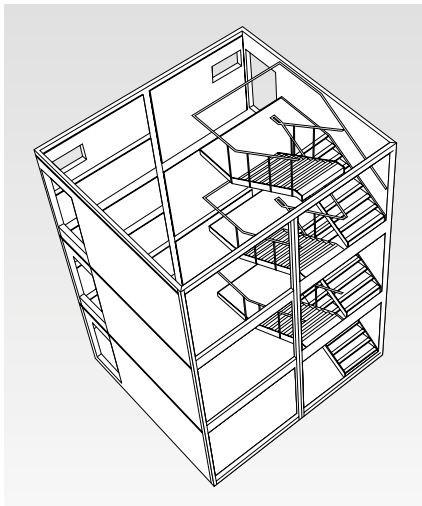
Exploded view of module construction



Corner detail of finite element model of module

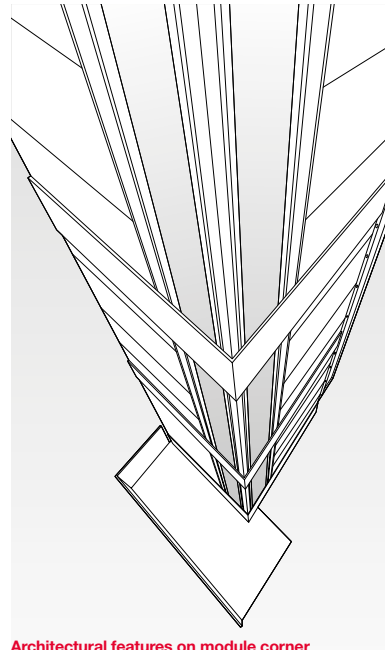


Complete FEA model of residential apartment (3m modules)



Modular staircase design

- Point loaded modules allow for all types of foundation design, eg concrete slab, piles, ground beam, etc
- The modules can easily be supported on podium structures, either structural steelwork or concrete decking. The modules are lighter than many traditional forms of construction which can lead to savings in foundations and supporting steelwork.



Architectural features on module corner



Nine module relocatable teaching facility



Module manufacture

Corus Living Solutions manufacture fully finished room modules in a controlled factory environment for a high level of quality and consistency that leads to significant construction programme benefits.

Our semi-automated production line at Shotton, Deeside, is the most advanced in the off-site modular manufacturing industry, using both PLC (Programmable Logic Controller) and CNC (Computer Numerical Control) technology.

The light gauge steel frames are fabricated, assembled and boarded in a controlled environment, which results in significant advantages over traditional methods of construction.

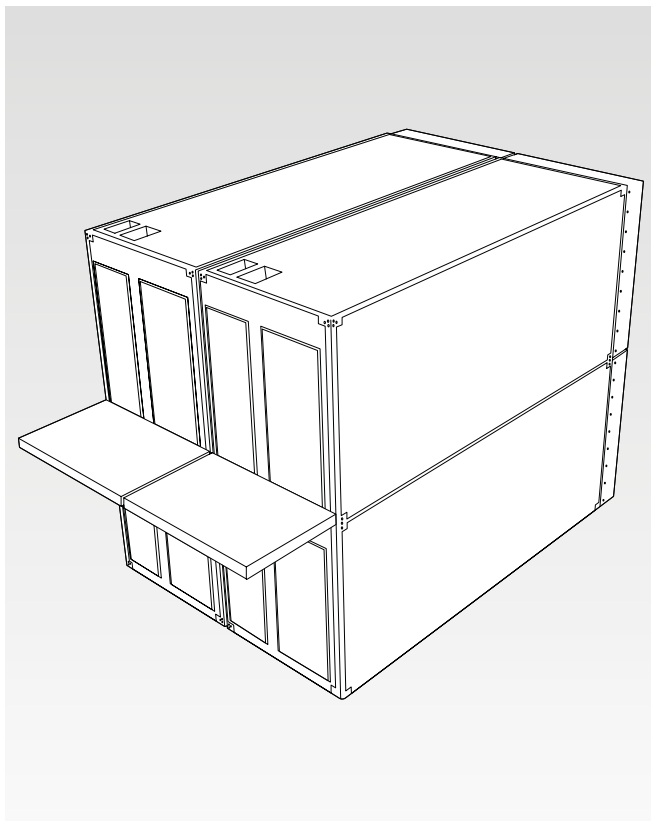
The modules are fully finished in the factory environment to our customer requirements. This includes bathrooms, kitchens, bedrooms and living space. All walls are decorated and the floors completed with carpet, tile or vinyl flooring. All fixed and loose furniture can be fitted in the factory. The module will be fully tested and the services laid out for straightforward site connection in both vertical service risers and corridor trays. The entire module is sealed and locked at the end of the production line to allow for efficient site delivery and construction. This ensures that the quality finish is maintained through to the finished building with electrical systems continuity and function tested, and plumbing and heating systems pressure tested.



Manufacturing a wall panel



Layout of vertical riser



Four modules connected to corridor cassettes

Site construction

The CLS fully finished modules are delivered to site, typically two at a time on a flat bed trailer. The modular core forms a weather tight structure ready for the roof and exterior cladding (eg brick, block/render or panelised rain screen cladding). The off-site manufacturing allows site preparation and module manufacture

to be programmed in parallel, leading to a shortened build programme by reducing overall project time and hence reducing expensive delays and on site work for our clients.

The modules are unloaded by lifting from their base, which avoids the need for any working at height during the module installation process.



The on-site build process

The modules are craned into position (using either mobile or tower cranes as required for site access and logistic requirements). The modules are bolted into place using site installation bracketry appropriate to foundation, module to module and corridor connections.

During the build process, the working from height risk is minimised using a fall-arrest system located in the corridor, man/safe and edge protection around the perimeter of the building.



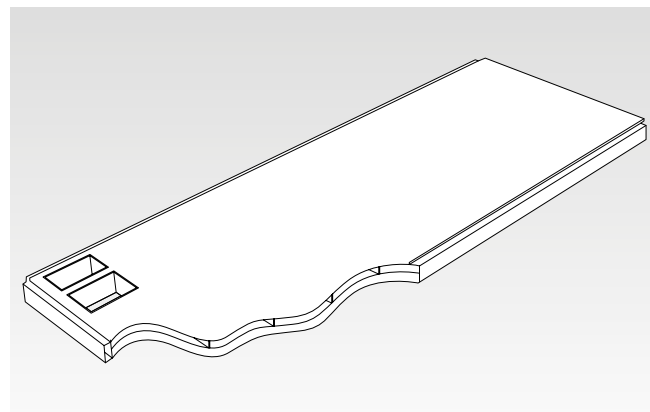
Typical finished hotel room

Accreditation and physical performance

- Modular structure approved by NHBC
- Code for Sustainable Homes level 5 is achievable
- Current module design meets or exceeds all appropriate statutory and regulatory design codes
- Building Control Type Approval
- Contributes to BREEAM 'Excellent'
- Counter Terrorism Measures (CTM) compliant
- Physical performance meets or exceeds building regulation



Residential accommodation



Floor module cassette

Sustainability

Corus Living Solutions has a commitment to controlling unwanted waste materials and waste energy using ISO 14001:

- Cold rolled steel frame construction plays a vital part in the current green changes to traditional building practices. Corus cold/hot rolled light steel framed MMC building techniques and management focus are ahead of the government plan to deliver Code for Sustainable Homes level 4 and 5 buildings as a standard
- Steel frame modular construction enables structural efficiency and ease of recycling
- The supply chain promotes sustainable products
- Just in time material supply for maximum efficiency of production and less energy waste
- Minimal waste on site and in the factory – CLS is committed to reducing its waste by 20% this year.

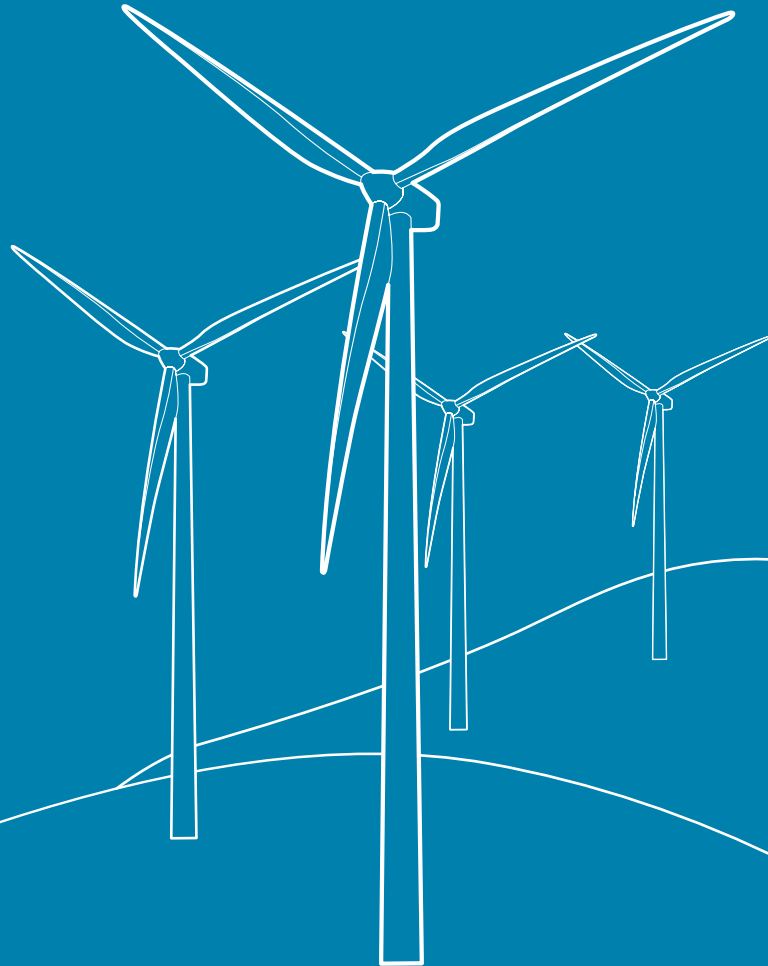


Typical finished room module

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Key construction topics

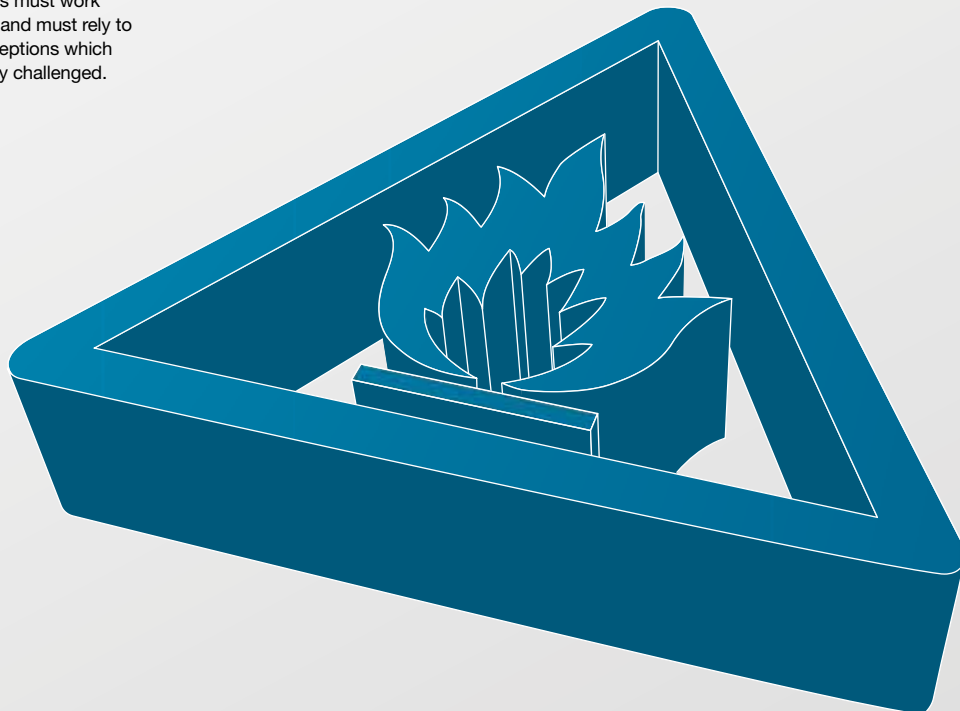


Fire performance

The performance of steel components and steel structures in fire has been researched more extensively than any other building material. The steel sector has invested decades of research into understanding the behaviour of structural steel components in fire – giving designers the confidence to engineer buildings safely in steel.

Full scale testing of complete steel structures, not just individual components, has furnished the industry with an unrivalled understanding of the response of steel buildings to fire. This has enabled advanced design and analysis techniques to be developed that allow very precise specification of the fire protection requirements of steel-framed buildings, often resulting in significant reductions in the amount of protection required.

By comparison, very little is known about the performance of other major construction materials in fire. This means designers must work without reliable data and must rely to some extent on perceptions which are being increasingly challenged.



Nothing could be more natural or sustainable than to develop our built environment using steel. Iron, the basic raw material, is the most abundant raw material on Earth. A compass points north because the iron content of the planet gives it polarity like a magnet. This inexhaustible natural resource becomes truly infinite as steel can be recycled indefinitely without loss of property or performance.

Sustainability is built into steel all along the supply chain, from an environmentally responsible approach to the sourcing of materials, through manufacturing processes that have a continuous improvement culture built-in, to the production of steel construction products that are modern and efficient.

Steel-framed buildings offer maximum flexibility to architects to express their design vision, allow easy adaptation to meet changing uses, can be cost effectively extended – even upwards – after being built, and are easily dismantled to allow future development on the same sites. Steel buildings retain their appeal far longer than the alternatives and therefore stand the

test of time. This saves money and the environment.

During construction, steel has many sustainability benefits. A large part of the process takes place off-site in factory controlled conditions. This means it is always fast, safe, high quality and waste free. Those same advantages continue during the site operations which are undertaken by small teams of well trained operatives for maximum safety.

It is at the end of a building's first occupancy that steel really stands apart from all other materials. Steel buildings are the most flexible and adaptable to facilitate change of use. This is the truly sustainable option as the building enters a whole new cycle without the disruption, cost and environmental harm of reconstruction. Beyond that, steel buildings are demountable and the whole structure or individual elements can be reused. Any steel not reused is recovered for multicycling. This is guaranteed to happen due to steel's inherent value. Even steel foundations can be extracted and the site returned to a green field.



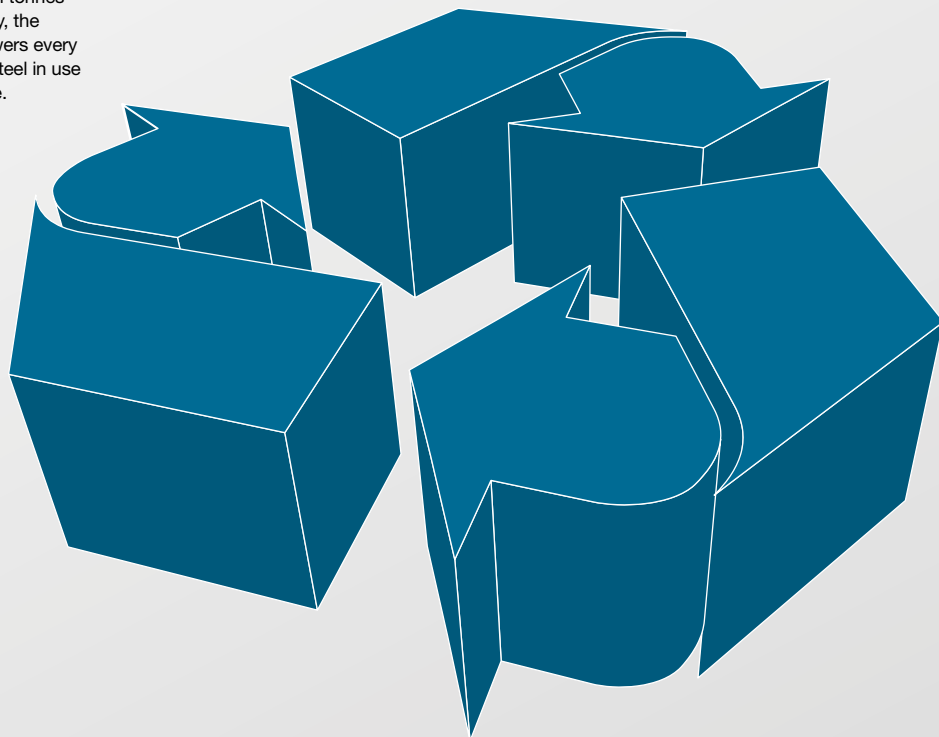
When it comes to recycling, steel has a unique position compared to other construction products. The term 'recycled' is often used for a construction product's single down-graded reuse prior to disposal. For steel products, the better term is 'multicycled,' as steel is used repeatedly without ever losing quality.

This unique characteristic gives all steel a high value at all stages of the life cycle. Because of this, a robust recovery infrastructure has developed, which predates modern appreciation of environmental issues and would continue in the unlikely event that they ever lessen in importance. This means the multicycling of steel is, by very definition, sustainable.

Research has shown that current recovery rates from demolition sites in the UK are 99 per cent for structural steelwork and 94 per cent for all steel construction products.

These values, which will only ever improve, far exceed those for any other major material.

Globally, almost 500 million tonnes of steel is recycled annually, the equivalent of 180 Eiffel Towers every day. The world's stock of steel in use always has a positive value. It can be regarded as one of our planet's most sustainable stores of value.



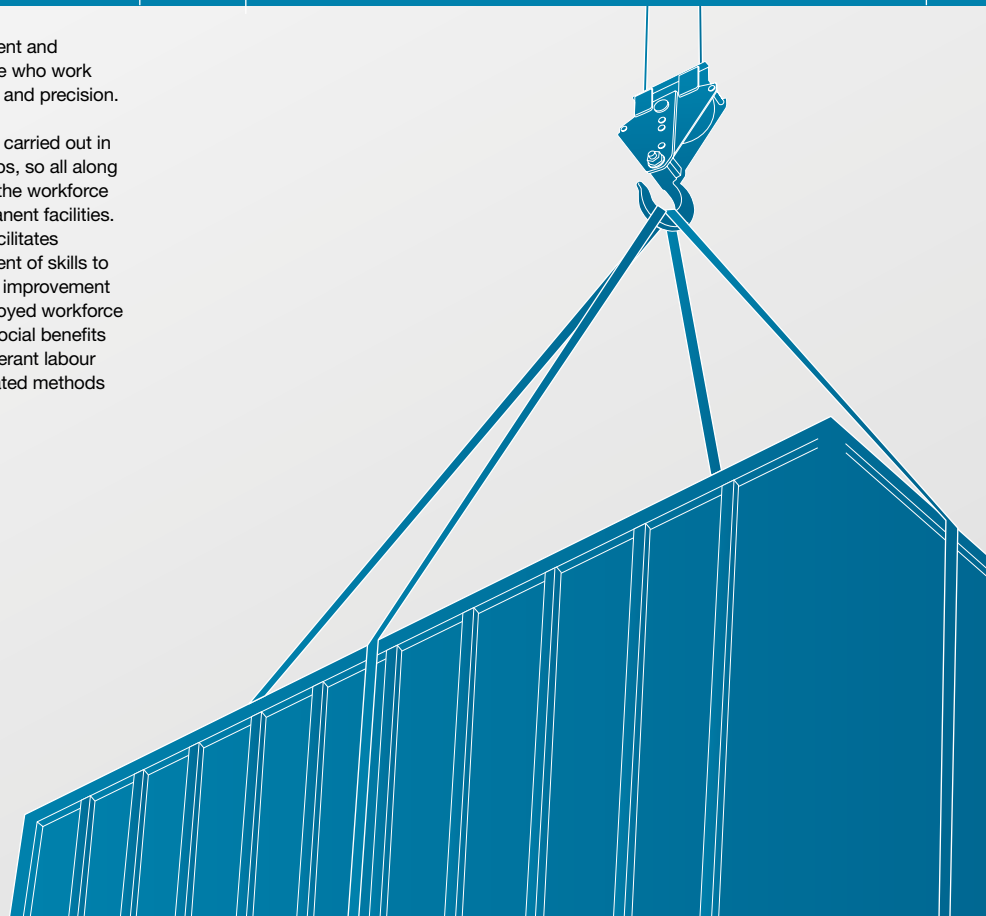
Off-site manufacture

Construction that takes place off-site is high in quality, controllable, safe and always leads to quicker and more predictable site operations. In addition to these traditional benefits, off-site manufacture has the clear environmental benefits of reduced waste and fewer site deliveries. As so much of the work takes place in the factory, only what is needed for the permanent works is ever taken to site.

Off-site manufacture is often referred to as being a modern method, but everyone knows that steel construction has always been delivered this way. That is why steel is the benchmark in off-site construction. Steel is manufactured as standard components and then fabricated to the finished form. Any spare material arising at any point in the process is recovered for reuse or multicycling. Steel is accepted as the fastest form of site construction, which is a function of the high level of factory pre-work. Steel is safe because so few people are required to assemble the pre-engineered structure. These people are well trained and skilled in the operations they undertake. Steel delivers quality every time.

The material is consistent and predictable. The people who work with it do so with pride and precision.

Off-site construction is carried out in factories and workshops, so all along the steel supply chain the workforce are employed at permanent facilities. This stable situation facilitates training and development of skills to consolidate the quality improvement cycle. The stably employed workforce enjoy conditions and social benefits not available to the itinerant labour force of less sophisticated methods of construction.



The introduction of the Eurocodes will be the largest single change in codified design in living memory. Corus, and our steel sector partners, are ready with a range of guidance and tools to support designers through the transition from British Standards.

New guidance documentation comprises:

- Steel Building Design: Introduction to the Eurocodes
- Steel Building Design: Concise Eurocodes
- Steel Building Design: Design data
- Steel Building Design: Medium rise braced frames
- Steel Building Design: Worked examples – open sections
- Steel Building Design: Worked examples – hollow sections
- Steel Building Design: Fire resistant design
- Steel Building Design: Stability for beams and columns
- Steel Building Design: Combined bending and torsion
- Steel Building Design: Composite members.



UK
EUROCODES

Perhaps the greatest environmental challenge for the construction industry concerns the emission of greenhouse gases, particularly carbon dioxide. All construction materials carry a carbon burden and most industries have accepted the realisation of global warming and are acting responsibly to reduce emissions from their processes. Cement and steel manufacture are roughly equal in their contribution at 5% and 4% of global CO₂ emissions respectively. The European steel industry are committed to a €360 million programme to combat the problem and bring about a step change in process emissions (www.ulcos.org).

The largest contributor to global CO₂ emissions is energy generation, so reduction of operational energy used in buildings is most important. Corus

is developing many products and solutions to deliver energy efficient buildings. We are also committed to providing the best information and guidance to help designers to reduce the carbon footprint of buildings, which account for approximately half of all CO₂ emissions through energy use. Corus and the BCSA are funding a £1 million three year research project, Target Zero, to provide designers with the information they require to deliver reduced carbon buildings with confidence. The study looks at five major building types - school, warehouse, supermarket, office, mixed use development - and provides solutions to meet each step along the path towards to zero carbon. All solutions are fully costed to give clients and designers the whole picture.



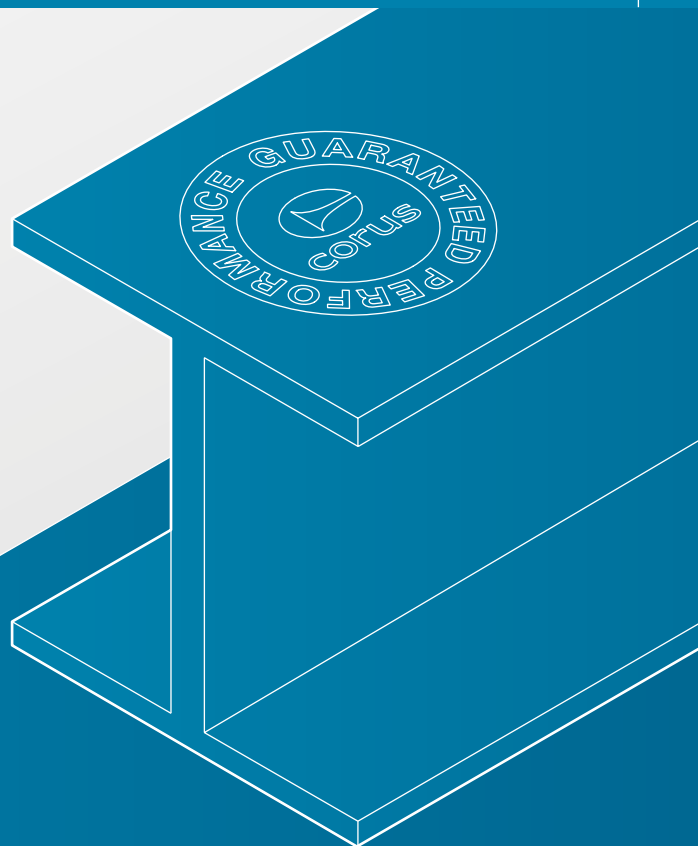
Peace of mind

Successful construction is achieved by reducing risk. Corus steel is manufactured to the highest quality standards, creating products with predictably excellent performance. When steel is specified it can be done so with the confidence that what you ask for is what you will get.

There are virtually no surprises when using steel construction. Precise economic design is the norm because of the predictable way that the material behaves. The products are standardised and have been developed with efficiency in mind. Site installation is a repeatable operation which is well practised and safe.

Our natural concerns for the future of the environment are mitigated by using steel. Designers that specify steel today can relax in the certainty that the material will never knowingly become waste. There is no requirement for special design considerations, as the products are reusable and endlessly multicyclable – as more new steel, not hardcore or fuel for the incinerator.

There is also peace of mind from working with a major responsible supplier such as Corus. Our product range is large and available when needed. Our technical support is extensive and immediate. Our commitment to the construction sector is proven by many years of investment into research and developments such as plastic design, fire engineering, composite construction and sustainability. This knowledge has been taken and used by designers to make steel the material of choice for UK building construction.



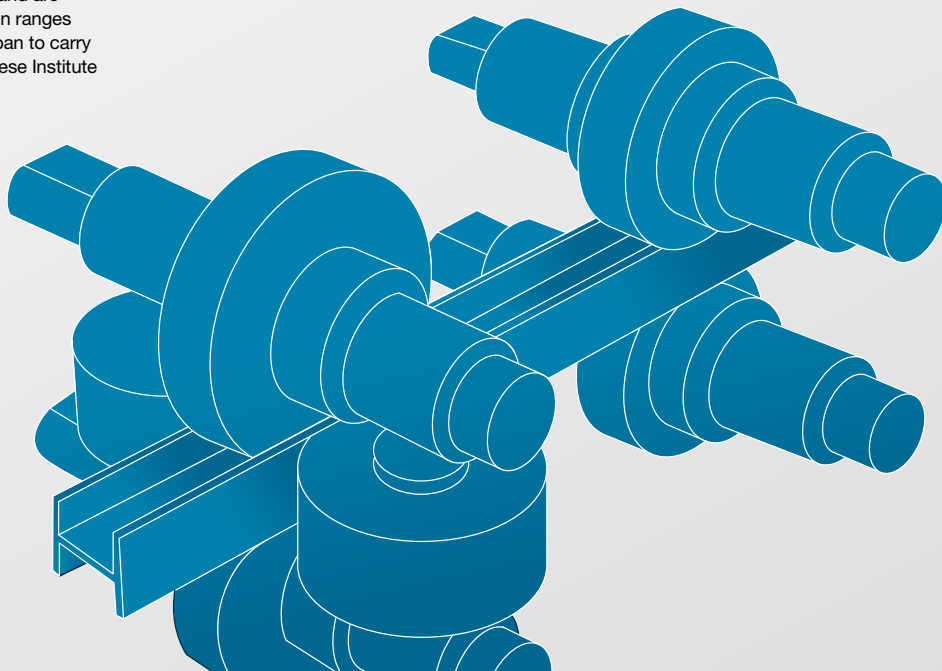
Manufacturing excellence

Manufacturing excellence underpins everything Corus does within the construction industry. Whether applied to its products, its people or the way it works in partnership with its supply chain, manufacturing excellence sits at the heart of the Corus brand.

We have a long heritage in delivering solutions to our customers that support them in delivering technically excellent buildings. Corus combines technical expertise and unrivalled knowledge of steel in construction with the attitude of a service provider. A diverse product range puts Corus in a unique position to provide added value whenever steel is used in the construction industry.

Our pursuit of manufacturing excellence goes beyond the physical performance of individual products. It is an attitude to business, which affects everything that we do; from research and development through product manufacture and distribution, to technical advice and support.

Corus was the first steelmaker in the world to gain approval to CE mark its structural sections and plates to meet the requirements of the EU Construction Products Directive. Advance sections from Corus were also the first in the world to achieve approval for the tough Lloyds register materials quality scheme and are still one of very few section ranges manufactured outside Japan to carry approvals from the Japanese Institute for Standardisation.



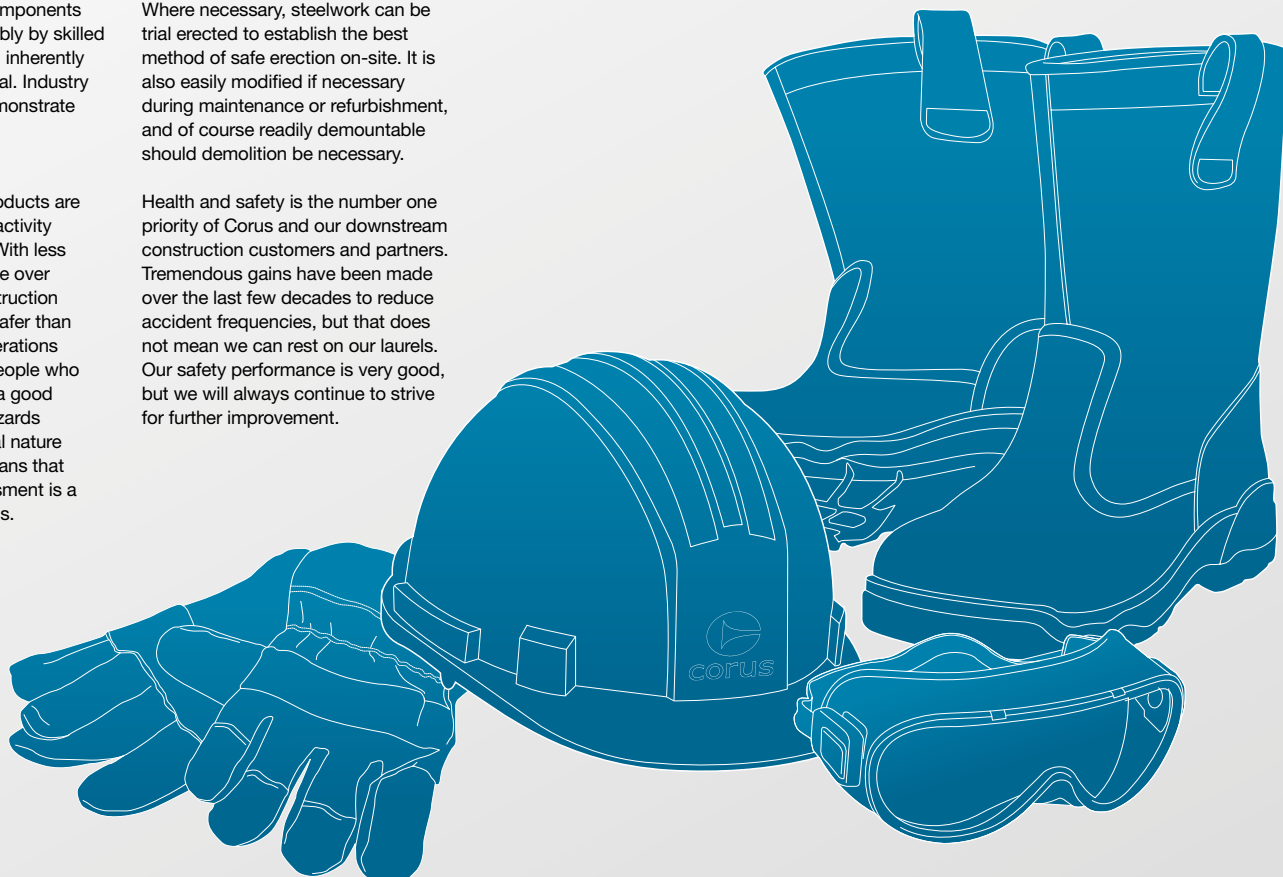
Health and safety

Off-site fabrication of components and rapid on-site assembly by skilled personnel make steel an inherently safe construction material. Industry surveys consistently demonstrate that steel is the safest construction material.

All steel construction products are pre-engineered, so site activity is fast and predictable. With less to do, using fewer people over a shorter duration, construction using steel products is safer than the alternatives. The operations are repeatable, so the people who carry them out develop a good understanding of the hazards involved. The methodical nature of steel construction means that planning and risk assessment is a thorough precise process.

Where necessary, steelwork can be trial erected to establish the best method of safe erection on-site. It is also easily modified if necessary during maintenance or refurbishment, and of course readily demountable should demolition be necessary.

Health and safety is the number one priority of Corus and our downstream construction customers and partners. Tremendous gains have been made over the last few decades to reduce accident frequencies, but that does not mean we can rest on our laurels. Our safety performance is very good, but we will always continue to strive for further improvement.



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Construction & Engineering products

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Bi-Steel

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Living Solutions

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