Week 11: Assignment 11

A power plant engineer at a large power plant needs to calculate the load on the drive system of a screw conveyor. The conveyor is part of the plant's ash management system and is used to move ash from various storage locations to a central disposal area. The conveyor is driven by a motor with a torque rating of 500 Nm. The conveyor is 12 meters long and has an incline of 30 degrees. The average ash density is 0.62 g/cm³. The conveyor is designed to handle a maximum of 200 tons of ash per hour. The conveyors are frequently powered on and off, resulting in frequent start-ups and stops.

1. Calculate the conveyor belt length.
2. Calculate the cross-sectional area of the conveyor belt.
3. Calculate the total weight of ash being conveyed.
4. Calculate the torque required to rotate the conveyor belt.
5. Calculate the power required to operate the conveyor belt.
6. Calculate the efficiency of the conveyor system.
7. Suggest improvements to the conveyor system to increase its efficiency.

Note: All calculations should be rounded to the nearest whole number.