**Homework 5 Problem 4**

The problem in this SolidWorks simulation step-by-step is from the homework 5 problems as below:

**Problem 4**

The bolt *AB* has a diameter of 20 mm and passes through a sleeve that has an inner diameter of 40 mm and an outer diameter of 50 mm. The bolt and sleeve are made of A-36 steel and are secured to the rigid brackets as shown. If the bolt length is 220 mm and the sleeve length is 200 mm, determine the tension in the bolt when a force of 50 kN is applied to the brackets.



**Diagram

Description automatically generated**

With the following solution:

**FBD:**

**Due to symmetry, we can determine the reaction force of the bolt and the sleeve in either the bracket at A OR the bracket at B.**

is the resistance of the bolt to the 50 kN load.

is the resistance of the sleeve to the 50 kN load.



**Using the bracket at A:**

**Text

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Compared to this problem, students should calculate the tensions at the same locations as in this problem, except with only one side of the bolt being pulled and the other remaining fixed.

To answer this question, we have created a SolidWorks model with dimensions exacting that of the above problem with a few assumptions such that the model is a 3D rather than a 2D problem as in here. Using SolidWorks statics simulations, we can determine the reaction force at the bolt and the sleeve.

1. Download the HW5P4 folder and unzip the contents (Or open the file using Citrix).
2. Make sure that the Simulations tab is visible in your SolidWorks window. Right click the tool bar at the top of your SolidWorks, go to the Tabs option, and ensure that SOLIDWORKS Add-Ins is checked.
3. Open a new simulation study and select the static option with default settings.
4. Fix the geometry of the outer surface of one bracket.

Graphical user interface, application

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1. Apply a distributed load to the outer surface of the second bracket with a force of 50000 N per item.

Diagram

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1. Add all component materials as below.

Text

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1. Apply a mesh to the model with the default settings, ensure that all components have a check mark next to them.
2. Run the simulation.
3. Use List Result Force to determine the free body force of the sleeve pulling on the bracket and the reaction force of the bolt against the bracket.

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