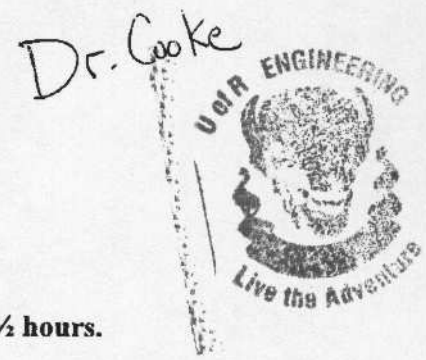


FACULTY OF ENGINEERING
MIDTERM EXAMINATION
ENIN 340 – Human Factors Engineering

October 31, 2000



Attempt all three questions. Questions are of equal value. Time limit: 1½ hours.

1. Your company has been awarded the contract to manufacture and supply the landing gear for an executive jet. Since you are regarded as the "human factors expert" in the Engineering Department, you have responsibilities in the design and evaluation methods for the project. The landing gear will consist of a nose wheel and a wheel under each wing, the hydraulics to support it, and the controls and instrumentation to operate it. The landing gear will be retractable. It is expected that the indicators for "gear down" will be three green lights and the indicator of "gear up" will be three red lights. This is an industry standard. Likewise, control for gear up and down will be a lever. A hand pump must be part of the landing gear such that the gear can be lowered in the event of a hydraulic system failure.

Outline your program of activities for this project – where you will be involved, what you want done, what checks you will undertake, etc.,

2. A simulator is being created for the training and testing of operators who will handle high-speed hydrofoils that ferry passengers in a large harbour. These operators will be handling vessels that normally operate at speeds of 50 mph – the speed necessary to keep them up on the foils. The hydrofoils can, of course, reduce speed and operate like normal boats. While up on the foils, they will have to avoid ships, small craft and floating objects (e.g. logs, debris, etc.). Operations in limited visibility situations (night, fog, etc.) are not anticipated. Unexpected situations of any kind could occur. Decision-making is obviously a major factor in performance of the operators.

You have been asked to be an advisor in setting up the simulator; in making suggestions with respect to testing, measuring and evaluating decision-making ability; and in recommending a set of standard operating procedures. How will you handle the "decision-making" aspect of this assignment?

3. A small company in Saskatchewan is being set up to manufacture low-volume electronic equipment. Since the volume of sales will be low, robots to install chips in the boards are out of the question. However, the soldering of connections will be done automatically. Work stations for people that do nothing but install chips in the boards are required. The work will be done in a clean room. The operators must work with gloves. They must have a drawing of the board in plain sight since they may be working on any one of a variety of projects. Chips must be installed carefully - the right chip must be in the right place without pins being bent. The normal shift is eight hours.

Your job is to design the workstation. What is required immediately is your rough design of the layout such that approval from the plant manager can be obtained.