



## How is the varying longitudinal stiffness of ballast/concrete bed considered for rail track analysis?



For Rail Track Analysis, Multi linear elastic links are used to simulate the bilinear curve of longitudinal stiffness for loaded and unloaded conditions of ballast/concrete bed connecting rail and superstructure

The image shows the 'Rail Track Analysis Model Wizard' dialog box in Midas Civil. The 'Boundary' tab is active, showing a graph of 'Lateral Resistance Force of Track' vs 'Displacement of Rail'. The graph displays two bilinear curves: one for 'Loaded Condition' and one for 'Unloaded Condition'. The 'Loaded Condition' curve has a yield point at displacement  $U_d$  and force  $F_{max}$ . The 'Unloaded Condition' curve has a lower yield point. The dialog box includes input fields for 'Longitudinal Resistance Data' for both 'Ballast Bed' and 'Concrete Bed'. For the 'Ballast Bed', the 'Unloaded Condition'  $F_{max}$  (For Stress Check) is set to 0 N/m, and the 'Loaded Condition'  $F_{max}$  (Yield Force) is also set to 0 N/m. The 'Define Condition' section has 'Ballast Bed' selected. Below the dialog box, a 3D model of a rail track is shown with an 'Elastic Link' highlighted in red in the 'Tree Menu' on the left. The 'Tree Menu' shows a hierarchy of 'Works' including 'Structures', 'Properties', 'Boundaries', and 'Static Loads'. The 'Elastic Link : 6132' is highlighted under 'Boundaries'.

The multi-linear link data is available under “MEInk” Tab, in the table of Elastic link data.