Estimation of the bolt size required in an application

Example Bolt Estimate Calculation

It has been determined that a force of 40 kN is applied to a joint as shown in the diagram. The plates are made of steel. It is intended that the bolt will be tightened using a torque wrench. What size of bolt is needed?

Solution

The bolt size estimate facility can be used to solve the problem. Having started the program, first make sure that metric units are selected. Select ‘Analysis Type’ from the main menu and then click on the entry marked ‘Initial Bolt Size Estimate’.

A form will appear allowing you to enter details about the joint. In this example, only an axially applied force acts on the joint. The bolt clamp length is 40 mm and the default value for the Modulus of Elasticity for steel is used.

On clicking the button marked ‘Tightening Factor’ on the form, another form will appear with a pull down menu. The tightening factor is a measure of the scatter in the bolt's clamp force as a result of the tightening method used to tighten the fastener. It is defined as the maximum bolt clamp force divided by the minimum value anticipated for that tightening method. The tightening method has a large influence on bolt sizing.

On clicking Ok on the bolt size form, you will be returned to the main window with the input data and results displayed. By scrolling down on the form, the program suggests an initial estimate based upon a M18 for a property class 8.8 bolt and a M14 for a property class 10.9 or 12.9 bolt. Check out the notes at the bottom of the form - the key points are that the program selected the nearest standard bolt size and further, more detailed checks are required in order to verify that the size selected is appropriate for the application.