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Problem Shown in the diagram is a disk sander. The shaft of the sander has an ultimate tensile strength $S_u = 900$ MPa, and a yield strength of $S_y = 750$ MPa. The most severe load occurs when an object is held near the periphery of the disk (100 mm radius) with sufficient force to develop a friction torque of 12 Nm. Assuming the coefficient of friction between the object and the disk is 0.6, what is the factor of safety with respect to eventual fatigue failure of the shaft?

