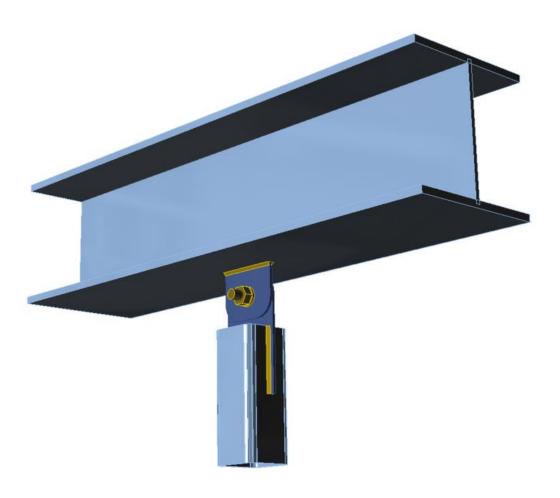


IDEA StatiCa Steel - Tutorial



Buckling analysis

Steel connection design reinvented – any topology, any loading, in minutes. Check of joint/connections acc. to EC/AISC. Unique CBFEM method. Get more resources at <u>www.idea-rs.com</u> and <u>www.ideastatica.com</u>



Welcome to IDEA StatiCa tutorial. We will show how to use software IDEA StatiCa to model, design and check buckling of a structural steel joint, example being connection of strut to beam.

Launching application

Let's launch IDEA StatiCa and select application Connection.

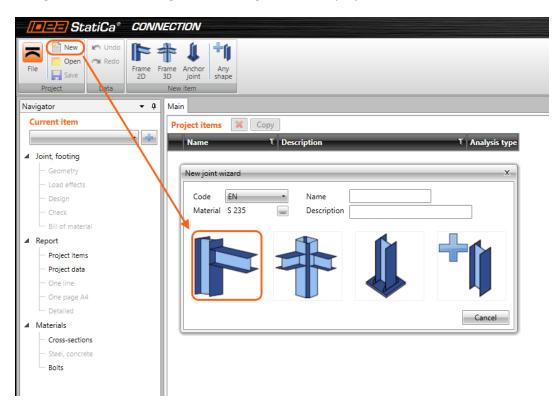




New project

We create a new project by clicking **New.** Wizard window is opened. We select **2D frame shape** and **column to beam** topology.

Navigator on the left will guide us through the whole project.



Select connection topol	ogy		96 S	×
		*		
	×			
				Cancel

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Navigator • 9 Current item CON1 • • • Joint, footing Geometry Load effects Design Check Bill of material Report Materials	We start change cr	oss-sections	•		vere automatica 5. We also chang	•
Members (Market State)	Mirror Y Mirror Z Length [mm]	2 - CON1 (HEB180)				
One member of the joint is 'connected'. The support in member.		0,0 -90,0 0,0 0 0 0 0 0 0 0 0 0 0 0	Cross-Set. Ion Navigator Rolled sections Welded, Con	nposed Cold-formed		×
	Cross-section AC AH FQ FR K MQ MR MSH QRO	SHS50/50/3.0 SHS50/50/3.2 SHS50/50/4.0 SHS50/50/5.0 SHS50/50/6.3 SHS50/60/3.0 SHS50/60/4.0 SHS50/60/5.0				Cancel
	RQ RRO SC VHP HSS HSS(Imp) RHS(Ce) RHS RHSCF(Hy RHSCF	SHS60/60/6 SHS60/60/60 SHS70/70/3.0 SHS70/70/3.6 SHS70/70/5.0 SHS70/70/6.3 SHS70/70/8.0 SHS80/80/3.0 SHS80/80/3.6 SHS80/80/5.0				
	SHS(Ce) SHS SHSCF(Hy) SHSCF	SHS80/80/6.3 SHS80/80/8.0 SHS90/90/3.6 SHS90/90/5.0 SHS90/90/6.3 SHS90/90/8.0 SHS100/100/4.0 SHS100/100/5.0	Cancel			
Members Name B > C		Bearing member Properties Cross-section Mirror Y Mirror Z Length [mm] Geometrical ty	4 - SHS80/80/5.0	• 🛛 🔊		

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Navigator - 4 Current item	Load effects
Joint, footing Geometry Load effects Design Check Bill of material	Let's continue with Load effects . One load effect was automatically added by the wizard. We input value on Normal force into the table. More load cases can be added.
Report	
Materials	
Internal forces	Clean Copy X position

Member	Position	X [mm]	N [kN]	Vy [kN]	Vz [kN]	Mx [kNm]	My [kNm]	Mz [kNm]
C	End	0	-40,0	0,0	0,0	0,0	0,0	0,0



We select default bolt type.

Design

Next step is the **Design**. To model connection between beams, we click on **Add button** and select operation **Connecting plate**.

olt assembl	у	
4.6	M12 4.6	
4.8	M16 4.6	
5.8	M20 4.6	
6.8	M22 4.6	
8.8	M24 4.6	
10.9	M27 4.6	
	M30 4.6	
	M36 4.6	
	M39 4.6	
	M42 4.6	
	M48 4.6	
	M52 4.6	
	OK	Cancel

Steel connection design reinvented – any topology, any loading, in minutes. Check of joint/connections acc. to EC/AISC. Unique CBFEM method. Get more resources at <u>www.idea-rs.com</u> and <u>www.ideastatica.com</u>



Calculate yesterday's estimates

Operation is added and we update its parameters (plate thickness and dimensions, bolt size and position and weld size and type)

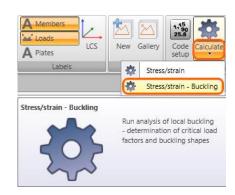
Manufacturing operations	÷	Calcul	ate E	ditor 💌	
Name T	4	Connecting plate			
		Member	С	•	
		Connected to	New pla	ate 🔹	
	4	New gusset plate			
-		R1 Type	Member -		
		R1 - related to	В	•	
		R2 Type	None	•	
		Material	< defau	lt > 🔹 🌊	
		Thickness [mm]	4		
		B – width [mm]	100		
		H – depth [mm]	80		
		X – position [mm]	0		
	4	Connection			
		X - position [mm]	200		
		Material	< defau	lt > 🔹 🌊	
		Thickness [mm]	0		
		Alignment	Front	•	
		Туре	Notche	d member 🔹	
		L - plate length [mm]	80		
		B – plate width [mm]	0		
		0 – Overlap [mm]	100		
		E – plate excentricity [mm]	0		
		Connection type	Bolted	•	
	4	Welds			
		Plate	3 mm	< default >	
		Tongue	3 mm	┘< default >	
	4	Bolts			
		Туре	M16 10	.9 • 🔊	
		Reference line	Membe	r x-axis 🔹	
		Rows [mm]	0		
		Positions [mm]	30		
		Grid	Regular	•	
		Shear plane in thread			
		Shear force transfer	Bearing	- tension/shear interaction	



Navigator 👻 🖡	~
Current item	U
CON1 -	No
Geometry	fro
- Design	
Bill of material	
Report	

Check of a structural steel joint

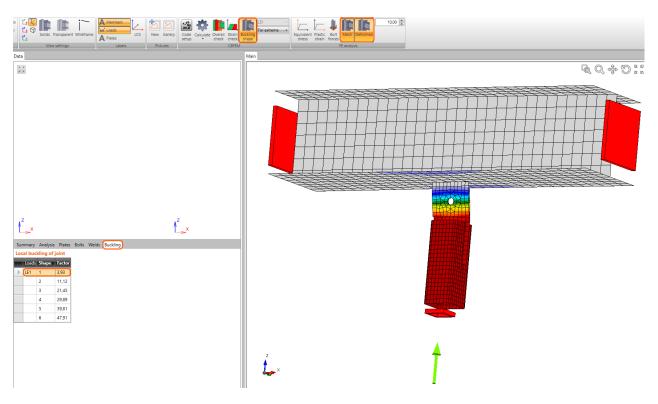
Now we move to the **Check** section of the Navigator. We click button **Code setup** from the ribbon and activate **Buckling analysis**.



Then we start nonlinear analysis by clicking **Calculate** in the ribbon. Analysis model is automatically generated, Stress/strain calculation is performed and we can start **Bucking analysis**.

We activate **Buckling shape**, **Mesh** and **Deformed** from the ribbon to get a full picture of buckling shape of the joint. Everything is displayed in the 3D window.

To check a shape of calculated **Factor of critical load**, we select tab **Buckling** and choose a particular raw from the table.

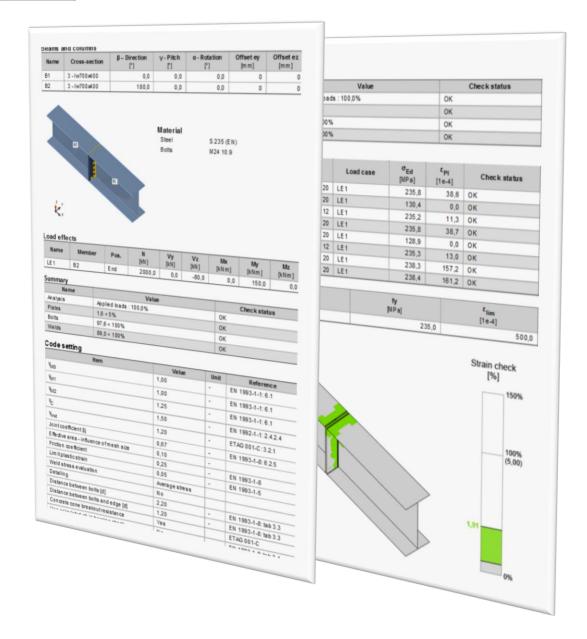




	Current item
	CON1 🔹 💠
Þ	Joint, footing
4	Report
	Project items
	 Project data
	- One line
	- One page A4
	Detailed
₽	Materials

Report

The final step of the project is to generate the **Report.** IDEA StatiCa offers three types of output reports – one line, one page and detailed. We will choose the **Detailed** report that contains materials, geometry, all checks. We can also add bill of material and theoretical background to explain underlying methods and references to selected design code.



Structural steel joint was modelled, designed and checked

Thank you for spending time on this tutorial. For further information please visit our website.