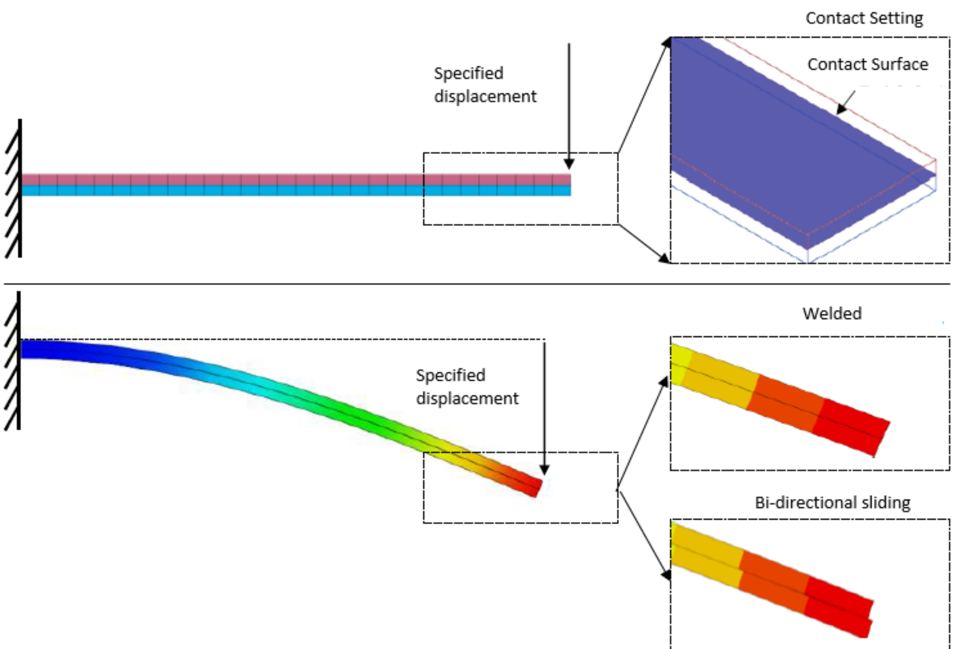
Here is the summary of the behavior of each contact type.

Contact type	Normal direction	Tangential direction	Analysis type
Weld	Bonded	Bonded	Linear / Nonlinear analysis
Bi-directional Sliding Contact	Bonded	Sliding	
Rough	Seperation	No sliding	Nonlinear analysis only
General	Separation	Sliding (Specify friction coefficient)	
Breaking-Weld	Separation (Specify failure force)	Separation (Specify failure force)	

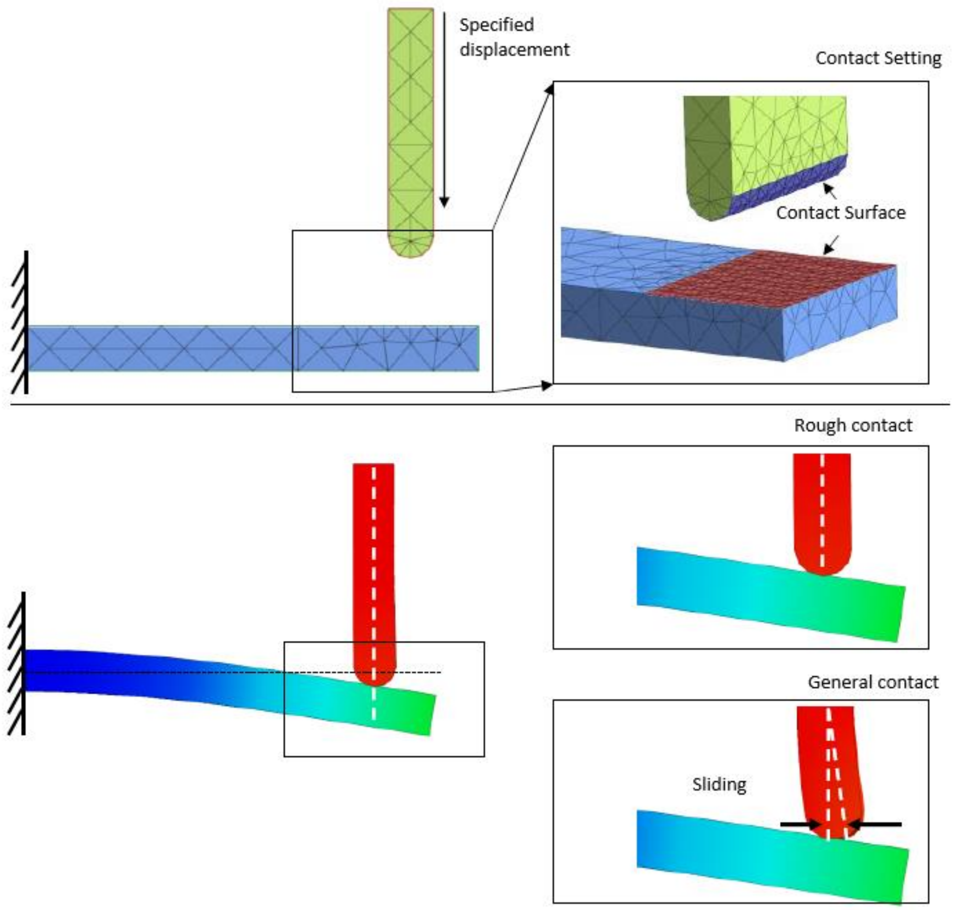
1. Linear contact

Linear contact can be used in linear/nonlinear analysis, and there are welded behavior and bi-directional sliding. A common feature of the two contact types is that they are not separated between parts, and the difference is whether or not there is a sliding in the horizontal direction of the contact surface. Welded type is not allowed to separate such that both parts move like a single part in a defined contact surface, but the bi-directional sliding contact type can slide in the tangent direction of the contact surface. The friction factor is not defined separately and the value of 0 is set automatically.

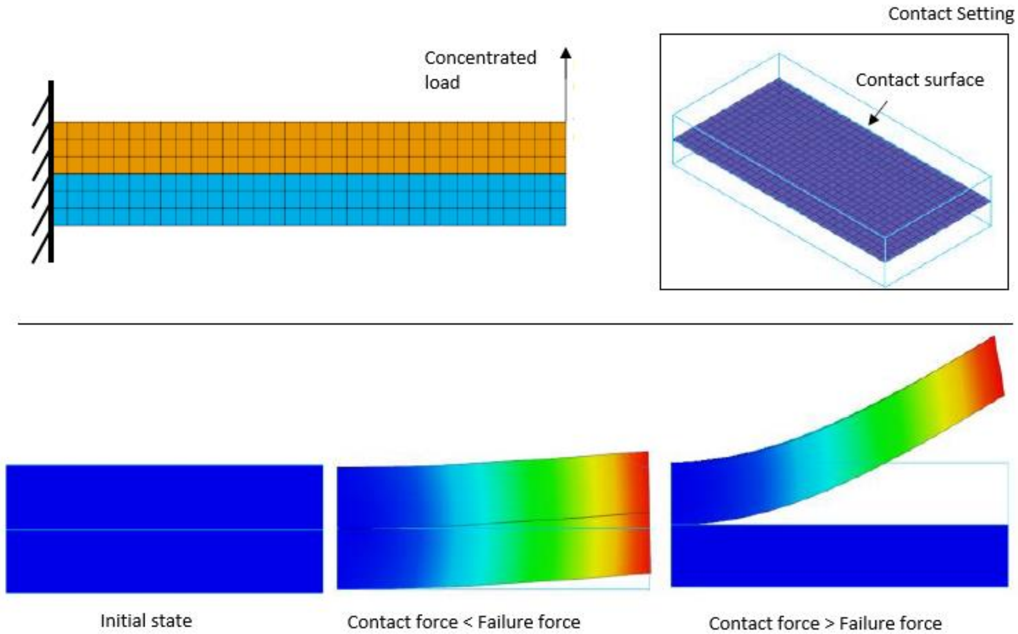


2. Nonlinear contact

Rough contact, general contact and breaking-weld contact can be used in nonlinear analysis. The common point of rough contact and general contact is that it is possible to separate the contact surface vertically/horizontal, while the difference lies in the consideration of horizontal sliding of the contact surface. As you can see in the figure below, the general contact has a horizontal slip on the contact surface, unlike rough contact, and the friction coefficient can be applied.



Breaking-weld contact allows separation. However, when the contact force is smaller than failure force, it moves like one body. As shown in the figure below, if the contact force at a node is greater than the vertical failure force, then it becomes separated. Failure forces must be defined directly by the user.



- Breaking-weld

The breaking-weld function is the same as welded contact, which constrains the relative motion between a slave node and the master segment until the contact force on the slave node satisfies the failure function (5.8.11). However, if the contact force does not satisfy Equation (5.8.11) during the analysis, the relative constraint between the slave node and the master segment is released becoming identical to general contact.

$$\left(\frac{\max\left(CF^n,0\right)}{F_f^n}\right)^2+\left(\frac{CF^s}{F_f^s}\right)^2\leq 1 \qquad (5.8.11)$$

F_f^n : Perpendicular failure force

F_f^s : Horizontal failure force

CF^n : Contact force in the perpendicular direction

CF^s : Contact force in the horizontal direction

The contact force in the perpendicular direction in Equation (5.8.11) only considers tension, not compression. If the failure force is specified for only one direction, vertical or horizontal, the contact force also is considered in that direction only. That is, only the contact force in the perpendicular direction is considered if only F_f^n is provided, while only the contact force in the horizontal direction is considered if only F_f^s is provided.