

# Session 10 - MECHANICAL ENGINEERING AND ITS FUTURE DEVELOPMENT

## Expanding World Population

- 1900-2000, world population climbs from 1.6 billion to 6 billion people
- Places new stress on conservation of resources, and gives engineers new challenges to compensate for high population

## Pollution

- Engineers concerned with management and the control of pollution, especially:
  - Air pollution
  - Water pollution and the depletion of freshwater resources
  - Management of solid waste

## Energy

- It is predicted that energy usage in the Developing Countries will more than double in the next 30 years
- Engineers must find new ways to generate power in an effort to conserve natural resources (fossil fuels)

## Infrastructure

- With mass transportation an ever-present problem, engineers will be responsible in the future for designing and maintaining a system by which the transportation of raw materials, as well as the human capital that process them, can easily and efficiently move from place to place

## **Problem Solving**

- Problem solving requires many “tools” and skills. Make sure that you have them, or at least know where to find them and how to use them

## Analytic and Creative Problem Solving

- Two basic types of problem solving involved in design process: creative and analytic
- More students familiar with analytic, where there is one right answer
- Creative problem solving has no *right* answers

## Analytic and Creative Problem Solving

- Steps that typically help w/ problem solving
  - Make a model/figure
  - Identify necessary, desired and given info
  - Work backwards from answers
  - Restate problem in one's own words

- Check the solution and validate it

### Analytic Problem Solving

- Six steps to analytic problem solving:
  - Define the problem and create a problem statement
  - Diagram and describe the problem
  - Apply theory and any known equations
  - Simplify assumptions
  - Solve necessary problems
  - Verify accuracy of answer to desired level

### Creative Problem Solving

- Use divergence and convergence to gather and analyze ideas. Divergence is brainstorming. Convergence is analyzing and evaluating the ideas, seeking out the best possible solutions
- What is wrong?
- What do we know?
- What is the real problem?
- What is the best solution?
- How do we implement the solution?