TEAMS 2003 PROBLEM STATEMENTS

The following are the preliminary Problem Statements and the initial Background material for the 2003 TEAMS Competition. They may be edited and expanded in the final document; however, the thrust of the problems will remain the same. Also, the order of the problems shown here are not necessarily the order to be presented in the final copy. Students are advised to research terms that they are unfamiliar with prior to the competition.

1. TITLE: WELDING OPERATION

PROBLEM STATEMENT:
Your engineering team is asked to investigate the important characteristics of the welding process, including gas-metal reactions, slag-metal reactions, surface phenomena, solid-state reactions, heat flow, solidification, reliability and cost.

2. TITLE: HYBRID-ELECTRIC VEHICLE ENVIRONMENTAL IMPACT ANALYSIS

PROBLEM STATEMENT:
Your team has been asked to study and evaluate the potential reduction in motor vehicle related environmental impact due to the availability of new high-efficiency hybrid-electric vehicles.

3. TITLE: SATELLITE IN ORBIT

PROBLEM STATEMENT:
Space-based navigation satellites are becoming vital components to the world's technological existence. Your team has been hired to design a new navigation satellite to complement the Global Positioning System (GPS). The satellite has been allocated an orbital radius, and you are to investigate various system parameters to assess the suitability of this orbital radius.

4. TITLE: SPIN EJECTION MECHANISM FOR A COMET SPACE PROBE

PROBLEM STATEMENT:
Your consulting firm has been hired by NASA to design a spin ejection device to initiate the flight of a space probe that is to make impact with a comet. The space probe is to be ejected from a mother spacecraft after the spacecraft begins to orbit the comet. After the probe is ejected from the spacecraft and gets a safe distance away, the rocket fuel in the base of the probe will be ignited in order to accelerate the probe to a high velocity, facilitating penetration of the probe tip into the comet's surface. NASA is concerned with proper targeting of the probe so that it hits a specified region on the comet's surface.

5. TITLE: DRAG REDUCING AGENT IN AN OIL PIPLINE

PROBLEM STATEMENT:
Your engineering group has been asked to evaluate the use of a drag-reducing agent to increase the capacity of the Alaskan oil pipeline.

6. TITLE: CHEESE MAKING PROCESS

PROBLEM STATEMENT:
Your engineering team is asked to develop a facility to produce large amounts of cheese (2500 kilograms per hour) from raw milk.

7. TITLE: NUCLEAR FISSION STUDY

PROBLEM STATEMENT:
Your team is requested to investigate various nuclear reactions and to evaluate their effects on soil.

8. TITLE: ROADWAY DESIGN

PROBLEM STATEMENT:
Your engineering consulting team has been hired to design a roadway. Curves must be designed for vehicles traveling at the posted speed limit.

9. TITLE: COASTAL HAZARD MITIGATION

PROBLEM STATEMENT:
Your team has been tasked with designing a building to house a laboratory engaged in critical national security research in the United States. Your work will include: selecting one of three locations, assessing the vulnerability to natural hazards for each location, and reflecting knowledge gained in order to reduce the potential for damage from the impact of natural hazards.

10. TITLE: USE ESTIMATES ON PRODUCT DEMANDS TO MAXIMIZE PROFITS

PROBLEM STATEMENT:
Your engineering consulting group has been hired by a national manufacturer to maximize its profits based on estimates on the demand of its products.