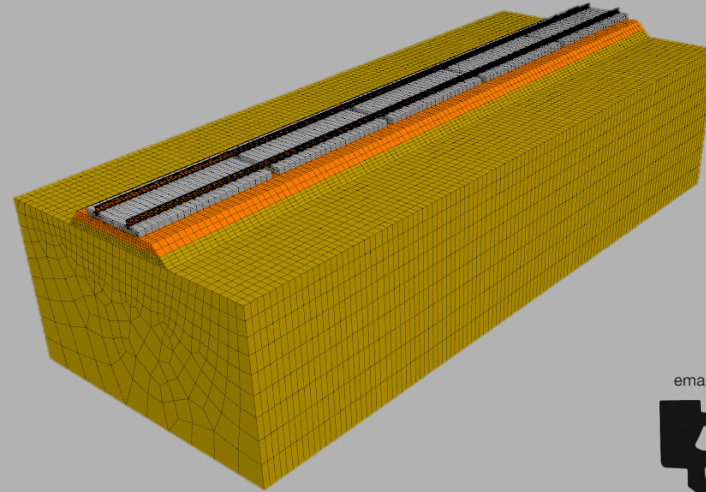


# SHINKANSEN BED PLATE DESIGN FOR HIGH SPEED TRAINS



**CivilFEM™**  
powered by Marc™

Courtesy of:

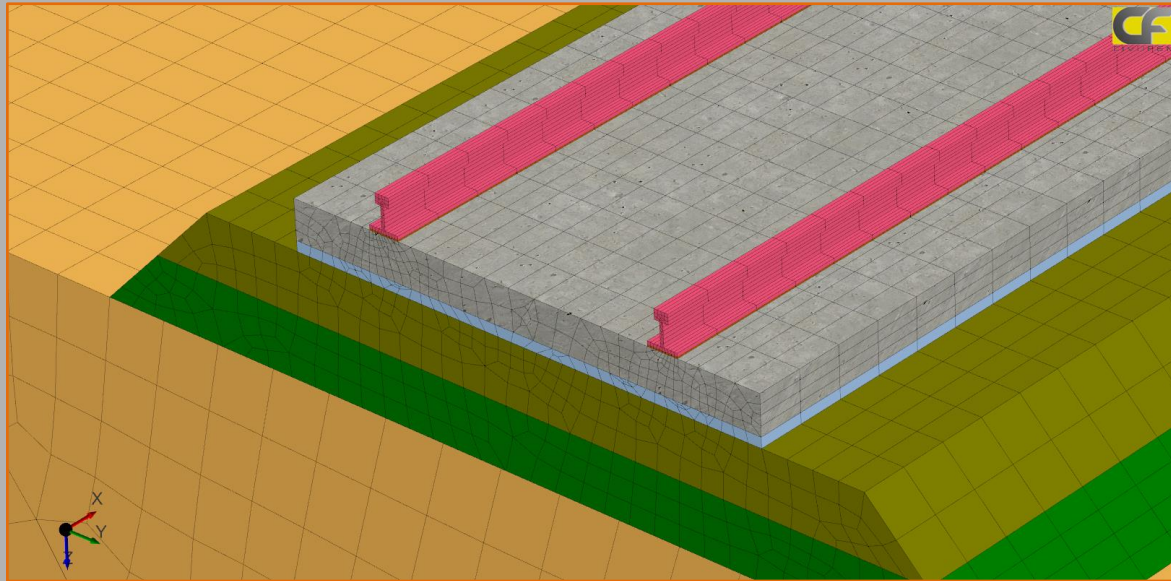
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# Model Description

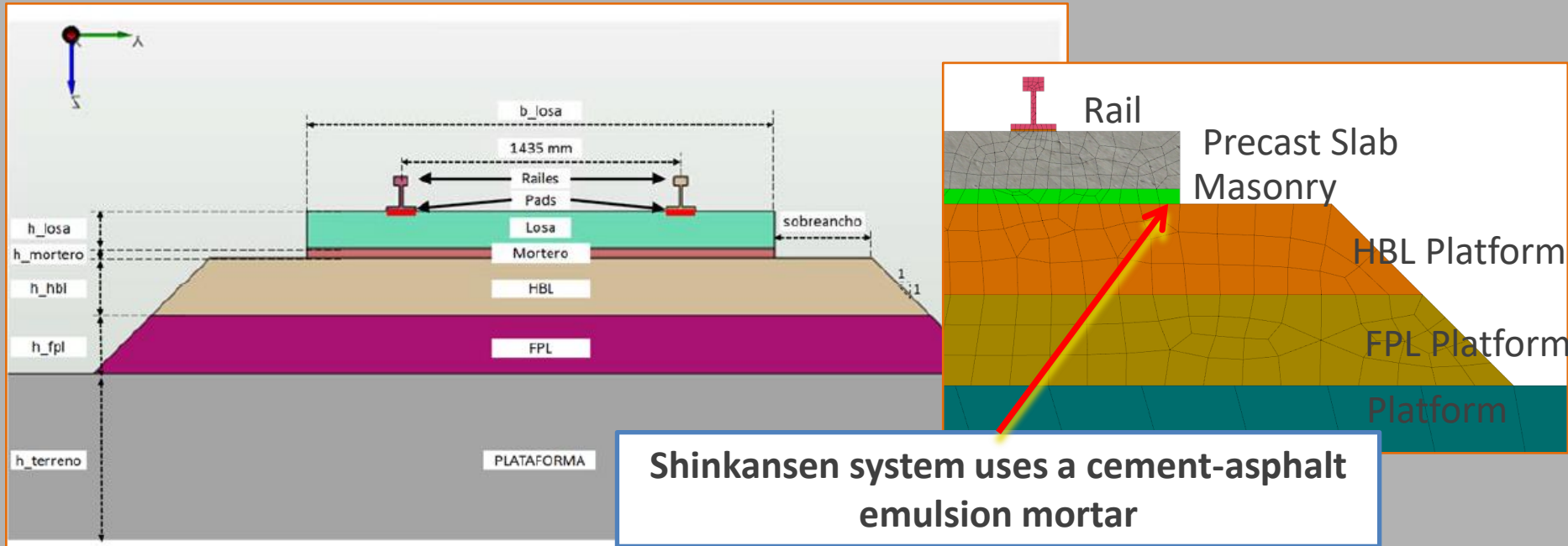


The **PLATFORM**, **SLABS** and **RAILS** are continuous along the entire length of the model.

However, the precast slabs are discontinuous.

The complete model has 5 slabs, with a variable distance between slabs.

# Model Description

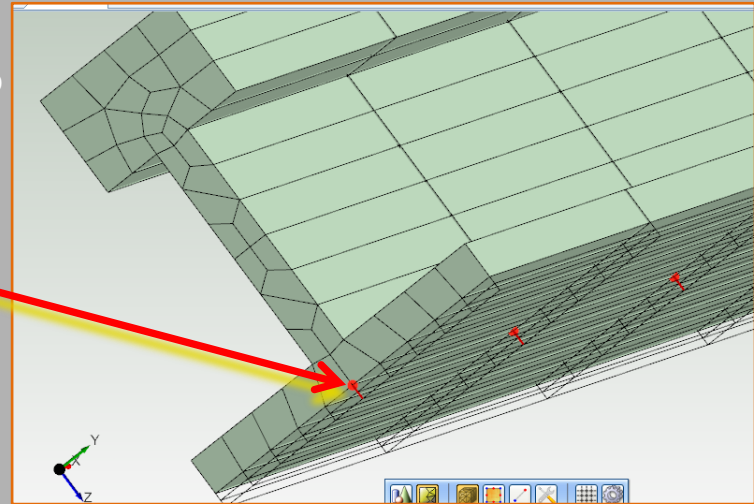


# Model Description

To simulate the contacts between the different layers; Rail-PAD-Slab-HBL Platform, the **advanced contact tool of CivilFEM "Glue Contact"** has been used:

While the **advanced contact tool "Touching Contact"** has been used to model the contacts between the HBL -FPL platforms.

Rails usually have **"clips"** on each sleeper that prevent relative lateral displacement between the rail and the slab; Therefore, a **series of connections linking the pad nodes and the bottom of the rail** were included to restrict this relative displacement.



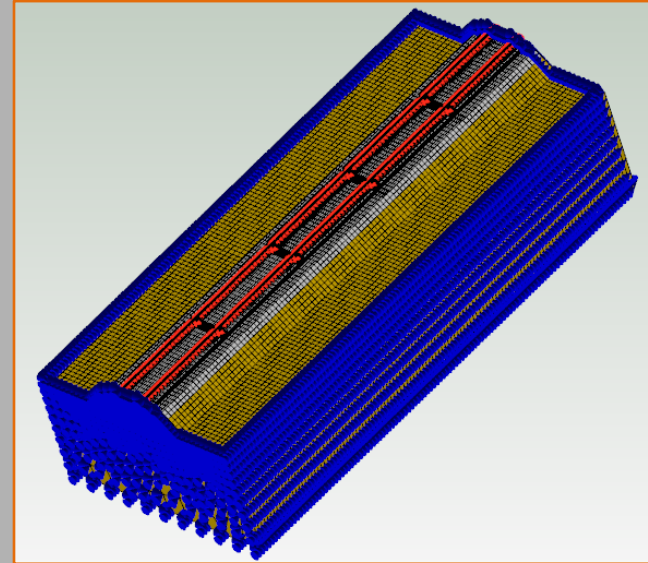
# Model Description

**Boundary Conditions** are applied directly to the nodes. Ground has a "no separation" condition preventing them from moving in the perpendicular direction.

-Lateral faces of the ground (planes parallel to the XZ plane):  
Y-displacement constrained.

-Ground underside (Plane parallel to the XY plane):  
displacement in Z constrained.

-Cross sections of the model at  $X=0$  and  $X=L_{\text{model}}$  (planes parallel to YZ):  
displacement in X constrained.



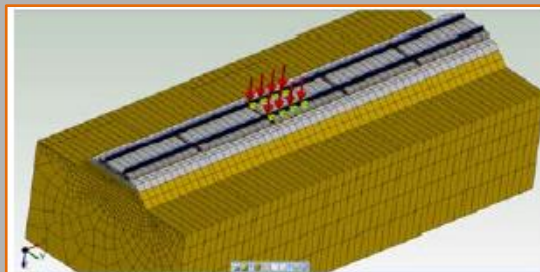
# Model Description

**Loads:** The loads defined by EN 16432-1 Standard were applied.

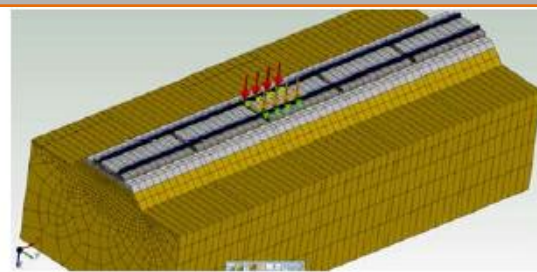
-Loads due to **thermal changes**, whether caused by weather or train braking (Eddy Flows).

-**Differential settlement in soils**

-**Moving train loads** along the system.

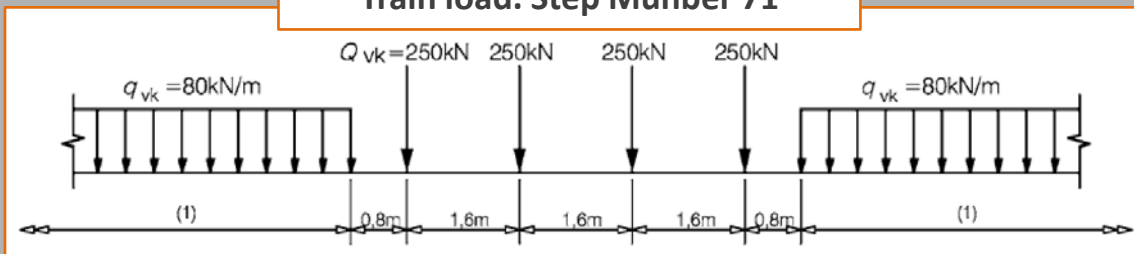


63



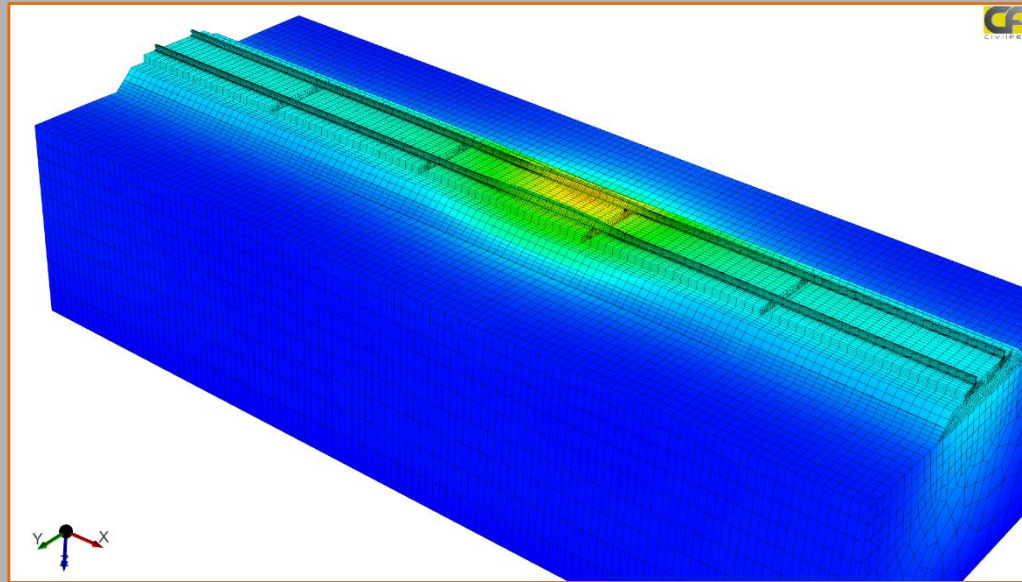
68

Train load. Step Munber 71



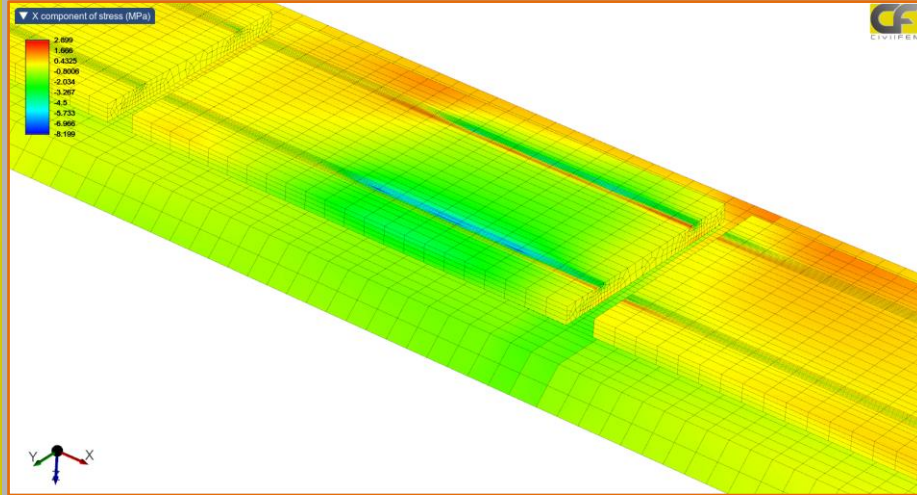
# Results

## Ground settlement (Z-axis displacements)

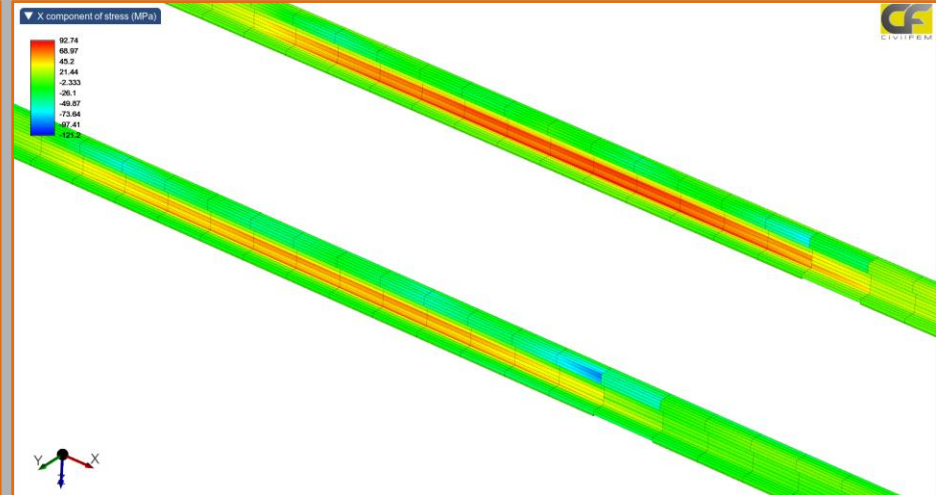


# Results

## Vertical stress at platform level



## Longitudinal stress at rails and pads



# Roque Borinaga Civil Engineer



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