

MECH 3200 – 12S – Homework Chap.7  
Due Friday, 10 Feb 12

For the Problem Scenario of HWChap.4b:

1. Create three significantly different configurations (i.e., different arrangements of parts, different types of parts) that all meet the basic definition of your leading concept (the leading concept from HW Chap.4b may be modified or replaced at your option; but either way, please be sure to specify what the leading concept is).
  - a. Explain the rationale for each configuration, and how it satisfies the EDS (more specifically than explained for the concept, but try to be concise).
  - b. Present an overall arrangement sketch of each concept.
  - c. Physically decompose each configuration into principal parts and assemblies (this could be a fairly detailed task, but for the purposes of this assignment, please use only a limited level of detail - 3 to 5 decomposition elements should be enough for HW purposes).
  - d. For each principal part or assembly, draw a Free Body Diagram of forces. Specify the magnitude and direction of the forces (some degree of approximation is acceptable). The FBD's will differ, depending where the machine is in its operating profile - try to choose the worst-case condition. It may be that the same part/assembly has more than one worst-case condition - in this case, present all design-controlling conditions.
  - e. For each principal part or assembly, focusing ONLY on the process of tram car propulsion in mid-span, detail how motion of the tram car relative to the cable is translated into motion of the part or assembly. Give magnitude of the motion (linear or angular) and range of motion (distance over which motion acts). For instance, if the car is propelled by a crew member pulling on a rope, what is the speed of the rope passing the crew member, and what is the range of motion (say, from ft. forward of the torso to ft. behind it) of the crew member's arm(s) on the rope? Or, if the car translates on the cable with rollers, what is the linear speed of the roller over the cable, and what is the angular velocity (or revolution rate) of the roller (in this case, range of motion is linear travel or number of revolutions).
2. Score the 3 configurations in a belief map-based, weighted decision matrix against the original (or modified) customer requirements. Select a leading configuration, and present the qualitative logic for this selection.

Note that, again, the results of this exercise are to be presented in the form of a technical memorandum.

Note also that this assignment will be turned in twice. The first time (10 Feb), it will be scored for technical content. On 10 Feb, we will conduct the second technical writing exercise, which will involve improvement of the technical memorandum which presents the assignment. Then on 17 Feb, the HW will be turned in again, to be scored this time for writing.