E Learning by Access Steel: How to use Access Steel

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Overview of the engineering design process
How Access Steel helps the engineer
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Access Steel - A Supranational Tool for Enhancement of the Eurocodes on-Line - Microsoft Internet Explorer
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Access Steel

240 detailed technical resources on steel design and construction

Quality assured

Printable

User friendly IT system

Fast, structured search

- "Google" type search query
- Index of contents

…and it is all free!

Types of information in Access steel

Case studies – examples of best European practice

Scheme development – turning the initial concept into an outline design

Non-contradictory, complementary information (NCCI)

- Initial sizing
- Completing the Eurocodes

Flow charts

Worked examples

- Static worked examples
- Active worked examples – simple software

Scope of Access Steel

Single storey
Multi-storey
Residential
Fire safety

Translations of Access Steel

Interface: common – with text files in four languages

- Home page
- Search functionality

Technical resources – in four languages

- Metadata: description and key words
- Full content
- 350,000 words

Additional languages

- Greek
- Czech
- ?

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Reference No. & ENGLISH keyword	GERMAN	FRENCH
2.7 Sealants	Abdichtung, Dichtungsmittel	Produits d'étanchéité
2.8 Steel products	Bauprodukte aus Stahl	Produits en acier
2.8.1 Cold formed steel products	Bauprodukte aus kaltgeformten Stahlbauteilen	Produits en acier formés a froid
2.8.1.1 Cold formed steel sections	kaltgeformte Stahlprofile	Profilés en acier formés a froid
2.8.1.1.1 C sections	C-Profile, U-Profile	Profilés en C
2.8.1.1.2 Sigma sections	Sigma-Profile	Profilés Sigma
2.8.1.1.3 Z sections	Z-Profile	Profilés en Z
2.8.1.2 Cold formed steel sheeting	kaltgeformtes Stahlblech	Tôles en acier formées à froid
2.8.1.2.1 Trapezoidal profile sheeting	Trapezblech	Tôles à section trapézoïdale
2.8.1.3 Steel decking	Profilblech	Bac acier
2.8.1.3.1 Deep decking	deep decking, Tiefdecke	Bac à nervures profondes
2.8.1.3.2 Re-entrant profile decking	Profilblech mit Sicken, Holorib®-Blech	Bac à nervures rentrantes
2.8.1.3.3 Trapezoidal profile decking	Trapezblech	Bac à nervures ouvertes
2.8.2 Fabricated/processed steel products	Weiterverarbeitete Bauprodukte aus Stahl	Produits préfabriqués en acier
2.8.2.1 Beams with web openings	Träger mit Stegöffnungen, Steglochträger	Poutres avec ouvertures dans l'âme
2.8.2.2 Box girders	Kastenträger	Poutres caisson
2.8.2.3 Plate girders	Blechträger	Poutres PRS
2.8.2.4 Galvanized steel	verzinkter Stahl	Acier galvanisé
2.8.3 Fasteners/fixings	Verbindungsmittel	Organes d'assemblage
2.8.3.1 Bolts	Schrauben	Boulons
2.8.3.1.1 Black bolts	schwarze Schrauben	Boulons bruts
2.8.3.1.2 Fully threaded bolts	Schrauben mit durchgehendem Gewinde	Boulons entièrement filetés
2.8.3.1.3 Holding down bolts	Ankerbolzen, Ankerschrauben	Boulons d'ancrage/tiges d'ancrages
2.8.3.1.4 HSFG (High strength friction grip) bolts	hochfeste gleitfest vorgespannte Schrauben	Boulons précontraints
2.8.3.2 Nuts	Muttern	Ecrous
2.8.3.3 Rivets	Niete	Rivets
2.8.3.4 Shear connectors	Schubdübel (i.d.R. Kopfbolzendübel)	Connecteurs/Goujons
2.8.3.5 Washers	Unterlegscheiben	Rondelles
2.8.3.5.1 Load indicating washers	Unterlegscheiben mit Belastungsanzeige	Rondelles indicatrices de précontra
2.8.4 Hot rolled steel products	warmgewalzte Erzeugnisse aus Stahl	Produits en acier laminés à chaud
2.8.4.1 Angle sections	Winkelprofile	Cornières
2.8.4.2 Channel sections	U-Profile	Sections en U
2.8.4.3 I sections and H sections	I-Profile und H-Profile	Sections en I et en H
2.8.4.3.1 Asymmetric sections	unsymmetrische Profile	Sections asymétriques
2.8.4.3.2 HE (European wide flange beams)	HE (Europäische Breitflanschträger)	HE (poutrelles européennes à larges
2.8.4.3.3 IEP (European beams with parallel flanges)	IPE (parallel-flanschige I-Träger)	IPE (poutrelles européennes à ailes
2.8.4.3.4 Steel bearing piles	Druckpfahl aus Stahl	Pieux porteurs en acier
2.8.4.3.5 UB (Universal beams)	UB (Britische Universalträger)	UB (Poutres universelles anglaises)
2.8.4.3.6 UC (Universal columns)	UC (Britische Universalstützen)	UC (Poteaux universels anglais)

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Industry investment in harmonisation

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Transfer of best value solutions
Safety and risk management

Steel is the only sector to invest
in an integrated approach
to the Eurocodes.

The Access Steel project team

France, Germany, Ireland, Luxembourg, Spain, Sweden and UK

Contributors from Czech Republic and Romania

Steel Alliance

Access Steel maintenance and user support

- Internet service
- Tracking of user queries
- Maintenance, upgrades and extensions

Feedback and usage to date

Usage since launch in June 2006

104,000 distinct hosts
70% corporate users
Target 250,000 users

75,000 page requests in November 2007

166 countries worldwide (79%)

"***The information on Access Steel is nothing short of spectacular***"
NUCONSteel Commercial Corp.,USA

Design process: Engineering inputs

Conceptual design: With the architect, developing overall concepts and structural forms

Scheme development: Developing structural schemes to the extent that defines general geometry – grids and approximate element sizes - and, potentially, costs

Detailed design: finalising all sizes and geometry and verifying the adequacy of the overall structure, its stability, and the strength and stability of all elements and connections – to a specific code.

Design process: Engineering inputs

Conceptual design
Scheme development
Detailed design

Technical resources

	Multi-storey buildings	Single-storey buildings	Residential buildings	Fire Safety Eng.	Totals
CONCEPTUAL DESIGN	8	5	9	14	36
SCHEME DEVELOPMENT	17	9	12	19	57
DETAILED DESIGN					
Flow Charts	17	14	5	11	47
NCCI	30	17	0	3	50
Worked Examples	18	11	7	14	50
	90	56	33	61	240

Design process

Conceptual design

Case studies

Scheme development

Detailed design

Case Studies (35)

Example: Le Sequana

Demonstrate European best practice

Inspire clients

Inspire architects and engineers

Useful source of:

- Ideas
- What has been done before
  - Concepts
  - Details

Design process

Conceptual design
Scheme development
Detailed design

Design process

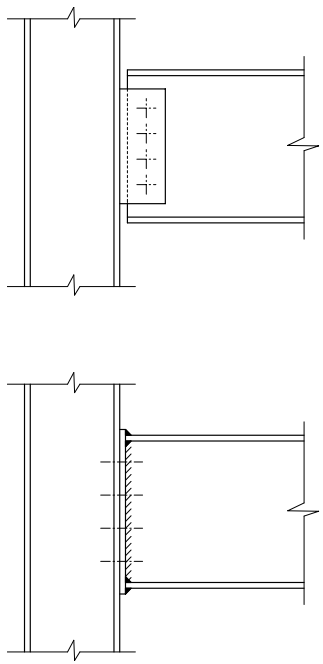
- Conceptual design
- Scheme development
  - Type of frame
  - Floor layout
  - Services strategy
  - Choice of beam type and initial size
  - Choice of column type and initial size
  - Floor construction
  - Fire strategy
- Detailed design

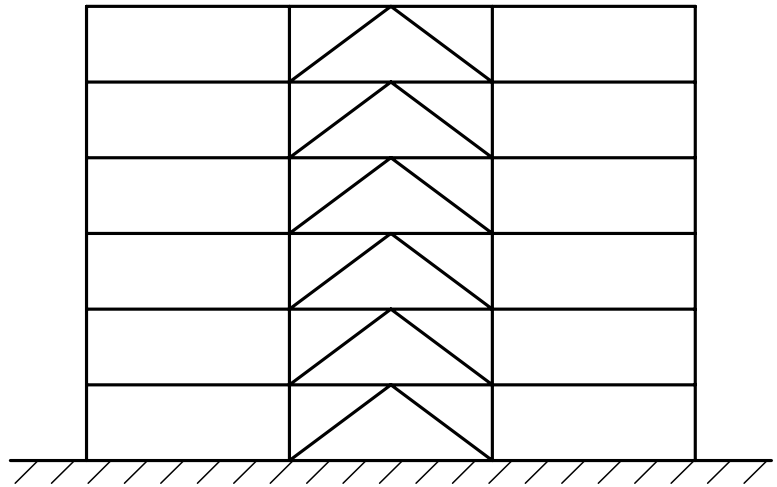
Choice of frame type

Braced frame

simple joints (simple construction)

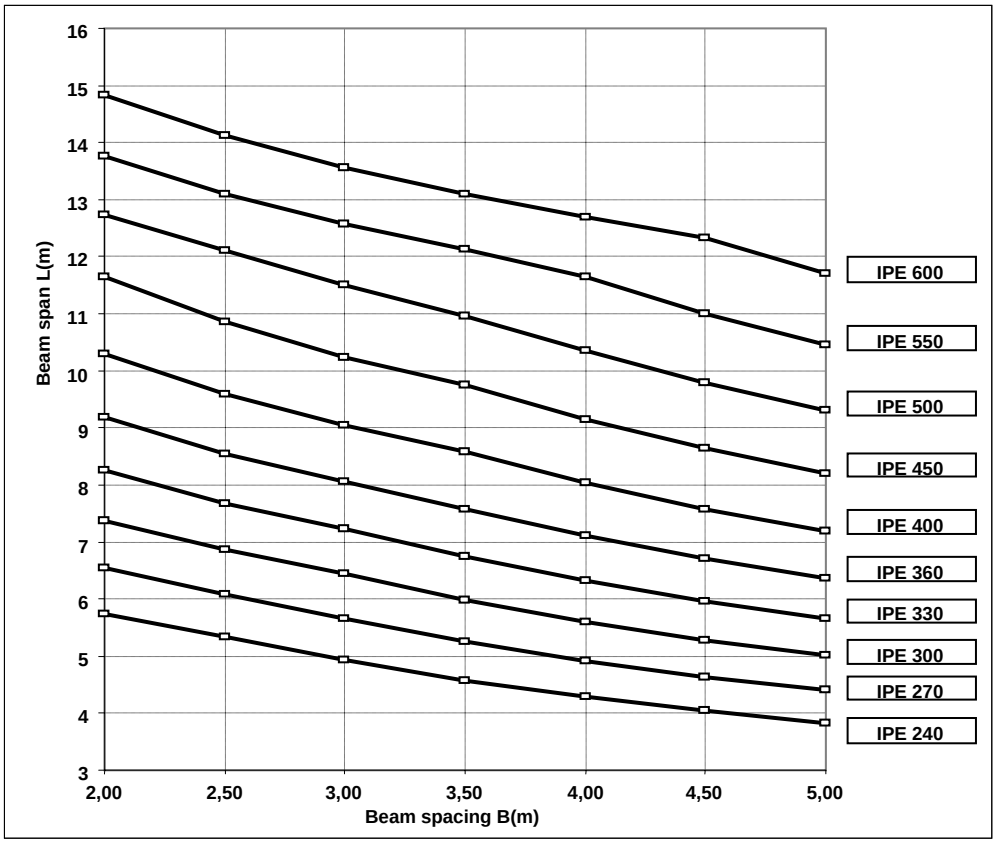
Un-braced frame





Initial sizing

Beams, Columns



Classification

Sub-grade for fracture toughness

Table 4.3 IPEA, IPE, IPEO profiles – S355

Profile		Section class			Maximum compression force (N_{Ed}) for the section class (kN)		
		Under pure compression	Under pure bending, M_y	Under pure bending, M_z	Class 1	Class 2	Class 3
	80	1	1	1	*		
	100	1	1	1	*		
	120	1	1	1	*		
	140	2	1	1	126	*	
	160	3	1	1	129	171	*
	180	3	1	1	137	186	*
	200	4	1	1	141	195	792
	220	4	1	1	173	240	945
	240	4	1	1	178	251	1063
	270	4	1	1	169	250	1086
	300	4	1	1	199	298	1247

Steel grade	Sub-grade	Charpy energy CVN		Re							
		at T [°C]	J_{min}	10	0	-10	-20	**-30**	-40	-50	10
				$\sigma_{Ed} = 0{,}75\ f_y(t)$							
S235	JR	20	27	60	50	40	35	30	25	20	90
	J0	0	27	90	75	60	50	40	35	30	125
	J2	-20	27	125	105	90	75	60	50	40	170
S275	JR	20	27	55	45	35	30	25	20	15	80
	J0	0	27	75	65	55	45	35	30	25	115
	J2	-20	27	110	95	75	65	55	45	35	155
	M,N	-20	40	135	110	95	75	65	55	45	180
	ML,NL	-50	27	185	160	135	110	95	75	65	200
S355	JR	20	27	40	35	25	20		15	10	65
	J0	~~-20~~	~~27~~	~~60~~	~~50~~	~~40~~	~~35~~	**25**	20	15	95
	J2	-20	27	90	75	60	50	40	35	25	135
	K2,M,N	-20	40	110	90	75	60	50	40	35	155

Scheme development (58)

Example: Intermediate floors in residential construction

Initial design issues

- Structural engineering
- Non-structural topics: check lists

What might the building look like

Layouts

Initial sizing

Design process

Conceptual design
Scheme development
Detailed design

Design process

- Conceptual design
- Scheme development
- Detailed design (to the Eurocodes)
  - Flow charts
  - NCCI
  - Worked examples both static and dynamic

Flow Charts (48)

Example: Fin plate connection

Where to start

What to do

When you have completed the design activity

‘Maps’ to linked resources

NCCI: Initial sizing (7)

Example: Column sizes in multi-storey buildings

Guidance on element and connection sizes for initial selection

Easy, graphical approaches

NCCI: Completing the Eurocodes (43)

Example: Buckling lengths of columns: rigorous approach

Eurocodes are missing:

- Essential guidance necessary for design
- ‘Text book’ material

Static worked examples (52)

Example: End plate beam-to-column-flange simple connection

Realistic

Complete

Rigorous

Excellent introduction to design to the Eurocodes:

- Practising engineers
- Undergraduates

Interactive Worked examples (11)

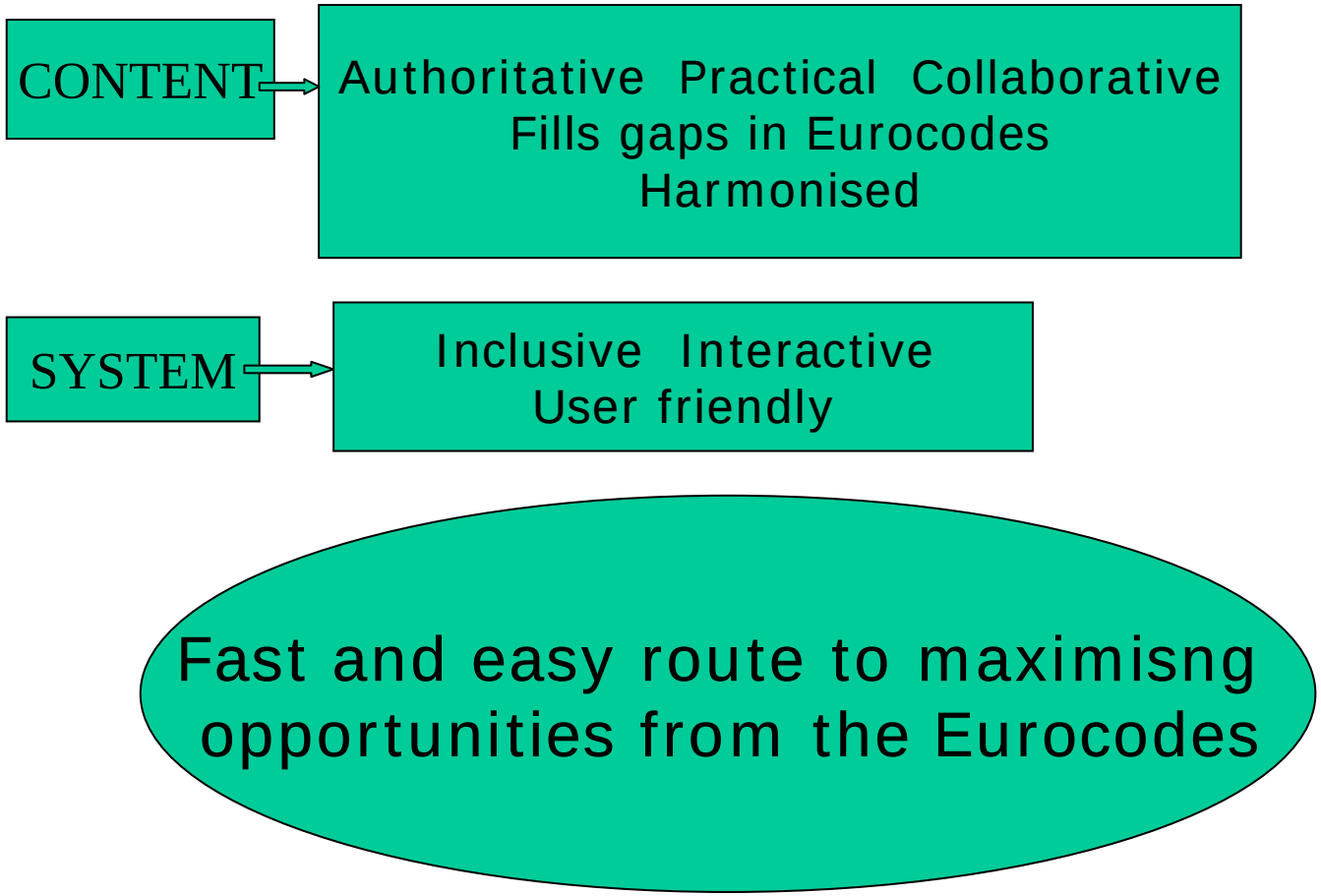
Example: Simple column design

11 Examples

Need to download the parent software, TEDDS LITE

Carries out design to the users' parameters and prepares calculation sheets

Key messages



Access Steel in summary

A very rich set of resources
A major step towards harmonised best practice in Europe
Wide potential beyond Europe
Use it!
Its free!

www.access-steel.com

A Coda on e-learning 1 role of A-S

Material prepared for use by practising engineers - in design practice

Very high pedagogical content

Will automatically be used for 'informal' e-learning

Can readily be adapted for formal e-learning with:

- Enhanced explanation, perhaps using existing electronic resources, e. g. SteelCAL
- Formal assessment

A Coda on e-learning 2

Traditional course market is declining

Employers want their engineers to be able to access their training:

- When they need it – for an immediate business need
- Where they want it – at their workplace or at home
- How they want it – at their own pace

Employers will therefore increasingly want their staff to use e-learning

The big difficulty is to replace the interaction with lecturers and fellow students of a traditional course, by:

- E-meetings
- E-tutorials
- Etc

A Coda on e-learning 3

Leonardo programme is sponsoring a pilot project on e-learning for steel design and construction

It will deliver:

- 12 modules
- Guidance on best practice for preparation of e-learning content

A simple questionnaire is available to guide the direction of this project

Input is needed, especially from practising engineers