

## MEMS1028 Mechanical Design 1

### Project

#### Introduction:

This individual project on the design of a floor crane is worth 15% of the course grade

#### Background:

Floor cranes are widely used in industries for lifting of heavy loads. A typical floor crane is shown in figure 1. The understanding of the design and analysis of a simple floor crane could help to illustrate the application of some fundamental concepts covered in this course. It would also serve as starting points for students to further apply their engineering knowledge in the design of practical mechanisms.



Figure 1: Typical floor crane

#### Tasks:

- 1) Each student must perform a literature search and identify the specifications of the floor crane to be designed and inform the instructors of these specifications before the end of week 4. The specifications must be properly documented
- 2) The loadings and support reactions must be analysed through free-body diagrams. Weights of the members should be considered. A conceptual design of the frame structure with appropriate materials and dimensions should be generated
- 3) Detail design analysis of the stresses and deformation of the cantilever beam, support column buckling, and the hook must be performed to determine their cross sections, dimensions, and materials. Failure analysis of key members due to static loading must be performed. The cable to be used should be determined
- 4) All assumptions used in the design must be stated. The overall weight of the crane, list of materials and properties, estimated material costs, etc. must be included
- 5) Each student must generate a neatly typed written report of the design, analysis, and recommendations (All appropriate calculations, shear force & bending moment diagrams, technical drawings, etc. must be included in the report)

#### Submission requirements:

Each student must submit the report to the Blackboard. The deadline for submission is on the Sunday 29 November at 23:59 hr. Late submission will not be accepted.

#### Note:

**The teaching schedule may change due to public holidays.**