

Online Technical Writing: Inquiry Communication Examples

Subject:Photolithography and the semiconductor manufacturing process

This is in response to the proposal assignment due on June 21st of this month. As I had mentioned in the topic planner and proposal bulletin board recently, I intend to provide an informational view of contemporary microchip fabrication and the way in which the photolithography section of the wafer fab affects the manufacture of microchips. The following proposal describes the problem that this project addresses, outlines the information I intend to present, and discusses the time and resources required to complete the study.

Background: Class Situation

Students in the Semiconductor Manufacturing Technology (SMT) program at Austin Community College often hear that the photolithography section of the wafer fabrication facility is the most important part of the fab. However, this aspect of the process in manufacturing semiconductors receives little or no in-depth coverage in any of the SMT courses I am aware of. Students graduating from the SMT program may be at some disadvantage when they seek jobs in industry if they have no understanding of the photolithography process.

Proposal

In the report, I'll present how and why the photolithography section of the wafer fab is so important to the manufacturing of semiconductors (microchips.) This section will also cover the basics of manufacturing microchips in a specific manufacturing process flow. I will not be presenting any information that may be trade secrets to particular companies, such as data about the copper chips that IBM currently has in development, or the steps that IBM is taking to build a 1 GHz chip.

Benefits

The primary benefit I see from writing this report will be the educational value—or SMT students and others interested in the semiconductor manufacturing process. To my knowledge, this direction in learning about how the different sections of the wafer fab has never been taken before. Another benefit is that this report will be written in a student's point of view, so that may help others understand the process more effectively. One other benefit is that this project ought to show my interest in the field and the professionalism of my work. I intend to list this project on my resume and have a copy of the report in my portfolio when I interview for jobs in this field.

Feasibility

I do not anticipate problems in obtaining the information I need for this report. I project that the report will be completed by the deadline date.

Procedure

In writing the report, I will take three steps to obtain the information I require:

1. My first source of information will be the textbooks I have available at home and information I can find in a local library.
2. I will also be searching for information in the Internet, either with search engines or with the addresses provided to me by others.
3. I will solicit interviews from experts that work within the wafer fabs, plus information I can obtain from instructors.

These steps will help tie together everything involved in how and why the photo section of the fab is so important.

Results

The end product will consist of at least four single-spaced pages for a written version, and at least four files for the HTML version. It will consist of the microchip fabrication process flow and the explanations of how and why photolithography is important to fab operations. Graphics illustrating the universal process flow and effects of photolithography on the microchip fabrication process will be included to emphasize points presented in the report. To clarify the technical language used in the report, I will append a glossary.

Information Sources

At present, I have most of the basic theoretical knowledge required to begin work on the report. For the finer details and other information that I have not received in my studies, I am certain that I can get what I need in and out of my course work. I can obtain data from my textbooks, the library, my current and former instructors, the Internet, and from experts in the microchip fabrication industry. I foresee little if any difficulty in using these sources for information. (See the tentative bibliography below for specific sources.)

Graphical Aids

The following is a tentative list of graphics I intend to use in my report:

CMOS process flow in wafer fab	flowchart
Steps in manufacturing CMOS devices	flowchart (31 individual diagrams)

Presence of photolithography in fab	diagram
Photolithography process	flowchart (10 individual diagrams)
Condition of wafer (before patterning)	photograph
Condition of wafer (before patterning)	photograph
Importance of resolution and overlay	diagram
Factors affecting wafer in photo	flowchart

This list of graphics is subject to change as required, due to points that come up in my research requiring graphics to better explain the situations involved. Some of the graphics may or may not be included from this preliminary list, depending on if they are actually needed to illustrate the points I will discuss.

Projected Schedule

The following is a tentative schedule for the report:

June 21 Proposal uploaded; begin research. July 19 Complete interviews and visits to wafer fabs. August 6 Final copy of report uploaded.

This schedule is subject to change as required, but I do not foresee any problems in maintaining this timeline.

My Qualifications

Here are my qualifications to do this project:

- I am currently an ACC student pursuing a major in Semiconductor Manufacturing Technology, and I will receive my certification by early August of this year.
- My current grade point average in the program is 4.0 out of 4.0. My studies have included the basics of manufacturing industry operations, the microchip manufacturing process flow, the theories behind the processes in the manufacture of microchips, and basic electronics.
- I am familiar with both PC and Macintosh computers, and can use MS-DOS 6.22, Windows 3.11, Windows 95, and MacOS 8.1. My software knowledge includes Ami Pro 3.1, Microsoft Works 4.0 for Windows 95, and Netscape 4.05.
- I have written personal web pages since 1994, and can utilize HTML 3.2. I have also made some graphics for my web pages, using Microsoft Paint and Jasc's Paint Shop Pro (3.11 to 5.0.)

With the experience I had mentioned, I can easily write a report for both Works and HTML formats.

Projected Expenses

The following is an anticipated breakdown:

Internet service: AOL5.60Travel: Bastrop to Austin (round trip)261.00**TOTAL\$266.60**

The Internet service charge by AOL is based on the sum of accumulated time totaling 8 days at \$21.00 a month for access. Travel expense is based on a total of 15 trips averaging 60 miles at 29 cents per mile.

Other expenses include the time required to research the report by other means I had previously mentioned, the time to format the report in both Works and HTML, and the time involved in making the HTML version of the report available for viewing on the Internet.

Undertaking the work involved in this report is feasible, regardless of the costs I have stated above. These costs are already part of my educational expenses, and while they may seem significant, they will have a negligible influence on my ability to finish this report. The study of how photolithography and its importance to the microchip manufacturing process is a direction in education that has not been traveled before. This will be something that I, other SMT students, and people interested in the operations of a wafer fab can learn from. The educational value this report will provide can be very important, especially since the information covered is part of the curriculum in the SMT major.

I encourage you to contact me if you have questions regarding the report. My home phone number is (512) 000-0000, and my email address is somebody@somewhere.net.

Tentative Outline

- I. Introduction
 - A. Photolithography
 - B. Wafer fabs
- II. Microchip Fabrication
 - A. General view of wafer fab
 - B. CMOS process flow
- III. Photolithography
 - A. Process
 - B. Effects on wafer
 - 1. Before patterning
 - 2. After patterning
 - C. Effects on wafer fab operations
 - 1. System constraint (bottleneck)
 - 2. Center of fab
- IV. Conclusion
 - A. Summary of effects
 - B. Emphasis on importance

Tentative Bibliography

1. Day, Richard, et al., *Sematech: Furnace Processes and Related Issues in Semiconductor Manufacturing*. Texas A&M University: Texas Engineering Extension Service, 1994.
2. Serda, Julian. *Semiconductor Manufacturing Technology II: Advanced Technology Education in Semiconductor Training*. Austin: AMD, 1997
3. Van Zant, Peter. *Microchip Fabrication*. New York: McGraw-Hill, 1997.