

EAC Workshop
Assessment Tool and Grading Criteria
EI Engr 473 – Introduction to CMOS VLSI System Design
Final Examination
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Background: At this point in the course, all students will be well aware of the limitations associated with microcircuit simulation, most importantly that simulation does not predict perfectly, the performance of designs manufactured by any particular microcircuit foundry. The problem I propose combines knowledge of the limitations of simulation with ethical decision-making.

Proposed Problem:

You are assigned as a VLSI engineer at the AF Logistics Command Obsolete Part Design Center in Sacramento CA. The center's mission is to design and manufacture custom VLSI parts, which serve as one-for-one system replacements for integrated circuits, used in fielded systems. You have been asked to make an emergency validation the design work of another engineer who is creating a replacement part for the 46XXXX CMOS integrated voltage-controlled oscillator. The VCO is part of a strap-on laser guided bomb seeker head mated to the standard Mark 82, 500 pound bomb.

The relationship each part exhibits between analog control voltage and output frequency is critical and is controlled by the RC time constant provided by on-chip passive elements. Simulation across the full span of process parameters for gate capacitors and diffused resistors yields the relationship shown in the graph below.

To be developed performance curve(s) showing the design **marginally** achieves the specified accuracy of the component it replaces.

Based upon these data, you must make a recommendation to your supervisor on the suitability of this design. The situation is mission critical since nearly all the available seeker heads have been expended, and your organization normally supplies this part for refurbished units. You must decide how to proceed very quickly.

What recommendation do you make to your supervisor? Clearly state a course of action and justify it. Your answer must demonstrate both that you understand the both the simulation data and your understanding and reflection on the ethical aspects of your decision.

Grading Scheme:

100 Points for Problem

80 Pts – Technical aspects of the problem. Criteria for assessment:

- Correct interpretation of the simulation data.
- A clear conclusion as to whether the design meets the system requirements. Detailed technical criteria TBD.

20 Pts - Ethical Judgement: Criteria for Assessment:

- Clearly states the relevant factors including an engineering code of ethics or officer's oath of office. (5pts)
- Clear identification of the relevant factors. (5pts)
- Clearly ignores the irrelevant factors. (5pts)
- Ethical judgment based upon the quality of the reasons stated. (5pts)