

Name: Your Name
Section: 0

Software Engineering

CSE470

Spring 2002

Homework 2

Due: 2/12/2002

1. In this problem you are asked to design the dynamic model for a controller class that controls a large pump motor (several hundred horsepower) for a municipal water system. The motor has two “coils” for running. The first is a “starter coil” and is engaged to start the motor turning and bring it up to speed. This coil draws a large amount of power and can only be used a short time (5 seconds max) to start the motor. Once the motor is up to speed, the starter coil is turned off, and the running coil is turned on. When the motor has attained sufficient speed, a “speed” event occurs. We need to also monitor the motor bearing temperature during the first 500 milliseconds of starting to ensure that the bearings will not seize. If the “bearing_temp” signal occurs during the first 500 milliseconds of starting, the motor has to be shut down completely, an “error 1” signaled, and no other signals are accepted.

The pump should be primed with water, but may be empty. If a “speed” signal is received within 2 seconds of starting, the motor has come up to speed too quickly, and the pump is probably not primed correctly. In this case, we need to shut everything off, signal “error 2”, and not accept any more signals. On the other hand, if the motor is not up to speed within 5 seconds, there is danger of overheating the starting coils, so an “error 3” must be signaled and everything shut down.

Once correctly started, the motor runs until a “stop” signal occurs, which must cause the motor to be shutdown in preparation for another “start” signal.

Draw the dynamic model for this controller.