UNIVERSIDAD CARLOS III DE MADRID

Bachelor in Mechanical Engineering

Machine Theory. November 2011

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MACHINE THEORY. ASSIGNMENTS 2011

Procedure

1. You must form **groups of three people.** Use the corresponding tool in Aula Global.
2. An assignment will be given to each group randomly.
3. There will be only **three different assignments** so three groups will have the same assignment.
4. Each individual group must **design a suitable mechanisms** for the task given. Graphical synthesis methods and/or analytical methods shall be applied. (***See Erdmand and Sandor for more information about the applicable methods***)
5. The design must be tested using **PRO-E** in order to check the movement of the whole mechanism. Therefore, the mechanism purposed must be drawn using this tool and motion should be given to the device.
6. You must **prepare a report** which should be uploaded to Aula Global before the date of the final exam. This report must should contain information regarding to the methods you used for the design, justification of your design and any hypothesis done by the group, calculus, drawings and result of the final design, PRO-E simulation results and so on...
7. In addition, a **presentation of maximum 15 min long** must be prepared for each group to present your work to the rest of the class on 1st and 13th of December 2011 during regular lecture time.

Evaluation

1. The assignments will be evaluated in function of the performance of the mechanism. All measures taken by the students must be justified.
2. The best proposal will obtain the higher note for a concrete assignment. The other two groups will be evaluated taking as reference the best proposal.
3. The mark of the assignment will be 30% of the final grade of the course*.

** Only if continuous evaluation is applicable.*

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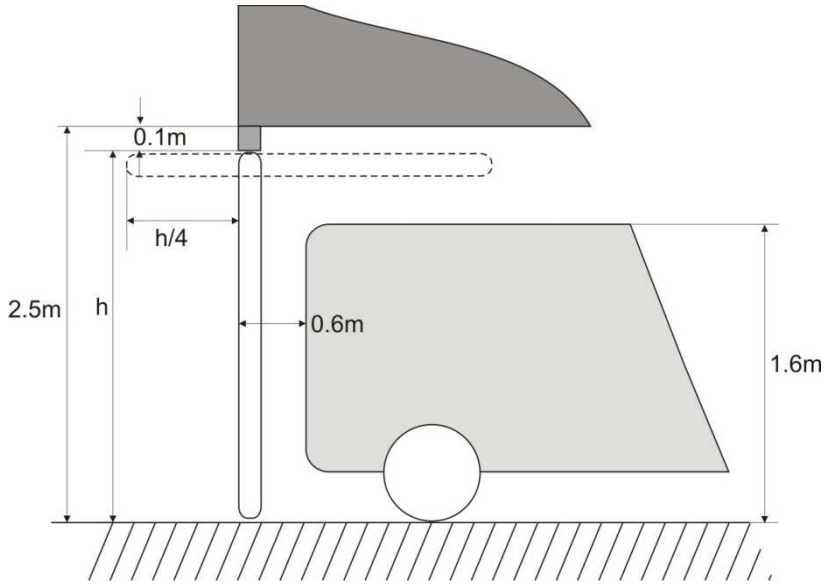
ASSIGNMENT 1

Design a garage door according to the figure. In the full open position the door must not protrude more than ¼ of its total length. To synthesize the mechanism use at least 3 positions, but remember that the more position you use the more precise the design will be. In order to protect the vehicle the door must not intersect with the body of the car in any case. The ground links can be attached to the floor, roof or the lateral walls of the garage. Of course, all the mechanism will have to be inside the garage. You must take into account that the mechanism shall be symmetric to support the weight of the door. There is a ventilation gap of 10cm on top of the door.



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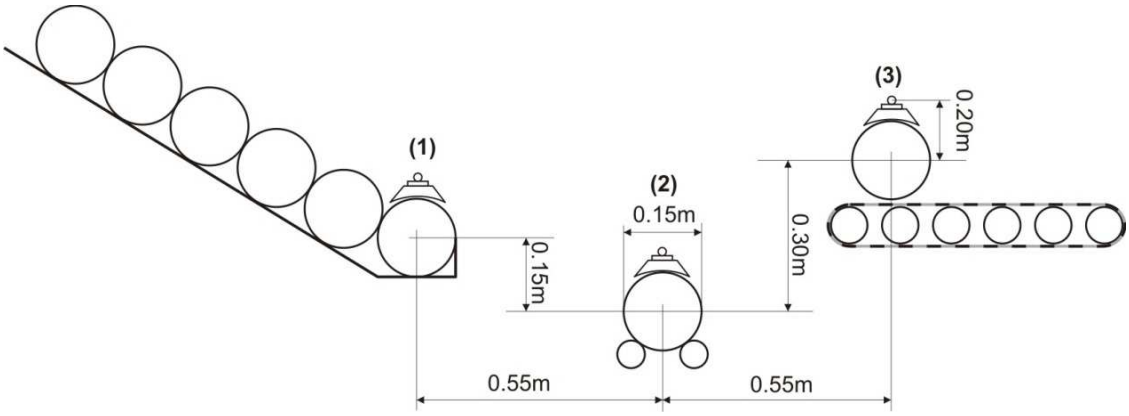
ASSIGNMENT 2

In the figure a test facility used for train axles is shown. The axles are allocated in the feeder (1), from that part a suction pad takes one axle to the test bench (2), after the test has been developed the axle is taken to the conveyor (3). Propose a four bar mechanism which provides the best performance to this task; use at least four positions for the synthesis.



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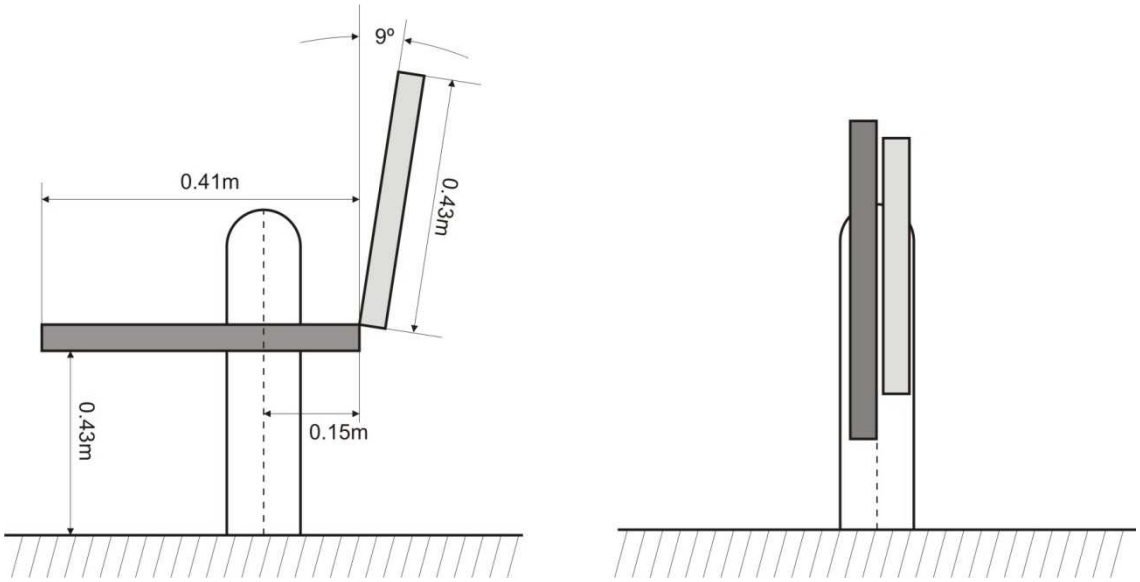
ASSIGNMENT 3

In the figure an auditorium foldable chair is shown. Propose a mechanism that folds the chair according to the illustration. The back and the seat of the chair should be as close as possible to the base of the chair. Armrests should be added and once folded should be also close to the base.



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ASSIGNMENT 4

Propose a mechanism that can wipe the windscreen maximizing the wiped area, using only one wiper. In the initial position (the horizontal position of the wiper), the mechanism should be contained in the box located in the bottom part of the windscreen as shown in the figure.