

**ECE 3500 DIGITAL ELECTRONICS
SPRING 2006**

Bonus Essay Assignment #1

3% of course grade

Due 9:00am, Friday, April 21, 2006

Write an essay to answer the questions raised in the problem statement below. It must be of minimum two pages long but not longer than three pages. If any resource is used to write your answer it must be properly referred to. The page set up is as follows: 1" margins, 12 pt fonts (Times New Roman), single line space.

Allowing Defective Chips To Go To Market

by Jeremy Hanzlik

Texas A & M University College Station, TX 77843

Introduction

A production line engineer, Shane, checks every chip for quality control (QC). His workers find errors approximately every 150 chips. Either the defective chips must be sent back for repair or they must be axed (thrown away). The manager, Rob, has mandated that workers must axe all defective chips. Rob walks over to Shane's line and declares, "Why some lines sink more dollars into a chip that's failed, I don't understand. We only make 25 cents off of each chip anyway! Spending an additional \$2.00 per chip will only be more money down the drain. Shane, in our line of work we can't afford to flush money down the toilet."

The following afternoon, Rob calls a meeting in his office. Rob informs Shane, that Shane's line is axing too many chips. "One chip every hundred and fifty is unacceptable! This is becoming a substantial cost to the company. I believe that it would be more beneficial to allow defective chips to go out the door." Shane asks, "What about the defective chips? Won't customers complain?" Rob replies, "Yeah, yeah, but that's not your problem, the company has a return department that will replace them as customers complain." Rob further estimates that allowing defective chips on the market will yield a \$416,000 profit for the company.

Facts:

- * The line produces 100,000 chips per year.
- * Every chip is purchased.
- * Chips cost about \$9.00 to produce.
- * Chip testing costs about \$4.00 per chip.
- * Chip repair (manpower and material) is about \$2.00 per chip.
- * This repair cost includes re-testing.
- * Profit per chip is \$0.25 after testing.

- * There are fifteen full-time employees working under Shane.
- * Two part-time employees work under Shane's supervision.
- * Shane's manager, Rob, has been with the company for about 7 years.
- * Shane has been working under the same manager for several years and has had relatively good relations with Rob.

Additional information regarding the Shane's line:

The engineer's line consists of the final inspection between the bond wires, which attach the chips to the prongs and spot plates (the prongs that protrude from the final product), just before the chips are encased in molding compound for final packaging. You may assume that all defects are caused by faulty bond wire attachment and not by any problem with the chip itself, because the chips were tested in the preceding phase before the bond wires were attached.

Numerical Problems

1. What percent of the chips may fail if Xanthum Inc. Orders 15,000 chips from Shane's production line?
2. Do you believe this is an acceptable failure rate? From the perspective of Xanthum? From the perspective of the manufacturer? Why or why not?
3. If Shane's line produces 100,000 chips per year, how much will it cost to:
 1. Test and repair each defective chip?
 2. Test all chips and throw away the defective chips?
 3. Not to test any chips and to replace customers chips as needed?
4. Is Rob's estimate reasonable? What about his assertion that it is cheaper to axe the chips?

Questions on Ethics and Professionalism

1. What issues are involved in following Rob's recommendation?
2. Is it acceptable to follow Rob's suggested course of action (based on your calculations above)?
3. If Shane has a differing opinion, how could he present his case to Rob?

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Reference: IEEE Code of Ethics

http://www.ieee.org/web/membership/ethics/code_ethics.html