









2.3.1.2.18 NAIL

Window 2-279: Options in menu Nail

Option	Method	Toolbar	Description
Create	2 nodes/2 points	—	Window 2-280
	2 nodes	—	Window 2-281
	Exter XYZ coord.	—	Window 2-282
	On edges	—	Window 2-283
	On objects	—	Window 2-284
	Copy with translation		Window 2-136
	Copy with rotation		Window 2-137
Copy by symmetry		Window 2-138	
Outline	All	—	Window 2-285
	Box with 2 nodes		Window 2-312
	In zoom box	—	Window 2-313
	In zoom circle	—	Window 2-314
	Inside contour	—	Window 2-315
	With material	—	Window 2-285
	With existence function	—	Window 2-285
Without linked head	—	Window 2-285	
Delete	Delete		Window 2-316
Update	Parameters	—	Window 2-286
	Reverse X axis	—	Window 2-341
	Link nail head	—	Window 2-287
	Split		Window 2-289
	Move		Window 2-317
	Rotate		Window 2-318
	Scale	—	Window 2-290

Window 2-279

Window 2-280: Nail:Create:2 nodes/points

New nail macro-element (including interfaces) is created by picking the two points in the graph pane. The two picked points will be first snapped to the existing nodes of the real mesh projected on the graph pane and then to the grid points according to the setup under Snap options. This option must be used with care because close to the picked point in the graph pane there may appear several projected nodes/grid points and it may not be so easy to control the selection. So if one wants to create a nail between the two existing nodes it is recommended to use the option Create:2 nodes described in Window 2-281. **Although it is typical macro-modeling option it can be used as well directly at the FE model level.**

Remarks:

1. The default orientation of local y_L and z_L axes is set up automatically by the preprocessor as the nail cross section is assumed to be circular; however, one may set it up in the edit fields Beam director; setting local nail cross section coordinate system follows the same procedure as for beam elements (see Window (2-180)
2. To flip orientation of e_{xL} base vector use option Update:Reverse X-axis

3. If **Create nail-soil interface** is set ON then the frictional contact interface will be automatically generated; this interface material will appear in the material menu as Nail interface
4. If **Create nail-soil interface** is set OFF then the full continuity of the displacement field for both nail and continuum will be enforced
5. If **Link nail head with** is set ON then top node of the nail will be linked with Visible elements or Selected elements; to generate linking press button **Link**; note that linking of the nail head may be applied only to translational degrees of freedom; linking can be made for subdomains at the macro-model level but also with elements selected from the real mesh
6. Split parameter controls mesh density in nail macro-element; it is recommended to avoid too big differences in mesh densities between continuum and nails; such modeling may lead to axial force oscillations in the nail for high strength parameters of subsoil
7. To avoid instabilities due to rigid rotation of the nail along its axis the rotation along local nail axis is fixed internally by the preprocessor
8. The shear ultimate stress in the nail is set up at the material level (nail interface) and expressed in terms of the stresses rather than forces
9. To obtain meaningful results nails must be added to the computational model via existence functions; activating nails from the very beginning, without the initial state defined, usually results in computation failure or wrong nail forces
10. Nails spacing in 2D is automatically inherited from the beam material used to model nail core
11. The diameter of the injected nail zone is defined at the material level for the nail interface

Window 2-280

Window 2-281: Nail:Create:2 nodes

New nail macro-element is created by picking the two existing nodes in the graph pane. It is strongly recommended to not to try to pick the node exactly (it is rather difficult action) but rather to select it by picking the existing element close to one of its vertices that coincides with the node.

The selection rule is the only difference between this option and the one given in Window 2-280 so refer to that Window for remaining information.

Window 2-281

Window 2-282: Nail:Create:XYZ for 2 points

New nail macro-element element is created by entering X,Y,Z coordinates of its two endpoints in the dialog box. Setting of the nail endpoints is the only difference between this option and the one given in Window 2-280 so refer to that Window for remaining information.

Window 2-282

Window 2-283: Nail:Create:On edge(s)

New nail macro-element(s) are generated on all selected edges (see figure below). Orientation of each nail macro-element element local x axis is coherent with orientation of the element edge. The remaining nail setup is given in Window 2-280

Window 2-283

Window 2-284: Nail:Create:On object(s)

New nail macro-element(s) are generated on all selected geometrical objects (see figure below). Orientation of each nail macro-element local x axis is coherent with orientation of the geometrical object. The remaining nail setup is given in Window 2-280

Window 2-284

Window 2-285: Nail: some options in menu Outline

Option	Description
All	Select all visible nail macro-elements
With existence function	Select all visible nail macro-elements with a given existence functions
With nail material	Select all visible nail macro-elements with a given nail material
Without linked head	Select all visible nail macro-elements without heads that are properly linked (usually to the structural elements)

Window 2-285

Window 2-286: Nail:Update:Parameters

This option allows the user to modify setting for the selected nail or group of nails. In case of group of nails this option is equivalent to the one designed for creating of nails described in Win.(2-280)

Window 2-286

Window 2-287: Nail:Update:Link nail head

This option allows the user to modify linking of the nail head with other elements of the computational model. The typical situation concerns connection of the nail head with the concrete wall. In such cases a full compatibility of translational degrees of freedom is automatically enforced (via Nodal link option). It is recommended to perform linking of the nail head with selected elements and not visible ones to keep full control of the data generation and to avoid potential ambiguities. The dialog boxes for this setting for a single picked nail or group of selected nails are shown in the figure below. In case of multi-selection one may update linking of the nail head. Note that linking can be made for subdomains at the macro-model level but also with elements selected from the real mesh. For more information please refer to Win.(2-280)

Dialog for selection of group of piles

Dialog for selection of one pile

