



# CORRUGATED WEB BEAM: SIN BEAM TECHNOLOGY

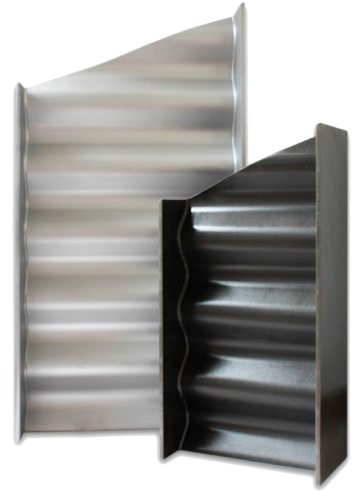
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FOR INDUSTRIAL/WAREHOUSE STRUCTURES



# Corrugated Web Beam

The Corrugated Web I-Beam is a built-up girder consisting of wide plate flanges which are welded to a corrugated web.



The corrugation of the web increases the stability of the web against buckling which results in considerable savings in raw material cost in a magnitude of approximately 10-30% versus welded I-beams and way above 30% versus hot-rolled sections.

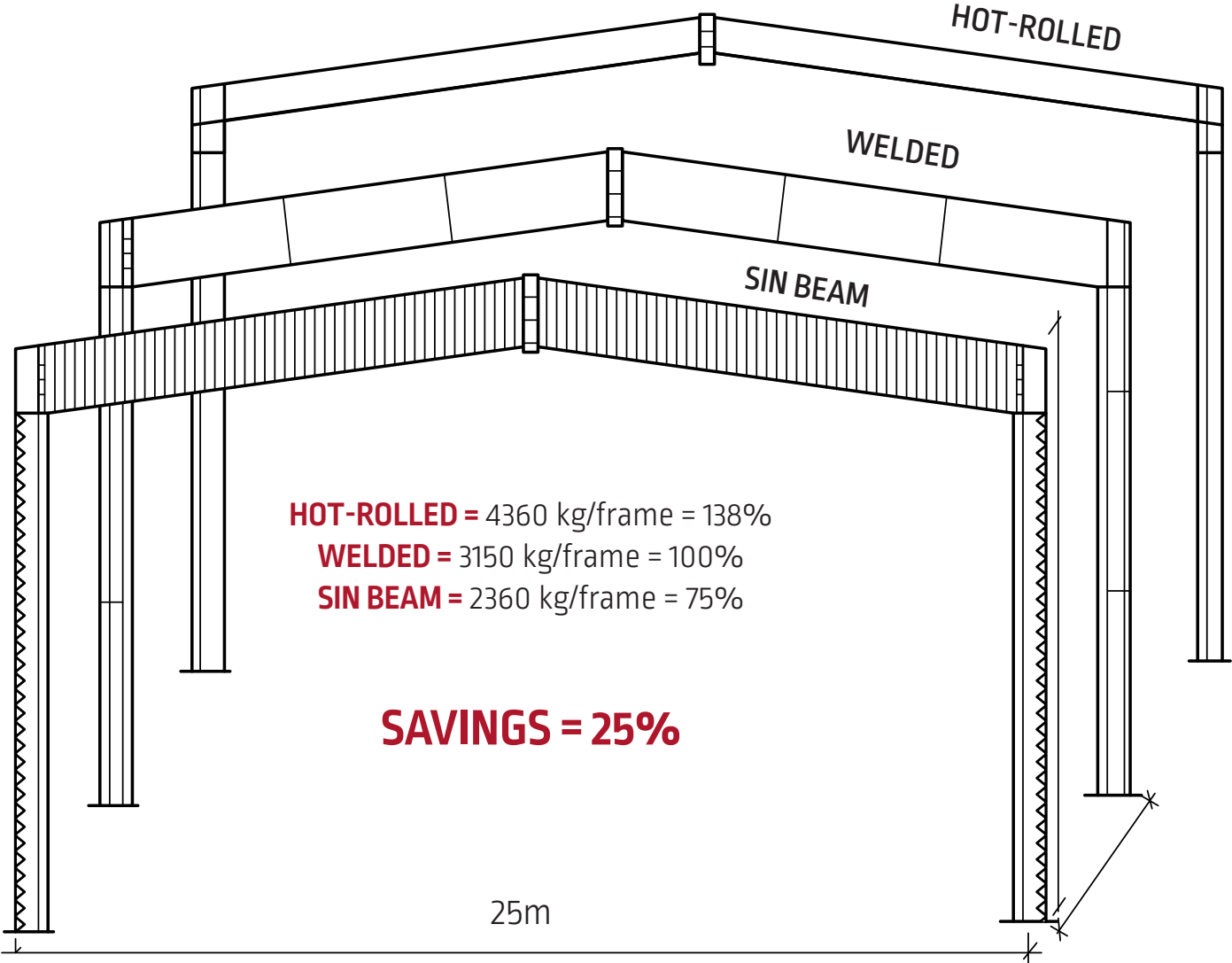
## SIN Beam: Technology

- » The web is usually 2 ~ 3mm thick (can go even up to 6mm) and welding is required in most cases only on one side of the web.
- » Easy and quick erection at construction site
- » Very sturdy and absolutely straight shape of the beam (perfect quality without fabrication mistakes)
- » Production "Just in Time", as only a stock of coils (for web material) and a plate stock (for flanges) are required for immediate production
- » About 1 minute per meter of manufactured beam
- » Machine capacity of about 15,000 tons per year
- » Appealing optical appearance of beams (gives a modern touch to a steel building)
- » European high quality
- » Standardized calculation/design (similar to lattice girder)



# SIN Beam: Technology Advantage

- » Sin-profiles combine large span and light weight of lattice girders with low beam height and high load-bearing capacity of ordinary girders.
- » Dimensions, material thickness and material quality of the upper and lower flange as well as the web are customized adapted to the specific requirements.
- » The sin-profiles are cut to the lengths required by the individual order. Spans around 40m can be bridged with the web height of 1.50m.



# SIN Beam: Technology Advantage

## ADVANTAGES OF SIN BEAM COMPARED TO HOT ROLLED PROFILES

- » Saving of construction weight respectively saving on raw material above 30%
- » More stiffness with increased web height
- » Increase of bearing capacity
- » Fewer handling steps
- » Aesthetical appearance

## ADVANTAGES OF SIN BEAM COMPARED TO WELDED PROFILE

- » Saving of construction weight respectively saving on raw materials up to 10-30%
- » Quick and efficient automated fabrication
- » More stiffness with increased web height
- » Increase of bearing capacity
- » Fewer handling steps
- » Aesthetical appearance

## ADVANTAGES OF SIN BEAM COMPARED TO LATTICE WORK

- » Quick and efficient automated fabrication



# SIN Beam: Geometry

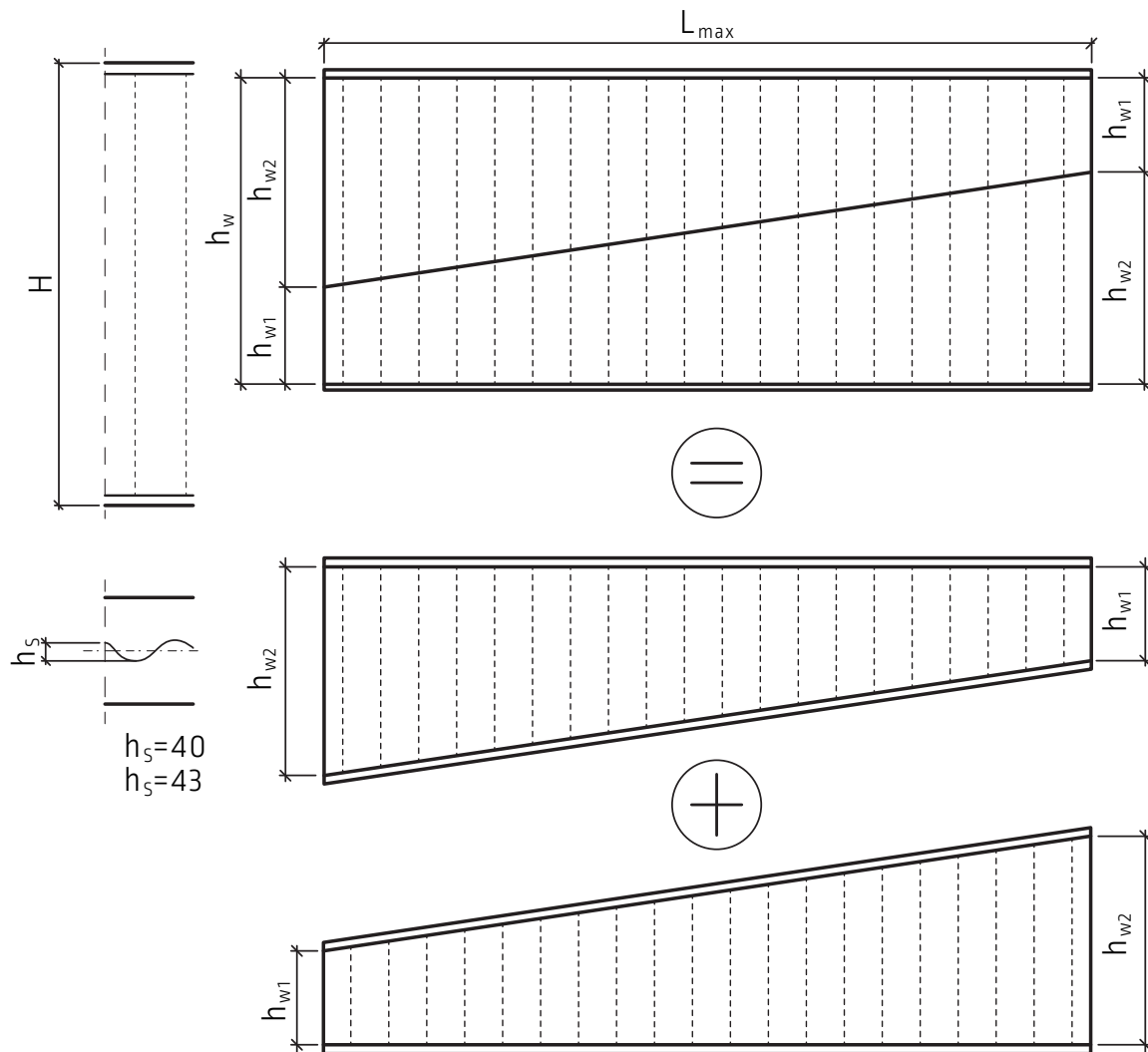
» Corrugated web (SIN) beams consist of a thin-walled corrugated web and flat, wide flanges.

» **WEB DIMENSIONS:**

- **Web heights:** 333, 500, 625, 750, 1000, 1250, 1500 CUSTOM HEIGHTS AVAILABLE UPON REQUEST
- **Web thicknesses:** 2.0 mm, 2.5 mm, 3.0 mm (4.0mm, 5.0mm, 6.0mm on special request)

» **FLANGES:**

- **Width:** 160 mm – 450 mm
- **Thickness:** 8 mm – 30 mm

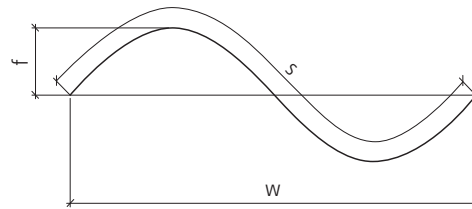
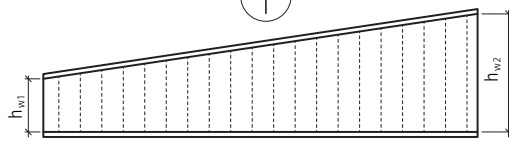
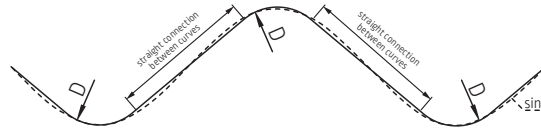
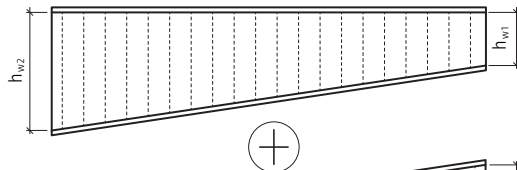
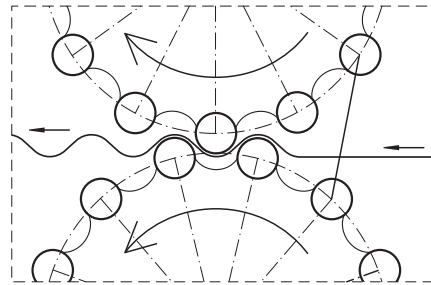
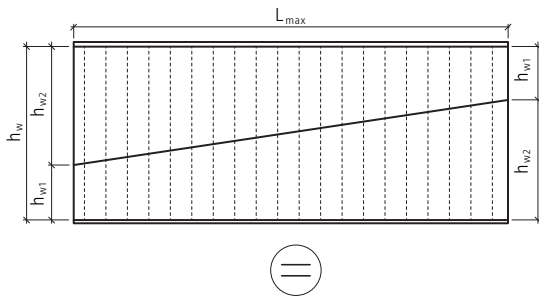


$$L_{max} = 11500 \text{ mm}$$

$$h_{w1} = \text{min. } 250 \text{ mm}$$

$$h_{w1} + h_{w2} = h_w = 625, 750, 1000, 1250, 1500 \text{ mm}$$

# SIN Beam: Geometry



$L_{max} = 11500 \text{ mm}$   
 $h_{w1} = \text{min. } 250 \text{ mm}$   
 $h_{w1} + h_{w2} = h_w = 625, 750, 1000, 1250, 1500 \text{ mm}$

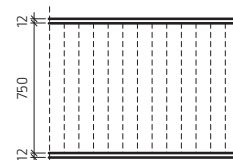
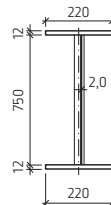
## TAPERED SIN PROFILE

## SIN WEB PROFILE

### EXAMPLES

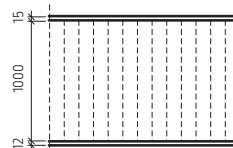
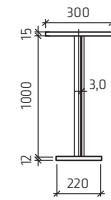
equal flanges  
 parallel flanges

$WT(\_) h_w / b_f \times t_f$   
 example: WTA 750 / 220 x 12



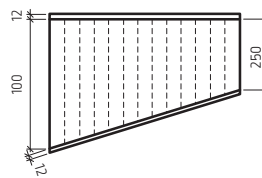
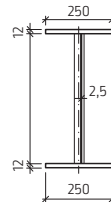
different flanges  
 parallel flanges

$WT(\_) h_w / b_{f1} \times t_{f1} / b_{f2} \times t_{f2}$   
 example: WTC 1000 / 300 x 15 / 220 x 12



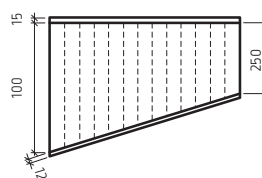
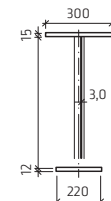
equal flanges  
 tapered profile

$SIN(\_) h_{w1} - h_{w2} / b_f \times t_f$   
 example: SINB 250 - 1000 / 250 x 12



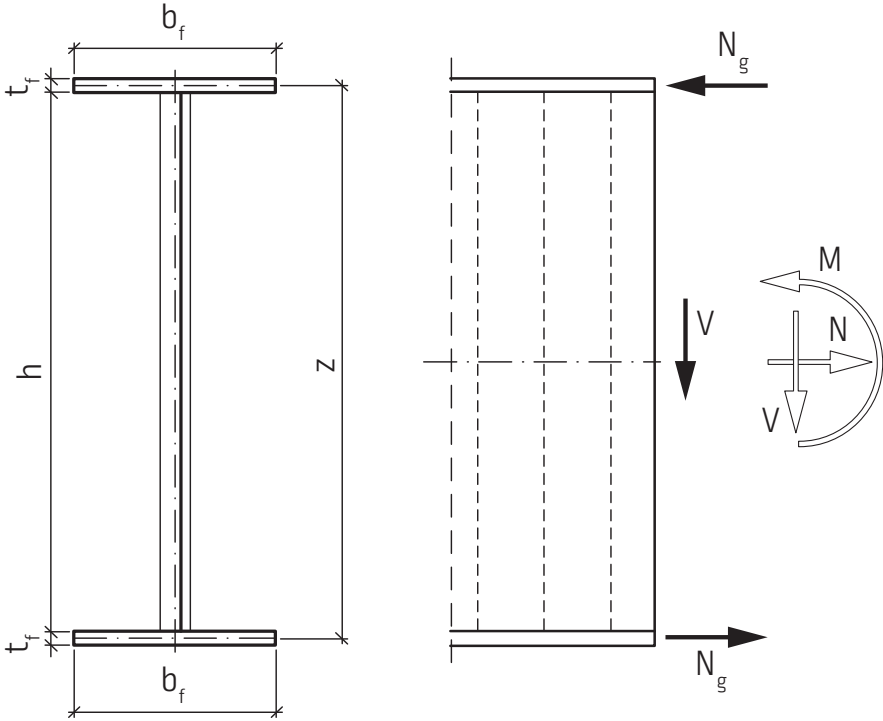
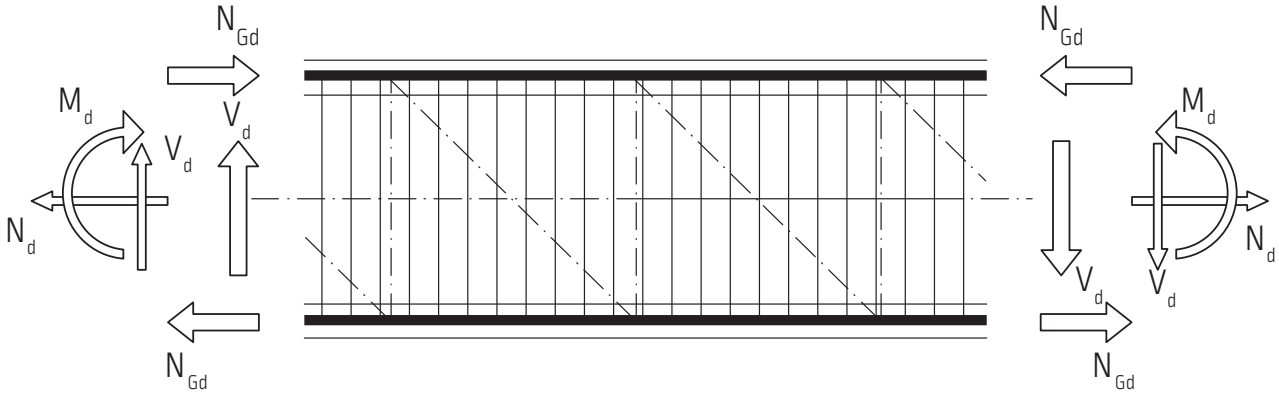
different flanges  
 tapered profile

$SIN(\_) h_{w1} - h_{w2} / b_{f1} \times t_{f1} / b_{f2} \times t_{f2}$   
 example: SIN C 250 - 1000 / 300 x 15 / 220 x 12



# SIN Beam: Basis of Concept

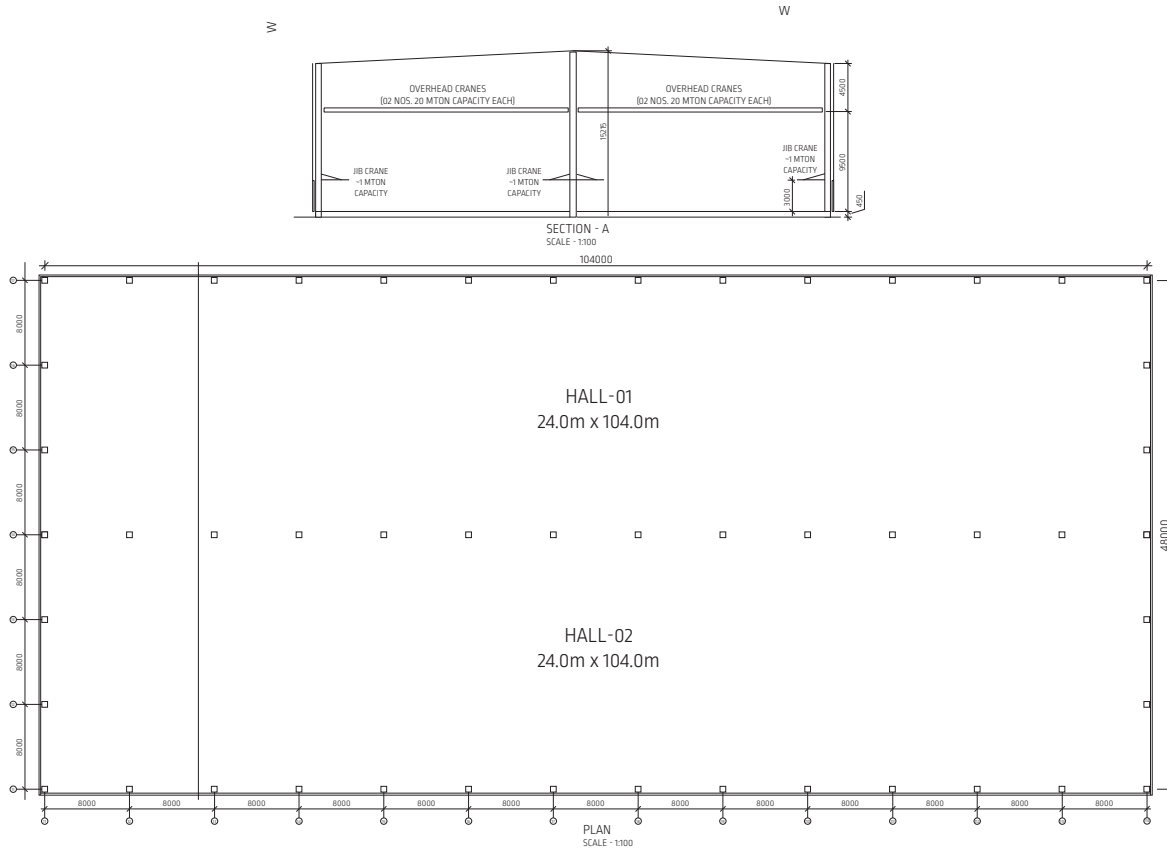
- » From a static point of view, the SIN beam works like a typical truss. The bending moments and axial forces are transmitted through the flanges and the shear forces are fully absorbed by the web.
- » By application of this mechanical model, sin beams and columns are correspondence with International standards of AISC and Eurocode as well Russian, Chinese code and others.



$$N_g = \frac{M}{z} \pm \frac{N}{2}$$

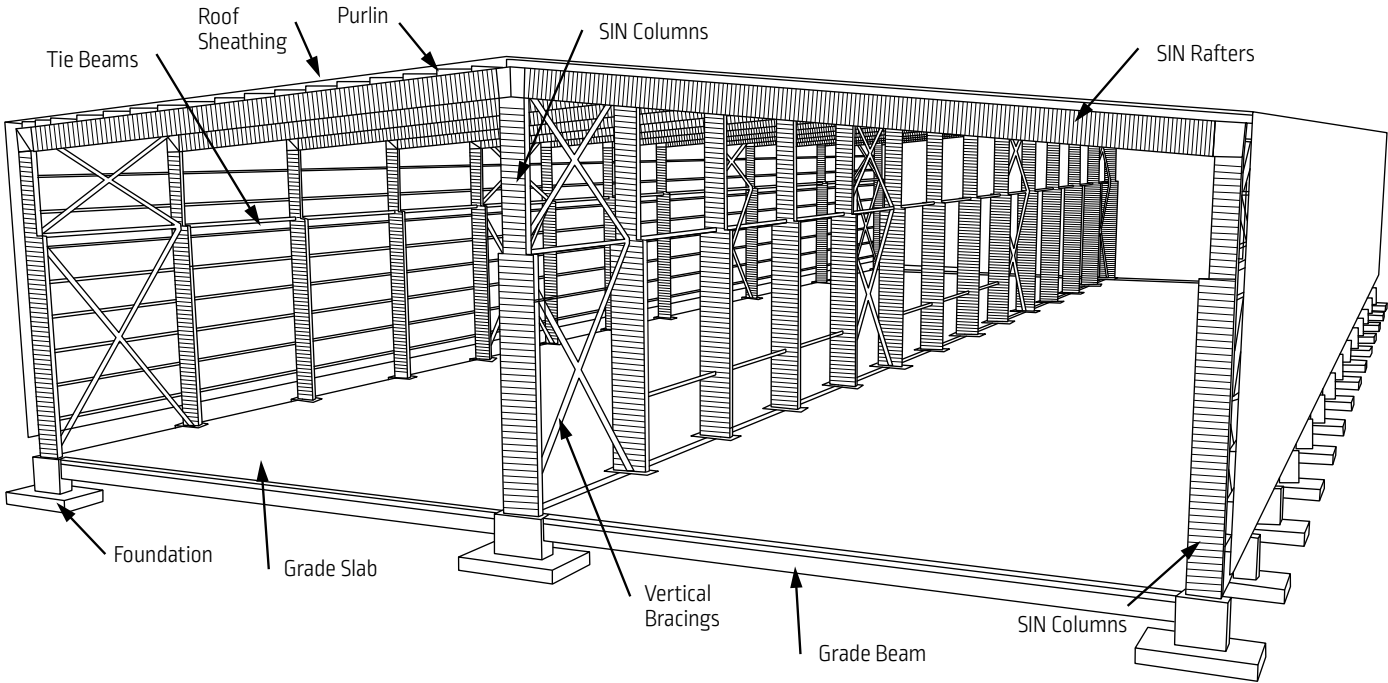
$$V_w = V$$

# Design Reference Project

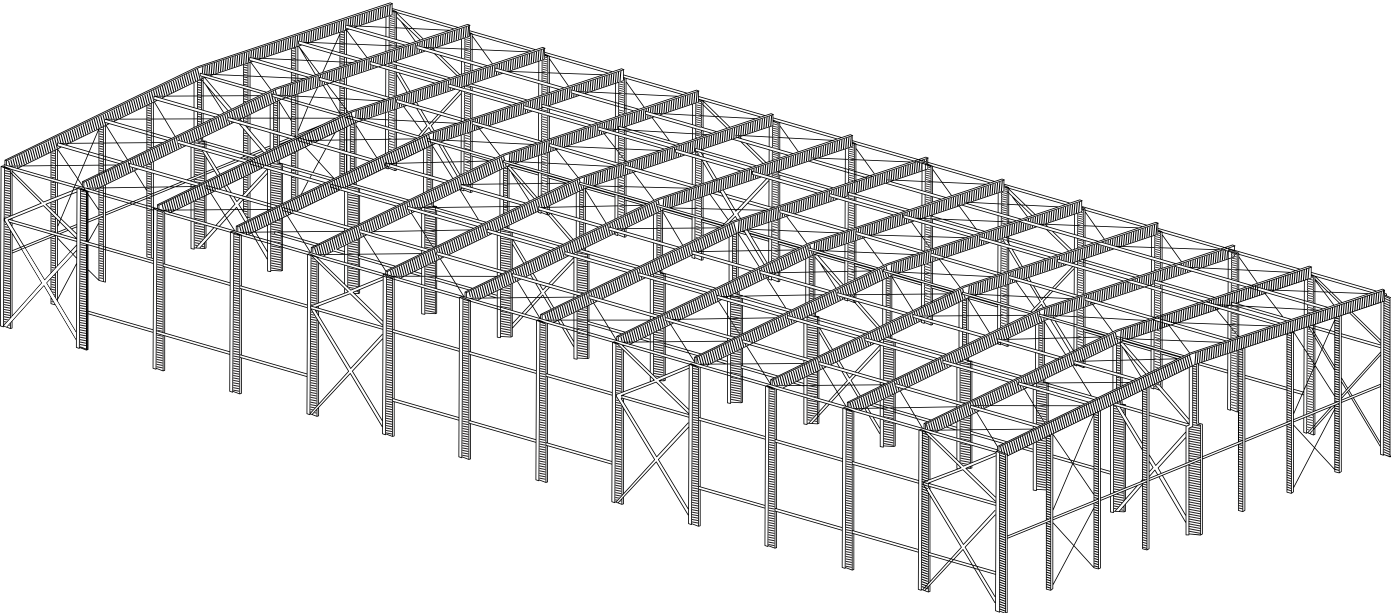


SECTION	DESCRIPTION
Engineering	Elematic India
Occupancy	Industrial Building
Typical Span	Along Y direction = 24.0 m Along X direction = 8.0 m
Height	Lowest at eave = 14.0 m Highest at ridge = 15.215 m
Super Structure	SIN Beam frame (columns, roof rafters) Gantry Girders (welded plate section)
Lateral System	Steel Portal Frame system with Ordinary Concentric Bracings
Crane	Two overhead cranes of 20 Mton in both halls and consideration of 1 Mton Jib cranes at all columns
Foundation	Isolated Precast Footings, pedestals, and tie beams
Façade	Lower 3.0-m high precast wall panels and above steel sheeting

# Design Reference: Structure



# Design Reference: Analysis Model



# Design Reference: Material Saving

Members	PEB MEMBERS		SIN BEAM		SAVINGS
	Tonnage	Unit Qty. (kg/m <sup>2</sup> )	Tonnage	Unit Qty. (kg/m <sup>2</sup> )	
<b>Primary Structural System:</b> <ul style="list-style-type: none"> <li>» Columns</li> <li>» Roof Rafters</li> <li>» Vertical Bracings</li> <li>» Plan Bracings</li> <li>» Tie Beams</li> </ul>	230,475	46.17	200,435	40.15	+ 14.99%

## REFERENCE: ROOF BEAMS & RC COLUMNS



# THANK YOU!

