

PARTICLE EQUILIBRIUM

VECTOR OPERATIONS

Resultant

Cartesian Components

Position & Unit Vectors

Angles & Projections

2-D EQUILIBRIUM

$\sum F_x = 0$
 $\sum F_y = 0$

3-D EQUILIBRIUM

$\sum F_x = 0$
 $\sum F_y = 0$
 $\sum F_z = 0$

Direction Cosines

RIGID BODY EQUILIBRIUM

About a Point

Moments

About a Line

Couple

Equivalent Systems

Distributed Loads

2-D RIGID BODY FBDS

$\sum F_x = 0$
 $\sum F_y = 0$
 $\sum M_{pt} = 0$

Drawing a FBD
 "Free" the body from its surroundings and "Expose" the forces acting on it
 "Show" all forces/moments (external loads, reactions, internal forces) on the FBD

3-D RIGID BODY FBDS

$\sum F = 0$
 $\sum M_{pt} = 0$

TRUSSES

FRAMES

MACHINES

Friction

Impending Motion

Wedges

Internal Forces

V & M Diagrams

Section Cuts

Centroids

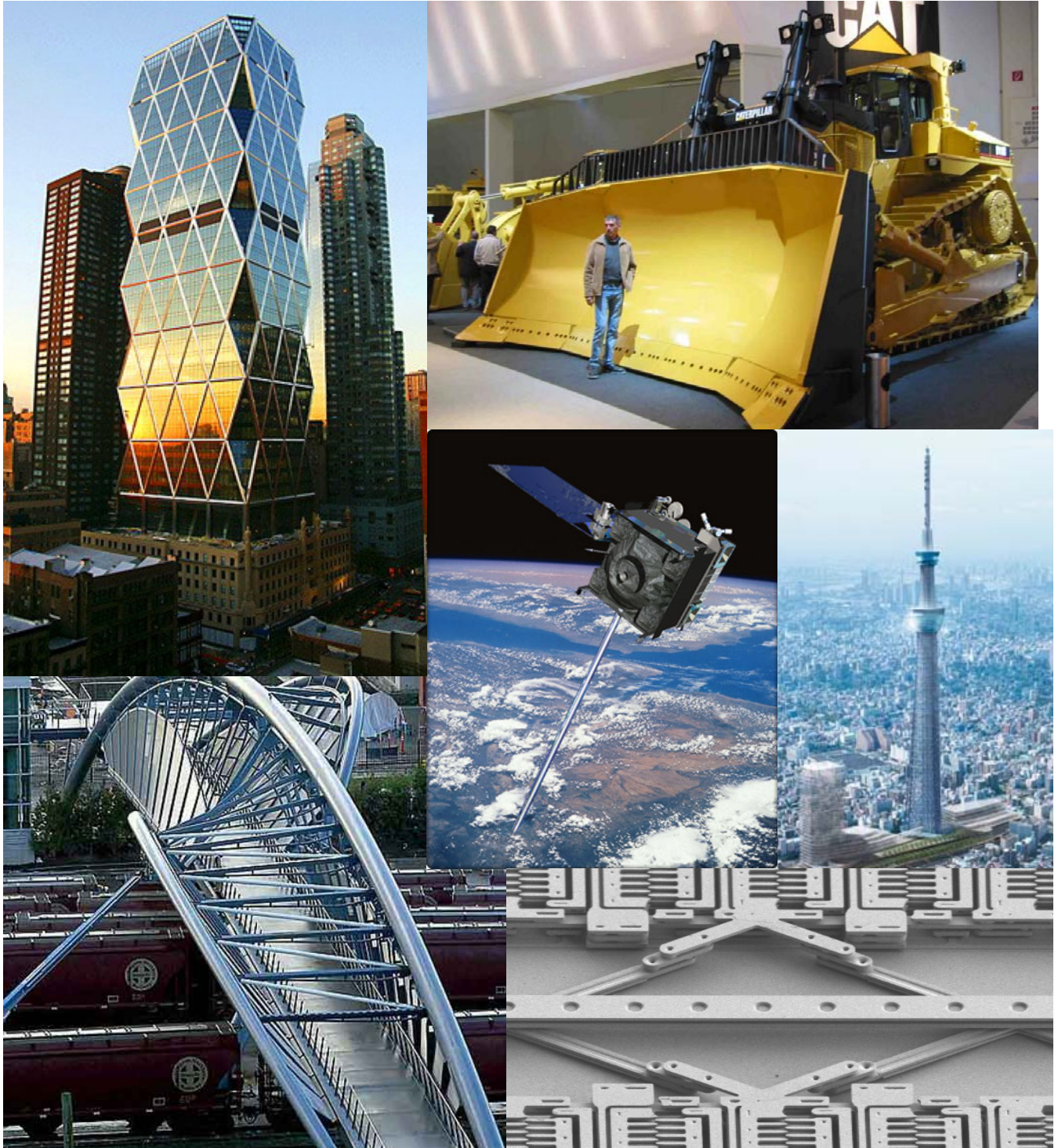
Exparabolic area

MOMENT OF INERTIA

Parallel Axis Theorem

Engineers Have Attitude:

In addition to focusing on picking up basic knowledge and developing technical skills required to solve engineering problems, such as problem solving, critical thinking, teamwork, and communication, there is another goal of all engineering courses. This is to promote an **“engineering attitude”**. The characteristics of having a solid engineering attitude are accepting mistakes, having common sense, patience, ethics, high standards, confidence, persistence, curiosity, flexibility, and understanding that there is not always a single right answer. Students with an engineering attitude possess a well-founded confidence in their ability to solve both routine and novel technical problems.



“Nothing is particularly hard if you divide it into small jobs” – Anon